

# **OXY USA RMAT**

**Garfield County, CO NAD27**

**Cascade Creek 697-08-53 Pad**

**CC 697-08-27A - Slot G**

**OH**

**Design: OH**

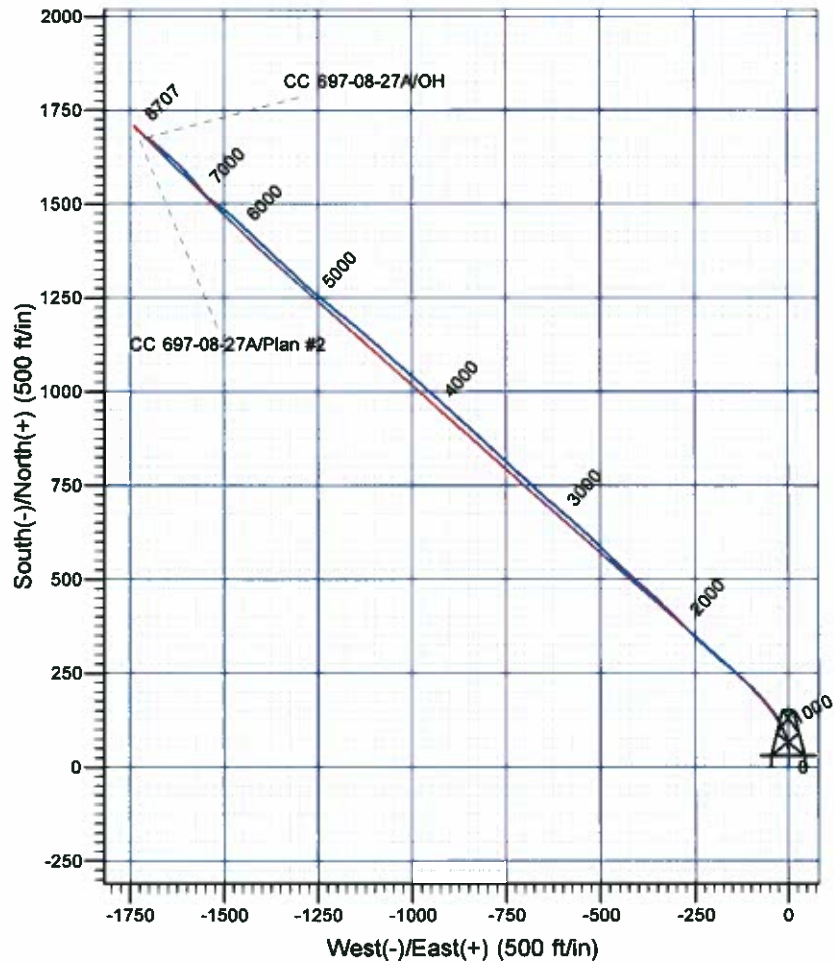
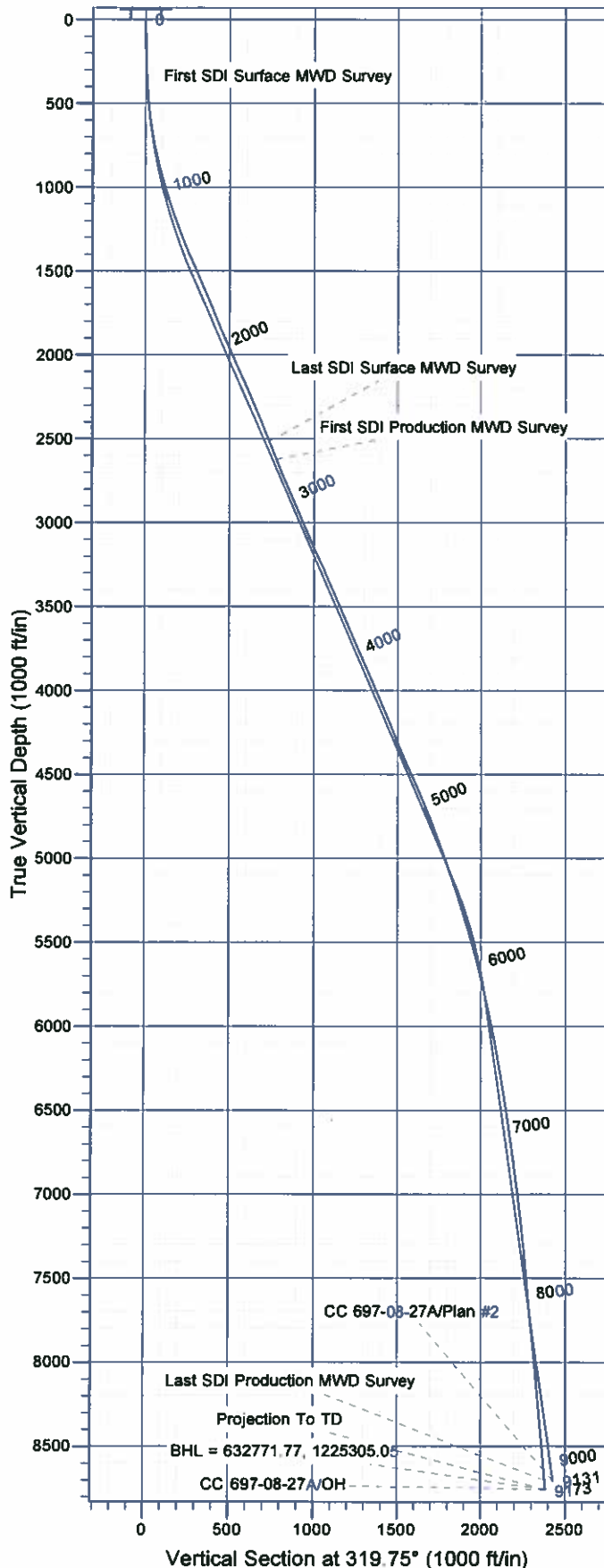
## **Standard Survey Report**

**02 December, 2011**



# Scientific Drilling

Company: OXY USA RMAT  
 Project: Garfield County, CO NAD27  
 Site: Cascade Creek 697-08-53 Pad  
 Well: CC 697-08-27A  
 Wellbore: OH  
 Design: OH



## Well Details: CC 697-08-27A

TVD Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)							Slot G
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude		
0.00	0.00	631044.38	1226960.43	39° 32' 2.453 N	108° 14' 28.150 W		

## REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-08-27A - Slot G, True North  
 Vertical (TVD) Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)  
 Section (VS) Reference: Slot - G(0.00N, 0.00E)  
 Measured Depth Reference: GL 8379' & RKB 30' @ 8409.00ft (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

9:43, December 02 2011  
 Created By: Rex Hall

# Scientific Drilling International

## Survey Report

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-08-27A - Slot G
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Site:</b>	Cascade Creek 697-08-53 Pad	<b>MD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Well:</b>	CC 697-08-27A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

<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		

Site	Cascade Creek 697-08-53 Pad, Sec. 8 T6S R97W				
Site Position:		Northing:	630,837.78 usft	Latitude:	39° 32' 0.393 N
From:	Map	Easting:	1,226,897.42 usft	Longitude:	108° 14' 28.874 W
Position Uncertainty:	0.00 ft	Slot Radius:	0.000 in	Grid Convergence:	-1.73 °

Well	CC 697-08-27A - Slot G					
Well Position	+N/-S	0.00 ft	Northing:	631,044.38 usft	Latitude:	39° 32' 2.453 N
	+E/-W	0.00 ft	Easting:	1,226,960.43 usft	Longitude:	108° 14' 28.150 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	8,379.00 ft

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2005-10	2010/09/01	10.54	65.76	52,329

<b>Design</b>	OH				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00	319.75	

<b>Survey Program</b>	<b>Date</b>	2011/12/02			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
332.00	2,652.00	Survey #1 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	
2,766.00	9,173.00	Survey #2 - Production MWD (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	
332.00	2.74	358.96	331.87	7.94	-0.14	6.15	0.83	0.83	0.00	
<b>First SDI Surface MWD Survey</b>										
422.00	5.19	4.98	421.65	14.14	0.17	10.68	2.76	2.72	6.69	
511.00	7.91	5.77	510.06	24.25	1.14	17.77	3.06	3.06	0.89	
602.00	10.11	1.73	599.93	38.46	2.01	28.06	2.51	2.42	-4.44	
694.00	11.52	348.63	690.31	55.54	0.44	42.11	3.07	1.53	-14.24	
786.00	13.37	343.36	780.15	74.74	-4.42	59.90	2.36	2.01	-5.73	
875.00	15.21	340.02	866.39	95.58	-11.36	80.28	2.26	2.07	-3.75	
966.00	15.04	331.41	954.25	117.17	-21.09	103.05	2.47	-0.19	-9.46	

# Scientific Drilling International

## Survey Report

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-08-27A - Slot G
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Site:</b>	Cascade Creek 697-08-53 Pad	<b>MD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Well:</b>	CC 697-08-27A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

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)
1,060.00	16.80	324.81	1,044.65	138.98	-34.75	128.53	2.68	1.87	-7.02
1,155.00	19.17	322.00	1,135.00	162.50	-52.27	157.79	2.66	2.49	-2.96
1,249.00	20.66	317.78	1,223.39	186.94	-72.92	189.79	2.20	1.59	-4.49
1,344.00	21.98	312.95	1,311.89	211.47	-97.20	224.20	2.31	1.39	-5.08
1,439.00	22.86	310.22	1,399.71	235.50	-124.30	260.05	1.43	0.93	-2.87
1,534.00	23.30	309.52	1,487.11	259.37	-152.88	296.74	0.55	0.46	-0.74
1,628.00	23.57	309.79	1,573.35	283.23	-181.67	333.55	0.31	0.29	0.29
1,723.00	23.21	312.25	1,660.55	307.97	-210.12	370.81	1.10	-0.38	2.59
1,818.00	21.63	313.48	1,748.36	332.61	-236.68	406.78	1.73	-1.66	1.29
1,912.00	22.86	314.27	1,835.37	357.27	-262.33	442.18	1.35	1.31	0.84
2,007.00	24.53	315.23	1,922.35	384.16	-289.43	480.21	1.80	1.76	1.01
2,102.00	24.18	315.76	2,008.90	412.10	-316.89	519.28	0.43	-0.37	0.56
2,196.00	24.27	313.30	2,094.63	439.14	-344.39	557.68	1.08	0.10	-2.62
2,291.00	22.51	311.63	2,181.82	464.61	-372.19	595.09	1.98	-1.85	-1.76
2,386.00	23.48	312.51	2,269.27	489.48	-399.73	631.87	1.08	1.02	0.93
2,480.00	21.63	313.56	2,356.07	514.08	-426.09	667.67	2.01	-1.97	1.12
2,575.00	23.13	313.48	2,443.92	538.98	-452.32	703.63	1.58	1.58	-0.08
2,652.00	21.72	314.18	2,515.09	559.32	-473.52	732.84	1.86	-1.83	0.91
Last SDI Surface MWD Survey									
2,766.00	20.66	315.66	2,621.38	588.41	-502.70	773.90	1.04	-0.93	1.30
First SDI Production MWD Survey									
2,861.00	23.21	313.12	2,709.50	613.19	-528.08	809.21	2.86	2.68	-2.67
2,956.00	23.92	312.15	2,796.58	638.91	-556.03	846.90	0.85	0.75	-1.02
3,051.00	23.39	311.45	2,883.59	664.32	-584.44	884.65	0.63	-0.56	-0.74
3,145.00	23.30	311.45	2,969.90	688.98	-612.36	921.51	0.10	-0.10	0.00
3,240.00	22.60	311.18	3,057.38	713.43	-640.18	958.15	0.75	-0.74	-0.28
3,335.00	24.97	312.24	3,144.30	738.94	-668.77	996.09	2.53	2.49	1.12
3,430.00	24.89	312.59	3,230.45	765.94	-698.33	1,035.80	0.18	-0.08	0.37
3,524.00	23.30	312.41	3,316.26	791.87	-726.62	1,073.87	1.69	-1.69	-0.19
3,619.00	23.39	313.38	3,403.48	817.49	-754.20	1,111.25	0.42	0.09	1.02
3,713.00	23.74	312.76	3,489.64	843.16	-781.65	1,148.57	0.46	0.37	-0.66
3,808.00	23.48	312.68	3,576.69	868.97	-809.61	1,186.33	0.28	-0.27	-0.08
3,903.00	23.13	312.15	3,663.94	894.32	-837.35	1,223.61	0.43	-0.37	-0.56
3,997.00	24.27	312.94	3,750.01	919.87	-865.18	1,261.09	1.26	1.21	0.84
4,092.00	24.36	312.24	3,836.59	946.34	-893.98	1,299.90	0.32	0.09	-0.74
4,187.00	23.21	312.41	3,923.52	972.14	-922.31	1,337.90	1.21	-1.21	0.18
4,281.00	21.81	312.32	4,010.35	996.39	-948.90	1,373.58	1.49	-1.49	-0.10
4,376.00	24.09	311.36	4,097.83	1,021.09	-976.50	1,410.27	2.43	2.40	-1.01
4,471.00	23.48	310.92	4,184.76	1,046.29	-1,005.36	1,448.15	0.67	-0.64	-0.46
4,566.00	21.63	310.39	4,272.49	1,070.04	-1,033.00	1,484.13	1.96	-1.95	-0.56
4,661.00	23.21	311.71	4,360.30	1,093.84	-1,060.31	1,519.95	1.75	1.66	1.39
4,755.00	24.27	312.24	4,446.35	1,119.15	-1,088.44	1,557.44	1.15	1.13	0.56
4,850.00	24.97	311.62	4,532.71	1,145.60	-1,117.88	1,596.65	0.79	0.74	-0.65



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## Survey Report

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<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Site:</b>	Cascade Creek 697-08-53 Pad	<b>MD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Well:</b>	CC 697-08-27A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

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)
4,945.00	23.48	309.95	4,619.35	1,171.07	-1,147.38	1,635.15	1.73	-1.57	-1.76
5,039.00	22.34	307.93	4,705.93	1,194.08	-1,175.83	1,671.09	1.47	-1.21	-2.15
5,134.00	22.16	310.13	4,793.86	1,216.72	-1,203.77	1,706.43	0.90	-0.19	2.32
5,229.00	20.84	309.16	4,882.25	1,238.94	-1,230.58	1,740.71	1.44	-1.39	-1.02
5,323.00	19.43	308.98	4,970.50	1,259.34	-1,255.70	1,772.50	1.50	-1.50	-0.19
5,418.00	19.43	312.85	5,060.09	1,280.02	-1,279.56	1,803.71	1.35	0.00	4.07
5,513.00	18.99	313.55	5,149.80	1,301.42	-1,302.35	1,834.77	0.52	-0.46	0.74
5,608.00	18.11	312.68	5,239.87	1,322.08	-1,324.41	1,864.79	0.97	-0.93	-0.92
5,702.00	17.23	313.12	5,329.43	1,341.50	-1,345.31	1,893.12	0.95	-0.94	0.47
5,797.00	16.53	313.12	5,420.34	1,360.35	-1,365.45	1,920.52	0.74	-0.74	0.00
5,892.00	15.74	313.47	5,511.59	1,378.46	-1,384.66	1,946.75	0.84	-0.83	0.37
5,987.00	14.51	313.20	5,603.30	1,395.47	-1,402.69	1,971.38	1.30	-1.29	-0.28
6,081.00	13.45	313.29	5,694.52	1,411.03	-1,419.23	1,993.94	1.13	-1.13	0.10
6,176.00	12.57	313.64	5,787.08	1,425.74	-1,434.76	2,015.20	0.93	-0.93	0.37
6,271.00	12.49	313.55	5,879.81	1,439.95	-1,449.68	2,035.69	0.09	-0.08	-0.09
6,365.00	12.05	312.50	5,971.67	1,453.58	-1,464.28	2,055.53	0.52	-0.47	-1.12
6,460.00	11.34	310.83	6,064.69	1,466.39	-1,478.66	2,074.60	0.83	-0.75	-1.76
6,555.00	10.55	309.60	6,157.97	1,478.04	-1,492.43	2,092.38	0.87	-0.83	-1.29
6,649.00	9.76	308.02	6,250.49	1,488.43	-1,505.34	2,108.66	0.89	-0.84	-1.68
6,744.00	9.23	307.14	6,344.19	1,497.99	-1,517.76	2,123.98	0.58	-0.56	-0.93
6,839.00	8.79	306.17	6,438.02	1,506.87	-1,529.69	2,138.47	0.49	-0.46	-1.02
6,933.00	8.71	306.70	6,530.92	1,515.37	-1,541.19	2,152.38	0.12	-0.09	0.56
7,028.00	7.83	318.56	6,624.94	1,524.52	-1,551.24	2,165.86	2.02	-0.93	12.48
7,123.00	7.65	323.49	6,719.08	1,534.45	-1,559.29	2,178.64	0.72	-0.19	5.19
7,217.00	7.83	320.94	6,812.22	1,544.45	-1,567.05	2,191.28	0.41	0.19	-2.71
7,312.00	7.74	321.64	6,906.35	1,554.49	-1,575.09	2,204.15	0.14	-0.09	0.74
7,407.00	7.03	319.27	7,000.56	1,563.91	-1,582.86	2,216.36	0.81	-0.75	-2.49
7,502.00	6.68	316.98	7,094.88	1,572.36	-1,590.42	2,227.69	0.47	-0.37	-2.41
7,596.00	6.33	316.63	7,188.27	1,580.12	-1,597.71	2,238.32	0.37	-0.37	-0.37
7,691.00	5.63	315.49	7,282.76	1,587.25	-1,604.57	2,248.20	0.75	-0.74	-1.20
7,786.00	5.63	316.89	7,377.30	1,593.98	-1,611.02	2,257.50	0.14	0.00	1.47
7,880.00	5.28	315.93	7,470.87	1,600.45	-1,617.18	2,266.42	0.38	-0.37	-1.02
7,975.00	4.75	317.07	7,565.51	1,606.47	-1,622.90	2,274.71	0.57	-0.56	1.20
8,070.00	4.66	313.29	7,660.19	1,612.00	-1,628.39	2,282.48	0.34	-0.09	-3.98
8,164.00	5.89	307.93	7,753.79	1,617.58	-1,634.97	2,290.99	1.41	1.31	-5.70
8,259.00	6.24	308.81	7,848.26	1,623.81	-1,642.84	2,300.83	0.38	0.37	0.93
8,354.00	5.72	311.45	7,942.74	1,630.18	-1,650.41	2,310.58	0.62	-0.55	2.78
8,448.00	5.28	313.99	8,036.31	1,636.29	-1,657.04	2,319.52	0.53	-0.47	2.70
8,543.00	5.01	313.55	8,130.92	1,642.18	-1,663.19	2,328.00	0.29	-0.28	-0.46
8,638.00	4.92	310.21	8,225.57	1,647.67	-1,669.31	2,336.14	0.32	-0.09	-3.52
8,732.00	5.01	313.82	8,319.21	1,653.11	-1,675.35	2,344.20	0.35	0.10	3.84
8,827.00	5.19	309.34	8,413.84	1,658.71	-1,681.66	2,352.55	0.46	0.19	-4.72
8,922.00	5.28	309.07	8,508.44	1,664.19	-1,688.38	2,361.07	0.10	0.09	-0.28
9,016.00	5.28	307.75	8,602.04	1,669.56	-1,695.16	2,369.55	0.13	0.00	-1.40

# Scientific Drilling International

## Survey Report

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-08-27A - Slot G
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Site:</b>	Cascade Creek 697-08-53 Pad	<b>MD Reference:</b>	GL 8379' & RKB 30' @ 8409.00ft (H&P 330)
<b>Well:</b>	CC 697-08-27A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies Compass Server

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)
9,117.00	4.84	298.26	8,702.65	1,674.43	-1,702.58	2,378.06	0.93	-0.44	-9.40
Last SDI Production MWD Survey									
9,173.00	4.84	298.26	8,758.45	1,676.66	-1,706.75	2,382.46	0.00	0.00	0.00
Projection To TD - BHL = 632771.77, 1225305.05									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
332.00	331.87	7.94	-0.14	First SDI Surface MWD Survey
2,652.00	2,515.09	559.32	-473.52	Last SDI Surface MWD Survey
2,766.00	2,621.38	588.41	-502.70	First SDI Production MWD Survey
9,117.00	8,702.65	1,674.43	-1,702.58	Last SDI Production MWD Survey
9,173.00	8,758.45	1,676.66	-1,706.75	Projection To TD
9,173.00	8,758.45	1,676.66	-1,706.75	BHL = 632771.77, 1225305.05

Checked By: _____	Approved By: _____	Date: _____
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