



**Scientific  
Drilling**

## Survey Certification

7327 West Barton Road  
Casper, WY 82604  
(307)-472-6621 Fax (307) 472-5439

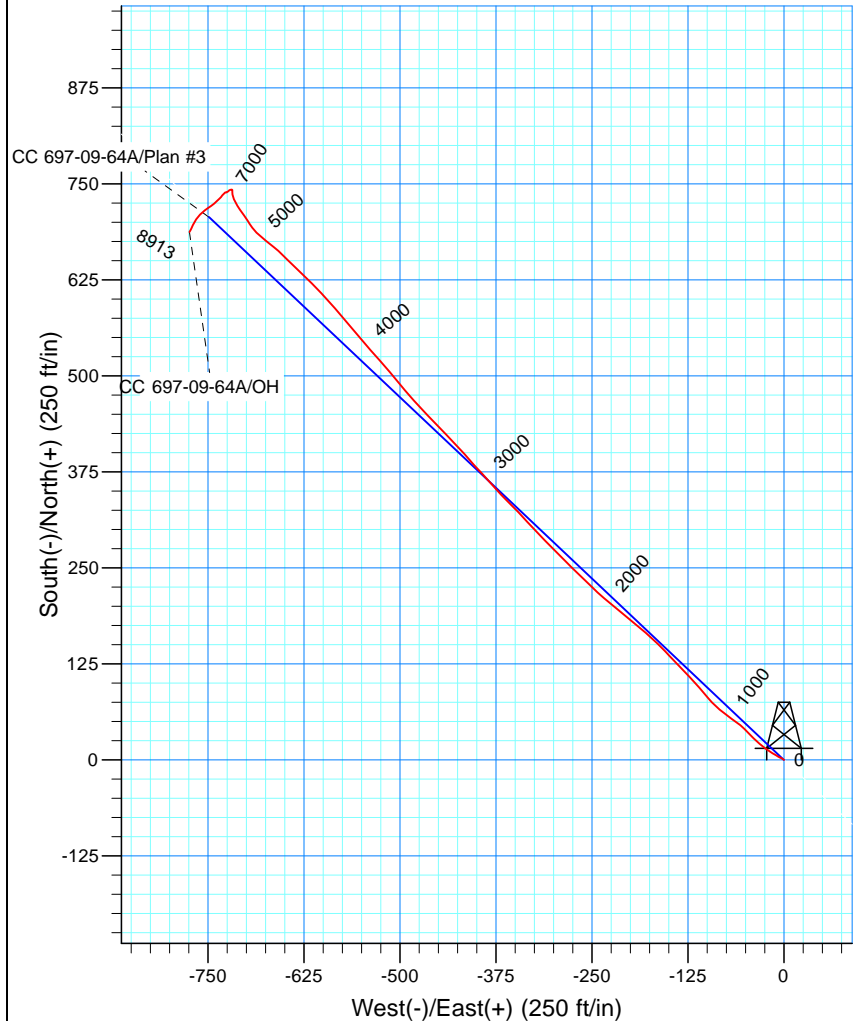
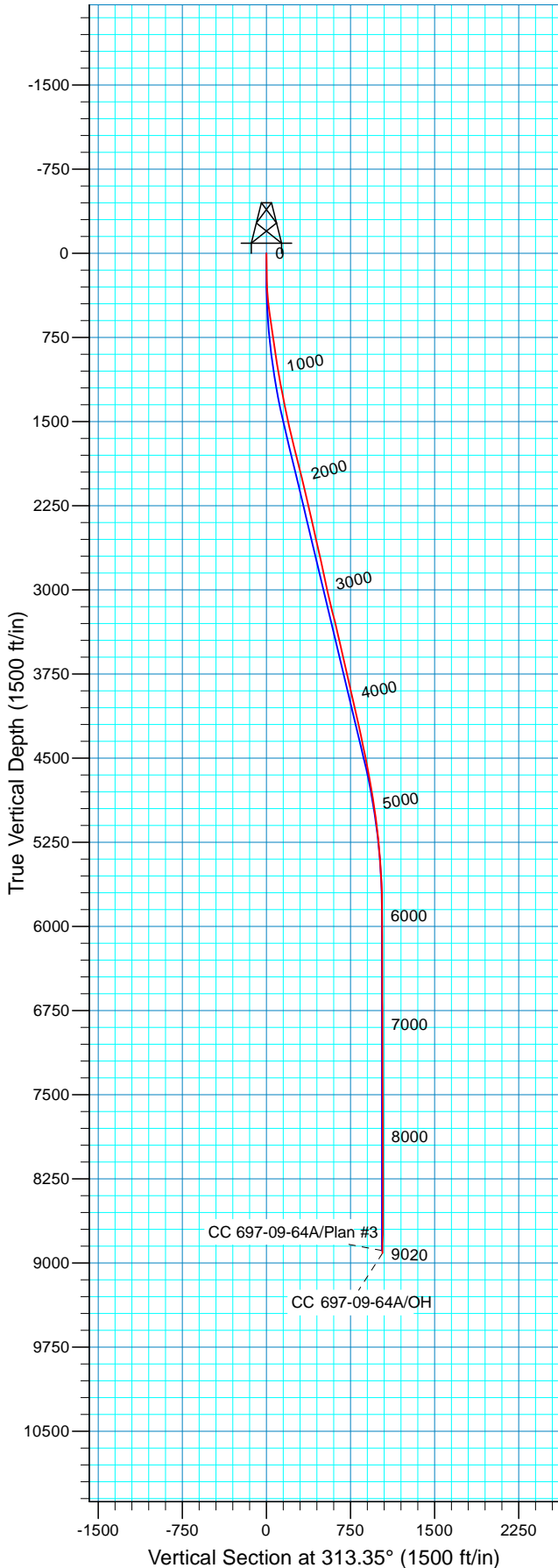
<b>Operator</b>	<u>OXY USA RMAT</u>
<b>Well Name &amp; No.</b>	<u>Cascade Creek 697-09-64A</u>
<b>County &amp; State</b>	<u>Garfield County, CO</u>
<b>SDI Job No.</b>	<u>42DEF10121395</u>
<b>Rig</b>	<u>H&amp;P 353</u>
<b>Survey Date</b>	<u>30-Dec-10</u>

I, Julie Cruse, having personal knowledge of all the facts, hereby  
certify that the attached directional survey run from a measured depth of 0 feet to a  
measured depth of 9020 feet is true and correct as determined from all available records.

Julie Cruse  
Signature

03-Feb-11  
Date

**Julie Cruse**  
Rockies Region Engineer  
Scientific Drilling - Rocky Mountain District



WELL DETAILS: CC 697-09-64A

		Ground Level: GL 8348' & RKB 30' @ 8378.00ft		Longitude	
North	East	North	East	North	East
0.00	0.00	629179.42	1234985.92	39° 31' 46.409 N	108° 12' 45.052 W

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-09-64A - Slot N, True North  
 Vertical (TVD) Reference: GL 8348' & RKB 30' @ 8378.00ft  
 Section (VS) Reference: Slot - N(0.00N, 0.00E)  
 Measured Depth Reference: GL 8348' & RKB 30' @ 8378.00ft  
 Calculation Method: Minimum Curvature  
 Local North: True  
 Location: Sec 15 T6S R97W

PROJECT DETAILS: Garfield County, CO NAD27

Design: OH (CC 697-09-64A/OH)

Geodetic System: US State Plane 1927 (Exact solution)  
 Datum: NAD 1927 (NADCON CONUS)  
 Ellipsoid: Clarke 1866  
 Zone: Colorado Central 502

Created By: Julie Cruse Date: 2011-02-03



Scientific Drilling

## **OXY USA RMAT**

Garfield County, CO NAD27  
Cascade Creek 697-15-01 Pad  
CC 697-09-64A - Slot N

OH

Design: OH

## **Standard Survey Report**

03 February, 2011



<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-09-64A - Slot N
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8348' & RKB 30' @ 8378.00ft
<b>Site:</b>	Cascade Creek 697-15-01 Pad	<b>MD Reference:</b>	GL 8348' & RKB 30' @ 8378.00ft
<b>Well:</b>	CC 697-09-64A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies-R5000.1

<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		

<b>Site</b>	Cascade Creek 697-15-01 Pad, Sec 15 T6S R97W		
<b>Site Position:</b>		<b>Northing:</b>	629,156.97 usft
<b>From:</b>	Map	<b>Easting:</b>	1,234,961.93 usft
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	13.200 in
		<b>Latitude:</b>	39° 31' 46.180 N
		<b>Longitude:</b>	108° 12' 45.350 W
		<b>Grid Convergence:</b>	-1.71 °

<b>Well</b>	CC 697-09-64A - Slot N, 265' FNL 628' FWL		
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b> 629,179.42 usft
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b> 1,234,985.92 usft
<b>Position Uncertainty</b>	0.00 ft	<b>Wellhead Elevation:</b>	ft
		<b>Latitude:</b>	39° 31' 46.409 N
		<b>Longitude:</b>	108° 12' 45.052 W
		<b>Ground Level:</b>	8,348.00 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>
	IGRF2010	2010-11-24	10.52	65.74	52,277

<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		313.35

<b>Survey Program</b>	<b>Date</b>	2011-02-03			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
246.00	2,670.00	Survey #1 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	
2,787.00	9,020.00	Survey #2 - Production (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	
246.00	1.92	301.08	245.95	2.13	-3.53	4.03	0.78	0.78	0.00	
<b>First SDI MWD Survey</b>										
338.00	3.69	296.89	337.84	4.26	-7.49	8.37	1.94	1.92	-4.55	
430.00	5.56	303.53	429.54	8.06	-13.85	15.60	2.11	2.03	7.22	
523.00	7.65	302.66	521.91	13.89	-22.81	26.13	2.25	2.25	-0.94	
615.00	9.15	312.50	612.93	22.14	-33.36	39.46	2.25	1.63	10.70	
708.00	7.91	317.34	704.90	31.84	-43.15	53.24	1.54	-1.33	5.20	
800.00	7.83	313.38	796.03	40.80	-52.00	65.82	0.60	-0.09	-4.30	
896.00	7.83	305.03	891.14	49.05	-62.11	78.83	1.18	0.00	-8.70	

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-09-64A - Slot N
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8348' & RKB 30' @ 8378.00ft
<b>Site:</b>	Cascade Creek 697-15-01 Pad	<b>MD Reference:</b>	GL 8348' & RKB 30' @ 8378.00ft
<b>Well:</b>	CC 697-09-64A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)
990.00	9.85	306.44	984.02	57.50	-73.82	93.15	2.16	2.15	1.50
1,085.00	10.38	311.89	1,077.55	68.04	-86.73	109.77	1.15	0.56	5.74
1,179.00	10.82	320.15	1,169.95	80.47	-98.68	127.00	1.68	0.47	8.79
1,274.00	10.90	318.83	1,263.25	94.08	-110.31	144.79	0.27	0.08	-1.39
1,369.00	10.99	316.46	1,356.52	107.40	-122.46	162.78	0.48	0.09	-2.49
1,463.00	12.57	316.02	1,448.54	121.26	-135.74	181.94	1.68	1.68	-0.47
1,558.00	12.57	317.60	1,541.26	136.33	-149.89	202.58	0.36	0.00	1.66
1,652.00	13.81	313.30	1,632.78	151.58	-164.95	224.00	1.68	1.32	-4.57
1,747.00	14.25	311.19	1,724.95	167.06	-182.00	247.02	0.71	0.46	-2.22
1,841.00	12.66	309.34	1,816.36	181.21	-198.67	268.86	1.75	-1.69	-1.97
1,936.00	14.60	308.29	1,908.68	195.23	-216.13	291.17	2.06	2.04	-1.11
2,030.00	14.51	311.54	1,999.67	210.38	-234.24	314.75	0.87	-0.10	3.46
2,125.00	13.72	314.79	2,091.80	226.21	-251.14	337.90	1.18	-0.83	3.42
2,219.00	12.05	313.73	2,183.43	240.84	-266.14	358.86	1.79	-1.78	-1.13
2,315.00	12.75	313.73	2,277.19	255.09	-281.04	379.47	0.73	0.73	0.00
2,409.00	13.45	315.40	2,368.75	270.05	-296.21	400.77	0.85	0.74	1.78
2,504.00	12.66	316.55	2,461.29	285.47	-311.13	422.21	0.88	-0.83	1.21
2,598.00	13.28	315.67	2,552.89	300.67	-325.76	443.28	0.69	0.66	-0.94
2,670.00	13.37	318.13	2,622.95	312.79	-337.09	459.84	0.80	0.13	3.42
Last Survey in 14 3/4" Hole									
2,787.00	11.86	314.06	2,737.13	331.22	-354.76	485.34	1.50	-1.29	-3.48
First Survey in 8 3/4" Hole									
2,882.00	11.96	317.60	2,830.08	345.28	-368.42	504.92	0.78	0.11	3.73
2,976.00	12.05	318.66	2,922.03	359.84	-381.47	524.40	0.25	0.10	1.13
3,071.00	12.05	316.20	3,014.94	374.44	-394.88	544.18	0.54	0.00	-2.59
3,166.00	14.51	318.66	3,107.39	390.54	-409.61	565.94	2.66	2.59	2.59
3,260.00	14.33	316.99	3,198.43	407.89	-425.32	589.28	0.48	-0.19	-1.78
3,354.00	13.63	316.81	3,289.64	424.47	-440.83	611.94	0.75	-0.74	-0.19
3,449.00	13.37	316.46	3,382.02	440.59	-456.06	634.08	0.29	-0.27	-0.37
3,542.00	12.57	314.97	3,472.64	455.54	-470.63	654.93	0.93	-0.86	-1.60
3,638.00	13.01	319.54	3,566.26	471.14	-485.03	676.12	1.15	0.46	4.76
3,732.00	13.81	320.15	3,657.70	487.81	-499.09	697.78	0.86	0.85	0.65
3,827.00	13.01	319.71	3,750.11	504.67	-513.27	719.67	0.85	-0.84	-0.46
3,921.00	12.57	318.92	3,841.78	520.45	-526.83	740.36	0.50	-0.47	-0.84
4,016.00	11.87	318.48	3,934.63	535.56	-540.10	760.38	0.74	-0.74	-0.46
4,110.00	12.84	319.80	4,026.45	550.77	-553.25	780.39	1.07	1.03	1.40
4,205.00	13.37	320.06	4,118.97	567.26	-567.12	801.79	0.56	0.56	0.27
4,300.00	12.93	319.01	4,211.48	583.70	-581.14	823.27	0.53	-0.46	-1.11
4,394.00	12.13	317.87	4,303.24	598.96	-594.66	843.59	0.89	-0.85	-1.21
4,489.00	11.87	316.37	4,396.17	613.44	-608.10	863.29	0.43	-0.27	-1.58
4,583.00	11.08	314.44	4,488.29	626.76	-621.22	881.98	0.93	-0.84	-2.05
4,678.00	10.64	312.86	4,581.59	639.12	-634.17	899.87	0.56	-0.46	-1.66
4,772.00	10.38	315.93	4,674.01	651.11	-646.42	917.01	0.66	-0.28	3.27



<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-09-64A - Slot N
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8348' & RKB 30' @ 8378.00ft
<b>Site:</b>	Cascade Creek 697-15-01 Pad	<b>MD Reference:</b>	GL 8348' & RKB 30' @ 8378.00ft
<b>Well:</b>	CC 697-09-64A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)
4,867.00	9.94	311.36	4,767.52	662.67	-658.52	933.76	0.97	-0.46	-4.81
4,961.00	8.71	307.49	4,860.28	672.37	-670.26	948.95	1.47	-1.31	-4.12
5,056.00	8.88	309.87	4,954.16	681.44	-681.60	963.42	0.42	0.18	2.51
5,150.00	8.18	323.58	5,047.13	691.48	-691.14	977.24	2.28	-0.74	14.59
5,245.00	5.89	326.48	5,141.41	700.98	-697.84	988.64	2.44	-2.41	3.05
5,339.00	5.54	325.07	5,234.94	708.72	-703.10	997.78	0.40	-0.37	-1.50
5,434.00	5.54	323.84	5,329.50	716.18	-708.43	1,006.78	0.12	0.00	-1.29
5,528.00	3.87	331.66	5,423.18	722.64	-712.62	1,014.26	1.90	-1.78	8.32
5,623.00	4.04	333.95	5,517.95	728.47	-715.61	1,020.43	0.24	0.18	2.41
5,717.00	3.17	345.81	5,611.77	733.96	-717.70	1,025.73	1.21	-0.93	12.62
5,812.00	1.85	358.91	5,706.67	738.04	-718.37	1,029.02	1.51	-1.39	13.79
5,906.00	0.70	351.79	5,800.65	740.13	-718.49	1,030.53	1.23	-1.22	-7.57
6,001.00	0.62	5.33	5,895.64	741.21	-718.52	1,031.30	0.18	-0.08	14.25
6,095.00	0.44	2.07	5,989.64	742.08	-718.46	1,031.85	0.19	-0.19	-3.47
6,190.00	0.26	274.36	6,084.64	742.46	-718.66	1,032.26	0.53	-0.19	-92.33
6,285.00	0.62	268.21	6,179.64	742.46	-719.39	1,032.79	0.38	0.38	-6.47
6,379.00	1.06	258.54	6,273.62	742.27	-720.75	1,033.65	0.49	0.47	-10.29
6,474.00	0.44	245.88	6,368.62	741.95	-721.94	1,034.30	0.67	-0.65	-13.33
6,568.00	0.35	217.85	6,462.61	741.58	-722.45	1,034.41	0.22	-0.10	-29.82
6,663.00	0.44	246.23	6,557.61	741.20	-722.96	1,034.52	0.22	0.09	29.87
6,757.00	0.53	215.21	6,651.61	740.70	-723.54	1,034.60	0.29	0.10	-33.00
6,852.00	0.79	236.92	6,746.60	739.98	-724.35	1,034.69	0.38	0.27	22.85
6,946.00	0.97	235.86	6,840.59	739.18	-725.55	1,035.01	0.19	0.19	-1.13
7,041.00	0.18	286.40	6,935.59	738.77	-726.36	1,035.32	0.91	-0.83	53.20
7,135.00	0.18	310.39	7,029.59	738.91	-726.61	1,035.60	0.08	0.00	25.52
7,230.00	0.35	272.07	7,124.58	739.02	-727.01	1,035.97	0.25	0.18	-40.34
7,325.00	0.70	233.58	7,219.58	738.68	-727.77	1,036.29	0.50	0.37	-40.52
7,419.00	1.06	223.21	7,313.57	737.71	-728.83	1,036.39	0.42	0.38	-11.03
7,514.00	1.14	226.20	7,408.55	736.41	-730.11	1,036.43	0.10	0.08	3.15
7,608.00	1.32	221.63	7,502.53	734.96	-731.51	1,036.45	0.22	0.19	-4.86
7,703.00	1.67	220.57	7,597.50	733.09	-733.13	1,036.35	0.37	0.37	-1.12
7,797.00	2.20	223.91	7,691.44	730.75	-735.27	1,036.30	0.58	0.56	3.55
7,892.00	2.81	229.97	7,786.35	727.94	-738.32	1,036.58	0.70	0.64	6.38
7,987.00	3.17	225.14	7,881.22	724.59	-741.97	1,036.93	0.46	0.38	-5.08
8,087.00	3.34	236.57	7,981.06	721.03	-746.36	1,037.69	0.67	0.17	11.43
8,176.00	2.37	228.57	8,069.95	718.39	-749.90	1,038.45	1.18	-1.09	-8.99
8,270.00	2.55	239.73	8,163.87	716.05	-753.17	1,039.21	0.54	0.19	11.87
8,365.00	2.90	230.77	8,258.76	713.46	-756.85	1,040.12	0.58	0.37	-9.43
8,459.00	2.90	221.98	8,352.64	710.19	-760.28	1,040.37	0.47	0.00	-9.35
8,554.00	2.20	221.10	8,447.54	707.03	-763.09	1,040.24	0.74	-0.74	-0.93
8,648.00	2.37	213.36	8,541.47	704.04	-765.35	1,039.83	0.37	0.18	-8.23
8,743.00	2.46	210.99	8,636.39	700.66	-767.48	1,039.06	0.14	0.09	-2.49
8,838.00	2.99	202.11	8,731.28	696.61	-769.46	1,037.72	0.71	0.56	-9.35
8,932.00	3.34	207.30	8,825.13	691.91	-771.64	1,036.08	0.48	0.37	5.52

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<b>Site:</b>	Cascade Creek 697-15-01 Pad	<b>MD Reference:</b>	GL 8348' & RKB 30' @ 8378.00ft
<b>Well:</b>	CC 697-09-64A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	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)
8,965.00	3.52	209.94	8,858.08	690.18	-772.58	1,035.57	0.73	0.55	8.00
Last SDI MWD Survey									
9,020.00	3.52	209.94	8,912.97	687.25	-774.27	1,034.79	0.00	0.00	0.00
Projection to TD - BHL = 629889.48 ft N, 1234232.52 ft E									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
246.00	245.95	2.13	-3.53	First SDI MWD Survey
2,670.00	2,622.95	312.79	-337.09	Last Survey in 14 3/4" Hole
2,787.00	2,737.13	331.22	-354.76	First Survey in 8 3/4" Hole
8,965.00	8,858.08	690.18	-772.58	Last SDI MWD Survey
9,020.00	8,912.97	687.25	-774.27	Projection to TD
9,020.00	8,912.97	687.25	-774.27	BHL = 629889.48 ft N, 1234232.52 ft E

Checked By: _____	Approved By: _____	Date: _____
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