



**Scientific  
Drilling**

## Survey Certification

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

Operator	OXY USA RMAT
Well Name & No.	Cascade Creek 697-15-09B
County & State	Garfield County, CO
SDI Job No.	42DEF1101003
Rig	H&P 353
Survey Date	02-Jan-11

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 9000 feet is true and correct as determined from all available records.

Julie Cruse  
Signature

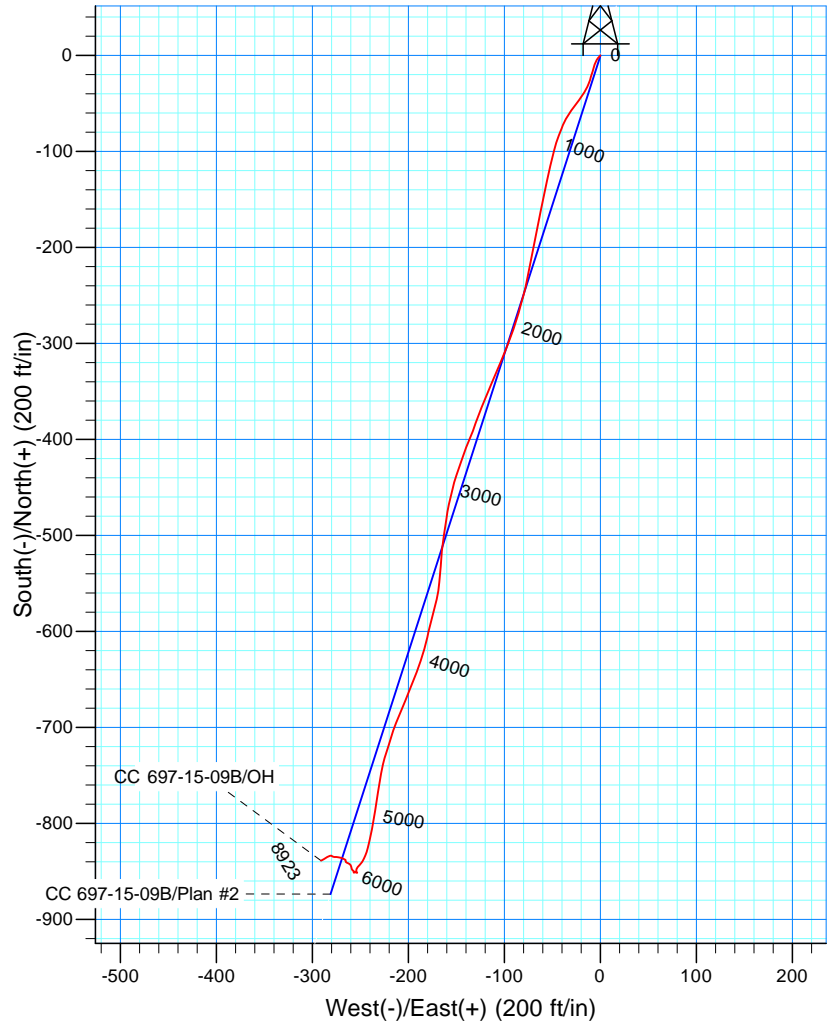
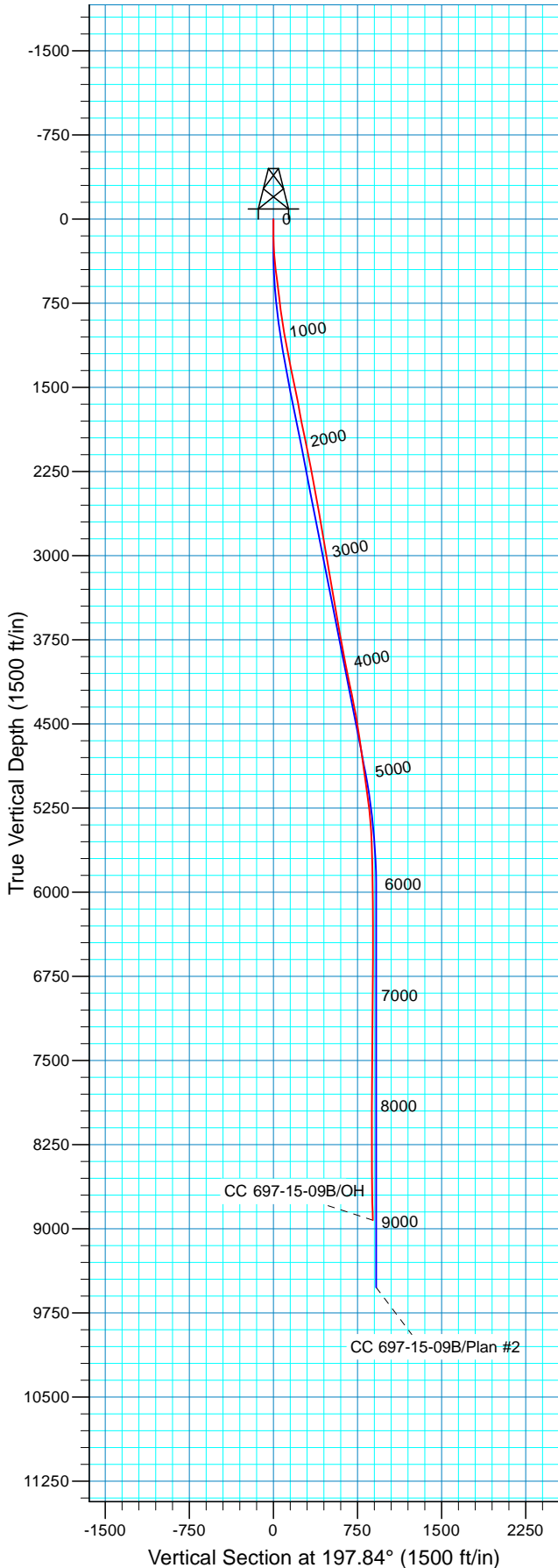
03-Feb-11  
Date

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



Project: Garfield County, CO NAD27  
 Site: Cascade Creek 697-15-01 Pad  
 Well: CC 697-15-09B  
 Wellbore: OH  
 Design: OH

OXY USA RMAT



#### WELL DETAILS: CC 697-15-09B

		Ground Level: GL 8348' & RKB 30' @ 8378.00ft			
0.00	0.00	Northing	Easting	Latitude	Longitude
		629176.16	1234979.06	39° 31' 46.375 N	108° 12' 45.138 W

#### REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-15-09B - Slot I, True North  
 Vertical (TVD) Reference: GL 8348' & RKB 30' @ 8378.00ft  
 Section (VS) Reference: Slot - I(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 697-15-09B/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 697-15-09B - Slot I

OH

Design: OH

## **Standard Survey Report**

03 February, 2011



<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-15-09B - Slot I
<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 697-15-09B	<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 697-15-09B - Slot I, 273' FNL 633' FEL		
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b> 629,176.16 usft
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b> 1,234,979.06 usft
<b>Position Uncertainty</b>	0.00 ft	<b>Wellhead Elevation:</b>	ft
		<b>Latitude:</b>	39° 31' 46.375 N
		<b>Longitude:</b>	108° 12' 45.138 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>
	IGRF2005-10	2008-09-24	10.78	65.81	52,519

<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	197.84	

<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>	
105.00	629.00	Survey #1 - Surface Gyro (OH)	Standard Keeper 103	Standard Wireline Keeper ver 1.0.3	
710.00	2,409.00	Survey #2 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	
2,503.00	9,000.00	Survey #3 - 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	
105.00	0.21	274.74	105.00	0.02	-0.19	0.04	0.20	0.20	0.00	
<b>First SDI Surface Wireline Gyro Survey</b>										
136.00	1.02	207.49	136.00	-0.22	-0.38	0.33	3.09	2.61	-216.94	
167.00	1.26	229.91	166.99	-0.69	-0.76	0.89	1.62	0.77	72.32	
198.00	1.87	223.88	197.98	-1.27	-1.38	1.63	2.04	1.97	-19.45	
228.00	2.65	218.27	227.96	-2.17	-2.14	2.72	2.70	2.60	-18.70	
259.00	3.45	213.81	258.91	-3.51	-3.11	4.29	2.69	2.58	-14.39	
290.00	4.11	211.22	289.85	-5.23	-4.20	6.27	2.20	2.13	-8.35	

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-15-09B - Slot I
<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 697-15-09B	<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)
321.00	4.39	201.85	320.76	-7.28	-5.22	8.53	2.41	0.90	-30.23
351.00	4.81	200.00	350.66	-9.53	-6.08	10.93	1.48	1.40	-6.17
413.00	5.95	194.77	412.39	-15.08	-7.79	16.74	2.00	1.84	-8.44
444.00	6.55	195.79	443.21	-18.34	-8.68	20.11	1.97	1.94	3.29
505.00	7.83	197.50	503.72	-25.65	-10.87	27.74	2.13	2.10	2.80
536.00	7.83	201.90	534.44	-29.62	-12.29	31.96	1.93	0.00	14.19
629.00	6.79	214.40	626.68	-40.04	-17.76	43.55	2.04	-1.12	13.44
Last SDI Surface Wireline Gyro Survey									
710.00	6.79	217.59	707.12	-47.78	-23.39	52.65	0.47	0.00	3.94
First SDI Surface MWD Survey									
802.00	7.56	215.91	798.40	-56.99	-30.26	63.52	0.87	0.84	-1.83
897.00	9.32	205.89	892.37	-68.98	-37.28	77.08	2.41	1.85	-10.55
991.00	9.85	200.53	985.06	-83.35	-43.43	92.65	1.10	0.56	-5.70
1,086.00	9.76	194.47	1,078.67	-98.76	-48.29	108.80	1.09	-0.09	-6.38
1,180.00	10.64	192.97	1,171.19	-114.93	-52.23	125.40	0.98	0.94	-1.60
1,275.00	11.78	191.65	1,264.37	-132.98	-56.15	143.79	1.23	1.20	-1.39
1,369.00	11.87	191.65	1,356.38	-151.84	-60.04	162.94	0.10	0.10	0.00
1,464.00	11.96	191.83	1,449.33	-171.05	-64.03	182.44	0.10	0.09	0.19
1,558.00	11.26	191.30	1,541.41	-189.58	-67.83	201.24	0.75	-0.74	-0.56
1,653.00	10.29	190.86	1,634.73	-207.01	-71.25	218.88	1.02	-1.02	-0.46
1,748.00	10.90	190.25	1,728.11	-224.18	-74.44	236.21	0.65	0.64	-0.64
1,842.00	10.90	193.41	1,820.42	-241.57	-78.08	253.88	0.64	0.00	3.36
1,937.00	12.13	196.40	1,913.50	-259.88	-82.99	272.81	1.44	1.29	3.15
2,031.00	12.22	197.37	2,005.39	-278.85	-88.74	292.63	0.24	0.10	1.03
2,125.00	10.38	199.92	2,097.56	-296.31	-94.60	311.04	2.03	-1.96	2.71
2,220.00	10.90	201.41	2,190.93	-312.72	-100.80	328.56	0.62	0.55	1.57
2,315.00	10.99	205.19	2,284.20	-329.28	-107.93	346.51	0.76	0.09	3.98
2,409.00	10.55	203.70	2,376.55	-345.26	-115.20	363.95	0.55	-0.47	-1.59
Last SDI Surface MWD Survey									
2,503.00	10.55	200.80	2,468.96	-361.19	-121.72	381.11	0.56	0.00	-3.09
First Survey in 8 3/4" Hole									
2,598.00	10.73	199.04	2,562.32	-377.68	-127.69	398.64	0.39	0.19	-1.85
2,677.00	10.11	202.55	2,640.02	-391.03	-132.75	412.90	1.12	-0.78	4.44
2,789.00	8.88	201.67	2,750.49	-408.15	-139.71	431.32	1.11	-1.10	-0.79
2,883.00	9.67	198.07	2,843.26	-422.39	-144.84	446.46	1.04	0.84	-3.83
2,977.00	9.58	199.74	2,935.93	-437.26	-149.93	462.17	0.31	-0.10	1.78
3,072.00	9.50	192.18	3,029.62	-452.37	-154.25	477.87	1.32	-0.08	-7.96
3,167.00	9.32	193.50	3,123.35	-467.51	-157.70	493.34	0.30	-0.19	1.39
3,261.00	10.29	187.08	3,215.97	-483.24	-160.51	509.18	1.55	1.03	-6.83
3,355.00	10.11	189.63	3,308.49	-499.71	-162.93	525.60	0.52	-0.19	2.71
3,450.00	10.02	185.41	3,402.03	-516.16	-165.10	541.92	0.78	-0.09	-4.44
3,544.00	9.94	184.18	3,494.61	-532.39	-166.47	557.79	0.24	-0.09	-1.31
3,637.00	10.64	184.71	3,586.11	-548.95	-167.76	573.95	0.76	0.75	0.57
3,732.00	10.82	194.03	3,679.46	-566.35	-170.64	591.39	1.83	0.19	9.81



<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-15-09B - Slot I
<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 697-15-09B	<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)
3,827.00	10.55	193.76	3,772.81	-583.44	-174.87	608.96	0.29	-0.28	-0.28
3,921.00	10.38	194.20	3,865.25	-600.01	-178.99	626.00	0.20	-0.18	0.47
4,016.00	10.02	193.06	3,958.74	-616.36	-182.96	642.77	0.43	-0.38	-1.20
4,110.00	11.78	201.06	4,051.05	-633.28	-188.26	660.51	2.46	1.87	8.51
4,205.00	11.78	199.92	4,144.05	-651.45	-195.04	679.88	0.24	0.00	-1.20
4,299.00	11.61	202.29	4,236.10	-669.22	-201.90	698.90	0.54	-0.18	2.52
4,394.00	11.52	204.05	4,329.17	-686.73	-209.39	717.86	0.38	-0.09	1.85
4,488.00	10.02	197.72	4,421.51	-703.09	-215.71	735.37	2.03	-1.60	-6.73
4,583.00	9.23	197.46	4,515.18	-718.23	-220.51	751.25	0.83	-0.83	-0.27
4,677.00	8.27	197.54	4,608.08	-731.87	-224.81	765.55	1.02	-1.02	0.09
4,772.00	8.09	190.16	4,702.12	-744.97	-228.05	779.01	1.12	-0.19	-7.77
4,866.00	8.97	189.11	4,795.08	-758.71	-230.37	792.81	0.95	0.94	-1.12
4,961.00	7.39	187.26	4,889.11	-772.09	-232.32	806.14	1.69	-1.66	-1.95
5,055.00	8.18	190.51	4,982.24	-784.66	-234.30	818.71	0.96	0.84	3.46
5,150.00	7.56	189.72	5,076.35	-797.46	-236.59	831.60	0.66	-0.65	-0.83
5,244.00	7.56	190.78	5,169.53	-809.63	-238.79	843.86	0.15	0.00	1.13
5,339.00	6.24	193.24	5,263.84	-820.80	-241.14	855.21	1.42	-1.39	2.59
5,434.00	4.92	198.33	5,358.39	-829.69	-243.61	864.43	1.48	-1.39	5.36
5,528.00	3.52	206.24	5,452.13	-836.11	-246.15	871.31	1.61	-1.49	8.41
5,623.00	2.16	215.21	5,547.01	-840.18	-248.47	875.91	1.50	-1.43	9.44
5,717.00	2.00	220.06	5,640.95	-842.89	-250.55	879.12	0.25	-0.17	5.16
5,811.00	2.04	222.44	5,734.89	-845.38	-252.73	882.16	0.10	0.04	2.53
5,906.00	0.79	187.88	5,829.86	-847.27	-253.96	884.34	1.54	-1.32	-36.38
6,000.00	0.62	190.51	5,923.85	-848.42	-254.15	885.48	0.18	-0.18	2.80
6,095.00	0.79	202.03	6,018.85	-849.53	-254.49	886.65	0.23	0.18	12.13
6,190.00	0.62	115.63	6,113.84	-850.36	-254.27	887.37	1.02	-0.18	-90.95
6,284.00	0.70	145.07	6,207.84	-851.05	-253.48	887.78	0.37	0.09	31.32
6,379.00	0.62	300.64	6,302.83	-851.26	-253.59	888.02	1.36	-0.08	163.76
6,473.00	0.70	282.27	6,396.83	-850.88	-254.59	887.96	0.24	0.09	-19.54
6,568.00	0.79	262.41	6,491.82	-850.84	-255.81	888.30	0.29	0.09	-20.91
6,662.00	0.44	246.23	6,585.81	-851.08	-256.78	888.82	0.41	-0.37	-17.21
6,757.00	0.62	24.49	6,680.81	-850.76	-256.90	888.55	1.04	0.19	145.54
6,851.00	0.53	343.97	6,774.81	-849.87	-256.81	887.69	0.43	-0.10	-43.11
6,946.00	0.53	301.78	6,869.81	-849.22	-257.30	887.22	0.40	0.00	-44.41
7,041.00	0.70	292.64	6,964.80	-848.77	-258.21	887.06	0.21	0.18	-9.62
7,135.00	1.49	346.43	7,058.78	-847.36	-259.03	885.97	1.29	0.84	57.22
7,230.00	1.23	348.19	7,153.76	-845.16	-259.53	884.03	0.28	-0.27	1.85
7,324.00	1.14	324.37	7,247.74	-843.41	-260.28	882.60	0.53	-0.10	-25.34
7,419.00	0.97	309.25	7,342.72	-842.13	-261.45	881.74	0.34	-0.18	-15.92
7,513.00	0.97	290.53	7,436.71	-841.35	-262.81	881.41	0.34	0.00	-19.91
7,608.00	1.14	297.12	7,531.69	-840.64	-264.41	881.22	0.22	0.18	6.94
7,703.00	0.35	332.28	7,626.68	-839.95	-265.38	880.87	0.92	-0.83	37.01
7,797.00	0.79	19.21	7,720.68	-839.08	-265.30	880.02	0.65	0.47	49.93

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<b>Well:</b>	CC 697-15-09B	<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)
7,892.00	0.79	321.38	7,815.67	-837.95	-265.50	879.00	0.80	0.00	-60.87
7,986.00	1.14	295.98	7,909.66	-837.04	-266.74	878.51	0.58	0.37	-27.02
8,081.00	0.79	282.53	8,004.64	-836.48	-268.23	878.44	0.44	-0.37	-14.16
8,175.00	1.85	290.00	8,098.62	-835.82	-270.29	878.44	1.14	1.13	7.95
8,270.00	1.41	278.58	8,193.58	-835.12	-272.89	878.57	0.57	-0.46	-12.02
8,364.00	1.23	268.56	8,287.56	-834.98	-275.04	879.09	0.31	-0.19	-10.66
8,459.00	1.49	274.80	8,382.53	-834.90	-277.29	879.70	0.31	0.27	6.57
8,553.00	0.88	310.13	8,476.51	-834.33	-279.06	879.70	0.98	-0.65	37.59
8,648.00	0.70	300.11	8,571.50	-833.57	-280.12	879.30	0.24	-0.19	-10.55
8,742.00	1.49	250.28	8,665.48	-833.69	-281.76	879.93	1.24	0.84	-53.01
8,837.00	2.29	242.28	8,760.43	-834.99	-284.61	882.04	0.88	0.84	-8.42
8,932.00	2.73	238.06	8,855.34	-837.07	-288.21	885.12	0.50	0.46	-4.44
8,942.00	2.73	238.85	8,865.33	-837.32	-288.61	885.48	0.38	0.00	7.90
<b>Last SDI MWD Survey</b>									
9,000.00	2.73	238.85	8,923.26	-838.75	-290.98	887.56	0.00	0.00	0.00
<b>Projection to TD - BHL = 628346.47 ft N, 1234663.17 ft E</b>									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
105.00	105.00	0.02	-0.19	First SDI Surface Wireline Gyro Survey
629.00	626.68	-40.04	-17.76	Last SDI Surface Wireline Gyro Survey
710.00	707.12	-47.78	-23.39	First SDI Surface MWD Survey
2,409.00	2,376.55	-345.26	-115.20	Last SDI Surface MWD Survey
2,503.00	2,468.96	-361.19	-121.72	First Survey in 8 3/4" Hole
8,942.00	8,865.33	-837.32	-288.61	Last SDI MWD Survey
9,000.00	8,923.26	-838.75	-290.98	Projection to TD
9,000.00	8,923.26	-838.75	-290.98	BHL = 628346.47 ft N, 1234663.17 ft E

Checked By: _____	Approved By: _____	Date: _____
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