



**Scientific  
Drilling**

## Survey Certification

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

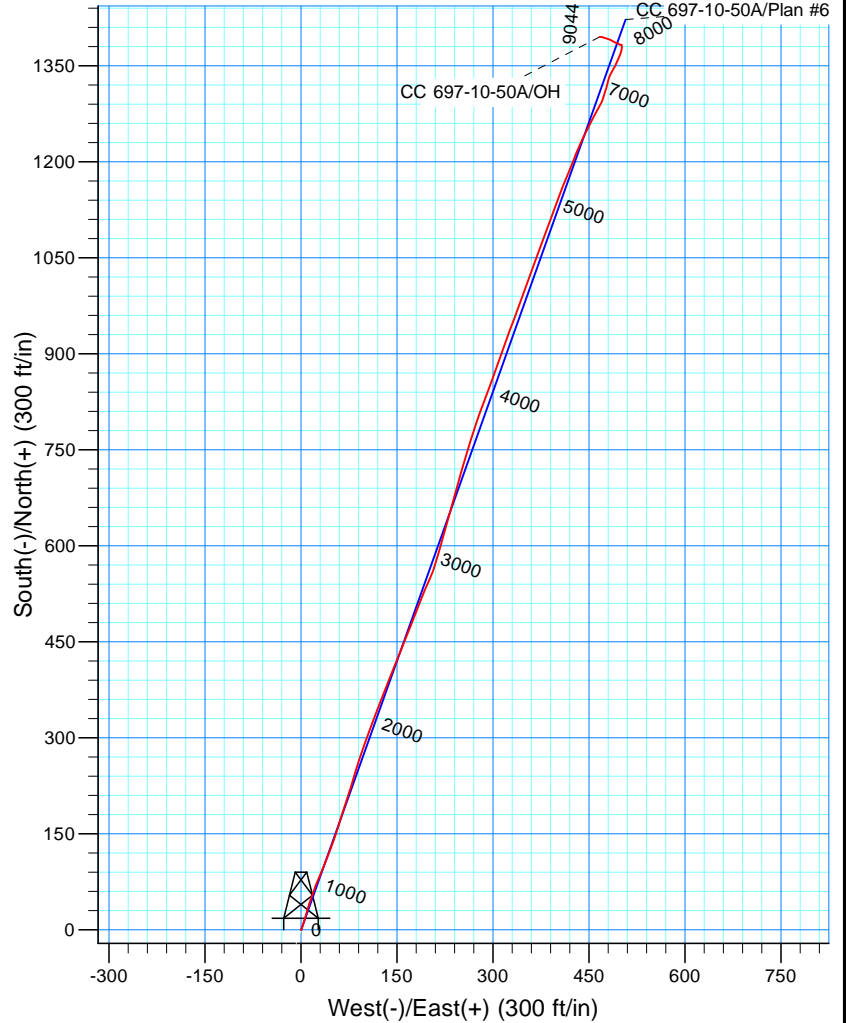
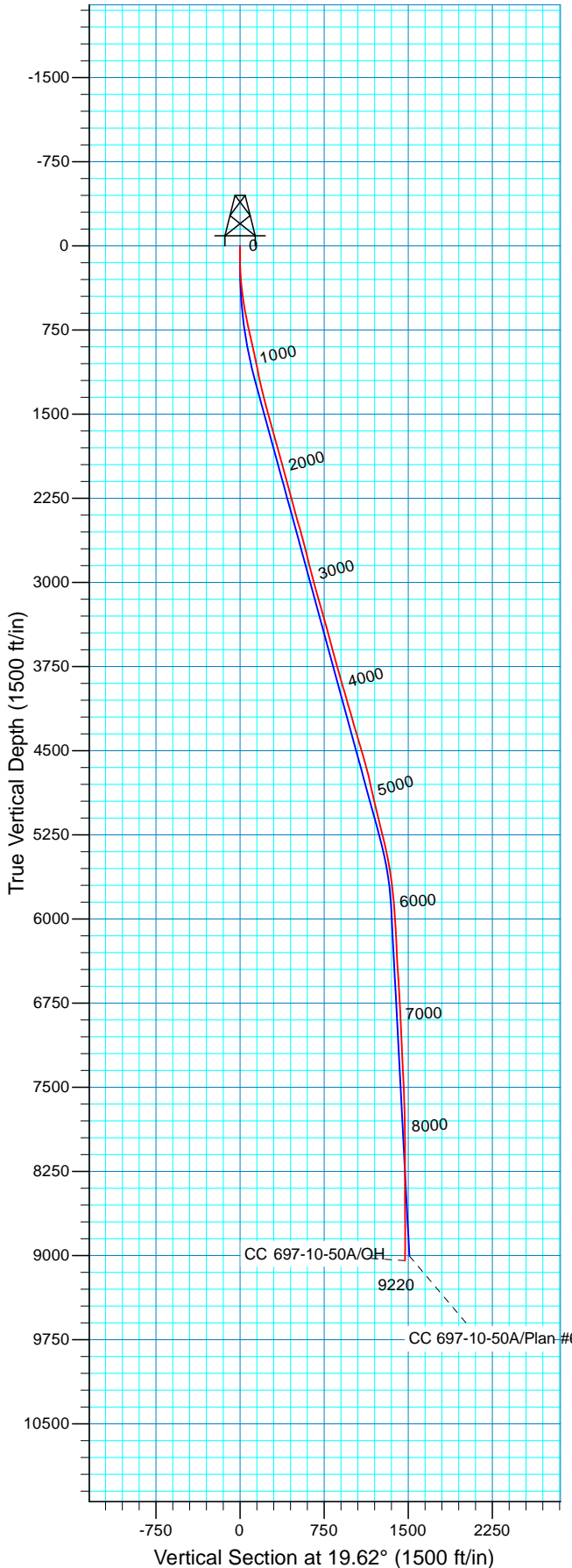
<b>Operator</b>	<u>OXY USA RMAT</u>
<b>Well Name &amp; No.</b>	<u>Cascade Creek 697-10-50A</u>
<b>County &amp; State</b>	<u>Garfield County, CO</u>
<b>SDI Job No.</b>	<u>42DEF10101132</u>
<b>Rig</b>	<u>H&amp;P 353</u>
<b>Survey Date</b>	<u>19-Oct-10</u>

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 9220 feet is true and correct as determined from all available records.

Julie Cruse  
Signature

09-Nov-10  
Date

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



WELL DETAILS: CC 697-10-50A

Ground Level: GL 8348' & RKB 30' @ 8378.00ft	
North	East
0.00	0.00
629198.97	1235026.28
39° 31' 46.614 N	108° 12' 44.545 W
C	

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-10-50A - Slot C, True North  
 Vertical (TVD) Reference: GL 8348' & RKB 30' @ 8378.00ft  
 Section (VS) Reference: Slot - C(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 697-10-50A/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: 2010-11-09



## **OXY USA RMAT**

**Garfield County, CO NAD27  
Cascade Creek 697-15-01 Pad  
CC 697-10-50A - Slot C**

**OH**

**Design: OH**

## **Standard Survey Report**

**09 November, 2010**



<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-10-50A - Slot C
<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 697-10-50A	<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		

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

Well	CC 697-10-50A - Slot C, 254' FNL 648' FWL					
Well Position	+N/-S	0.00 ft	Northing:	629,198.97 usft	Latitude:	39° 31' 46.614 N
	+E/-W	0.00 ft	Easting:	1,235,026.28 usft	Longitude:	108° 12' 44.545 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	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	2010-10-18	10.54	65.74	52,287

<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	19.62	

<b>Survey Program</b>	<b>Date</b>	2010-11-09			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
112.00	823.00	Survey #1 - Surface Gyro (OH)	Standard Keeper 103	Standard Wireline Keeper ver 1.0.3	
899.00	2,600.00	Survey #2 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	
2,789.00	9,220.00	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	
112.00	0.35	113.37	112.00	-0.14	0.31	-0.02	0.31	0.31	0.00	
143.00	0.43	33.94	143.00	-0.08	0.47	0.08	1.62	0.26	-256.23	
173.00	0.99	13.50	173.00	0.27	0.59	0.45	2.02	1.87	-68.13	
204.00	1.96	12.52	203.99	1.05	0.77	1.24	3.13	3.13	-3.16	
235.00	2.94	13.40	234.96	2.34	1.07	2.56	3.16	3.16	2.84	
266.00	3.66	19.92	265.91	4.04	1.59	4.34	2.62	2.32	21.03	
296.00	4.46	18.39	295.83	6.05	2.28	6.46	2.69	2.67	-5.10	
327.00	4.90	18.13	326.73	8.45	3.07	8.99	1.42	1.42	-0.84	

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-10-50A - Slot C
<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 697-10-50A	<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)	
358.00	5.84	18.61	357.59	11.20	3.99	11.89	3.04	3.03	1.55	
389.00	6.62	15.72	388.41	14.42	4.98	15.25	2.71	2.52	-9.32	
419.00	7.41	15.61	418.18	17.95	5.97	18.91	2.63	2.63	-0.37	
450.00	8.13	16.33	448.90	21.97	7.12	23.09	2.34	2.32	2.32	
481.00	8.61	15.31	479.57	26.32	8.35	27.59	1.62	1.55	-3.29	
512.00	8.67	14.92	510.22	30.81	9.56	32.23	0.27	0.19	-1.26	
542.00	9.31	18.97	539.85	35.29	10.93	36.91	3.00	2.13	13.50	
575.00	10.08	20.27	572.38	40.53	12.80	42.47	2.43	2.33	3.94	
636.00	11.19	18.48	632.33	51.15	16.53	53.73	1.90	1.82	-2.93	
667.00	11.45	18.38	662.72	56.92	18.45	59.81	0.84	0.84	-0.32	
698.00	12.01	18.91	693.08	62.89	20.47	66.11	1.84	1.81	1.71	
728.00	12.53	21.26	722.39	68.88	22.66	72.49	2.40	1.73	7.83	
760.00	13.09	22.88	753.59	75.45	25.33	79.57	2.08	1.75	5.06	
823.00	12.62	22.79	815.02	88.37	30.77	93.57	0.75	-0.75	-0.14	
Last Gyro Survey										
899.00	12.25	21.66	889.23	103.52	36.96	109.92	0.58	-0.49	-1.49	
First SDI MWD Survey										
993.00	12.31	21.07	981.08	122.14	44.24	129.90	0.15	0.06	-0.63	
1,088.00	11.52	20.19	1,074.03	140.49	51.16	149.51	0.85	-0.83	-0.93	
1,182.00	11.61	17.20	1,166.13	158.33	57.19	168.35	0.64	0.10	-3.18	
1,277.00	13.19	16.59	1,258.91	177.85	63.11	188.72	1.67	1.66	-0.64	
1,371.00	15.04	19.14	1,350.07	199.66	70.18	211.63	2.08	1.97	2.71	
1,466.00	14.33	17.03	1,441.96	222.54	77.66	235.70	0.94	-0.75	-2.22	
1,560.00	13.98	16.06	1,533.11	244.58	84.21	258.65	0.45	-0.37	-1.03	
1,655.00	15.65	18.43	1,624.95	267.76	91.44	282.92	1.87	1.76	2.49	
1,750.00	16.88	19.66	1,716.15	292.91	100.13	309.52	1.34	1.29	1.29	
1,844.00	16.36	20.72	1,806.22	318.14	109.40	336.41	0.64	-0.55	1.13	
1,939.00	14.95	21.60	1,897.69	342.05	118.65	362.03	1.51	-1.48	0.93	
2,033.00	16.00	20.10	1,988.28	365.49	127.56	387.10	1.20	1.12	-1.60	
2,127.00	15.39	21.07	2,078.78	389.30	136.50	412.53	0.71	-0.65	1.03	
2,222.00	13.37	24.41	2,170.80	411.06	145.57	436.08	2.30	-2.13	3.52	
2,316.00	14.77	21.33	2,261.98	432.12	154.42	458.89	1.69	1.49	-3.28	
2,411.00	15.56	21.16	2,353.67	455.29	163.43	483.73	0.83	0.83	-0.18	
2,505.00	16.97	21.07	2,443.90	479.85	172.91	510.05	1.50	1.50	-0.10	
2,600.00	15.74	21.51	2,535.06	504.77	182.62	536.79	1.30	-1.29	0.46	
Last Survey in 14 3/4" Hole										
2,789.00	14.51	24.14	2,717.51	550.23	201.70	586.01	0.75	-0.65	1.39	
First Survey in 8 3/4" Hole										
2,883.00	14.25	17.63	2,808.57	572.00	210.02	609.32	1.74	-0.28	-6.93	
2,978.00	13.98	15.35	2,900.70	594.21	216.60	632.44	0.65	-0.28	-2.40	
3,072.00	13.81	15.43	2,991.95	615.98	222.59	654.96	0.18	-0.18	0.09	
3,167.00	16.62	15.35	3,083.61	640.01	229.21	679.82	2.96	2.96	-0.08	
3,261.00	16.97	14.73	3,173.60	666.24	236.25	706.89	0.42	0.37	-0.66	
3,356.00	15.92	16.05	3,264.72	692.17	243.38	733.71	1.17	-1.11	1.39	

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-10-50A - Slot C
<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 697-10-50A	<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)
3,450.00	14.51	16.14	3,355.42	715.88	250.22	758.33	1.50	-1.50	0.10
3,545.00	14.86	17.37	3,447.32	738.94	257.16	782.38	0.49	0.37	1.29
3,639.00	14.77	16.58	3,538.19	761.92	264.18	806.39	0.24	-0.10	-0.84
3,733.00	16.53	18.86	3,628.70	786.06	271.92	831.73	1.98	1.87	2.43
3,828.00	15.65	18.95	3,719.98	810.97	280.45	858.06	0.93	-0.93	0.09
3,923.00	15.39	21.68	3,811.52	834.81	289.27	883.47	0.82	-0.27	2.87
4,017.00	15.92	19.65	3,902.03	858.54	298.22	908.83	0.81	0.56	-2.16
4,112.00	16.62	19.21	3,993.23	883.64	307.07	935.44	0.75	0.74	-0.46
4,206.00	15.65	19.21	4,083.52	908.31	315.66	961.56	1.03	-1.03	0.00
4,301.00	16.27	20.71	4,174.86	932.85	324.58	987.68	0.78	0.65	1.58
4,395.00	15.92	20.36	4,265.18	957.26	333.73	1,013.74	0.39	-0.37	-0.37
4,490.00	16.88	20.88	4,356.31	982.36	343.18	1,040.56	1.02	1.01	0.55
4,584.00	16.62	17.81	4,446.32	1,007.91	352.15	1,067.64	0.98	-0.28	-3.27
4,679.00	16.44	20.88	4,537.40	1,033.41	361.10	1,094.66	0.94	-0.19	3.23
4,774.00	15.39	21.50	4,628.76	1,057.70	370.51	1,120.70	1.12	-1.11	0.65
4,868.00	13.10	19.57	4,719.86	1,079.34	378.65	1,143.82	2.49	-2.44	-2.05
4,963.00	12.22	19.48	4,812.55	1,098.96	385.61	1,164.64	0.93	-0.93	-0.09
5,057.00	14.16	21.24	4,904.07	1,119.06	393.09	1,186.08	2.11	2.06	1.87
5,151.00	12.84	18.77	4,995.47	1,139.67	400.62	1,208.02	1.53	-1.40	-2.63
5,246.00	13.28	22.55	5,088.01	1,159.74	408.20	1,229.47	1.01	0.46	3.98
5,341.00	14.25	22.20	5,180.28	1,180.64	416.80	1,252.05	1.02	1.02	-0.37
5,435.00	13.72	22.20	5,271.50	1,201.68	425.39	1,274.74	0.56	-0.56	0.00
5,530.00	12.57	22.11	5,364.01	1,221.69	433.53	1,296.33	1.21	-1.21	-0.09
5,624.00	11.61	25.37	5,455.92	1,239.71	441.44	1,315.96	1.25	-1.02	3.47
5,718.00	9.50	28.35	5,548.33	1,255.08	449.18	1,333.04	2.32	-2.24	3.17
5,813.00	8.27	26.77	5,642.18	1,268.08	455.98	1,347.57	1.32	-1.29	-1.66
5,907.00	6.33	28.79	5,735.42	1,278.66	461.52	1,359.39	2.08	-2.06	2.15
6,002.00	5.89	30.11	5,829.88	1,287.47	466.48	1,369.36	0.49	-0.46	1.39
6,097.00	3.52	20.53	5,924.55	1,294.42	469.95	1,377.07	2.62	-2.49	-10.08
6,191.00	2.81	19.74	6,018.41	1,299.29	471.74	1,382.26	0.76	-0.76	-0.84
6,286.00	3.52	14.56	6,113.26	1,304.30	473.26	1,387.49	0.80	0.75	-5.45
6,380.00	3.08	21.15	6,207.11	1,309.45	474.90	1,392.89	0.62	-0.47	7.01
6,475.00	2.90	15.26	6,301.98	1,314.15	476.45	1,397.84	0.37	-0.19	-6.20
6,569.00	3.34	13.24	6,395.84	1,319.11	477.71	1,402.93	0.48	0.47	-2.15
6,664.00	3.78	16.40	6,490.65	1,324.81	479.22	1,408.80	0.51	0.46	3.33
6,759.00	3.43	17.10	6,585.47	1,330.53	480.94	1,414.77	0.37	-0.37	0.74
6,853.00	3.52	24.14	6,679.29	1,335.85	482.95	1,420.46	0.46	0.10	7.49
6,948.00	2.90	30.99	6,774.15	1,340.57	485.38	1,425.72	0.77	-0.65	7.21
7,042.00	2.81	25.72	6,868.03	1,344.69	487.60	1,430.34	0.30	-0.10	-5.61
7,137.00	1.93	30.99	6,962.95	1,348.16	489.44	1,434.23	0.95	-0.93	5.55
7,231.00	2.64	28.97	7,056.87	1,351.41	491.30	1,437.91	0.76	0.76	-2.15
7,326.00	2.90	25.45	7,151.76	1,355.49	493.39	1,442.46	0.33	0.27	-3.71
7,420.00	2.90	17.10	7,245.64	1,359.91	495.12	1,447.20	0.45	0.00	-8.88

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<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 697-10-50A	<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)	
7,515.00	3.17	24.40	7,340.51	1,364.60	496.91	1,452.22	0.50	0.28	7.68	
7,609.00	2.46	20.01	7,434.39	1,368.86	498.67	1,456.83	0.79	-0.76	-4.67	
7,704.00	2.11	17.10	7,529.32	1,372.45	499.88	1,460.62	0.39	-0.37	-3.06	
7,799.00	2.29	12.71	7,624.25	1,375.97	500.82	1,464.25	0.26	0.19	-4.62	
7,893.00	1.32	0.23	7,718.20	1,378.89	501.23	1,467.13	1.11	-1.03	-13.28	
7,988.00	1.14	3.83	7,813.18	1,380.92	501.30	1,469.07	0.21	-0.19	3.79	
8,082.00	0.53	345.02	7,907.17	1,382.28	501.25	1,470.33	0.70	-0.65	-20.01	
8,177.00	0.26	329.47	8,002.17	1,382.89	501.03	1,470.83	0.30	-0.28	-16.37	
8,271.00	0.79	274.71	8,096.16	1,383.12	500.27	1,470.80	0.72	0.56	-58.26	
8,366.00	0.88	230.33	8,191.15	1,382.71	499.06	1,470.01	0.67	0.09	-46.72	
8,460.00	1.06	326.04	8,285.14	1,382.97	498.02	1,469.90	1.54	0.19	101.82	
8,555.00	1.67	297.39	8,380.12	1,384.34	496.30	1,470.61	0.94	0.64	-30.16	
8,649.00	2.20	288.86	8,474.06	1,385.55	493.37	1,470.77	0.64	0.56	-9.07	
8,744.00	2.37	299.41	8,568.99	1,387.11	489.94	1,471.08	0.48	0.18	11.11	
8,839.00	2.73	296.60	8,663.89	1,389.08	486.20	1,471.69	0.40	0.38	-2.96	
8,933.00	3.08	294.14	8,757.77	1,391.12	481.90	1,472.16	0.40	0.37	-2.62	
9,028.00	3.25	290.44	8,852.63	1,393.10	477.04	1,472.40	0.28	0.18	-3.89	
9,122.00	3.17	283.68	8,946.48	1,394.65	472.02	1,472.17	0.41	-0.09	-7.19	
9,161.00	3.17	275.24	8,985.42	1,395.00	469.90	1,471.79	1.20	0.00	-21.64	
<b>Last SDI MWD Survey</b>										
9,220.00	3.17	275.24	9,044.33	1,395.30	466.65	1,470.98	0.00	0.00	0.00	
<b>Projection to TD - BHL = 630579.71 ft N, 1235534.38 ft E</b>										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
823.00	815.02	88.37	30.77	Last Gyro Survey	
899.00	889.23	103.52	36.96	First SDI MWD Survey	
2,600.00	2,535.06	504.77	182.62	Last Survey in 14 3/4" Hole	

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