



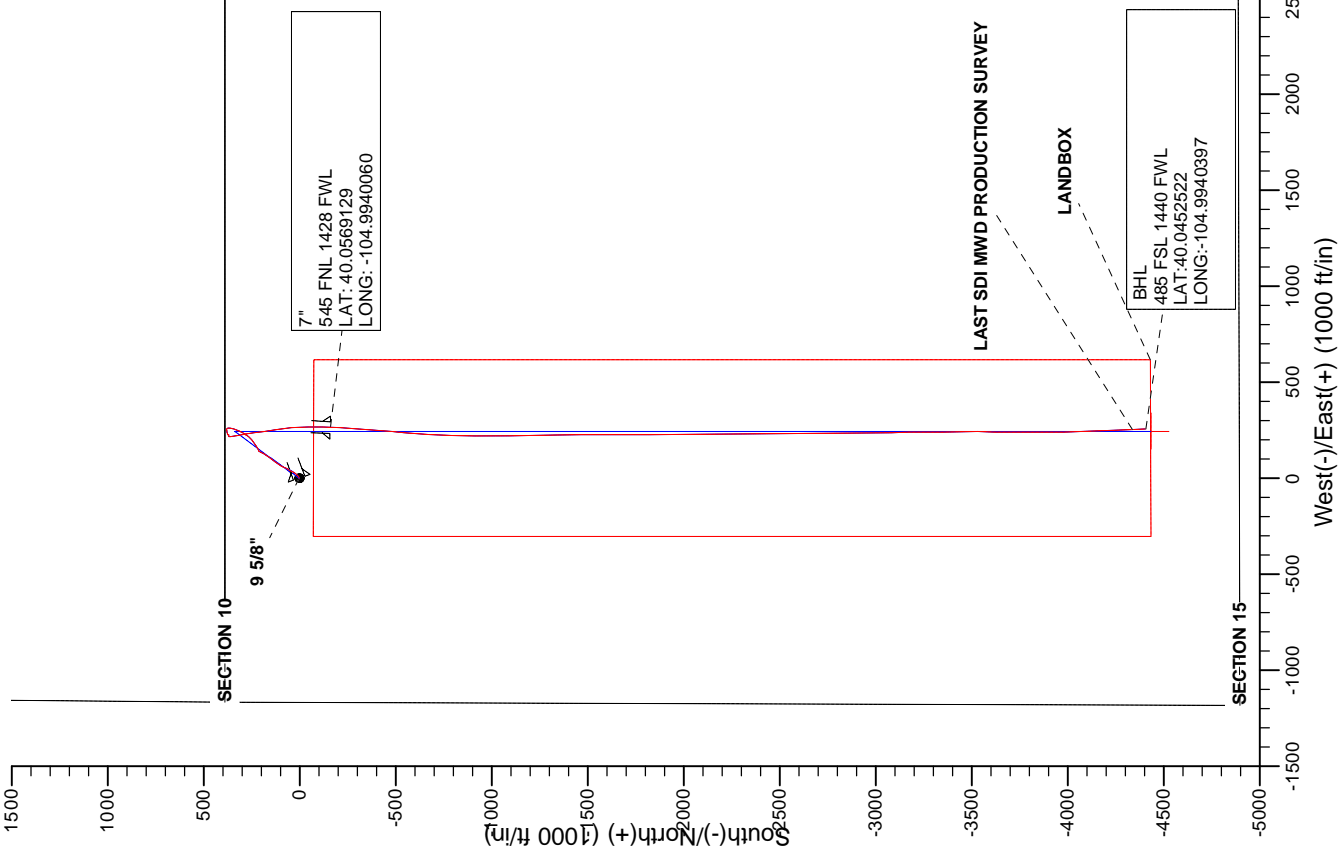
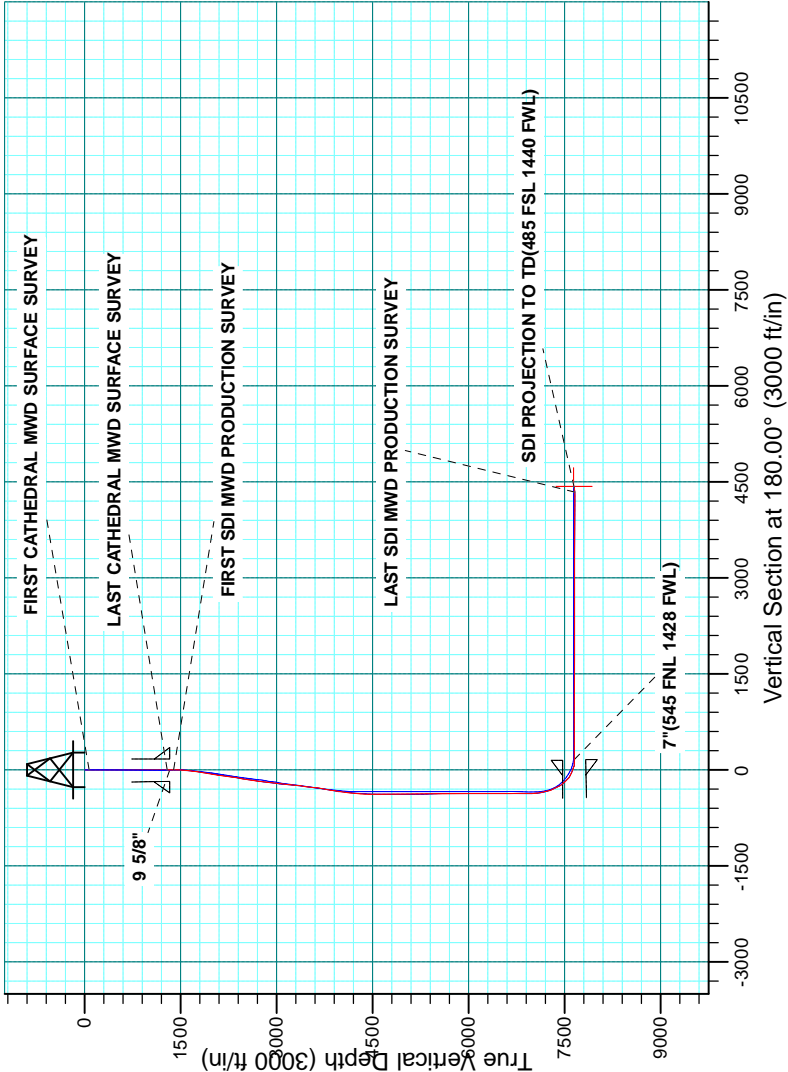
Project: COLORADO NORTHERN ZONE - 83
Site: BUFFALO & BADGER 4E-15HZ PAD
Well: BUFFALO 35N-15HZ
Wellbore: OH
Design: OH



WELL DETAILS: BUFFALO 35N-15HZ					
GL 5132 & KB 20 @ 5152.00ft (PRECISION 461)					
+N/-S 0.00	+E/-W 0.00	Northing 1264140.93	Easting 3141370.70	Latitude 40.0573509	Longitude -104.9949540

PROJECT DETAILS: COLORADO NORTHERN ZONE - 83	
Geodetic System: US State Plane 1983	
Datum: North American Datum 1983	
Ellipsoid: GRS 1980	
Zone: Colorado Northern Zone	
Location: SECTION 15 T1N R68W	
System Datum: Mean Sea Level	

CASING DETAILS		
TVD	MD	Name
1328.98	1329.00	9 5/8"
7650.69	7978.00	7"



Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well BUFFALO 35N-15HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 5132 & KB 20 @ 5152.00ft (PRECISION 461)
Site:	BUFFALO & BADGER 4E-15HZ PAD	MD Reference:	GL 5132 & KB 20 @ 5152.00ft (PRECISION 461)
Well:	BUFFALO 35N-15HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Project	COLORADO NORTHERN ZONE - 83, KERR MCGEE OIL & GAS ONSHORE LP		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		BUFFALO & BADGER 4E-15HZ PAD, SECTION 15 T1N R68W			
Site Position:		Northing:	1,264,140.95 usft	Latitude:	40.0573510
From:	Lat/Long	Easting:	3,141,370.70 usft	Longitude:	-104.9949540
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.33 °

Well	BUFFALO 35N-15HZ, 389 FNL 1169 FWL					
Well Position	+N/-S	0.00 ft	Northing:	1,264,140.92 usft	Latitude:	40.0573510
	+E/-W	0.00 ft	Easting:	3,141,370.70 usft	Longitude:	-104.9949540
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	5,132.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2013	6/5/2014	8.61	66.62	52,525

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	180.00	

Survey Program	Date	4/9/2015			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
14.00	1,289.00	Survey #1 CATHEDRAL MWD SURFACE	MWD	MWD - Standard	
1,392.00	12,228.00	Survey #2 SDI MWD PRODUCTION (OH)	MWD+IFR	MWD + IFR correction	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
14.00	0.00	0.00	14.00	0.00	0.00	0.00	0.00	0.00	0.00	
66.00	0.10	159.40	66.00	-0.04	0.02	0.04	0.19	0.19	0.00	
FIRST CATHEDRAL MWD SURFACE SURVEY										
156.00	0.30	264.40	156.00	-0.14	-0.19	0.14	0.38	0.22	116.67	
255.00	0.20	221.90	255.00	-0.29	-0.56	0.29	0.21	-0.10	-42.93	
336.00	0.20	124.50	336.00	-0.48	-0.54	0.48	0.37	0.00	-120.25	
416.00	0.10	6.80	416.00	-0.49	-0.42	0.49	0.33	-0.13	-147.13	

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Site:	BUFFALO & BADGER 4E-15HZ PAD	MD Reference:	GL 5132 & KB 20 @ 5152.00ft (PRECISION 461)
Well:	BUFFALO 35N-15HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
496.00	0.60	32.10	496.00	-0.06	-0.19	0.06	0.64	0.63	31.63
576.00	0.30	358.80	575.99	0.50	0.03	-0.50	0.48	-0.38	-41.63
656.00	0.30	88.20	655.99	0.72	0.24	-0.72	0.53	0.00	111.75
736.00	0.20	22.10	735.99	0.85	0.50	-0.85	0.36	-0.13	-82.63
816.00	0.70	37.40	815.99	1.37	0.85	-1.37	0.64	0.63	19.13
896.00	0.20	98.50	895.99	1.74	1.28	-1.74	0.79	-0.63	76.38
976.00	0.30	27.50	975.99	1.90	1.52	-1.90	0.38	0.13	-88.75
1,056.00	0.20	79.90	1,055.99	2.11	1.75	-2.11	0.30	-0.13	65.50
1,136.00	0.10	94.60	1,135.99	2.13	1.96	-2.13	0.13	-0.13	18.38
1,216.00	0.40	298.10	1,215.99	2.26	1.78	-2.26	0.62	0.38	-195.63
1,289.00	0.30	304.50	1,288.98	2.49	1.40	-2.49	0.15	-0.14	8.77
LAST CATHEDRAL MWD SURFACE SURVEY									
1,329.00	0.25	249.88	1,328.98	2.51	1.23	-2.51	0.64	-0.12	-136.54
9 5/8"									
1,392.00	0.54	204.37	1,391.98	2.20	0.98	-2.20	0.64	0.46	-72.24
FIRST SDI MWD PRODUCTION SURVEY									
1,487.00	3.08	69.03	1,486.94	2.70	3.17	-2.70	3.67	2.67	-142.46
1,576.00	5.65	50.39	1,575.68	6.35	8.78	-6.35	3.26	2.89	-20.94
1,666.00	8.45	42.46	1,664.99	14.06	16.66	-14.06	3.29	3.11	-8.81
1,756.00	9.98	38.70	1,753.83	25.02	26.00	-25.02	1.83	1.70	-4.18
1,846.00	10.57	29.09	1,842.39	38.32	34.89	-38.32	2.01	0.66	-10.68
1,935.00	10.47	23.55	1,929.90	52.87	42.09	-52.87	1.14	-0.11	-6.22
2,025.00	10.54	28.22	2,018.39	67.62	49.25	-67.62	0.95	0.08	5.19
2,115.00	10.43	29.34	2,106.89	81.97	57.14	-81.97	0.26	-0.12	1.24
2,205.00	10.04	25.85	2,195.46	96.14	64.55	-96.14	0.81	-0.43	-3.88
2,294.00	10.40	36.78	2,283.05	109.55	72.74	-109.55	2.21	0.40	12.28
2,384.00	10.44	37.95	2,371.57	122.49	82.62	-122.49	0.24	0.04	1.30
2,474.00	10.36	37.43	2,460.09	135.35	92.55	-135.35	0.14	-0.09	-0.58
2,564.00	10.01	34.75	2,548.67	148.20	101.93	-148.20	0.65	-0.39	-2.98
2,653.00	9.52	32.86	2,636.38	160.74	110.33	-160.74	0.66	-0.55	-2.12
2,743.00	10.29	31.44	2,725.04	173.85	118.57	-173.85	0.90	0.86	-1.58
2,833.00	9.39	31.54	2,813.72	186.96	126.60	-186.96	1.00	-1.00	0.11
2,923.00	8.56	23.86	2,902.62	199.35	133.15	-199.35	1.62	-0.92	-8.53
3,012.00	8.51	41.10	2,990.65	210.37	140.16	-210.37	2.86	-0.06	19.37
3,102.00	10.43	58.10	3,079.43	219.69	151.46	-219.69	3.75	2.13	18.89
3,192.00	9.30	60.54	3,168.10	227.58	164.70	-227.58	1.34	-1.26	2.71
3,282.00	11.00	57.92	3,256.69	235.71	178.31	-235.71	1.96	1.89	-2.91
3,371.00	10.84	53.87	3,344.08	245.16	192.27	-245.16	0.88	-0.18	-4.55
3,461.00	9.68	49.04	3,432.64	255.11	204.82	-255.11	1.60	-1.29	-5.37
3,551.00	9.89	42.72	3,521.33	265.75	215.77	-265.75	1.22	0.23	-7.02
3,641.00	9.60	35.06	3,610.04	277.57	225.33	-277.57	1.48	-0.32	-8.51
3,730.00	11.72	30.43	3,697.50	291.44	234.17	-291.44	2.57	2.38	-5.20

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Site:	BUFFALO & BADGER 4E-15HZ PAD	MD Reference:	GL 5132 & KB 20 @ 5152.00ft (PRECISION 461)
Well:	BUFFALO 35N-15HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
3,820.00	11.27	26.39	3,785.69	307.20	242.71	-307.20	1.02	-0.50	-4.49	
3,910.00	9.76	19.52	3,874.18	322.27	249.17	-322.27	2.18	-1.68	-7.63	
4,000.00	8.53	16.76	3,963.04	335.85	253.64	-335.85	1.45	-1.37	-3.07	
4,089.00	6.88	18.29	4,051.23	347.23	257.22	-347.23	1.87	-1.85	1.72	
4,179.00	5.72	10.96	4,140.69	356.75	259.76	-356.75	1.57	-1.29	-8.14	
4,269.00	4.78	7.24	4,230.31	364.88	261.09	-364.88	1.11	-1.04	-4.13	
4,359.00	3.85	355.16	4,320.06	371.61	261.31	-371.61	1.44	-1.03	-13.42	
4,448.00	2.10	334.08	4,408.94	376.05	260.34	-376.05	2.29	-1.97	-23.69	
4,538.00	2.07	307.34	4,498.88	378.52	258.33	-378.52	1.07	-0.03	-29.71	
4,628.00	2.11	316.45	4,588.82	380.71	255.90	-380.71	0.37	0.04	10.12	
4,718.00	1.45	248.81	4,678.78	381.50	253.69	-381.50	2.28	-0.73	-75.16	
4,808.00	1.89	252.60	4,768.74	380.64	251.21	-380.64	0.50	0.49	4.21	
4,897.00	2.29	261.30	4,857.69	379.94	248.06	-379.94	0.57	0.45	9.78	
4,987.00	2.17	259.05	4,947.62	379.34	244.61	-379.34	0.17	-0.13	-2.50	
5,077.00	2.29	263.95	5,037.55	378.83	241.14	-378.83	0.25	0.13	5.44	
5,167.00	2.74	261.31	5,127.46	378.31	237.23	-378.31	0.52	0.50	-2.93	
5,257.00	3.19	266.46	5,217.34	377.83	232.60	-377.83	0.58	0.50	5.72	
5,347.00	1.88	244.98	5,307.25	377.05	228.77	-377.05	1.77	-1.46	-23.87	
5,437.00	1.71	184.19	5,397.22	375.09	227.33	-375.09	2.02	-0.19	-67.54	
5,526.00	1.48	182.21	5,486.18	372.62	227.19	-372.62	0.27	-0.26	-2.22	
5,616.00	1.11	194.01	5,576.16	370.61	226.93	-370.61	0.50	-0.41	13.11	
5,706.00	0.60	219.20	5,666.15	369.40	226.42	-369.40	0.69	-0.57	27.99	
5,796.00	0.78	250.02	5,756.14	368.82	225.55	-368.82	0.45	0.20	34.24	
5,886.00	0.76	236.81	5,846.14	368.29	224.48	-368.29	0.20	-0.02	-14.68	
5,975.00	0.76	276.89	5,935.13	368.04	223.40	-368.04	0.59	0.00	45.03	
6,065.00	0.71	298.82	6,025.12	368.38	222.31	-368.38	0.32	-0.06	24.37	
6,155.00	1.16	281.59	6,115.11	368.83	220.93	-368.83	0.58	0.50	-19.14	
6,245.00	1.74	293.54	6,205.08	369.56	218.79	-369.56	0.72	0.64	13.28	
6,335.00	0.75	186.88	6,295.07	369.52	217.47	-369.52	2.31	-1.10	-118.51	
6,424.00	0.93	190.12	6,384.06	368.23	217.27	-368.23	0.21	0.20	3.64	
6,514.00	0.51	251.29	6,474.05	367.38	216.76	-367.38	0.91	-0.47	67.97	
6,604.00	0.36	265.21	6,564.05	367.23	216.10	-367.23	0.20	-0.17	15.47	
6,694.00	0.26	134.63	6,654.05	367.06	215.96	-367.06	0.63	-0.11	-145.09	
6,784.00	0.24	140.44	6,744.05	366.77	216.23	-366.77	0.04	-0.02	6.46	
6,873.00	0.51	64.18	6,833.04	366.80	216.70	-366.80	0.57	0.30	-85.69	
6,963.00	0.54	46.68	6,923.04	367.27	217.37	-367.27	0.18	0.03	-19.44	
7,053.00	1.89	200.06	7,013.03	366.16	217.17	-366.16	2.65	1.50	170.42	
7,143.00	8.65	170.68	7,102.60	358.08	217.76	-358.08	7.85	7.51	-32.64	
7,233.00	12.95	169.30	7,190.99	341.48	220.73	-341.48	4.79	4.78	-1.53	
7,322.00	20.24	169.73	7,276.22	316.50	225.33	-316.50	8.19	8.19	0.48	
7,412.00	25.90	170.65	7,358.99	281.76	231.31	-281.76	6.30	6.29	1.02	
7,502.00	33.03	171.22	7,437.30	238.07	238.25	-238.07	7.93	7.92	0.63	

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Well:	BUFFALO 35N-15HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
7,592.00	41.33	172.79	7,508.95	184.25	245.74	-184.25	9.28	9.22	1.74	
7,681.00	53.70	171.53	7,568.94	119.37	254.75	-119.37	13.94	13.90	-1.42	
7,771.00	66.63	175.25	7,613.63	41.98	263.55	-41.98	14.80	14.37	4.13	
7,861.00	77.02	179.12	7,641.68	-43.29	267.65	43.29	12.24	11.54	4.30	
7,934.00	89.09	182.05	7,650.49	-115.61	266.89	115.61	17.01	16.53	4.01	
7,978.00	90.40	181.94	7,650.69	-159.58	265.36	159.58	2.99	2.98	-0.25	
7"(545 FNL 1428 FWL)										
8,029.00	91.92	181.81	7,649.65	-210.54	263.69	210.54	2.99	2.98	-0.25	
8,119.00	91.48	184.31	7,646.98	-300.37	258.89	300.37	2.82	-0.49	2.78	
8,209.00	90.40	184.85	7,645.51	-390.07	251.71	390.07	1.34	-1.20	0.60	
8,299.00	89.76	184.61	7,645.38	-479.76	244.28	479.76	0.76	-0.71	-0.27	
8,388.00	90.30	184.41	7,645.33	-568.48	237.29	568.48	0.65	0.61	-0.22	
8,478.00	89.80	184.04	7,645.26	-658.24	230.66	658.24	0.69	-0.56	-0.41	
8,568.00	89.19	183.68	7,646.05	-748.03	224.60	748.03	0.79	-0.68	-0.40	
8,658.00	89.03	181.67	7,647.45	-837.92	220.40	837.92	2.24	-0.18	-2.23	
8,747.00	89.03	179.85	7,648.95	-926.89	219.22	926.89	2.04	0.00	-2.04	
8,837.00	90.30	179.48	7,649.48	-1,016.89	219.74	1,016.89	1.47	1.41	-0.41	
8,927.00	89.66	178.86	7,649.51	-1,106.88	221.05	1,106.88	0.99	-0.71	-0.69	
9,017.00	89.93	178.95	7,649.83	-1,196.86	222.77	1,196.86	0.32	0.30	0.10	
9,106.00	90.94	178.28	7,649.16	-1,285.83	224.92	1,285.83	1.36	1.13	-0.75	
9,196.00	90.54	179.23	7,648.00	-1,375.80	226.87	1,375.80	1.15	-0.44	1.06	
9,286.00	89.63	180.08	7,647.86	-1,465.80	227.42	1,465.80	1.38	-1.01	0.94	
9,376.00	89.23	180.13	7,648.76	-1,555.79	227.25	1,555.79	0.45	-0.44	0.06	
9,466.00	89.97	180.04	7,649.39	-1,645.79	227.12	1,645.79	0.83	0.82	-0.10	
9,555.00	88.89	180.27	7,650.27	-1,734.78	226.88	1,734.78	1.24	-1.21	0.26	
9,645.00	89.36	180.10	7,651.65	-1,824.77	226.59	1,824.77	0.56	0.52	-0.19	
9,735.00	89.63	179.45	7,652.44	-1,914.77	226.94	1,914.77	0.78	0.30	-0.72	
9,825.00	89.90	179.35	7,652.81	-2,004.76	227.88	2,004.76	0.32	0.30	-0.11	
9,915.00	90.23	179.35	7,652.71	-2,094.75	228.90	2,094.75	0.37	0.37	0.00	
10,004.00	90.40	179.70	7,652.22	-2,183.75	229.64	2,183.75	0.44	0.19	0.39	
10,094.00	90.71	179.40	7,651.35	-2,273.74	230.35	2,273.74	0.48	0.34	-0.33	
10,184.00	89.40	179.56	7,651.26	-2,363.74	231.16	2,363.74	1.47	-1.46	0.18	
10,274.00	90.00	179.59	7,651.73	-2,453.73	231.83	2,453.73	0.67	0.67	0.03	
10,364.00	90.40	179.11	7,651.42	-2,543.73	232.85	2,543.73	0.69	0.44	-0.53	
10,543.00	89.09	179.55	7,652.21	-2,722.71	234.95	2,722.71	0.77	-0.73	0.25	
10,723.00	89.87	179.70	7,653.85	-2,902.70	236.12	2,902.70	0.44	0.43	0.08	
10,903.00	90.74	178.94	7,652.89	-3,082.68	238.26	3,082.68	0.64	0.48	-0.42	
10,992.00	90.71	179.82	7,651.76	-3,171.66	239.22	3,171.66	0.99	-0.03	0.99	
11,082.00	89.19	179.71	7,651.84	-3,261.66	239.59	3,261.66	1.69	-1.69	-0.12	
11,172.00	90.37	178.69	7,652.19	-3,351.65	240.85	3,351.65	1.73	1.31	-1.13	
11,262.00	89.70	179.03	7,652.13	-3,441.63	242.64	3,441.63	0.83	-0.74	0.38	
11,352.00	90.47	180.50	7,652.00	-3,531.63	243.01	3,531.63	1.84	0.86	1.63	

Company:	US ROCKIES REGION PLANNING	Local Co-ordinate Reference:	Well BUFFALO 35N-15HZ
Project:	COLORADO NORTHERN ZONE - 83	TVD Reference:	GL 5132 & KB 20 @ 5152.00ft (PRECISION 461)
Site:	BUFFALO & BADGER 4E-15HZ PAD	MD Reference:	GL 5132 & KB 20 @ 5152.00ft (PRECISION 461)
Well:	BUFFALO 35N-15HZ	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Denver Sales

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,441.00	89.83	181.05	7,651.76	-3,620.62	241.80	3,620.62	0.95	-0.72	0.62
11,531.00	90.30	180.09	7,651.66	-3,710.61	240.91	3,710.61	1.19	0.52	-1.07
11,621.00	88.42	179.91	7,652.67	-3,800.60	240.91	3,800.60	2.10	-2.09	-0.20
11,711.00	89.03	179.21	7,654.67	-3,890.58	241.60	3,890.58	1.03	0.68	-0.78
11,800.00	88.79	179.26	7,656.36	-3,979.55	242.79	3,979.55	0.28	-0.27	0.06
11,890.00	89.70	178.52	7,657.55	-4,069.52	244.53	4,069.52	1.30	1.01	-0.82
11,980.00	90.34	178.50	7,657.52	-4,159.49	246.87	4,159.49	0.71	0.71	-0.02
12,070.00	91.61	178.13	7,655.99	-4,249.44	249.52	4,249.44	1.47	1.41	-0.41
12,159.00	90.77	177.48	7,654.14	-4,338.35	252.93	4,338.35	1.19	-0.94	-0.73
LAST SDI MWD PRODUCTION SURVEY									
12,228.00	90.77	177.48	7,653.21	-4,407.28	255.96	4,407.28	0.00	0.00	0.00
SDI PROJECTION TO TD(485 FSL 1440 FWL)									

Casing Points					
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)	
1,329.00	1,328.98	9 5/8"	9.625	13.500	
7,978.00	7,650.69	7"(545 FNL 1428 FWL)	7.000	8.750	

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
66.00	66.00	-0.04	0.02	FIRST CATHEDRAL MWD SURFACE SURVEY	
1,289.00	1,288.98	2.49	1.40	LAST CATHEDRAL MWD SURFACE SURVEY	
1,392.00	1,391.98	2.20	0.98	FIRST SDI MWD PRODUCTION SURVEY	
12,159.00	7,654.14	-4,338.35	252.93	LAST SDI MWD PRODUCTION SURVEY	
12,228.00	7,653.21	-4,407.28	255.96	SDI PROJECTION TO TD(485 FSL 1440 FWL)	

Checked By: _____ Approved By: _____ Date: _____