

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 18-T2N-R65W

Crowder 38N-19HZ

Plan A Rev 0

Plan: Plan A Rev 0 Permit

Sperry Drilling Services

Proposal Report

24 July, 2012

Well Coordinates: 1,296,457.48 N, 3,223,550.51 E (40° 08' 39.85" N, 104° 42' 01.22" W)

Ground Level: 4,952.00 ft

Local Coordinate Origin: Centered on Well Crowder 38N-19HZ

Viewing Datum: RKB=16ft @ 4968.00ft (Drilling Rig)

TVDs to System: N

North Reference: True

Unit System: API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 18-T2N-R65W
 Well: Crowder 38N-19HZ
 Wellbore: Plan A Rev 0
 Design: Plan A Rev 0 Permit

Anadarko Petroleum Corp.

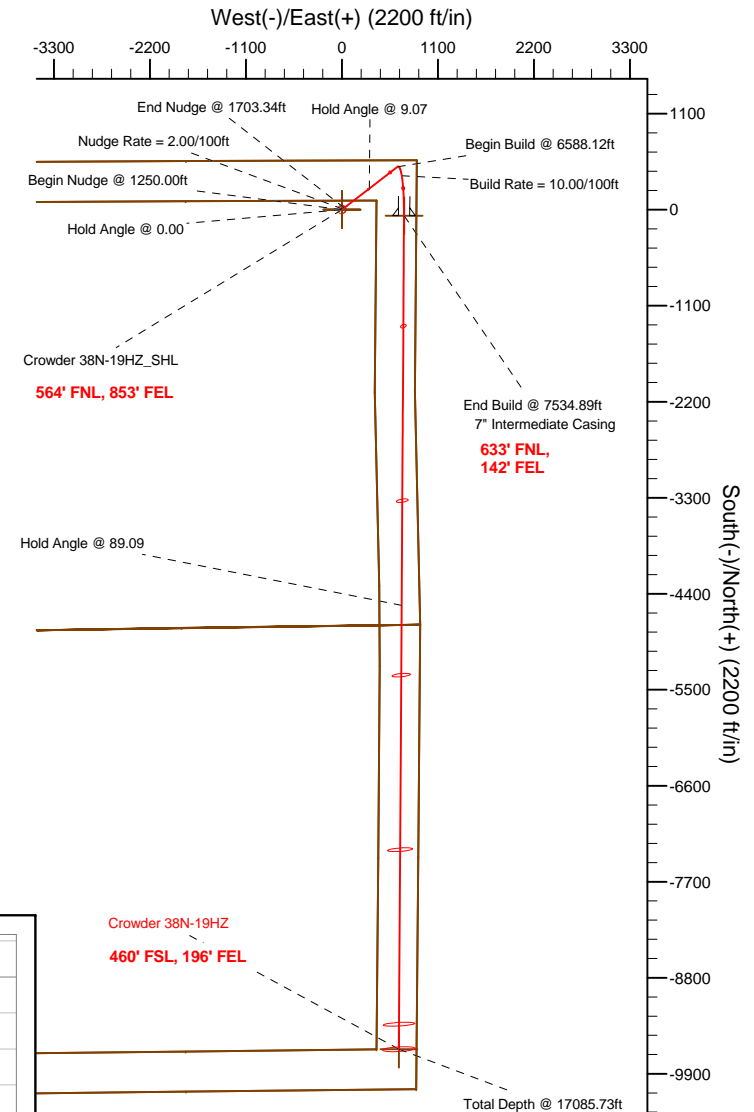
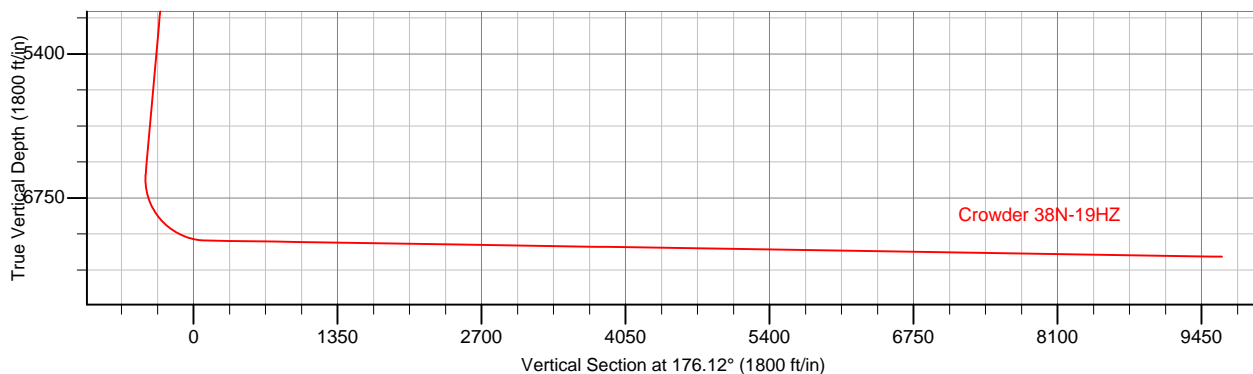
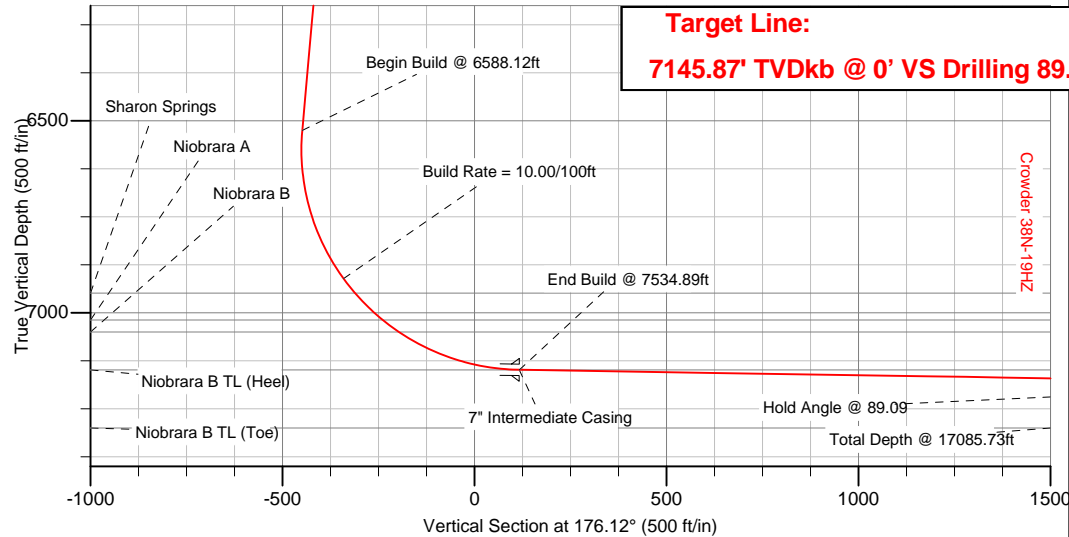


SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1250.00	0.00	0.00	1250.00	0.00	0.00	0.00	0.00	0.00	
3	1703.34	9.07	52.29	1701.45	21.89	28.32	2.00	52.29	-19.93	
4	6588.12	9.07	52.29	6525.20	492.72	637.31	0.00	0.00	-448.48	
5	7534.89	89.09	180.35	7149.00	-69.00	711.00	10.00	127.83	116.94	Crowder 38N-19HZ_Casing Point
6	17085.73	89.09	180.35	7300.00	-9618.47	652.21	0.00	0.00	9640.55	Crowder 38N-19HZ_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Crowder 38N-19HZ_Section 18/19 Line	0.00	0.00	0.00	40.144403	-104.700339	Polygon
Crowder 38N-19HZ_Section Lines	0.00	0.00	0.00	40.144403	-104.700339	Polygon
Crowder 38N-19HZ_Setback Lines	0.00	0.00	0.00	40.144403	-104.700339	Polygon
Crowder 38N-19HZ_SHL	0.00	0.00	0.00	40.144403	-104.700339	Point
Crowder 38N-19HZ_Casing Point	7149.00	-69.00	711.00	40.144214	-104.697796	Point
Crowder 38N-19HZ_BHL	7300.00	-9618.47	652.21	40.118000	-104.698007	Point



WELL DETAILS: Crowder 38N-19HZ

Ground Level: 4952.00 RKB=16ft @ 4968.00ft (Drilling Rig)

Plan: Plan A Rev 0 Permit (Crowder 38N-19HZ/Plan A Rev 0)

Created By: Fred Hartmann Date: 07/23/2012
 Reviewed: _____ Date: _____

Plan Report for Crowder 38N-19HZ - Plan A Rev 0 Permit

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)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crowder 38N-19HZ_SHL - Crowder 38N-19HZ_Section 18/19 Line - Crowder 38N-19HZ_Section Lines - Crowder 38N-19HZ_Setb:										
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hold Angle @ 0.00										
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,250.00	0.00	0.00	1,250.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin Nudge @ 1250.00ft										
1,300.00	1.00	52.29	1,300.00	0.27	0.35	-0.24	2.00	2.00	0.00	52.29
1,400.00	3.00	52.29	1,399.93	2.40	3.11	-2.19	2.00	2.00	0.00	0.00
1,500.00	5.00	52.29	1,499.68	6.67	8.62	-6.07	2.00	2.00	0.00	0.00
Nudge Rate = 2.00/100ft										
1,600.00	7.00	52.29	1,599.13	13.06	16.89	-11.89	2.00	2.00	0.00	0.00
1,700.00	9.00	52.29	1,698.15	21.57	27.90	-19.64	2.00	2.00	0.00	0.00
1,703.34	9.07	52.29	1,701.45	21.89	28.32	-19.93	2.00	2.00	0.00	0.00
End Nudge @ 1703.34ft										
1,800.00	9.07	52.29	1,796.90	31.21	40.37	-28.41	0.00	0.00	0.00	0.00
1,900.00	9.07	52.29	1,895.65	40.85	52.84	-37.18	0.00	0.00	0.00	0.00
2,000.00	9.07	52.29	1,994.40	50.49	65.30	-45.95	0.00	0.00	0.00	0.00
2,100.00	9.07	52.29	2,093.15	60.13	77.77	-54.73	0.00	0.00	0.00	0.00
2,200.00	9.07	52.29	2,191.90	69.77	90.24	-63.50	0.00	0.00	0.00	0.00
2,300.00	9.07	52.29	2,290.66	79.40	102.71	-72.27	0.00	0.00	0.00	0.00
2,400.00	9.07	52.29	2,389.41	89.04	115.17	-81.05	0.00	0.00	0.00	0.00
2,500.00	9.07	52.29	2,488.16	98.68	127.64	-89.82	0.00	0.00	0.00	0.00
2,600.00	9.07	52.29	2,586.91	108.32	140.11	-98.59	0.00	0.00	0.00	0.00
2,700.00	9.07	52.29	2,685.66	117.96	152.57	-107.37	0.00	0.00	0.00	0.00
2,800.00	9.07	52.29	2,784.41	127.60	165.04	-116.14	0.00	0.00	0.00	0.00
2,900.00	9.07	52.29	2,883.16	137.24	177.51	-124.91	0.00	0.00	0.00	0.00
3,000.00	9.07	52.29	2,981.91	146.87	189.98	-133.69	0.00	0.00	0.00	0.00
3,100.00	9.07	52.29	3,080.66	156.51	202.44	-142.46	0.00	0.00	0.00	0.00
3,200.00	9.07	52.29	3,179.41	166.15	214.91	-151.23	0.00	0.00	0.00	0.00
3,300.00	9.07	52.29	3,278.16	175.79	227.38	-160.01	0.00	0.00	0.00	0.00
3,400.00	9.07	52.29	3,376.91	185.43	239.84	-168.78	0.00	0.00	0.00	0.00
3,500.00	9.07	52.29	3,475.66	195.07	252.31	-177.55	0.00	0.00	0.00	0.00
3,600.00	9.07	52.29	3,574.41	204.71	264.78	-186.32	0.00	0.00	0.00	0.00
3,700.00	9.07	52.29	3,673.16	214.35	277.25	-195.10	0.00	0.00	0.00	0.00
3,800.00	9.07	52.29	3,771.91	223.98	289.71	-203.87	0.00	0.00	0.00	0.00
3,900.00	9.07	52.29	3,870.66	233.62	302.18	-212.64	0.00	0.00	0.00	0.00
3,983.38	9.07	52.29	3,953.00	241.66	312.57	-219.96	0.00	0.00	0.00	0.00
Parkman										
4,000.00	9.07	52.29	3,969.41	243.26	314.65	-221.42	0.00	0.00	0.00	0.00
Hold Angle @ 9.07										
4,100.00	9.07	52.29	4,068.16	252.90	327.11	-230.19	0.00	0.00	0.00	0.00
4,200.00	9.07	52.29	4,166.92	262.54	339.58	-238.96	0.00	0.00	0.00	0.00
4,300.00	9.07	52.29	4,265.67	272.18	352.05	-247.74	0.00	0.00	0.00	0.00
4,400.00	9.07	52.29	4,364.42	281.82	364.52	-256.51	0.00	0.00	0.00	0.00
4,500.00	9.07	52.29	4,463.17	291.45	376.98	-265.28	0.00	0.00	0.00	0.00
4,584.89	9.07	52.29	4,547.00	299.64	387.57	-272.73	0.00	0.00	0.00	0.00
Sussex										

Plan Report for Crowder 38N-19HZ - Plan A Rev 0 Permit

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)	Toolface Azimuth (°)
4,600.00	9.07	52.29	4,561.92	301.09	389.45	-274.06	0.00	0.00	0.00	0.00
4,700.00	9.07	52.29	4,660.67	310.73	401.92	-282.83	0.00	0.00	0.00	0.00
4,800.00	9.07	52.29	4,759.42	320.37	414.38	-291.60	0.00	0.00	0.00	0.00
4,900.00	9.07	52.29	4,858.17	330.01	426.85	-300.38	0.00	0.00	0.00	0.00
5,000.00	9.07	52.29	4,956.92	339.65	439.32	-309.15	0.00	0.00	0.00	0.00
5,100.00	9.07	52.29	5,055.67	349.29	451.79	-317.92	0.00	0.00	0.00	0.00
5,200.00	9.07	52.29	5,154.42	358.93	464.25	-326.70	0.00	0.00	0.00	0.00
5,300.00	9.07	52.29	5,253.17	368.56	476.72	-335.47	0.00	0.00	0.00	0.00
5,400.00	9.07	52.29	5,351.92	378.20	489.19	-344.24	0.00	0.00	0.00	0.00
5,500.00	9.07	52.29	5,450.67	387.84	501.66	-353.01	0.00	0.00	0.00	0.00
5,600.00	9.07	52.29	5,549.42	397.48	514.12	-361.79	0.00	0.00	0.00	0.00
5,700.00	9.07	52.29	5,648.17	407.12	526.59	-370.56	0.00	0.00	0.00	0.00
5,800.00	9.07	52.29	5,746.92	416.76	539.06	-379.33	0.00	0.00	0.00	0.00
5,900.00	9.07	52.29	5,845.67	426.40	551.52	-388.11	0.00	0.00	0.00	0.00
6,000.00	9.07	52.29	5,944.42	436.04	563.99	-396.88	0.00	0.00	0.00	0.00
6,100.00	9.07	52.29	6,043.17	445.67	576.46	-405.65	0.00	0.00	0.00	0.00
6,200.00	9.07	52.29	6,141.93	455.31	588.93	-414.43	0.00	0.00	0.00	0.00
6,300.00	9.07	52.29	6,240.68	464.95	601.39	-423.20	0.00	0.00	0.00	0.00
6,400.00	9.07	52.29	6,339.43	474.59	613.86	-431.97	0.00	0.00	0.00	0.00
6,500.00	9.07	52.29	6,438.18	484.23	626.33	-440.75	0.00	0.00	0.00	0.00
6,588.12	9.07	52.29	6,525.20	492.72	637.31	-448.48	0.00	0.00	0.00	0.00
Begin Build @ 6588.12ft										
6,600.00	8.39	58.73	6,536.94	493.74	638.79	-449.40	10.00	-5.69	54.23	127.83
6,700.00	9.07	128.69	6,636.03	492.60	651.22	-447.42	10.00	0.68	69.95	121.46
6,800.00	17.12	156.44	6,733.44	474.13	663.29	-428.17	10.00	8.05	27.75	52.13
6,900.00	26.51	165.90	6,826.20	438.90	674.64	-392.26	10.00	9.39	9.47	25.01
7,000.00	36.22	170.60	6,911.49	387.98	684.92	-340.75	10.00	9.70	4.70	16.19
Build Rate = 10.00/100ft										
7,047.98	40.92	172.14	6,949.00	358.41	689.39	-310.95	10.00	9.80	3.21	12.16
Sharon Springs										
7,100.00	46.03	173.52	6,986.74	322.91	693.83	-275.23	10.00	9.83	2.64	10.96
7,148.64	50.83	174.60	7,019.00	286.73	697.59	-238.88	10.00	9.86	2.23	9.96
Niobrara A										
7,200.00	55.90	175.59	7,049.64	245.68	701.10	-197.68	10.00	9.88	1.94	9.24
7,200.64	55.97	175.61	7,050.00	245.15	701.14	-197.15	10.00	9.89	1.81	8.65
Niobrara B										
7,300.00	65.80	177.23	7,098.29	158.62	706.49	-110.46	10.00	9.90	1.64	8.64
7,400.00	75.71	178.64	7,131.21	64.39	709.85	-16.22	10.00	9.91	1.40	7.84
7,500.00	85.63	179.92	7,147.40	-34.16	711.08	82.18	10.00	9.92	1.28	7.38
7,534.89	89.09	180.35	7,149.00	-69.00	711.00	116.94	10.00	9.92	1.25	7.17
End Build @ 7534.89ft - Niobrara B TL (Heel) - 7" Intermediate Casing - Crowder 38N-19HZ_Casing Point										
7,600.00	89.09	180.35	7,150.03	-134.10	710.60	181.87	0.00	0.00	0.00	7.15
7,700.00	89.09	180.35	7,151.61	-234.09	709.98	281.59	0.00	0.00	0.00	0.00
7,800.00	89.09	180.35	7,153.19	-334.07	709.37	381.30	0.00	0.00	0.00	0.00
7,900.00	89.09	180.35	7,154.77	-434.06	708.75	481.02	0.00	0.00	0.00	0.00
8,000.00	89.09	180.35	7,156.35	-534.05	708.14	580.73	0.00	0.00	0.00	0.00
8,100.00	89.09	180.35	7,157.93	-634.03	707.52	680.44	0.00	0.00	0.00	0.00
8,200.00	89.09	180.35	7,159.52	-734.02	706.91	780.16	0.00	0.00	0.00	0.00
8,300.00	89.09	180.35	7,161.10	-834.00	706.29	879.87	0.00	0.00	0.00	0.00
8,400.00	89.09	180.35	7,162.68	-933.99	705.68	979.59	0.00	0.00	0.00	0.00
8,500.00	89.09	180.35	7,164.26	-1,033.97	705.06	1,079.30	0.00	0.00	0.00	0.00
8,600.00	89.09	180.35	7,165.84	-1,133.96	704.44	1,179.02	0.00	0.00	0.00	0.00
8,700.00	89.09	180.35	7,167.42	-1,233.95	703.83	1,278.73	0.00	0.00	0.00	0.00
8,800.00	89.09	180.35	7,169.00	-1,333.93	703.21	1,378.45	0.00	0.00	0.00	0.00
8,900.00	89.09	180.35	7,170.58	-1,433.92	702.60	1,478.16	0.00	0.00	0.00	0.00
9,000.00	89.09	180.35	7,172.16	-1,533.90	701.98	1,577.88	0.00	0.00	0.00	0.00
9,100.00	89.09	180.35	7,173.74	-1,633.89	701.37	1,677.59	0.00	0.00	0.00	0.00
9,200.00	89.09	180.35	7,175.33	-1,733.87	700.75	1,777.31	0.00	0.00	0.00	0.00
9,300.00	89.09	180.35	7,176.91	-1,833.86	700.14	1,877.02	0.00	0.00	0.00	0.00

Plan Report for Crowder 38N-19HZ - Plan A Rev 0 Permit

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)	Toolface Azimuth (°)
9,400.00	89.09	180.35	7,178.49	-1,933.84	699.52	1,976.74	0.00	0.00	0.00	0.00
9,500.00	89.09	180.35	7,180.07	-2,033.83	698.90	2,076.45	0.00	0.00	0.00	0.00
9,600.00	89.09	180.35	7,181.65	-2,133.82	698.29	2,176.17	0.00	0.00	0.00	0.00
9,700.00	89.09	180.35	7,183.23	-2,233.80	697.67	2,275.88	0.00	0.00	0.00	0.00
9,800.00	89.09	180.35	7,184.81	-2,333.79	697.06	2,375.60	0.00	0.00	0.00	0.00
9,900.00	89.09	180.35	7,186.39	-2,433.77	696.44	2,475.31	0.00	0.00	0.00	0.00
10,000.00	89.09	180.35	7,187.97	-2,533.76	695.83	2,575.03	0.00	0.00	0.00	0.00
10,100.00	89.09	180.35	7,189.55	-2,633.74	695.21	2,674.74	0.00	0.00	0.00	0.00
10,200.00	89.09	180.35	7,191.14	-2,733.73	694.60	2,774.46	0.00	0.00	0.00	0.00
10,300.00	89.09	180.35	7,192.72	-2,833.71	693.98	2,874.17	0.00	0.00	0.00	0.00
10,400.00	89.09	180.35	7,194.30	-2,933.70	693.37	2,973.89	0.00	0.00	0.00	0.00
10,500.00	89.09	180.35	7,195.88	-3,033.69	692.75	3,073.60	0.00	0.00	0.00	0.00
10,600.00	89.09	180.35	7,197.46	-3,133.67	692.13	3,173.32	0.00	0.00	0.00	0.00
10,700.00	89.09	180.35	7,199.04	-3,233.66	691.52	3,273.03	0.00	0.00	0.00	0.00
10,800.00	89.09	180.35	7,200.62	-3,333.64	690.90	3,372.75	0.00	0.00	0.00	0.00
10,900.00	89.09	180.35	7,202.20	-3,433.63	690.29	3,472.46	0.00	0.00	0.00	0.00
11,000.00	89.09	180.35	7,203.78	-3,533.61	689.67	3,572.18	0.00	0.00	0.00	0.00
11,100.00	89.09	180.35	7,205.36	-3,633.60	689.06	3,671.89	0.00	0.00	0.00	0.00
11,200.00	89.09	180.35	7,206.95	-3,733.59	688.44	3,771.61	0.00	0.00	0.00	0.00
11,300.00	89.09	180.35	7,208.53	-3,833.57	687.83	3,871.32	0.00	0.00	0.00	0.00
11,400.00	89.09	180.35	7,210.11	-3,933.56	687.21	3,971.04	0.00	0.00	0.00	0.00
11,500.00	89.09	180.35	7,211.69	-4,033.54	686.59	4,070.75	0.00	0.00	0.00	0.00
11,600.00	89.09	180.35	7,213.27	-4,133.53	685.98	4,170.47	0.00	0.00	0.00	0.00
11,700.00	89.09	180.35	7,214.85	-4,233.51	685.36	4,270.18	0.00	0.00	0.00	0.00
11,800.00	89.09	180.35	7,216.43	-4,333.50	684.75	4,369.90	0.00	0.00	0.00	0.00
11,900.00	89.09	180.35	7,218.01	-4,433.48	684.13	4,469.61	0.00	0.00	0.00	0.00
12,000.00	89.09	180.35	7,219.59	-4,533.47	683.52	4,569.33	0.00	0.00	0.00	0.00
Hold Angle @ 89.09										
12,100.00	89.09	180.35	7,221.18	-4,633.46	682.90	4,669.04	0.00	0.00	0.00	0.00
12,200.00	89.09	180.35	7,222.76	-4,733.44	682.29	4,768.76	0.00	0.00	0.00	0.00
12,300.00	89.09	180.35	7,224.34	-4,833.43	681.67	4,868.47	0.00	0.00	0.00	0.00
12,400.00	89.09	180.35	7,225.92	-4,933.41	681.06	4,968.19	0.00	0.00	0.00	0.00
12,500.00	89.09	180.35	7,227.50	-5,033.40	680.44	5,067.90	0.00	0.00	0.00	0.00
12,600.00	89.09	180.35	7,229.08	-5,133.38	679.82	5,167.61	0.00	0.00	0.00	0.00
12,700.00	89.09	180.35	7,230.66	-5,233.37	679.21	5,267.33	0.00	0.00	0.00	0.00
12,800.00	89.09	180.35	7,232.24	-5,333.35	678.59	5,367.04	0.00	0.00	0.00	0.00
12,900.00	89.09	180.35	7,233.82	-5,433.34	677.98	5,466.76	0.00	0.00	0.00	0.00
13,000.00	89.09	180.35	7,235.40	-5,533.33	677.36	5,566.47	0.00	0.00	0.00	0.00
13,100.00	89.09	180.35	7,236.99	-5,633.31	676.75	5,666.19	0.00	0.00	0.00	0.00
13,200.00	89.09	180.35	7,238.57	-5,733.30	676.13	5,765.90	0.00	0.00	0.00	0.00
13,300.00	89.09	180.35	7,240.15	-5,833.28	675.52	5,865.62	0.00	0.00	0.00	0.00
13,400.00	89.09	180.35	7,241.73	-5,933.27	674.90	5,965.33	0.00	0.00	0.00	0.00
13,500.00	89.09	180.35	7,243.31	-6,033.25	674.28	6,065.05	0.00	0.00	0.00	0.00
13,600.00	89.09	180.35	7,244.89	-6,133.24	673.67	6,164.76	0.00	0.00	0.00	0.00
13,700.00	89.09	180.35	7,246.47	-6,233.23	673.05	6,264.48	0.00	0.00	0.00	0.00
13,800.00	89.09	180.35	7,248.05	-6,333.21	672.44	6,364.19	0.00	0.00	0.00	0.00
13,900.00	89.09	180.35	7,249.63	-6,433.20	671.82	6,463.91	0.00	0.00	0.00	0.00
14,000.00	89.09	180.35	7,251.21	-6,533.18	671.21	6,563.62	0.00	0.00	0.00	0.00
14,100.00	89.09	180.35	7,252.80	-6,633.17	670.59	6,663.34	0.00	0.00	0.00	0.00
14,200.00	89.09	180.35	7,254.38	-6,733.15	669.98	6,763.05	0.00	0.00	0.00	0.00
14,300.00	89.09	180.35	7,255.96	-6,833.14	669.36	6,862.77	0.00	0.00	0.00	0.00
14,400.00	89.09	180.35	7,257.54	-6,933.12	668.75	6,962.48	0.00	0.00	0.00	0.00
14,500.00	89.09	180.35	7,259.12	-7,033.11	668.13	7,062.20	0.00	0.00	0.00	0.00
14,600.00	89.09	180.35	7,260.70	-7,133.10	667.51	7,161.91	0.00	0.00	0.00	0.00
14,700.00	89.09	180.35	7,262.28	-7,233.08	666.90	7,261.63	0.00	0.00	0.00	0.00
14,800.00	89.09	180.35	7,263.86	-7,333.07	666.28	7,361.34	0.00	0.00	0.00	0.00
14,900.00	89.09	180.35	7,265.44	-7,433.05	665.67	7,461.06	0.00	0.00	0.00	0.00
15,000.00	89.09	180.35	7,267.02	-7,533.04	665.05	7,560.77	0.00	0.00	0.00	0.00
15,100.00	89.09	180.35	7,268.61	-7,633.02	664.44	7,660.49	0.00	0.00	0.00	0.00

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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)	Toolface Azimuth (°)
15,200.00	89.09	180.35	7,270.19	-7,733.01	663.82	7,760.20	0.00	0.00	0.00	0.00
15,300.00	89.09	180.35	7,271.77	-7,833.00	663.21	7,859.92	0.00	0.00	0.00	0.00
15,400.00	89.09	180.35	7,273.35	-7,932.98	662.59	7,959.63	0.00	0.00	0.00	0.00
15,500.00	89.09	180.35	7,274.93	-8,032.97	661.97	8,059.35	0.00	0.00	0.00	0.00
15,600.00	89.09	180.35	7,276.51	-8,132.95	661.36	8,159.06	0.00	0.00	0.00	0.00
15,700.00	89.09	180.35	7,278.09	-8,232.94	660.74	8,258.78	0.00	0.00	0.00	0.00
15,800.00	89.09	180.35	7,279.67	-8,332.92	660.13	8,358.49	0.00	0.00	0.00	0.00
15,900.00	89.09	180.35	7,281.25	-8,432.91	659.51	8,458.21	0.00	0.00	0.00	0.00
16,000.00	89.09	180.35	7,282.83	-8,532.89	658.90	8,557.92	0.00	0.00	0.00	0.00
16,100.00	89.09	180.35	7,284.42	-8,632.88	658.28	8,657.64	0.00	0.00	0.00	0.00
16,200.00	89.09	180.35	7,286.00	-8,732.87	657.67	8,757.35	0.00	0.00	0.00	0.00
16,300.00	89.09	180.35	7,287.58	-8,832.85	657.05	8,857.07	0.00	0.00	0.00	0.00
16,400.00	89.09	180.35	7,289.16	-8,932.84	656.44	8,956.78	0.00	0.00	0.00	0.00
16,500.00	89.09	180.35	7,290.74	-9,032.82	655.82	9,056.50	0.00	0.00	0.00	0.00
16,600.00	89.09	180.35	7,292.32	-9,132.81	655.20	9,156.21	0.00	0.00	0.00	0.00
16,700.00	89.09	180.35	7,293.90	-9,232.79	654.59	9,255.93	0.00	0.00	0.00	0.00
16,800.00	89.09	180.35	7,295.48	-9,332.78	653.97	9,355.64	0.00	0.00	0.00	0.00
16,900.00	89.09	180.35	7,297.06	-9,432.76	653.36	9,455.36	0.00	0.00	0.00	0.00
17,000.00	89.09	180.35	7,298.64	-9,532.75	652.74	9,555.07	0.00	0.00	0.00	0.00
17,085.73	89.09	180.35	7,300.00	-9,618.47	652.21	9,640.55	0.00	0.00	0.00	0.00
Niobrara B TL (Toe) - Crowder 38N-19HZ_BHL										

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
600.00	600.00	0.00	0.00	Hold Angle @ 0.00
1,250.00	1,250.00	0.00	0.00	Begin Nudge @ 1250.00ft
1,500.00	1,499.68	6.67	8.62	Nudge Rate = 2.00/100ft
1,703.34	1,701.45	21.89	28.32	End Nudge @ 1703.34ft
4,000.00	3,969.41	243.26	314.65	Hold Angle @ 9.07
6,588.12	6,525.20	492.72	637.31	Begin Build @ 6588.12ft
7,000.00	6,911.49	387.98	684.92	Build Rate = 10.00/100ft
7,534.89	7,149.00	-69.00	711.00	End Build @ 7534.89ft
12,000.00	7,219.59	-4,533.47	683.52	Hold Angle @ 89.09
17,085.73	7,300.00	-9,618.47	652.21	Total Depth @ 17085.73ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Crowder 38N-19HZ_BHL	176.12	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	17,085.73	Plan A Rev 0 Permit	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,534.89	7,149.00	7" Intermediate Casing	7	8-3/4

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Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,983.38	3,953.00	Parkman		0.00	
4,584.89	4,547.00	Sussex		0.00	
7,047.98	6,949.00	Sharon Springs		0.00	
7,148.64	7,019.00	Niobrara A		0.00	
7,200.64	7,050.00	Niobrara B		0.00	
7,534.89	7,149.00	Niobrara B TL (Heel)		0.00	
17,085.73	7,300.00	Niobrara B TL (Toe)		0.00	

Targets associated with this wellbore

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
Crowder 38N-19HZ_Section 18/19 Line	0.00	0.00	0.00	Polygon
Crowder 38N-19HZ_Setback Lines	0.00	0.00	0.00	Polygon
Crowder 38N-19HZ_Casing Point	7,149.00	-69.00	711.00	Point
Crowder 38N-19HZ_Section Lines	0.00	0.00	0.00	Polygon
Crowder 38N-19HZ_SHL	0.00	0.00	0.00	Point
Crowder 38N-19HZ_BHL	7,300.00	-9,618.47	652.21	Point

North Reference Sheet for Sec. 18-T2N-R65W - Crowder 38N-19HZ - Plan A Rev 0

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.
Vertical Depths are relative to RKB=16ft @ 4968.00ft (Drilling Rig). Northing and Easting are relative to Crowder 38N-19HZ
Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)
Central Meridian is -105.50°, Longitude Origin:0.000000°, Latitude Origin:40.783333°
False Easting: 3,000,000.000644ft, False Northing: 1,000,000.001308ft, Scale Reduction: 0.99995856

Grid Coordinates of Well: 1,296,457.476345 ft N, 3,223,550.505336 ft E
Geographical Coordinates of Well: 40° 08' 39.85" N, 104° 42' 01.22" W
Grid Convergence at Surface is: 0.52°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,085.73ft
the Bottom Hole Displacement is 9,640.55ft in the Direction of 176.12° (True).

Magnetic Convergence at surface is: -8.13° (24 July 2012, , BGGM2011)

