

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 21-T1N-R67W

Howard 3N-21HZ

Plan A Rev 0

Plan: Plan A Rev 0 Permit

## Sperry Drilling Services

# Proposal Report

20 December, 2012

Well Coordinates: 1,254,559.56 N, 3,168,292.42 E (40° 01' 50.12" N, 104° 53' 56.44" W)

Ground Level: 5,024.00 ft

Local Coordinate Origin:	Centered on Well Howard 3N-21HZ
Viewing Datum:	RKB=17 @ 5041.00ft (Drilling Rig)
TVDs to System:	N
North Reference:	True
Unit System:	API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

**HALLIBURTON**

Project: Weld County, CO (NAD 83)  
 Site: Sec. 21-T1N-R67W  
 Well: Howard 3N-21HZ  
 Wellbore: Plan A Rev 0  
 Design: Plan A Rev 0 Permit

# Anadarko Petroleum Corp.

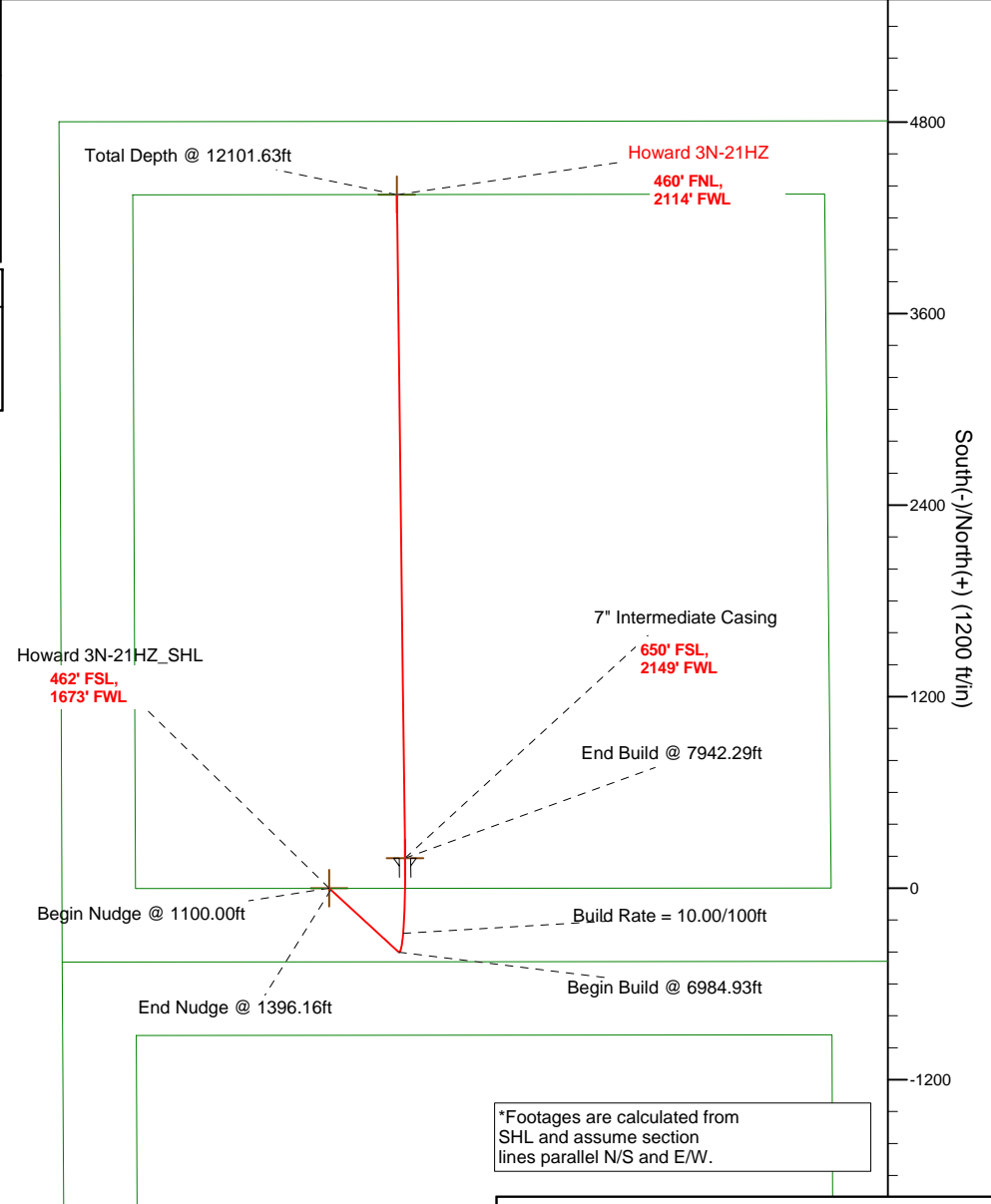
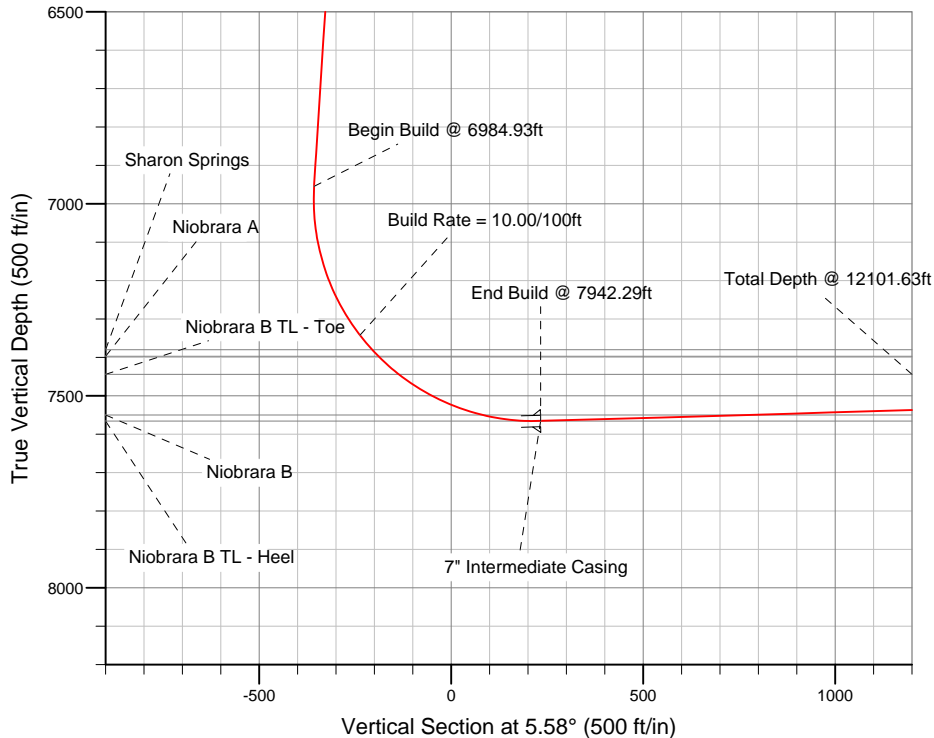


### SECTION DETAILS

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	1100.00	0.00	0.00	1100.00	0.00	0.00	0.00	0.00	0.00	
3	1396.16	5.92	132.61	1395.63	-10.35	11.26	2.00	132.61	-9.21	
4	6984.93	5.92	132.61	6954.57	-400.82	435.70	0.00	0.00	-356.53	
5	7942.29	91.68	359.29	7566.00	188.00	476.00	10.00	-133.04	233.42	Howard 3N-21HZ_CP
6	12101.63	91.68	359.29	7444.00	4345.23	424.74	0.00	0.00	4365.94	Howard 3N-21HZ_BHL

### WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Howard 3N-21HZ_SHL	0.00	0.00	0.00	40.030588	-104.899011	Point
Howard 3N-21HZ_BHL	7444.00	4345.23	424.74	40.042516	-104.897494	Point
Howard 3N-21HZ_CP	7566.00	188.00	476.00	40.031104	-104.897311	Point



WELL DETAILS: Howard 3N-21HZ	
Ground Level	5024.00 RKB=17 @ 5041.00ft (Drilling Rig)
Plan: Plan A Rev 0 Permit (Howard 3N-21HZ/Plan A Rev 0)	
Created By: Fred Hartmann	Date: 12/20/2012
Reviewed: _____	Date: _____

**Plan Report for Howard 3N-21HZ - 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
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
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
<b>Begin Nudge @ 1100.00ft</b>										
1,200.00	2.00	132.61	1,199.98	-1.18	1.28	-1.05	2.00	2.00	0.00	132.61
1,300.00	4.00	132.61	1,299.84	-4.72	5.14	-4.20	2.00	2.00	0.00	0.00
1,396.16	5.92	132.61	1,395.63	-10.36	11.26	-9.21	2.00	2.00	0.00	0.00
<b>End Nudge @ 1396.16ft</b>										
1,400.00	5.92	132.61	1,399.45	-10.62	11.55	-9.45	0.00	0.00	0.00	0.00
1,500.00	5.92	132.61	1,498.92	-17.61	19.14	-15.66	0.00	0.00	0.00	0.00
1,600.00	5.92	132.61	1,598.38	-24.60	26.74	-21.88	0.00	0.00	0.00	0.00
1,700.00	5.92	132.61	1,697.85	-31.58	34.33	-28.09	0.00	0.00	0.00	0.00
1,800.00	5.92	132.61	1,797.32	-38.57	41.93	-34.31	0.00	0.00	0.00	0.00
1,900.00	5.92	132.61	1,896.78	-45.56	49.52	-40.52	0.00	0.00	0.00	0.00
2,000.00	5.92	132.61	1,996.25	-52.54	57.12	-46.74	0.00	0.00	0.00	0.00
2,100.00	5.92	132.61	2,095.72	-59.53	64.71	-52.95	0.00	0.00	0.00	0.00
2,200.00	5.92	132.61	2,195.18	-66.52	72.30	-59.17	0.00	0.00	0.00	0.00
2,300.00	5.92	132.61	2,294.65	-73.50	79.90	-65.38	0.00	0.00	0.00	0.00
2,400.00	5.92	132.61	2,394.11	-80.49	87.49	-71.60	0.00	0.00	0.00	0.00
2,500.00	5.92	132.61	2,493.58	-87.48	95.09	-77.81	0.00	0.00	0.00	0.00
2,600.00	5.92	132.61	2,593.05	-94.46	102.68	-84.02	0.00	0.00	0.00	0.00
2,700.00	5.92	132.61	2,692.51	-101.45	110.28	-90.24	0.00	0.00	0.00	0.00
2,800.00	5.92	132.61	2,791.98	-108.44	117.87	-96.45	0.00	0.00	0.00	0.00
2,900.00	5.92	132.61	2,891.44	-115.42	125.47	-102.67	0.00	0.00	0.00	0.00
3,000.00	5.92	132.61	2,990.91	-122.41	133.06	-108.88	0.00	0.00	0.00	0.00
3,100.00	5.92	132.61	3,090.38	-129.39	140.66	-115.10	0.00	0.00	0.00	0.00
3,200.00	5.92	132.61	3,189.84	-136.38	148.25	-121.31	0.00	0.00	0.00	0.00
3,300.00	5.92	132.61	3,289.31	-143.37	155.85	-127.53	0.00	0.00	0.00	0.00
3,400.00	5.92	132.61	3,388.77	-150.35	163.44	-133.74	0.00	0.00	0.00	0.00
3,500.00	5.92	132.61	3,488.24	-157.34	171.03	-139.96	0.00	0.00	0.00	0.00
3,600.00	5.92	132.61	3,587.71	-164.33	178.63	-146.17	0.00	0.00	0.00	0.00
3,700.00	5.92	132.61	3,687.17	-171.31	186.22	-152.38	0.00	0.00	0.00	0.00
3,800.00	5.92	132.61	3,786.64	-178.30	193.82	-158.60	0.00	0.00	0.00	0.00
3,900.00	5.92	132.61	3,886.11	-185.29	201.41	-164.81	0.00	0.00	0.00	0.00
4,000.00	5.92	132.61	3,985.57	-192.27	209.01	-171.03	0.00	0.00	0.00	0.00
4,100.00	5.92	132.61	4,085.04	-199.26	216.60	-177.24	0.00	0.00	0.00	0.00
4,200.00	5.92	132.61	4,184.50	-206.25	224.20	-183.46	0.00	0.00	0.00	0.00
4,300.00	5.92	132.61	4,283.97	-213.23	231.79	-189.67	0.00	0.00	0.00	0.00
4,400.00	5.92	132.61	4,383.44	-220.22	239.39	-195.89	0.00	0.00	0.00	0.00
4,500.00	5.92	132.61	4,482.90	-227.21	246.98	-202.10	0.00	0.00	0.00	0.00
4,600.00	5.92	132.61	4,582.37	-234.19	254.58	-208.32	0.00	0.00	0.00	0.00
4,700.00	5.92	132.61	4,681.83	-241.18	262.17	-214.53	0.00	0.00	0.00	0.00
4,759.48	5.92	132.61	4,741.00	-245.34	266.69	-218.23	0.00	0.00	0.00	0.00
<b>Sussex</b>										
4,800.00	5.92	132.61	4,781.30	-248.17	269.76	-220.75	0.00	0.00	0.00	0.00
4,900.00	5.92	132.61	4,880.77	-255.15	277.36	-226.96	0.00	0.00	0.00	0.00
5,000.00	5.92	132.61	4,980.23	-262.14	284.95	-233.17	0.00	0.00	0.00	0.00
5,100.00	5.92	132.61	5,079.70	-269.13	292.55	-239.39	0.00	0.00	0.00	0.00
5,200.00	5.92	132.61	5,179.16	-276.11	300.14	-245.60	0.00	0.00	0.00	0.00

**Plan Report for Howard 3N-21HZ - 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 (°)
5,300.00	5.92	132.61	5,278.63	-283.10	307.74	-251.82	0.00	0.00	0.00	0.00
5,400.00	5.92	132.61	5,378.10	-290.09	315.33	-258.03	0.00	0.00	0.00	0.00
5,500.00	5.92	132.61	5,477.56	-297.07	322.93	-264.25	0.00	0.00	0.00	0.00
5,600.00	5.92	132.61	5,577.03	-304.06	330.52	-270.46	0.00	0.00	0.00	0.00
5,700.00	5.92	132.61	5,676.50	-311.05	338.12	-276.68	0.00	0.00	0.00	0.00
5,800.00	5.92	132.61	5,775.96	-318.03	345.71	-282.89	0.00	0.00	0.00	0.00
5,900.00	5.92	132.61	5,875.43	-325.02	353.31	-289.11	0.00	0.00	0.00	0.00
6,000.00	5.92	132.61	5,974.89	-332.01	360.90	-295.32	0.00	0.00	0.00	0.00
6,100.00	5.92	132.61	6,074.36	-338.99	368.49	-301.53	0.00	0.00	0.00	0.00
6,200.00	5.92	132.61	6,173.83	-345.98	376.09	-307.75	0.00	0.00	0.00	0.00
6,300.00	5.92	132.61	6,273.29	-352.96	383.68	-313.96	0.00	0.00	0.00	0.00
6,400.00	5.92	132.61	6,372.76	-359.95	391.28	-320.18	0.00	0.00	0.00	0.00
6,500.00	5.92	132.61	6,472.22	-366.94	398.87	-326.39	0.00	0.00	0.00	0.00
6,600.00	5.92	132.61	6,571.69	-373.92	406.47	-332.61	0.00	0.00	0.00	0.00
6,700.00	5.92	132.61	6,671.16	-380.91	414.06	-338.82	0.00	0.00	0.00	0.00
6,800.00	5.92	132.61	6,770.62	-387.90	421.66	-345.04	0.00	0.00	0.00	0.00
6,900.00	5.92	132.61	6,870.09	-394.88	429.25	-351.25	0.00	0.00	0.00	0.00
6,984.93	5.92	132.61	6,954.57	-400.82	435.70	-356.53	0.00	0.00	0.00	0.00
<b>Begin Build @ 6984.93ft</b>										
7,000.00	5.02	119.92	6,969.57	-401.67	436.85	-357.27	10.00	-6.01	-84.24	-133.04
7,100.00	8.61	29.37	7,069.06	-397.32	444.33	-352.21	10.00	3.60	-90.54	-120.40
7,200.00	17.97	12.91	7,166.31	-375.70	451.46	-330.00	10.00	9.35	-16.47	-30.24
7,300.00	27.77	7.68	7,258.35	-337.48	458.04	-291.32	10.00	9.80	-5.23	-14.15
7,400.00	37.67	5.04	7,342.38	-283.82	463.85	-237.35	10.00	9.90	-2.64	-9.32
<b>Build Rate = 10.00/100ft</b>										
7,449.21	42.56	4.15	7,380.00	-252.23	466.38	-205.66	10.00	9.93	-1.82	-7.09
<b>Sharon Springs</b>										
7,472.73	44.89	3.77	7,397.00	-236.01	467.50	-189.41	10.00	9.94	-1.58	-6.40
<b>Niobrara A</b>										
7,500.00	47.61	3.38	7,415.85	-216.35	468.73	-169.73	10.00	9.95	-1.45	-6.13
7,600.00	57.56	2.18	7,476.54	-137.12	472.52	-90.50	10.00	9.95	-1.20	-5.86
7,700.00	67.52	1.21	7,522.59	-48.54	475.11	-2.09	10.00	9.96	-0.96	-5.13
7,788.47	76.34	0.47	7,550.00	35.47	476.33	81.65	10.00	9.97	-0.84	-4.68
<b>Niobrara B</b>										
7,800.00	77.49	0.38	7,552.61	46.71	476.42	92.83	10.00	9.97	-0.80	-4.45
7,900.00	87.46	359.61	7,565.68	145.72	476.40	191.38	10.00	9.97	-0.77	-4.43
7,942.29	91.68	359.29	7,566.00	188.00	476.00	233.42	10.00	9.97	-0.75	-4.33
<b>End Build @ 7942.29ft - Niobrara B TL - Heel - 7" Intermediate Casing - Howard 3N-21HZ_CP</b>										
8,000.00	91.68	359.29	7,564.31	245.68	475.29	290.75	0.00	0.00	0.00	-4.33
8,100.00	91.68	359.29	7,561.37	345.63	474.06	390.11	0.00	0.00	0.00	0.00
8,200.00	91.68	359.29	7,558.44	445.58	472.82	489.46	0.00	0.00	0.00	0.00
8,300.00	91.68	359.29	7,555.51	545.53	471.59	588.82	0.00	0.00	0.00	0.00
8,400.00	91.68	359.29	7,552.57	645.48	470.36	688.17	0.00	0.00	0.00	0.00
8,500.00	91.68	359.29	7,549.64	745.43	469.13	787.53	0.00	0.00	0.00	0.00
8,600.00	91.68	359.29	7,546.71	845.38	467.89	886.89	0.00	0.00	0.00	0.00
8,700.00	91.68	359.29	7,543.78	945.33	466.66	986.24	0.00	0.00	0.00	0.00
8,800.00	91.68	359.29	7,540.84	1,045.27	465.43	1,085.60	0.00	0.00	0.00	0.00
8,900.00	91.68	359.29	7,537.91	1,145.22	464.20	1,184.95	0.00	0.00	0.00	0.00
9,000.00	91.68	359.29	7,534.98	1,245.17	462.97	1,284.31	0.00	0.00	0.00	0.00
9,100.00	91.68	359.29	7,532.04	1,345.12	461.73	1,383.66	0.00	0.00	0.00	0.00
9,200.00	91.68	359.29	7,529.11	1,445.07	460.50	1,483.02	0.00	0.00	0.00	0.00
9,300.00	91.68	359.29	7,526.18	1,545.02	459.27	1,582.37	0.00	0.00	0.00	0.00
9,400.00	91.68	359.29	7,523.24	1,644.97	458.04	1,681.73	0.00	0.00	0.00	0.00
9,500.00	91.68	359.29	7,520.31	1,744.92	456.80	1,781.08	0.00	0.00	0.00	0.00
9,600.00	91.68	359.29	7,517.38	1,844.87	455.57	1,880.44	0.00	0.00	0.00	0.00
9,700.00	91.68	359.29	7,514.44	1,944.82	454.34	1,979.79	0.00	0.00	0.00	0.00
9,800.00	91.68	359.29	7,511.51	2,044.77	453.11	2,079.15	0.00	0.00	0.00	0.00
9,900.00	91.68	359.29	7,508.58	2,144.72	451.87	2,178.51	0.00	0.00	0.00	0.00
10,000.00	91.68	359.29	7,505.64	2,244.67	450.64	2,277.86	0.00	0.00	0.00	0.00

**Plan Report for Howard 3N-21HZ - 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)	Toothface Azimuth (°)
10,100.00	91.68	359.29	7,502.71	2,344.62	449.41	2,377.22	0.00	0.00	0.00	0.00
10,200.00	91.68	359.29	7,499.78	2,444.57	448.18	2,476.57	0.00	0.00	0.00	0.00
10,300.00	91.68	359.29	7,496.84	2,544.52	446.95	2,575.93	0.00	0.00	0.00	0.00
10,400.00	91.68	359.29	7,493.91	2,644.46	445.71	2,675.28	0.00	0.00	0.00	0.00
10,500.00	91.68	359.29	7,490.98	2,744.41	444.48	2,774.64	0.00	0.00	0.00	0.00
10,600.00	91.68	359.29	7,488.05	2,844.36	443.25	2,873.99	0.00	0.00	0.00	0.00
10,700.00	91.68	359.29	7,485.11	2,944.31	442.02	2,973.35	0.00	0.00	0.00	0.00
10,800.00	91.68	359.29	7,482.18	3,044.26	440.78	3,072.70	0.00	0.00	0.00	0.00
10,900.00	91.68	359.29	7,479.25	3,144.21	439.55	3,172.06	0.00	0.00	0.00	0.00
11,000.00	91.68	359.29	7,476.31	3,244.16	438.32	3,271.41	0.00	0.00	0.00	0.00
11,100.00	91.68	359.29	7,473.38	3,344.11	437.09	3,370.77	0.00	0.00	0.00	0.00
11,200.00	91.68	359.29	7,470.45	3,444.06	435.85	3,470.13	0.00	0.00	0.00	0.00
11,300.00	91.68	359.29	7,467.51	3,544.01	434.62	3,569.48	0.00	0.00	0.00	0.00
11,400.00	91.68	359.29	7,464.58	3,643.96	433.39	3,668.84	0.00	0.00	0.00	0.00
11,500.00	91.68	359.29	7,461.65	3,743.91	432.16	3,768.19	0.00	0.00	0.00	0.00
11,600.00	91.68	359.29	7,458.71	3,843.86	430.92	3,867.55	0.00	0.00	0.00	0.00
11,700.00	91.68	359.29	7,455.78	3,943.81	429.69	3,966.90	0.00	0.00	0.00	0.00
11,800.00	91.68	359.29	7,452.85	4,043.76	428.46	4,066.26	0.00	0.00	0.00	0.00
11,900.00	91.68	359.29	7,449.91	4,143.71	427.23	4,165.61	0.00	0.00	0.00	0.00
12,000.00	91.68	359.29	7,446.98	4,243.65	426.00	4,264.97	0.00	0.00	0.00	0.00
12,100.00	91.68	359.29	7,444.05	4,343.60	424.76	4,364.32	0.00	0.00	0.00	0.00
12,101.62	91.68	359.29	7,444.00	4,345.22	424.74	4,365.93	0.00	0.00	0.00	0.00
<b>Niobrara B TL - Toe</b>										
12,101.63	91.68	359.29	7,444.00	4,345.23	424.74	4,365.94	0.00	0.00	0.00	0.00
<b>Total Depth @ 12101.63ft - Howard 3N-21HZ_BHL</b>										

**Plan Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,100.00	1,100.00	0.00	0.00	Begin Nudge @ 1100.00ft
1,396.16	1,395.63	-10.36	11.26	End Nudge @ 1396.16ft
6,984.93	6,954.57	-400.82	435.70	Begin Build @ 6984.93ft
7,400.00	7,342.38	-283.82	463.85	Build Rate = 10.00/100ft
7,942.29	7,566.00	188.00	476.00	End Build @ 7942.29ft
12,101.63	7,444.00	4,345.23	424.74	Total Depth @ 12101.63ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Howard 3N-21HZ_BHL	5.58	Slot	0.00	0.00	0.00

**Survey tool program**

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	7,942.29	Plan A Rev 0 Permit	MWD
7,942.29	12,101.63	Plan A Rev 0 Permit	MWD

**Plan Report for Howard 3N-21HZ - Plan A Rev 0 Permit****Casing Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,942.29	7,566.00	7" Intermediate Casing	7	8-3/4

**Formation Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,759.48	4,741.00	Sussex		0.00	
7,449.21	7,380.00	Sharon Springs		0.00	
7,472.73	7,397.00	Niobrara A		0.00	
7,788.47	7,550.00	Niobrara B		0.00	
7,942.29	7,566.00	Niobrara B TL - Heel		0.00	
12,101.62	7,444.00	Niobrara B TL - Toe		0.00	

***Targets associated with this wellbore***

Target Name	TVD (ft)	+N-S (ft)	+E-W (ft)	Shape
Howard 3N-21HZ_BHL	7,444.00	4,345.23	424.74	Point
Howard 3N-21HZ_SHL	0.00	0.00	0.00	Point
Howard 3N-21HZ_CP	7,566.00	188.00	476.00	Point

**North Reference Sheet for Sec. 21-T1N-R67W - Howard 3N-21HZ - 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=17 @ 5041.00ft (Drilling Rig). Northing and Easting are relative to Howard 3N-21HZ  
 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: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996419

Grid Coordinates of Well: 1,254,559.56 ft N, 3,168,292.42 ft E  
 Geographical Coordinates of Well: 40° 01' 50.12" N, 104° 53' 56.44" W  
 Grid Convergence at Surface is: 0.39°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,101.63ft  
 the Bottom Hole Displacement is 4,365.94ft in the Direction of 5.58° (True).  
 Magnetic Convergence at surface is: -8.36° (19 December 2012, , BGGM2012)

