

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 21-T1N-R67W

Howard 29N-21HZ

Plan A Rev 0

Plan: Plan A Rev 0 Permit

Sperry Drilling Services

Proposal Report

20 December, 2012

Well Coordinates: 1,254,529.68 N, 3,168,292.06 E (40° 01' 49.82" N, 104° 53' 56.45" W)

Ground Level: 5,023.00 ft

Local Coordinate Origin:

Centered on Well Howard 29N-21HZ

Viewing Datum:

RKB=17 @ 5040.00ft (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 29N-21HZ
 Wellbore: Plan A Rev 0
 Design: Plan A Rev 0 Permit

Anadarko Petroleum Corp.

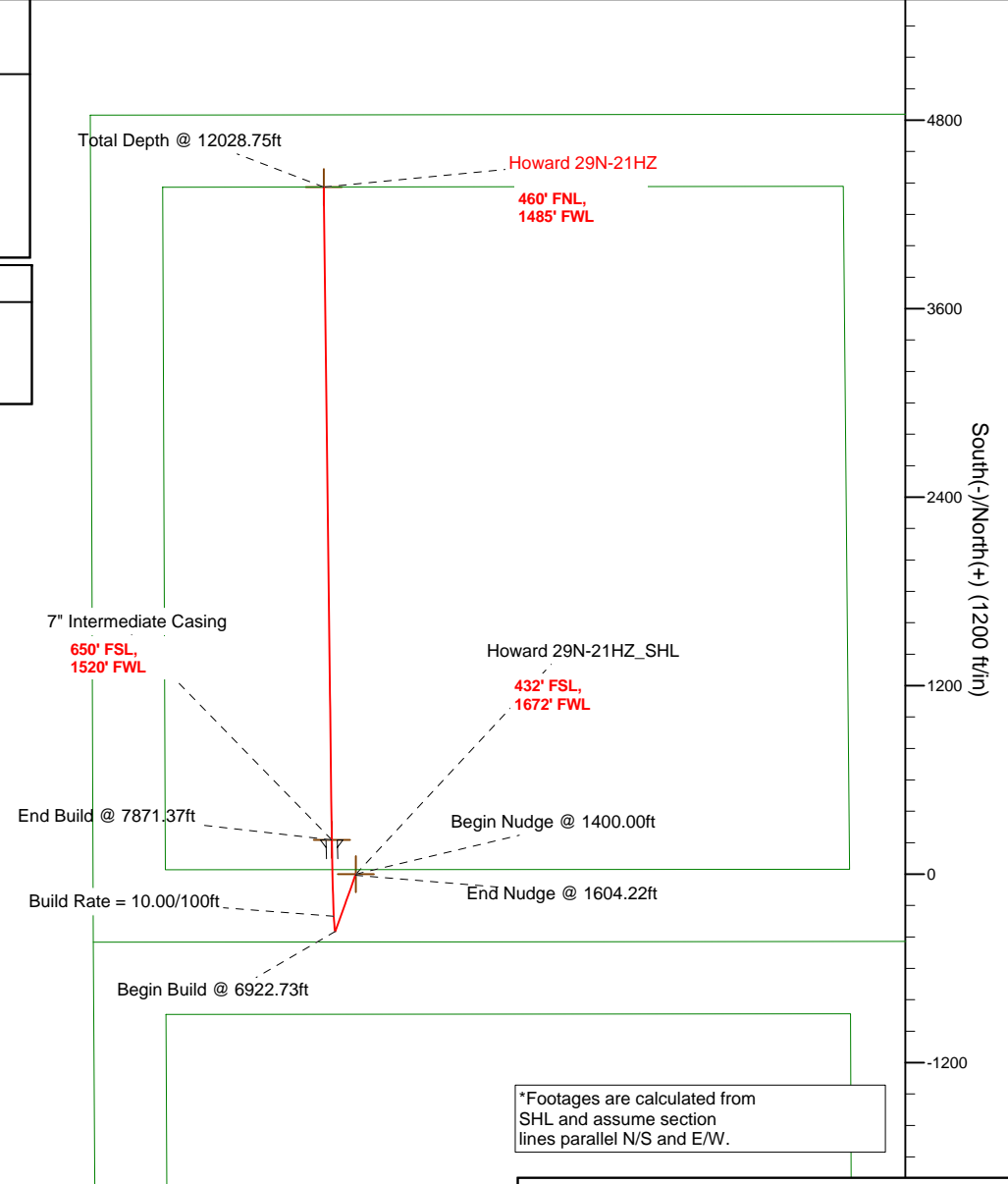
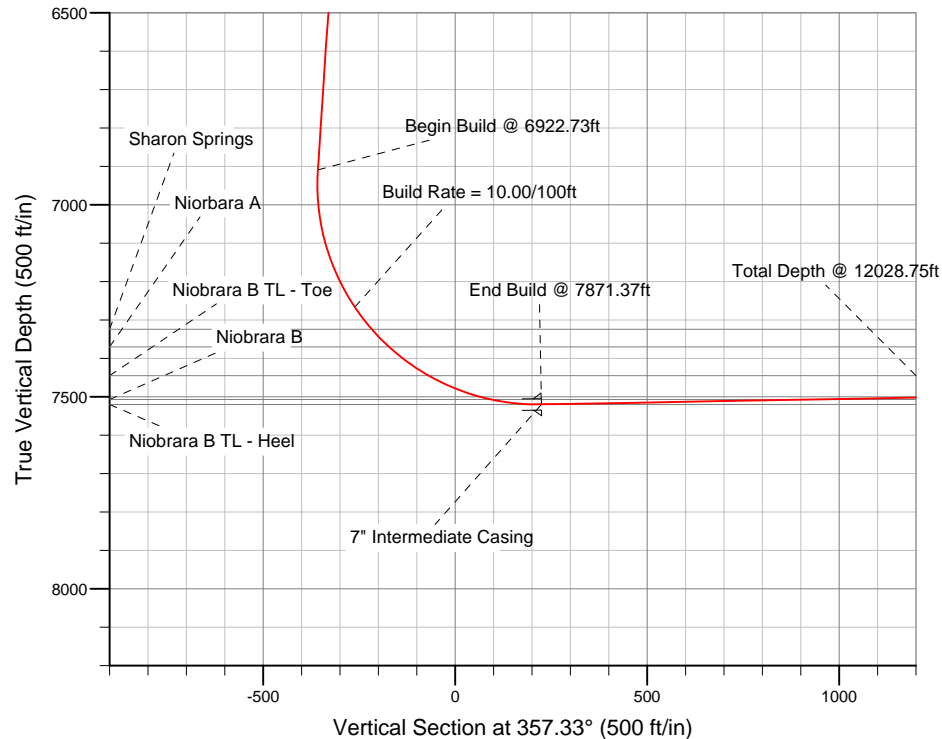
HALLIBURTON
 Sperry Drilling

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	1400.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	0.00	
3	1604.22	4.08	199.57	1604.04	-6.86	-2.44	2.00	199.57	-6.73	
4	6922.73	4.08	199.57	6909.05	-363.77	-129.34	0.00	0.00	-357.36	
5	7871.37	91.03	359.29	7520.00	218.00	-152.00	10.00	159.64	224.84	Howard 29N-21HZ_CP
6	12028.75	91.03	359.29	7445.00	4374.38	-203.83	0.00	0.00	4379.13	Howard 29N-21HZ_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Howard 29N-21HZ_SHL	0.00	0.00	0.00	40.030506	-104.899013	Point
Howard 29N-21HZ_BHL	7445.00	4374.38	-203.83	40.042514	-104.899741	Point
Howard 29N-21HZ_CP	7520.00	218.00	-152.00	40.031104	-104.899556	Point



*Footages are calculated from SHL and assume section lines parallel N/S and E/W.

WELL DETAILS: Howard 29N-21HZ

Ground Level: 5023.00 RKB=17 @ 5040.00ft (Drilling Rig)

Plan: Plan A Rev 0 Permit (Howard 29N-21HZ/Plan A Rev 0)

Created By: Fred Hartmann Date: 12/20/2012
 Reviewed: _____ Date: _____

Plan Report for Howard 29N-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
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin Nudge @ 1400.00ft										
1,500.00	2.00	199.57	1,499.98	-1.64	-0.58	-1.62	2.00	2.00	0.00	199.57
1,600.00	4.00	199.57	1,599.84	-6.58	-2.34	-6.46	2.00	2.00	0.00	0.00
1,604.22	4.08	199.57	1,604.05	-6.86	-2.44	-6.73	2.00	2.00	0.00	0.00
End Nudge @ 1604.22ft										
1,700.00	4.08	199.57	1,699.58	-13.28	-4.72	-13.05	0.00	0.00	0.00	0.00
1,800.00	4.08	199.57	1,799.33	-19.99	-7.11	-19.64	0.00	0.00	0.00	0.00
1,900.00	4.08	199.57	1,899.08	-26.70	-9.49	-26.23	0.00	0.00	0.00	0.00
2,000.00	4.08	199.57	1,998.82	-33.42	-11.88	-32.83	0.00	0.00	0.00	0.00
2,100.00	4.08	199.57	2,098.57	-40.13	-14.27	-39.42	0.00	0.00	0.00	0.00
2,200.00	4.08	199.57	2,198.31	-46.84	-16.65	-46.01	0.00	0.00	0.00	0.00
2,300.00	4.08	199.57	2,298.06	-53.55	-19.04	-52.60	0.00	0.00	0.00	0.00
2,400.00	4.08	199.57	2,397.81	-60.26	-21.43	-59.20	0.00	0.00	0.00	0.00
2,500.00	4.08	199.57	2,497.55	-66.97	-23.81	-65.79	0.00	0.00	0.00	0.00
2,600.00	4.08	199.57	2,597.30	-73.68	-26.20	-72.38	0.00	0.00	0.00	0.00
2,700.00	4.08	199.57	2,697.04	-80.39	-28.58	-78.97	0.00	0.00	0.00	0.00
2,800.00	4.08	199.57	2,796.79	-87.10	-30.97	-85.57	0.00	0.00	0.00	0.00
2,900.00	4.08	199.57	2,896.54	-93.81	-33.36	-92.16	0.00	0.00	0.00	0.00
3,000.00	4.08	199.57	2,996.28	-100.52	-35.74	-98.75	0.00	0.00	0.00	0.00
3,100.00	4.08	199.57	3,096.03	-107.24	-38.13	-105.34	0.00	0.00	0.00	0.00
3,200.00	4.08	199.57	3,195.77	-113.95	-40.51	-111.94	0.00	0.00	0.00	0.00
3,300.00	4.08	199.57	3,295.52	-120.66	-42.90	-118.53	0.00	0.00	0.00	0.00
3,400.00	4.08	199.57	3,395.27	-127.37	-45.29	-125.12	0.00	0.00	0.00	0.00
3,500.00	4.08	199.57	3,495.01	-134.08	-47.67	-131.71	0.00	0.00	0.00	0.00
3,600.00	4.08	199.57	3,594.76	-140.79	-50.06	-138.31	0.00	0.00	0.00	0.00
3,700.00	4.08	199.57	3,694.50	-147.50	-52.44	-144.90	0.00	0.00	0.00	0.00
3,800.00	4.08	199.57	3,794.25	-154.21	-54.83	-151.49	0.00	0.00	0.00	0.00
3,900.00	4.08	199.57	3,894.00	-160.92	-57.22	-158.08	0.00	0.00	0.00	0.00
4,000.00	4.08	199.57	3,993.74	-167.63	-59.60	-164.68	0.00	0.00	0.00	0.00
4,100.00	4.08	199.57	4,093.49	-174.34	-61.99	-171.27	0.00	0.00	0.00	0.00
4,200.00	4.08	199.57	4,193.23	-181.05	-64.37	-177.86	0.00	0.00	0.00	0.00
4,300.00	4.08	199.57	4,292.98	-187.77	-66.76	-184.45	0.00	0.00	0.00	0.00
4,400.00	4.08	199.57	4,392.73	-194.48	-69.15	-191.05	0.00	0.00	0.00	0.00
4,500.00	4.08	199.57	4,492.47	-201.19	-71.53	-197.64	0.00	0.00	0.00	0.00
4,600.00	4.08	199.57	4,592.22	-207.90	-73.92	-204.23	0.00	0.00	0.00	0.00
4,700.00	4.08	199.57	4,691.96	-214.61	-76.30	-210.82	0.00	0.00	0.00	0.00
4,748.16	4.08	199.57	4,740.00	-217.84	-77.45	-214.00	0.00	0.00	0.00	0.00
Sussex										
4,800.00	4.08	199.57	4,791.71	-221.32	-78.69	-217.42	0.00	0.00	0.00	0.00
4,900.00	4.08	199.57	4,891.46	-228.03	-81.08	-224.01	0.00	0.00	0.00	0.00
5,000.00	4.08	199.57	4,991.20	-234.74	-83.46	-230.60	0.00	0.00	0.00	0.00
5,100.00	4.08	199.57	5,090.95	-241.45	-85.85	-237.19	0.00	0.00	0.00	0.00
5,200.00	4.08	199.57	5,190.69	-248.16	-88.23	-243.79	0.00	0.00	0.00	0.00

Plan Report for Howard 29N-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	4.08	199.57	5,290.44	-254.87	-90.62	-250.38	0.00	0.00	0.00	0.00
5,400.00	4.08	199.57	5,390.19	-261.59	-93.01	-256.97	0.00	0.00	0.00	0.00
5,500.00	4.08	199.57	5,489.93	-268.30	-95.39	-263.56	0.00	0.00	0.00	0.00
5,600.00	4.08	199.57	5,589.68	-275.01	-97.78	-270.16	0.00	0.00	0.00	0.00
5,700.00	4.08	199.57	5,689.43	-281.72	-100.16	-276.75	0.00	0.00	0.00	0.00
5,800.00	4.08	199.57	5,789.17	-288.43	-102.55	-283.34	0.00	0.00	0.00	0.00
5,900.00	4.08	199.57	5,888.92	-295.14	-104.94	-289.94	0.00	0.00	0.00	0.00
6,000.00	4.08	199.57	5,988.66	-301.85	-107.32	-296.53	0.00	0.00	0.00	0.00
6,100.00	4.08	199.57	6,088.41	-308.56	-109.71	-303.12	0.00	0.00	0.00	0.00
6,200.00	4.08	199.57	6,188.16	-315.27	-112.09	-309.71	0.00	0.00	0.00	0.00
6,300.00	4.08	199.57	6,287.90	-321.98	-114.48	-316.31	0.00	0.00	0.00	0.00
6,400.00	4.08	199.57	6,387.65	-328.69	-116.87	-322.90	0.00	0.00	0.00	0.00
6,500.00	4.08	199.57	6,487.39	-335.40	-119.25	-329.49	0.00	0.00	0.00	0.00
6,600.00	4.08	199.57	6,587.14	-342.12	-121.64	-336.08	0.00	0.00	0.00	0.00
6,700.00	4.08	199.57	6,686.89	-348.83	-124.02	-342.68	0.00	0.00	0.00	0.00
6,800.00	4.08	199.57	6,786.63	-355.54	-126.41	-349.27	0.00	0.00	0.00	0.00
6,900.00	4.08	199.57	6,886.38	-362.25	-128.80	-355.86	0.00	0.00	0.00	0.00
6,922.73	4.08	199.57	6,909.05	-363.77	-129.34	-357.36	0.00	0.00	0.00	0.00
Begin Build @ 6922.73ft										
7,000.00	4.15	339.27	6,986.24	-363.75	-131.25	-357.25	10.00	0.08	180.79	159.64
7,100.00	13.97	353.54	7,084.88	-348.34	-133.90	-341.73	10.00	9.82	14.27	20.04
7,200.00	23.94	356.06	7,179.34	-316.03	-136.66	-309.32	10.00	9.97	2.52	5.89
7,300.00	33.92	357.15	7,266.75	-267.80	-139.45	-261.02	10.00	9.99	1.09	3.50
Build Rate = 10.00/100ft										
7,372.24	41.14	357.63	7,324.00	-223.86	-141.43	-217.04	10.00	9.99	0.67	2.54
Sharon Springs										
7,400.00	43.92	357.78	7,344.46	-205.12	-142.18	-198.28	10.00	9.99	0.54	2.16
7,436.61	47.57	357.96	7,370.00	-178.92	-143.15	-172.06	10.00	9.99	0.48	2.05
Niobrara A										
7,500.00	53.91	358.22	7,410.09	-129.89	-144.78	-123.01	10.00	9.99	0.41	1.92
7,600.00	63.91	358.56	7,461.67	-44.39	-147.16	-37.50	10.00	10.00	0.34	1.76
7,700.00	73.90	358.85	7,497.62	48.76	-149.26	55.66	10.00	10.00	0.29	1.58
7,738.29	77.73	358.95	7,507.00	85.87	-149.97	92.76	10.00	10.00	0.26	1.48
Niobrara B										
7,800.00	83.90	359.11	7,516.85	146.75	-151.00	153.62	10.00	10.00	0.25	1.45
7,871.37	91.03	359.29	7,520.00	218.00	-152.00	224.84	10.00	10.00	0.25	1.43
End Build @ 7871.37ft - Niobrara B TL - Heel - 7" Intermediate Casing - Howard 29N-21HZ_CP										
7,900.00	91.03	359.29	7,519.48	246.62	-152.36	253.45	0.00	0.00	0.00	1.42
8,000.00	91.03	359.29	7,517.68	346.60	-153.60	353.37	0.00	0.00	0.00	0.00
8,100.00	91.03	359.29	7,515.88	446.57	-154.85	453.30	0.00	0.00	0.00	0.00
8,200.00	91.03	359.29	7,514.07	546.55	-156.10	553.22	0.00	0.00	0.00	0.00
8,300.00	91.03	359.29	7,512.27	646.53	-157.34	653.15	0.00	0.00	0.00	0.00
8,400.00	91.03	359.29	7,510.46	746.50	-158.59	753.07	0.00	0.00	0.00	0.00
8,500.00	91.03	359.29	7,508.66	846.48	-159.84	853.00	0.00	0.00	0.00	0.00
8,600.00	91.03	359.29	7,506.86	946.45	-161.08	952.92	0.00	0.00	0.00	0.00
8,700.00	91.03	359.29	7,505.05	1,046.43	-162.33	1,052.85	0.00	0.00	0.00	0.00
8,800.00	91.03	359.29	7,503.25	1,146.40	-163.58	1,152.78	0.00	0.00	0.00	0.00
8,900.00	91.03	359.29	7,501.44	1,246.38	-164.82	1,252.70	0.00	0.00	0.00	0.00
9,000.00	91.03	359.29	7,499.64	1,346.36	-166.07	1,352.63	0.00	0.00	0.00	0.00
9,100.00	91.03	359.29	7,497.84	1,446.33	-167.32	1,452.55	0.00	0.00	0.00	0.00
9,200.00	91.03	359.29	7,496.03	1,546.31	-168.56	1,552.48	0.00	0.00	0.00	0.00
9,300.00	91.03	359.29	7,494.23	1,646.28	-169.81	1,652.40	0.00	0.00	0.00	0.00
9,400.00	91.03	359.29	7,492.42	1,746.26	-171.06	1,752.33	0.00	0.00	0.00	0.00
9,500.00	91.03	359.29	7,490.62	1,846.24	-172.30	1,852.26	0.00	0.00	0.00	0.00
9,600.00	91.03	359.29	7,488.82	1,946.21	-173.55	1,952.18	0.00	0.00	0.00	0.00
9,700.00	91.03	359.29	7,487.01	2,046.19	-174.80	2,052.11	0.00	0.00	0.00	0.00
9,800.00	91.03	359.29	7,485.21	2,146.16	-176.05	2,152.03	0.00	0.00	0.00	0.00
9,900.00	91.03	359.29	7,483.40	2,246.14	-177.29	2,251.96	0.00	0.00	0.00	0.00
10,000.00	91.03	359.29	7,481.60	2,346.12	-178.54	2,351.88	0.00	0.00	0.00	0.00

Plan Report for Howard 29N-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 (°)
10,100.00	91.03	359.29	7,479.80	2,446.09	-179.79	2,451.81	0.00	0.00	0.00	0.00
10,200.00	91.03	359.29	7,477.99	2,546.07	-181.03	2,551.73	0.00	0.00	0.00	0.00
10,300.00	91.03	359.29	7,476.19	2,646.04	-182.28	2,651.66	0.00	0.00	0.00	0.00
10,400.00	91.03	359.29	7,474.38	2,746.02	-183.53	2,751.59	0.00	0.00	0.00	0.00
10,500.00	91.03	359.29	7,472.58	2,846.00	-184.77	2,851.51	0.00	0.00	0.00	0.00
10,600.00	91.03	359.29	7,470.77	2,945.97	-186.02	2,951.44	0.00	0.00	0.00	0.00
10,700.00	91.03	359.29	7,468.97	3,045.95	-187.27	3,051.36	0.00	0.00	0.00	0.00
10,800.00	91.03	359.29	7,467.17	3,145.92	-188.51	3,151.29	0.00	0.00	0.00	0.00
10,900.00	91.03	359.29	7,465.36	3,245.90	-189.76	3,251.21	0.00	0.00	0.00	0.00
11,000.00	91.03	359.29	7,463.56	3,345.88	-191.01	3,351.14	0.00	0.00	0.00	0.00
11,100.00	91.03	359.29	7,461.75	3,445.85	-192.25	3,451.07	0.00	0.00	0.00	0.00
11,200.00	91.03	359.29	7,459.95	3,545.83	-193.50	3,550.99	0.00	0.00	0.00	0.00
11,300.00	91.03	359.29	7,458.15	3,645.80	-194.75	3,650.92	0.00	0.00	0.00	0.00
11,400.00	91.03	359.29	7,456.34	3,745.78	-195.99	3,750.84	0.00	0.00	0.00	0.00
11,500.00	91.03	359.29	7,454.54	3,845.76	-197.24	3,850.77	0.00	0.00	0.00	0.00
11,600.00	91.03	359.29	7,452.73	3,945.73	-198.49	3,950.69	0.00	0.00	0.00	0.00
11,700.00	91.03	359.29	7,450.93	4,045.71	-199.73	4,050.62	0.00	0.00	0.00	0.00
11,800.00	91.03	359.29	7,449.13	4,145.68	-200.98	4,150.54	0.00	0.00	0.00	0.00
11,900.00	91.03	359.29	7,447.32	4,245.66	-202.23	4,250.47	0.00	0.00	0.00	0.00
12,000.00	91.03	359.29	7,445.52	4,345.64	-203.47	4,350.40	0.00	0.00	0.00	0.00
12,028.74	91.03	359.29	7,445.00	4,374.37	-203.83	4,379.11	0.00	0.00	0.00	0.00
Niobrara B TL - Toe										
12,028.75	91.03	359.29	7,445.00	4,374.38	-203.83	4,379.12	0.01	0.00	0.00	0.00
Total Depth @ 12028.75ft - Howard 29N-21HZ_BHL										

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,400.00	1,400.00	0.00	0.00	Begin Nudge @ 1400.00ft
1,604.22	1,604.05	-6.86	-2.44	End Nudge @ 1604.22ft
6,922.73	6,909.05	-363.77	-129.34	Begin Build @ 6922.73ft
7,300.00	7,266.75	-267.80	-139.45	Build Rate = 10.00/100ft
7,871.37	7,520.00	218.00	-152.00	End Build @ 7871.37ft
12,028.75	7,445.00	4,374.38	-203.83	Total Depth @ 12028.75ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Howard 29N-21HZ_BHL	357.33	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	7,871.37	Plan A Rev 0 Permit	MWD
7,871.37	12,028.75	Plan A Rev 0 Permit	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,871.37	7,520.00	7" Intermediate Casing	7	8-3/4

Plan Report for Howard 29N-21HZ - Plan A Rev 0 Permit**Formation Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,748.16	4,740.00	Sussex		0.00	
7,372.24	7,324.00	Sharon Springs		0.00	
7,436.61	7,370.00	Niobrara A		0.00	
7,738.29	7,507.00	Niobrara B		0.00	
7,871.37	7,520.00	Niobrara B TL - Heel		0.00	
12,028.74	7,445.00	Niobrara B TL - Toe		0.00	

Targets associated with this wellbore

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
Howard 29N-21HZ_SHL	0.00	0.00	0.00	Point
Howard 29N-21HZ_CP	7,520.00	218.00	-152.00	Point
Howard 29N-21HZ_BHL	7,445.00	4,374.38	-203.83	Point

North Reference Sheet for Sec. 21-T1N-R67W - Howard 29N-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 @ 5040.00ft (Drilling Rig). Northing and Easting are relative to Howard 29N-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: 1,254,529.68 ft N, 3,168,292.06 ft E

Geographical Coordinates of Well: 40° 01' 49.82" N, 104° 53' 56.45" W

Grid Convergence at Surface is: 0.39°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,028.75ft
the Bottom Hole Displacement is 4,379.12ft in the Direction of 357.33° (True).

Magnetic Convergence at surface is: -8.36° (19 December 2012, , BGGM2012)

