

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 19-T3N-R66W

Harris Federal 16N-18HZ

Plan A Rev 0

Plan: Plan A Rev 0 - PERMIT

## Sperry Drilling Services

# Proposal Report

14 May, 2013

Well Coordinates: 1,318,373.98 N, 3,191,656.85 E (40° 12' 19.07" N, 104° 48' 49.73" W)

Ground Level: 4,865.00 ft

Local Coordinate Origin: Centered on Well Harris Federal 16N-18HZ

Viewing Datum: RKB=17 @ 4882.00ft (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. 19-T3N-R66W  
 Well: Harris Federal 16N-18HZ  
 Wellbore: Plan A Rev 0  
 Design: Plan A Rev 0 - PERMIT

# Anadarko Petroleum Corp.



### SECTION DETAILS

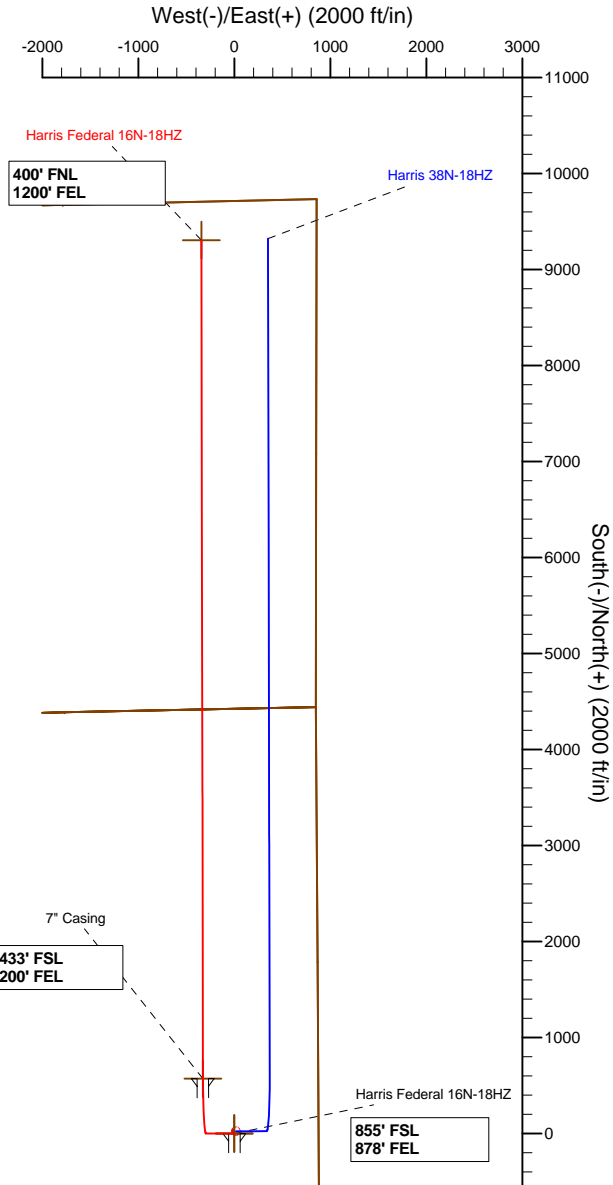
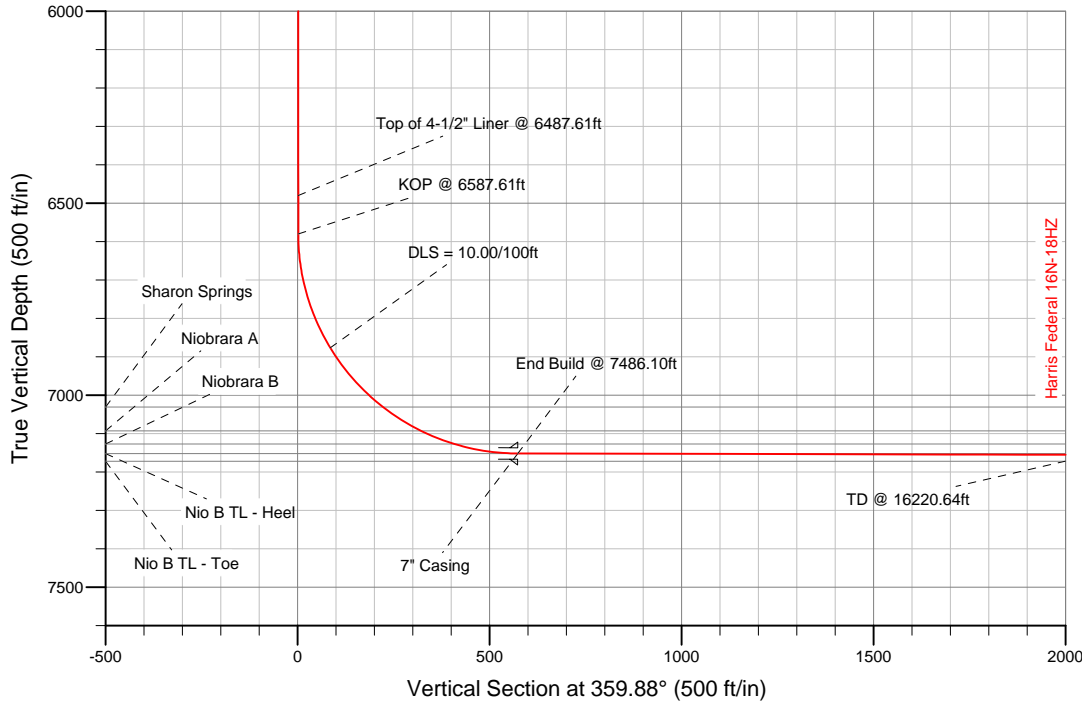
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	
3	948.13	2.96	270.27	948.07	0.02	-3.83	2.00	270.27	0.03	
4	6587.61	2.96	270.27	6580.01	1.41	-295.31	0.00	0.00	2.03	
5	7486.10	89.87	359.88	7152.00	573.00	-326.00	10.00	89.62	573.68	Harris Federal 16N-18HZ_CP
6	16220.64	89.87	359.88	7172.00	9307.50	-343.72	0.00	0.00	9308.20	Harris Federal 16N-18HZ_BHL

### WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Harris Federal 16N-18HZ_Sec	0.00	0.00	0.00	40.205298	-104.813814	Polygon
Harris Federal 16N-18HZ_SHL	0.00	0.00	0.00	40.205298	-104.813814	Point
Harris Federal 16N-18HZ_CP	7152.00	573.00	-326.00	40.206871	-104.814981	Point
Harris Federal 16N-18HZ_BHL	7172.00	9307.50	-343.72	40.230847	-104.815045	Point

MD TVD

6487.61 6480.14 Top of 4-1/2" Liner @ 6487.61ft  
 6587.61 6580.01 KOP @ 6587.61ft



WELL DETAILS: Harris Federal 16N-18HZ

Ground Level: 4865.00  
 RKB=17 @ 4882.00ft (Drilling Rig)

Plan: Plan A Rev 0 - PERMIT (Harris Federal 16N-18HZ/Plan A Rev 0)

Created By: Fred Hartmann Date: 05/14/2013  
 Reviewed: \_\_\_\_\_ Date: \_\_\_\_\_

Project: Weld County, CO (NAD 83)  
Site: Sec. 19-T3N-R66W  
Well: Harris Federal 16N-18HZ  
Plan A Rev 0  
Plan A Rev 0 - PERMIT

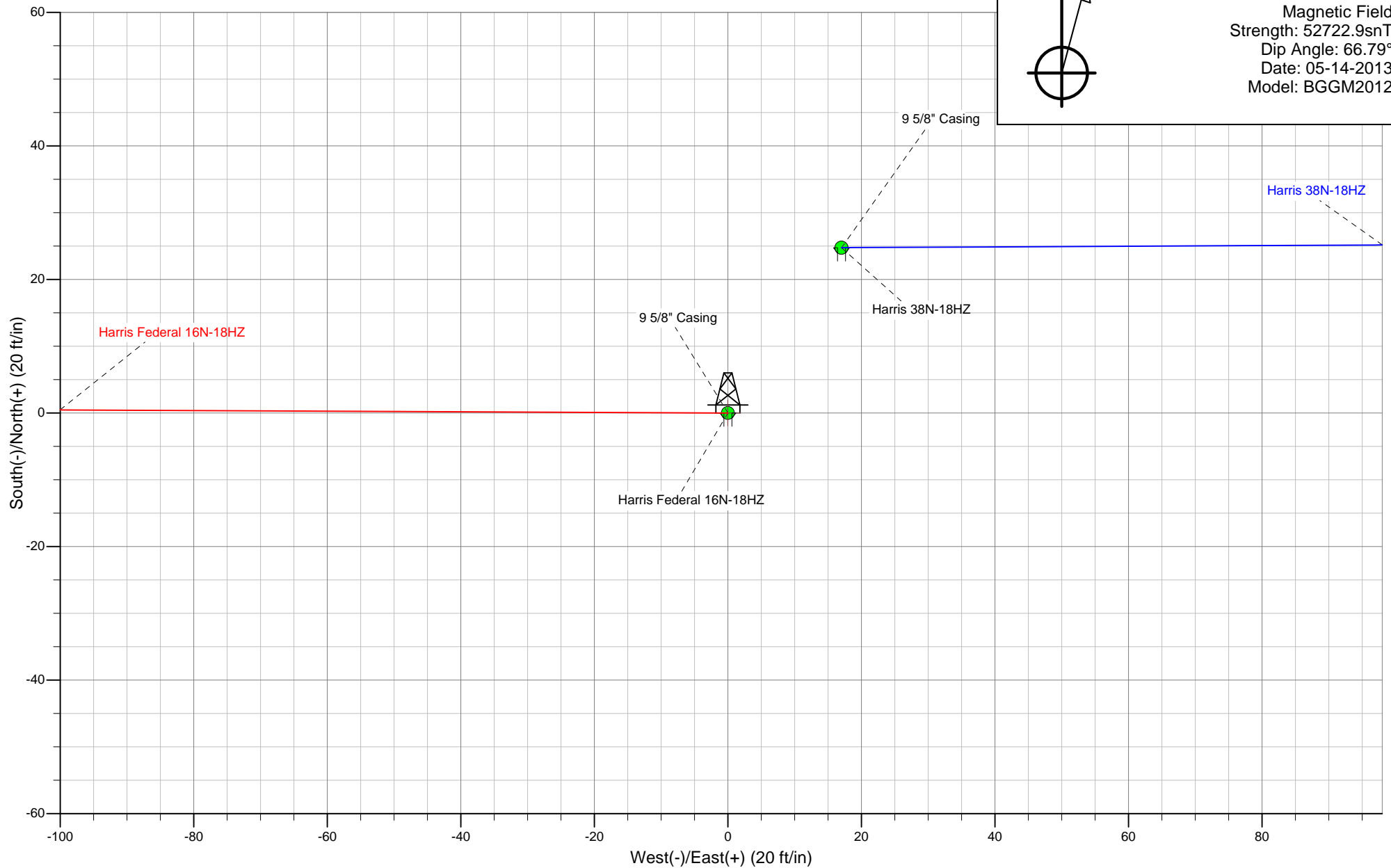
# Anadarko Petroleum Corp.

**HALLIBURTON**  
Sperry Drilling



Azimuths to True North  
Magnetic North: 8.67°

Magnetic Field  
Strength: 52722.9snT  
Dip Angle: 66.79°  
Date: 05-14-2013  
Model: BGGM2012



**Plan Report for Harris Federal 16N-18HZ - 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
602.00	0.00	0.00	602.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>9 5/8" Casing</b>										
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
<b>Begin Nudge @ 800.00ft</b>										
900.00	2.00	270.27	899.98	0.01	-1.75	0.01	2.00	2.00	0.00	270.27
948.13	2.96	270.27	948.06	0.02	-3.83	0.03	2.00	2.00	0.00	0.00
<b>End Nudge @ 948.13ft</b>										
1,000.00	2.96	270.27	999.86	0.03	-6.51	0.04	0.00	0.00	0.00	0.00
1,100.00	2.96	270.27	1,099.73	0.06	-11.68	0.08	0.00	0.00	0.00	0.00
1,200.00	2.96	270.27	1,199.60	0.08	-16.85	0.12	0.00	0.00	0.00	0.00
1,300.00	2.96	270.27	1,299.46	0.11	-22.02	0.15	0.00	0.00	0.00	0.00
1,400.00	2.96	270.27	1,399.33	0.13	-27.18	0.19	0.00	0.00	0.00	0.00
1,500.00	2.96	270.27	1,499.20	0.15	-32.35	0.22	0.00	0.00	0.00	0.00
1,600.00	2.96	270.27	1,599.06	0.18	-37.52	0.26	0.00	0.00	0.00	0.00
1,700.00	2.96	270.27	1,698.93	0.20	-42.69	0.29	0.00	0.00	0.00	0.00
1,800.00	2.96	270.27	1,798.80	0.23	-47.86	0.33	0.00	0.00	0.00	0.00
1,900.00	2.96	270.27	1,898.66	0.25	-53.03	0.36	0.00	0.00	0.00	0.00
2,000.00	2.96	270.27	1,998.53	0.28	-58.19	0.40	0.00	0.00	0.00	0.00
2,100.00	2.96	270.27	2,098.39	0.30	-63.36	0.44	0.00	0.00	0.00	0.00
2,200.00	2.96	270.27	2,198.26	0.33	-68.53	0.47	0.00	0.00	0.00	0.00
2,300.00	2.96	270.27	2,298.13	0.35	-73.70	0.51	0.00	0.00	0.00	0.00
2,400.00	2.96	270.27	2,397.99	0.38	-78.87	0.54	0.00	0.00	0.00	0.00
2,500.00	2.96	270.27	2,497.86	0.40	-84.04	0.58	0.00	0.00	0.00	0.00
2,600.00	2.96	270.27	2,597.73	0.43	-89.21	0.61	0.00	0.00	0.00	0.00
2,700.00	2.96	270.27	2,697.59	0.45	-94.37	0.65	0.00	0.00	0.00	0.00
2,800.00	2.96	270.27	2,797.46	0.48	-99.54	0.69	0.00	0.00	0.00	0.00
2,900.00	2.96	270.27	2,897.33	0.50	-104.71	0.72	0.00	0.00	0.00	0.00
3,000.00	2.96	270.27	2,997.19	0.53	-109.88	0.76	0.00	0.00	0.00	0.00
3,100.00	2.96	270.27	3,097.06	0.55	-115.05	0.79	0.00	0.00	0.00	0.00
3,200.00	2.96	270.27	3,196.92	0.58	-120.22	0.83	0.00	0.00	0.00	0.00
3,300.00	2.96	270.27	3,296.79	0.60	-125.39	0.86	0.00	0.00	0.00	0.00
3,400.00	2.96	270.27	3,396.66	0.63	-130.55	0.90	0.00	0.00	0.00	0.00
3,500.00	2.96	270.27	3,496.52	0.65	-135.72	0.93	0.00	0.00	0.00	0.00
3,600.00	2.96	270.27	3,596.39	0.67	-140.89	0.97	0.00	0.00	0.00	0.00
3,700.00	2.96	270.27	3,696.26	0.70	-146.06	1.01	0.00	0.00	0.00	0.00
3,800.00	2.96	270.27	3,796.12	0.72	-151.23	1.04	0.00	0.00	0.00	0.00
3,877.98	2.96	270.27	3,874.00	0.74	-155.26	1.07	0.00	0.00	0.00	0.00
<b>Parkman</b>										
3,900.00	2.96	270.27	3,895.99	0.75	-156.40	1.08	0.00	0.00	0.00	0.00
4,000.00	2.96	270.27	3,995.85	0.77	-161.56	1.11	0.00	0.00	0.00	0.00
4,100.00	2.96	270.27	4,095.72	0.80	-166.73	1.15	0.00	0.00	0.00	0.00
4,200.00	2.96	270.27	4,195.59	0.82	-171.90	1.18	0.00	0.00	0.00	0.00
4,300.00	2.96	270.27	4,295.45	0.85	-177.07	1.22	0.00	0.00	0.00	0.00
4,306.55	2.96	270.27	4,302.00	0.85	-177.41	1.22	0.00	0.00	0.00	0.00
<b>Sussex</b>										
4,400.00	2.96	270.27	4,395.32	0.87	-182.24	1.25	0.00	0.00	0.00	0.00
4,500.00	2.96	270.27	4,495.19	0.90	-187.41	1.29	0.00	0.00	0.00	0.00
4,600.00	2.96	270.27	4,595.05	0.92	-192.58	1.33	0.00	0.00	0.00	0.00
4,700.00	2.96	270.27	4,694.92	0.95	-197.74	1.36	0.00	0.00	0.00	0.00
4,800.00	2.96	270.27	4,794.79	0.97	-202.91	1.40	0.00	0.00	0.00	0.00

**Plan Report for Harris Federal 16N-18HZ - 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 (°)
4,900.00	2.96	270.27	4,894.65	1.00	-208.08	1.43	0.00	0.00	0.00	0.00
5,000.00	2.96	270.27	4,994.52	1.02	-213.25	1.47	0.00	0.00	0.00	0.00
5,100.00	2.96	270.27	5,094.38	1.05	-218.42	1.50	0.00	0.00	0.00	0.00
5,200.00	2.96	270.27	5,194.25	1.07	-223.59	1.54	0.00	0.00	0.00	0.00
5,300.00	2.96	270.27	5,294.12	1.10	-228.76	1.57	0.00	0.00	0.00	0.00
5,400.00	2.96	270.27	5,393.98	1.12	-233.92	1.61	0.00	0.00	0.00	0.00
5,500.00	2.96	270.27	5,493.85	1.14	-239.09	1.65	0.00	0.00	0.00	0.00
5,600.00	2.96	270.27	5,593.72	1.17	-244.26	1.68	0.00	0.00	0.00	0.00
5,700.00	2.96	270.27	5,693.58	1.19	-249.43	1.72	0.00	0.00	0.00	0.00
5,800.00	2.96	270.27	5,793.45	1.22	-254.60	1.75	0.00	0.00	0.00	0.00
5,900.00	2.96	270.27	5,893.32	1.24	-259.77	1.79	0.00	0.00	0.00	0.00
6,000.00	2.96	270.27	5,993.18	1.27	-264.93	1.82	0.00	0.00	0.00	0.00
6,100.00	2.96	270.27	6,093.05	1.29	-270.10	1.86	0.00	0.00	0.00	0.00
6,200.00	2.96	270.27	6,192.91	1.32	-275.27	1.89	0.00	0.00	0.00	0.00
6,300.00	2.96	270.27	6,292.78	1.34	-280.44	1.93	0.00	0.00	0.00	0.00
6,400.00	2.96	270.27	6,392.65	1.37	-285.61	1.97	0.00	0.00	0.00	0.00
6,487.61	2.96	270.27	6,480.14	1.39	-290.14	2.00	0.00	0.00	0.00	0.00
<b>Top of 4-1/2" Liner @ 6487.61ft</b>										
6,500.00	2.96	270.27	6,492.51	1.39	-290.78	2.00	0.00	0.00	0.00	0.00
6,587.61	2.96	270.27	6,580.01	1.41	-295.31	2.03	0.00	0.00	0.00	0.00
<b>KOP @ 6587.61ft</b>										
6,600.00	3.22	292.92	6,592.38	1.55	-295.95	2.17	10.00	2.07	182.79	89.62
6,700.00	11.64	345.34	6,691.52	12.43	-301.10	13.06	10.00	8.42	52.41	67.00
6,800.00	21.45	352.32	6,787.27	40.38	-306.11	41.02	10.00	9.82	6.99	14.85
6,900.00	31.38	355.02	6,876.72	84.56	-310.82	85.21	10.00	9.93	2.70	8.12
<b>DLS = 10.00/100ft</b>										
7,000.00	41.35	356.52	6,957.15	143.62	-315.10	144.28	10.00	9.96	1.49	5.70
7,100.00	51.32	357.52	7,026.11	215.77	-318.80	216.43	10.00	9.97	1.00	4.49
7,107.90	52.11	357.58	7,031.00	221.96	-319.07	222.63	10.00	9.98	0.84	3.80
<b>Sharon Springs</b>										
7,200.00	61.30	358.27	7,081.51	298.81	-321.83	299.48	10.00	9.98	0.74	3.76
7,224.93	63.79	358.43	7,093.00	320.92	-322.47	321.60	10.00	9.98	0.66	3.38
<b>Niobrara A</b>										
7,300.00	71.28	358.89	7,121.66	390.23	-324.08	390.91	10.00	9.98	0.61	3.30
7,317.41	73.02	358.99	7,127.00	406.80	-324.39	407.48	10.00	9.99	0.57	3.13
<b>Niobrara B</b>										
7,400.00	81.27	359.44	7,145.36	487.24	-325.49	487.92	10.00	9.99	0.54	3.10
7,486.10	89.87	359.88	7,152.00	573.00	-326.00	573.68	10.00	9.99	0.52	3.00
<b>End Build @ 7486.10ft - Nio B TL - Heel - 7" Casing - Harris Federal 16N-18HZ_CP</b>										
7,500.00	89.87	359.88	7,152.03	586.90	-326.03	587.58	0.00	0.00	0.00	2.96
7,600.00	89.87	359.88	7,152.26	686.90	-326.23	687.58	0.00	0.00	0.00	0.00
7,700.00	89.87	359.88	7,152.49	786.90	-326.43	787.58	0.00	0.00	0.00	0.00
7,800.00	89.87	359.88	7,152.72	886.90	-326.64	887.58	0.00	0.00	0.00	0.00
7,900.00	89.87	359.88	7,152.95	986.90	-326.84	987.58	0.00	0.00	0.00	0.00
8,000.00	89.87	359.88	7,153.18	1,086.90	-327.04	1,087.58	0.00	0.00	0.00	0.00
8,100.00	89.87	359.88	7,153.41	1,186.90	-327.25	1,187.58	0.00	0.00	0.00	0.00
8,200.00	89.87	359.88	7,153.63	1,286.90	-327.45	1,287.58	0.00	0.00	0.00	0.00
8,300.00	89.87	359.88	7,153.86	1,386.90	-327.65	1,387.58	0.00	0.00	0.00	0.00
8,400.00	89.87	359.88	7,154.09	1,486.90	-327.85	1,487.58	0.00	0.00	0.00	0.00
8,500.00	89.87	359.88	7,154.32	1,586.90	-328.06	1,587.58	0.00	0.00	0.00	0.00
8,600.00	89.87	359.88	7,154.55	1,686.90	-328.26	1,687.58	0.00	0.00	0.00	0.00
8,700.00	89.87	359.88	7,154.78	1,786.90	-328.46	1,787.58	0.00	0.00	0.00	0.00
8,800.00	89.87	359.88	7,155.01	1,886.89	-328.67	1,887.58	0.00	0.00	0.00	0.00
8,900.00	89.87	359.88	7,155.24	1,986.89	-328.87	1,987.58	0.00	0.00	0.00	0.00
9,000.00	89.87	359.88	7,155.47	2,086.89	-329.07	2,087.58	0.00	0.00	0.00	0.00
9,100.00	89.87	359.88	7,155.70	2,186.89	-329.27	2,187.58	0.00	0.00	0.00	0.00
9,200.00	89.87	359.88	7,155.92	2,286.89	-329.48	2,287.58	0.00	0.00	0.00	0.00
9,300.00	89.87	359.88	7,156.15	2,386.89	-329.68	2,387.58	0.00	0.00	0.00	0.00
9,400.00	89.87	359.88	7,156.38	2,486.89	-329.88	2,487.58	0.00	0.00	0.00	0.00

**Plan Report for Harris Federal 16N-18HZ - 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 (°)
9,500.00	89.87	359.88	7,156.61	2,586.89	-330.08	2,587.58	0.00	0.00	0.00	0.00
9,600.00	89.87	359.88	7,156.84	2,686.89	-330.29	2,687.58	0.00	0.00	0.00	0.00
9,700.00	89.87	359.88	7,157.07	2,786.89	-330.49	2,787.58	0.00	0.00	0.00	0.00
9,800.00	89.87	359.88	7,157.30	2,886.89	-330.69	2,887.58	0.00	0.00	0.00	0.00
9,900.00	89.87	359.88	7,157.53	2,986.89	-330.90	2,987.58	0.00	0.00	0.00	0.00
10,000.00	89.87	359.88	7,157.76	3,086.89	-331.10	3,087.58	0.00	0.00	0.00	0.00
10,100.00	89.87	359.88	7,157.99	3,186.89	-331.30	3,187.58	0.00	0.00	0.00	0.00
10,200.00	89.87	359.88	7,158.21	3,286.89	-331.50	3,287.58	0.00	0.00	0.00	0.00
10,300.00	89.87	359.88	7,158.44	3,386.89	-331.71	3,387.57	0.00	0.00	0.00	0.00
10,400.00	89.87	359.88	7,158.67	3,486.89	-331.91	3,487.57	0.00	0.00	0.00	0.00
10,500.00	89.87	359.88	7,158.90	3,586.89	-332.11	3,587.57	0.00	0.00	0.00	0.00
10,600.00	89.87	359.88	7,159.13	3,686.89	-332.32	3,687.57	0.00	0.00	0.00	0.00
10,700.00	89.87	359.88	7,159.36	3,786.89	-332.52	3,787.57	0.00	0.00	0.00	0.00
10,800.00	89.87	359.88	7,159.59	3,886.89	-332.72	3,887.57	0.00	0.00	0.00	0.00
10,900.00	89.87	359.88	7,159.82	3,986.88	-332.92	3,987.57	0.00	0.00	0.00	0.00
11,000.00	89.87	359.88	7,160.05	4,086.88	-333.13	4,087.57	0.00	0.00	0.00	0.00
11,100.00	89.87	359.88	7,160.27	4,186.88	-333.33	4,187.57	0.00	0.00	0.00	0.00
11,200.00	89.87	359.88	7,160.50	4,286.88	-333.53	4,287.57	0.00	0.00	0.00	0.00
11,300.00	89.87	359.88	7,160.73	4,386.88	-333.74	4,387.57	0.00	0.00	0.00	0.00
11,400.00	89.87	359.88	7,160.96	4,486.88	-333.94	4,487.57	0.00	0.00	0.00	0.00
11,500.00	89.87	359.88	7,161.19	4,586.88	-334.14	4,587.57	0.00	0.00	0.00	0.00
11,600.00	89.87	359.88	7,161.42	4,686.88	-334.34	4,687.57	0.00	0.00	0.00	0.00
11,700.00	89.87	359.88	7,161.65	4,786.88	-334.55	4,787.57	0.00	0.00	0.00	0.00
11,800.00	89.87	359.88	7,161.88	4,886.88	-334.75	4,887.57	0.00	0.00	0.00	0.00
11,900.00	89.87	359.88	7,162.11	4,986.88	-334.95	4,987.57	0.00	0.00	0.00	0.00
12,000.00	89.87	359.88	7,162.34	5,086.88	-335.16	5,087.57	0.00	0.00	0.00	0.00
12,100.00	89.87	359.88	7,162.56	5,186.88	-335.36	5,187.57	0.00	0.00	0.00	0.00
12,200.00	89.87	359.88	7,162.79	5,286.88	-335.56	5,287.57	0.00	0.00	0.00	0.00
12,300.00	89.87	359.88	7,163.02	5,386.88	-335.76	5,387.57	0.00	0.00	0.00	0.00
12,400.00	89.87	359.88	7,163.25	5,486.88	-335.97	5,487.57	0.00	0.00	0.00	0.00
12,500.00	89.87	359.88	7,163.48	5,586.88	-336.17	5,587.57	0.00	0.00	0.00	0.00
12,600.00	89.87	359.88	7,163.71	5,686.88	-336.37	5,687.57	0.00	0.00	0.00	0.00
12,700.00	89.87	359.88	7,163.94	5,786.88	-336.58	5,787.57	0.00	0.00	0.00	0.00
12,800.00	89.87	359.88	7,164.17	5,886.88	-336.78	5,887.57	0.00	0.00	0.00	0.00
12,900.00	89.87	359.88	7,164.40	5,986.88	-336.98	5,987.57	0.00	0.00	0.00	0.00
13,000.00	89.87	359.88	7,164.63	6,086.88	-337.18	6,087.57	0.00	0.00	0.00	0.00
13,100.00	89.87	359.88	7,164.85	6,186.87	-337.39	6,187.57	0.00	0.00	0.00	0.00
13,200.00	89.87	359.88	7,165.08	6,286.87	-337.59	6,287.57	0.00	0.00	0.00	0.00
13,300.00	89.87	359.88	7,165.31	6,386.87	-337.79	6,387.57	0.00	0.00	0.00	0.00
13,400.00	89.87	359.88	7,165.54	6,486.87	-338.00	6,487.57	0.00	0.00	0.00	0.00
13,500.00	89.87	359.88	7,165.77	6,586.87	-338.20	6,587.57	0.00	0.00	0.00	0.00
13,600.00	89.87	359.88	7,166.00	6,686.87	-338.40	6,687.57	0.00	0.00	0.00	0.00
13,700.00	89.87	359.88	7,166.23	6,786.87	-338.60	6,787.57	0.00	0.00	0.00	0.00
13,800.00	89.87	359.88	7,166.46	6,886.87	-338.81	6,887.57	0.00	0.00	0.00	0.00
13,900.00	89.87	359.88	7,166.69	6,986.87	-339.01	6,987.57	0.00	0.00	0.00	0.00
14,000.00	89.87	359.88	7,166.92	7,086.87	-339.21	7,087.57	0.00	0.00	0.00	0.00
14,100.00	89.87	359.88	7,167.14	7,186.87	-339.42	7,187.56	0.00	0.00	0.00	0.00
14,200.00	89.87	359.88	7,167.37	7,286.87	-339.62	7,287.56	0.00	0.00	0.00	0.00
14,300.00	89.87	359.88	7,167.60	7,386.87	-339.82	7,387.56	0.00	0.00	0.00	0.00
14,400.00	89.87	359.88	7,167.83	7,486.87	-340.02	7,487.56	0.00	0.00	0.00	0.00
14,500.00	89.87	359.88	7,168.06	7,586.87	-340.23	7,587.56	0.00	0.00	0.00	0.00
14,600.00	89.87	359.88	7,168.29	7,686.87	-340.43	7,687.56	0.00	0.00	0.00	0.00
14,700.00	89.87	359.88	7,168.52	7,786.87	-340.63	7,787.56	0.00	0.00	0.00	0.00
14,800.00	89.87	359.88	7,168.75	7,886.87	-340.83	7,887.56	0.00	0.00	0.00	0.00
14,900.00	89.87	359.88	7,168.98	7,986.87	-341.04	7,987.56	0.00	0.00	0.00	0.00
15,000.00	89.87	359.88	7,169.21	8,086.87	-341.24	8,087.56	0.00	0.00	0.00	0.00
15,100.00	89.87	359.88	7,169.43	8,186.87	-341.44	8,187.56	0.00	0.00	0.00	0.00
15,200.00	89.87	359.88	7,169.66	8,286.86	-341.65	8,287.56	0.00	0.00	0.00	0.00
15,300.00	89.87	359.88	7,169.89	8,386.86	-341.85	8,387.56	0.00	0.00	0.00	0.00
15,400.00	89.87	359.88	7,170.12	8,486.86	-342.05	8,487.56	0.00	0.00	0.00	0.00

**Plan Report for Harris Federal 16N-18HZ - 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)	Tooface Azimuth (°)
15,500.00	89.87	359.88	7,170.35	8,586.86	-342.25	8,587.56	0.00	0.00	0.00	0.00
15,600.00	89.87	359.88	7,170.58	8,686.86	-342.46	8,687.56	0.00	0.00	0.00	0.00
15,700.00	89.87	359.88	7,170.81	8,786.86	-342.66	8,787.56	0.00	0.00	0.00	0.00
15,800.00	89.87	359.88	7,171.04	8,886.86	-342.86	8,887.56	0.00	0.00	0.00	0.00
15,900.00	89.87	359.88	7,171.27	8,986.86	-343.07	8,987.56	0.00	0.00	0.00	0.00
16,000.00	89.87	359.88	7,171.49	9,086.86	-343.27	9,087.56	0.00	0.00	0.00	0.00
16,100.00	89.87	359.88	7,171.72	9,186.86	-343.47	9,187.56	0.00	0.00	0.00	0.00
16,200.00	89.87	359.88	7,171.95	9,286.86	-343.67	9,287.56	0.00	0.00	0.00	0.00
16,220.64	89.87	359.88	7,172.00	9,307.50	-343.72	9,308.20	0.00	0.00	0.00	0.00

TD @ 16220.64ft - Harris Federal 16N-18HZ\_BHL

**Plan Annotations**

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
800.00	800.00	0.00	0.00	Begin Nudge @ 800.00ft
948.13	948.06	0.02	-3.83	End Nudge @ 948.13ft
6,487.61	6,480.14	1.39	-290.14	Top of 4-1/2" Liner @ 6487.61ft
6,587.61	6,580.01	1.41	-295.31	KOP @ 6587.61ft
6,900.00	6,876.72	84.56	-310.82	DLS = 10.00/100ft
7,486.10	7,152.00	573.00	-326.00	End Build @ 7486.10ft
16,220.64	7,172.00	9,307.50	-343.72	TD @ 16220.64ft

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	+N/_S (ft)	+E/-W (ft)	Start TVD (ft)
User	No Target (Freehand)	359.88	Slot	0.00	0.00	0.00

**Survey tool program**

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	16,220.64	Plan A Rev 0 - PERMIT	MWD

**Casing Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
602.00	602.00	9 5/8" Casing	9-5/8	13-1/2
7,486.10	7,152.00	7" Casing	7	8-3/4

**Plan Report for Harris Federal 16N-18HZ - Plan A Rev 0 - PERMIT****Formation Details**

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,877.98	3,874.00	Parkman		0.00	
4,306.55	4,302.00	Sussex		0.00	
7,107.90	7,031.00	Sharon Springs		0.00	
7,224.93	7,093.00	Niobrara A		0.00	
7,317.41	7,127.00	Niobrara B		0.00	
7,486.10	7,152.00	Nio B TL - Heel		0.00	
16,220.64	7,172.00	Nio B TL - Toe		0.00	

***Targets associated with this wellbore***

Target Name	TVD (ft)	+N-S (ft)	+E-W (ft)	Shape
Harris Federal 16N-18HZ_BHL	7,172.00	9,307.50	-343.72	Point
Harris Federal 16N-18HZ_Sec	0.00	0.00	0.00	Polygon
Harris Federal 16N-18HZ_CP	7,152.00	573.00	-326.00	Point
Harris Federal 16N-18HZ_SHL	0.00	0.00	0.00	Point

## North Reference Sheet for Sec. 19-T3N-R66W - Harris Federal 16N-18HZ - 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 @ 4882.00ft (Drilling Rig). Northing and Easting are relative to Harris Federal 16N-18HZ

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: 0.99995716

Grid Coordinates of Well: 1,318,373.98 ft N, 3,191,656.85 ft E

Geographical Coordinates of Well: 40° 12' 19.07" N, 104° 48' 49.73" W

Grid Convergence at Surface is: 0.44°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,220.64ft  
the Bottom Hole Displacement is 9,313.84ft in the Direction of 357.89° (True).

Magnetic Convergence at surface is: -8.23° (14 May 2013, , BGGM2012)

