

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 18-T2N-R65W

Crowder 16C-19HZ

Plan C Rev 0

Plan: Plan C Rev 0 Permit

Sperry Drilling Services

Proposal Report

21 August, 2012

Well Coordinates: 1,296,487.36 N, 3,223,550.80 E (40° 08' 40.15" N, 104° 42' 01.21" W)

Ground Level: 4,952.00 ft

Local Coordinate Origin: Centered on Well Crowder 16C-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 16C-19HZ
Wellbore: Plan C Rev 0
Design: Plan C Rev 0 Permit

Anadarko Petroleum Corp.

HALLIBURTON
Sperry Drilling

SECTION DETAILS

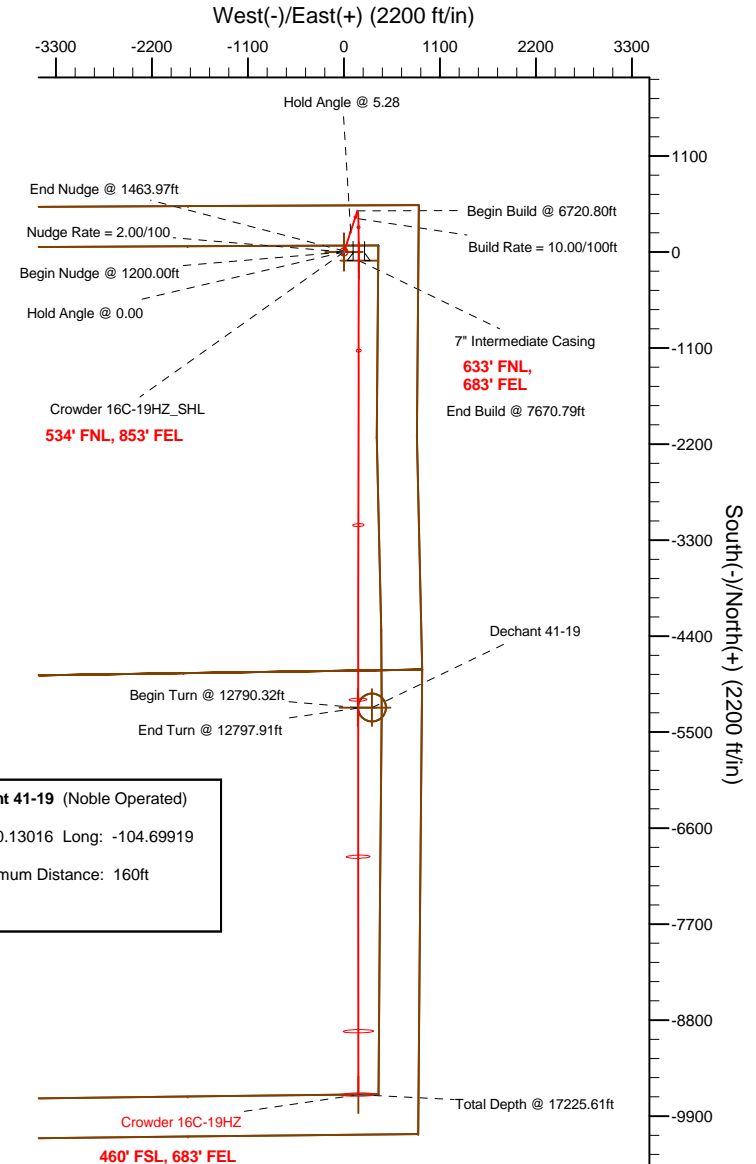
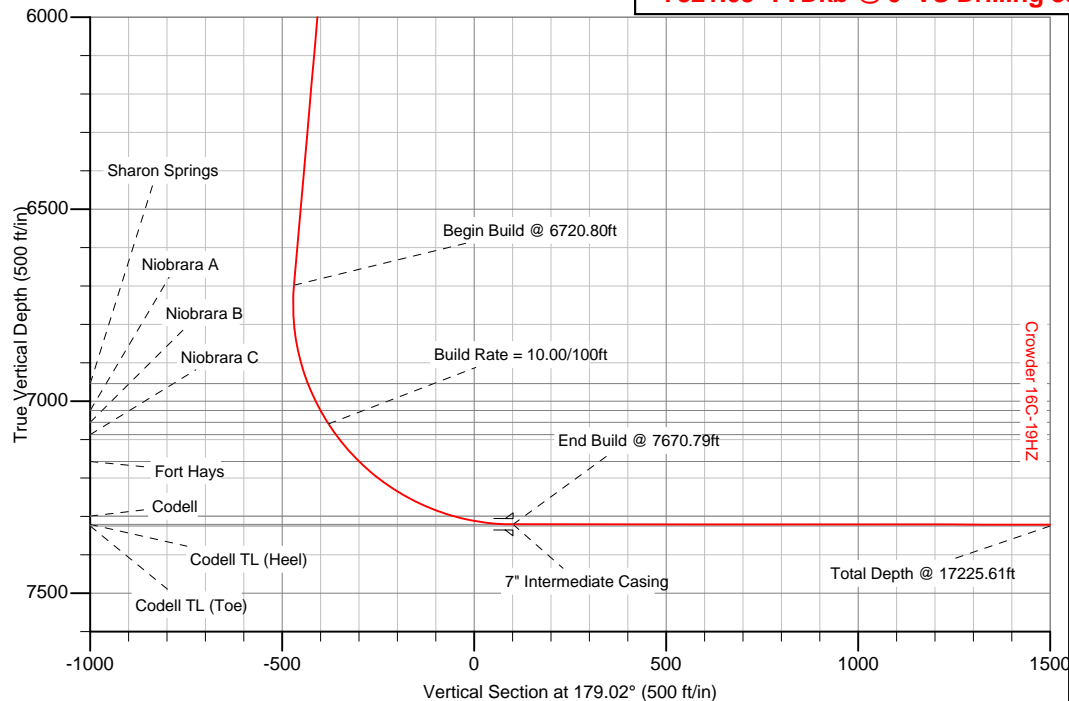
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	0.00	
3	1463.97	5.28	18.01	1463.60	11.56	3.76	2.00	18.01	-11.49	
4	6720.80	5.28	18.01	6698.13	471.55	153.34	0.00	0.00	-468.87	
5	7670.79	89.98	180.10	7321.00	-99.00	170.00	10.00	162.02	101.88	Crowder 16C-19HZ_Casing Point
6	12790.32	89.98	180.10	7323.14	-5218.52	160.74	0.00	0.00	5220.50	Crowder 16C-19HZ_WPtgt
7	12797.91	89.98	179.95	7323.14	-5226.11	160.74	2.00	-90.03	5228.09	
8	17225.61	89.98	179.95	7325.00	-9653.81	164.45	0.00	0.00	9655.21	Crowder 16C-19HZ_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Crowder 16C-19HZ_Section 18/19 Line	0.00	0.00	0.00	40.144485	-104.700337	Polygon
Crowder 16C-19HZ_Section Lines	0.00	0.00	0.00	40.144485	-104.700337	Polygon
Crowder 16C-19HZ_Setback Lines	0.00	0.00	0.00	40.144485	-104.700337	Polygon
Crowder 16C-19HZ_SHL	0.00	0.00	0.00	40.144485	-104.700337	Point
Dechant 41-19	0.00	-5218.52	320.74	40.130160	-104.699190	Circle (Radius: 160.00)
Crowder 16C-19HZ_Casing Point	7321.00	-99.00	170.00	40.144213	-104.699729	Point
Crowder 16C-19HZ_WPtgt	7323.14	-5218.52	160.74	40.130160	-104.699762	Point
Crowder 16C-19HZ_BHL	7325.00	-9653.81	164.45	40.117985	-104.699749	Point

Target Line:

7321.63' TVDkb @ 0' VS Drilling 89.98°



Dechant 41-19 (Noble Operated)

Lat: 40.13016 Long: -104.69919

Minimum Distance: 160ft

WELL DETAILS: Crowder 16C-19HZ

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

Plan: Plan C Rev 0 Permit (Crowder 16C-19HZ/Plan C Rev 0)

Created By: Fred Hartmann Date: 09-21-2012
Reviewed: _____ Date: _____

Plan Report for Crowder 16C-19HZ - Plan C 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 16C-19HZ_SHL - Crowder 16C-19HZ_Section 18/19 Line - Crowder 16C-19HZ_Section Lines - Crowder 16C-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
Begin Nudge @ 1200.00ft										
1,300.00	2.00	18.01	1,299.98	1.66	0.54	-1.65	2.00	2.00	0.00	18.01
Nudge Rate = 2.00/100										
1,400.00	4.00	18.01	1,399.84	6.64	2.16	-6.60	2.00	2.00	0.00	0.00
1,463.97	5.28	18.01	1,463.60	11.56	3.76	-11.49	2.00	2.00	0.00	0.00
End Nudge @ 1463.97ft										
1,500.00	5.28	18.01	1,499.47	14.71	4.78	-14.63	0.00	0.00	0.00	0.00
1,600.00	5.28	18.01	1,599.05	23.46	7.63	-23.33	0.00	0.00	0.00	0.00
1,700.00	5.28	18.01	1,698.63	32.21	10.47	-32.03	0.00	0.00	0.00	0.00
1,800.00	5.28	18.01	1,798.20	40.96	13.32	-40.73	0.00	0.00	0.00	0.00
1,900.00	5.28	18.01	1,897.78	49.71	16.17	-49.43	0.00	0.00	0.00	0.00
2,000.00	5.28	18.01	1,997.35	58.46	19.01	-58.13	0.00	0.00	0.00	0.00
2,100.00	5.28	18.01	2,096.93	67.21	21.86	-66.83	0.00	0.00	0.00	0.00
2,200.00	5.28	18.01	2,196.50	75.96	24.70	-75.53	0.00	0.00	0.00	0.00
2,300.00	5.28	18.01	2,296.08	84.71	27.55	-84.23	0.00	0.00	0.00	0.00
2,400.00	5.28	18.01	2,395.66	93.46	30.39	-92.93	0.00	0.00	0.00	0.00
2,500.00	5.28	18.01	2,495.23	102.21	33.24	-101.63	0.00	0.00	0.00	0.00
2,600.00	5.28	18.01	2,594.81	110.96	36.08	-110.33	0.00	0.00	0.00	0.00
2,700.00	5.28	18.01	2,694.38	119.71	38.93	-119.03	0.00	0.00	0.00	0.00
2,800.00	5.28	18.01	2,793.96	128.46	41.77	-127.73	0.00	0.00	0.00	0.00
2,900.00	5.28	18.01	2,893.53	137.22	44.62	-136.44	0.00	0.00	0.00	0.00
3,000.00	5.28	18.01	2,993.11	145.97	47.47	-145.14	0.00	0.00	0.00	0.00
3,100.00	5.28	18.01	3,092.69	154.72	50.31	-153.84	0.00	0.00	0.00	0.00
3,200.00	5.28	18.01	3,192.26	163.47	53.16	-162.54	0.00	0.00	0.00	0.00
3,300.00	5.28	18.01	3,291.84	172.22	56.00	-171.24	0.00	0.00	0.00	0.00
3,400.00	5.28	18.01	3,391.41	180.97	58.85	-179.94	0.00	0.00	0.00	0.00
3,500.00	5.28	18.01	3,490.99	189.72	61.69	-188.64	0.00	0.00	0.00	0.00
3,600.00	5.28	18.01	3,590.57	198.47	64.54	-197.34	0.00	0.00	0.00	0.00
3,700.00	5.28	18.01	3,690.14	207.22	67.38	-206.04	0.00	0.00	0.00	0.00
3,800.00	5.28	18.01	3,789.72	215.97	70.23	-214.74	0.00	0.00	0.00	0.00
3,900.00	5.28	18.01	3,889.29	224.72	73.07	-223.44	0.00	0.00	0.00	0.00
3,969.00	5.28	18.01	3,958.00	230.76	75.04	-229.44	0.00	0.00	0.00	0.00
Parkman										
4,000.00	5.28	18.01	3,988.87	233.47	75.92	-232.14	0.00	0.00	0.00	0.00
Hold Angle @ 5.28										
4,100.00	5.28	18.01	4,088.44	242.22	78.77	-240.84	0.00	0.00	0.00	0.00
4,200.00	5.28	18.01	4,188.02	250.97	81.61	-249.54	0.00	0.00	0.00	0.00
4,300.00	5.28	18.01	4,287.60	259.72	84.46	-258.24	0.00	0.00	0.00	0.00
4,400.00	5.28	18.01	4,387.17	268.47	87.30	-266.94	0.00	0.00	0.00	0.00
4,500.00	5.28	18.01	4,486.75	277.22	90.15	-275.65	0.00	0.00	0.00	0.00
4,506.28	5.28	18.01	4,493.00	277.77	90.33	-276.19	0.00	0.00	0.00	0.00
Sussex										
4,600.00	5.28	18.01	4,586.32	285.97	92.99	-284.35	0.00	0.00	0.00	0.00

Plan Report for Crowder 16C-19HZ - Plan C 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 (°)
4,700.00	5.28	18.01	4,685.90	294.72	95.84	-293.05	0.00	0.00	0.00	0.00
4,800.00	5.28	18.01	4,785.47	303.47	98.68	-301.75	0.00	0.00	0.00	0.00
4,900.00	5.28	18.01	4,885.05	312.22	101.53	-310.45	0.00	0.00	0.00	0.00
5,000.00	5.28	18.01	4,984.63	320.97	104.37	-319.15	0.00	0.00	0.00	0.00
5,100.00	5.28	18.01	5,084.20	329.72	107.22	-327.85	0.00	0.00	0.00	0.00
5,200.00	5.28	18.01	5,183.78	338.47	110.07	-336.55	0.00	0.00	0.00	0.00
5,300.00	5.28	18.01	5,283.35	347.22	112.91	-345.25	0.00	0.00	0.00	0.00
5,400.00	5.28	18.01	5,382.93	355.97	115.76	-353.95	0.00	0.00	0.00	0.00
5,500.00	5.28	18.01	5,482.50	364.72	118.60	-362.65	0.00	0.00	0.00	0.00
5,600.00	5.28	18.01	5,582.08	373.47	121.45	-371.35	0.00	0.00	0.00	0.00
5,700.00	5.28	18.01	5,681.66	382.23	124.29	-380.05	0.00	0.00	0.00	0.00
5,800.00	5.28	18.01	5,781.23	390.98	127.14	-388.75	0.00	0.00	0.00	0.00
5,900.00	5.28	18.01	5,880.81	399.73	129.98	-397.45	0.00	0.00	0.00	0.00
6,000.00	5.28	18.01	5,980.38	408.48	132.83	-406.15	0.00	0.00	0.00	0.00
6,100.00	5.28	18.01	6,079.96	417.23	135.67	-414.86	0.00	0.00	0.00	0.00
6,200.00	5.28	18.01	6,179.54	425.98	138.52	-423.56	0.00	0.00	0.00	0.00
6,300.00	5.28	18.01	6,279.11	434.73	141.37	-432.26	0.00	0.00	0.00	0.00
6,400.00	5.28	18.01	6,378.69	443.48	144.21	-440.96	0.00	0.00	0.00	0.00
6,500.00	5.28	18.01	6,478.26	452.23	147.06	-449.66	0.00	0.00	0.00	0.00
6,600.00	5.28	18.01	6,577.84	460.98	149.90	-458.36	0.00	0.00	0.00	0.00
6,700.00	5.28	18.01	6,677.41	469.73	152.75	-467.06	0.00	0.00	0.00	0.00
6,720.80	5.28	18.01	6,698.13	471.55	153.34	-468.87	0.00	0.00	0.00	0.00
Begin Build @ 6720.80ft										
6,800.00	3.32	150.80	6,777.22	473.01	155.59	-470.29	10.00	-2.47	167.66	162.02
6,900.00	13.00	173.03	6,876.10	459.29	158.37	-456.52	10.00	9.67	22.24	29.35
6,981.55	21.11	175.88	6,954.00	435.50	160.54	-432.70	10.00	9.95	3.50	7.26
Sharon Springs										
7,000.00	22.95	176.26	6,971.11	428.59	161.02	-425.79	10.00	9.97	2.02	4.52
7,058.82	28.82	177.14	7,024.00	402.96	162.47	-400.14	10.00	9.98	1.51	4.18
Niobrara A										
7,094.85	32.42	177.54	7,055.00	384.64	163.32	-381.80	10.00	9.98	1.10	3.38
Niobrara B										
7,100.00	32.93	177.59	7,059.34	381.86	163.44	-379.02	10.00	9.99	0.97	3.04
Build Rate = 10.00/100ft										
7,133.62	36.29	177.89	7,087.00	362.78	164.19	-359.93	10.00	9.99	0.88	2.99
Niobrara C										
7,200.00	42.92	178.35	7,138.12	320.51	165.57	-317.64	10.00	9.99	0.70	2.75
7,226.36	45.56	178.51	7,157.00	302.13	166.07	-299.25	10.00	9.99	0.58	2.39
Fort Hays										
7,300.00	52.91	178.87	7,205.05	246.40	167.33	-243.52	10.00	9.99	0.50	2.28
7,400.00	62.91	179.27	7,258.11	161.80	168.69	-158.90	10.00	9.99	0.40	2.04
7,500.00	72.90	179.60	7,295.67	69.27	169.59	-66.37	10.00	10.00	0.33	1.83
7,511.71	74.07	179.64	7,299.00	58.04	169.66	-55.14	10.00	10.00	0.31	1.70
Codell										
7,600.00	82.90	179.90	7,316.60	-28.39	170.00	31.28	10.00	10.00	0.30	1.69
7,670.79	89.98	180.10	7,321.00	-99.00	170.00	101.88	10.00	10.00	0.29	1.64
End Build @ 7670.79ft - Codell TL (Heel) - 7" Intermediate Casing - Crowder 16C-19HZ Casing Point										
7,700.00	89.98	180.10	7,321.01	-128.21	169.95	131.08	0.00	0.00	0.00	1.63
7,800.00	89.98	180.10	7,321.05	-228.21	169.77	231.07	0.00	0.00	0.00	0.00
7,900.00	89.98	180.10	7,321.10	-328.21	169.59	331.05	0.00	0.00	0.00	0.00
8,000.00	89.98	180.10	7,321.14	-428.21	169.40	431.03	0.00	0.00	0.00	0.00
8,100.00	89.98	180.10	7,321.18	-528.21	169.22	531.01	0.00	0.00	0.00	0.00
8,200.00	89.98	180.10	7,321.22	-628.21	169.04	630.99	0.00	0.00	0.00	0.00
8,300.00	89.98	180.10	7,321.26	-728.21	168.86	730.98	0.00	0.00	0.00	0.00
8,400.00	89.98	180.10	7,321.30	-828.21	168.68	830.96	0.00	0.00	0.00	0.00
8,500.00	89.98	180.10	7,321.35	-928.21	168.50	930.94	0.00	0.00	0.00	0.00
8,600.00	89.98	180.10	7,321.39	-1,028.21	168.32	1,030.92	0.00	0.00	0.00	0.00
8,700.00	89.98	180.10	7,321.43	-1,128.21	168.14	1,130.91	0.00	0.00	0.00	0.00

Plan Report for Crowder 16C-19HZ - Plan C 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 (°)
8,800.00	89.98	180.10	7,321.47	-1,228.21	167.96	1,230.89	0.00	0.00	0.00	0.00
8,900.00	89.98	180.10	7,321.51	-1,328.21	167.78	1,330.87	0.00	0.00	0.00	0.00
9,000.00	89.98	180.10	7,321.56	-1,428.20	167.60	1,430.85	0.00	0.00	0.00	0.00
9,100.00	89.98	180.10	7,321.60	-1,528.20	167.41	1,530.83	0.00	0.00	0.00	0.00
9,200.00	89.98	180.10	7,321.64	-1,628.20	167.23	1,630.82	0.00	0.00	0.00	0.00
9,300.00	89.98	180.10	7,321.68	-1,728.20	167.05	1,730.80	0.00	0.00	0.00	0.00
9,400.00	89.98	180.10	7,321.72	-1,828.20	166.87	1,830.78	0.00	0.00	0.00	0.00
9,500.00	89.98	180.10	7,321.76	-1,928.20	166.69	1,930.76	0.00	0.00	0.00	0.00
9,600.00	89.98	180.10	7,321.81	-2,028.20	166.51	2,030.75	0.00	0.00	0.00	0.00
9,700.00	89.98	180.10	7,321.85	-2,128.20	166.33	2,130.73	0.00	0.00	0.00	0.00
9,800.00	89.98	180.10	7,321.89	-2,228.20	166.15	2,230.71	0.00	0.00	0.00	0.00
9,900.00	89.98	180.10	7,321.93	-2,328.20	165.97	2,330.69	0.00	0.00	0.00	0.00
10,000.00	89.98	180.10	7,321.97	-2,428.20	165.79	2,430.67	0.00	0.00	0.00	0.00
10,100.00	89.98	180.10	7,322.02	-2,528.20	165.61	2,530.66	0.00	0.00	0.00	0.00
10,200.00	89.98	180.10	7,322.06	-2,628.20	165.43	2,630.64	0.00	0.00	0.00	0.00
10,300.00	89.98	180.10	7,322.10	-2,728.20	165.24	2,730.62	0.00	0.00	0.00	0.00
10,400.00	89.98	180.10	7,322.14	-2,828.20	165.06	2,830.60	0.00	0.00	0.00	0.00
10,500.00	89.98	180.10	7,322.18	-2,928.20	164.88	2,930.59	0.00	0.00	0.00	0.00
10,600.00	89.98	180.10	7,322.22	-3,028.20	164.70	3,030.57	0.00	0.00	0.00	0.00
10,700.00	89.98	180.10	7,322.27	-3,128.20	164.52	3,130.55	0.00	0.00	0.00	0.00
10,800.00	89.98	180.10	7,322.31	-3,228.20	164.34	3,230.53	0.00	0.00	0.00	0.00
10,900.00	89.98	180.10	7,322.35	-3,328.20	164.16	3,330.51	0.00	0.00	0.00	0.00
11,000.00	89.98	180.10	7,322.39	-3,428.20	163.98	3,430.50	0.00	0.00	0.00	0.00
11,100.00	89.98	180.10	7,322.43	-3,528.20	163.80	3,530.48	0.00	0.00	0.00	0.00
11,200.00	89.98	180.10	7,322.48	-3,628.20	163.62	3,630.46	0.00	0.00	0.00	0.00
11,300.00	89.98	180.10	7,322.52	-3,728.20	163.44	3,730.44	0.00	0.00	0.00	0.00
11,400.00	89.98	180.10	7,322.56	-3,828.20	163.25	3,830.43	0.00	0.00	0.00	0.00
11,500.00	89.98	180.10	7,322.60	-3,928.20	163.07	3,930.41	0.00	0.00	0.00	0.00
11,600.00	89.98	180.10	7,322.64	-4,028.20	162.89	4,030.39	0.00	0.00	0.00	0.00
11,700.00	89.98	180.10	7,322.68	-4,128.20	162.71	4,130.37	0.00	0.00	0.00	0.00
11,800.00	89.98	180.10	7,322.73	-4,228.20	162.53	4,230.36	0.00	0.00	0.00	0.00
11,900.00	89.98	180.10	7,322.77	-4,328.20	162.35	4,330.34	0.00	0.00	0.00	0.00
12,000.00	89.98	180.10	7,322.81	-4,428.20	162.17	4,430.32	0.00	0.00	0.00	0.00
12,100.00	89.98	180.10	7,322.85	-4,528.20	161.99	4,530.30	0.00	0.00	0.00	0.00
12,200.00	89.98	180.10	7,322.89	-4,628.20	161.81	4,630.28	0.00	0.00	0.00	0.00
12,300.00	89.98	180.10	7,322.94	-4,728.20	161.63	4,730.27	0.00	0.00	0.00	0.00
12,400.00	89.98	180.10	7,322.98	-4,828.20	161.45	4,830.25	0.00	0.00	0.00	0.00
12,500.00	89.98	180.10	7,323.02	-4,928.20	161.27	4,930.23	0.00	0.00	0.00	0.00
12,600.00	89.98	180.10	7,323.06	-5,028.20	161.08	5,030.21	0.00	0.00	0.00	0.00
12,700.00	89.98	180.10	7,323.10	-5,128.20	160.90	5,130.20	0.00	0.00	0.00	0.00
12,790.32	89.98	180.10	7,323.14	-5,218.52	160.74	5,220.50	0.00	0.00	0.00	0.00
Begin Turn @ 12790.32ft - Crowder 16C-19HZ_WPtgt										
12,797.91	89.98	179.95	7,323.14	-5,226.11	160.74	5,228.09	2.00	0.00	-2.00	-90.03
End Turn @ 12797.91ft										
12,800.00	89.98	179.95	7,323.14	-5,228.20	160.74	5,230.18	0.00	0.00	0.00	0.00
12,900.00	89.98	179.95	7,323.19	-5,328.20	160.82	5,330.16	0.00	0.00	0.00	0.00
13,000.00	89.98	179.95	7,323.23	-5,428.20	160.91	5,430.15	0.00	0.00	0.00	0.00
13,100.00	89.98	179.95	7,323.27	-5,528.20	160.99	5,530.14	0.00	0.00	0.00	0.00
13,200.00	89.98	179.95	7,323.31	-5,628.20	161.07	5,630.13	0.00	0.00	0.00	0.00
13,300.00	89.98	179.95	7,323.35	-5,728.20	161.16	5,730.11	0.00	0.00	0.00	0.00
13,400.00	89.98	179.95	7,323.40	-5,828.20	161.24	5,830.10	0.00	0.00	0.00	0.00
13,500.00	89.98	179.95	7,323.44	-5,928.20	161.33	5,930.09	0.00	0.00	0.00	0.00
13,600.00	89.98	179.95	7,323.48	-6,028.20	161.41	6,030.07	0.00	0.00	0.00	0.00
13,700.00	89.98	179.95	7,323.52	-6,128.20	161.49	6,130.06	0.00	0.00	0.00	0.00
13,800.00	89.98	179.95	7,323.56	-6,228.20	161.58	6,230.05	0.00	0.00	0.00	0.00
13,900.00	89.98	179.95	7,323.61	-6,328.20	161.66	6,330.03	0.00	0.00	0.00	0.00
14,000.00	89.98	179.95	7,323.65	-6,428.20	161.75	6,430.02	0.00	0.00	0.00	0.00
14,100.00	89.98	179.95	7,323.69	-6,528.20	161.83	6,530.01	0.00	0.00	0.00	0.00
14,200.00	89.98	179.95	7,323.73	-6,628.20	161.91	6,629.99	0.00	0.00	0.00	0.00

Plan Report for Crowder 16C-19HZ - Plan C 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 (°)
14,300.00	89.98	179.95	7,323.77	-6,728.20	162.00	6,729.98	0.00	0.00	0.00	0.00
14,400.00	89.98	179.95	7,323.82	-6,828.20	162.08	6,829.97	0.00	0.00	0.00	0.00
14,500.00	89.98	179.95	7,323.86	-6,928.20	162.16	6,929.95	0.00	0.00	0.00	0.00
14,600.00	89.98	179.95	7,323.90	-7,028.20	162.25	7,029.94	0.00	0.00	0.00	0.00
14,700.00	89.98	179.95	7,323.94	-7,128.20	162.33	7,129.93	0.00	0.00	0.00	0.00
14,800.00	89.98	179.95	7,323.98	-7,228.20	162.42	7,229.92	0.00	0.00	0.00	0.00
14,900.00	89.98	179.95	7,324.02	-7,328.20	162.50	7,329.90	0.00	0.00	0.00	0.00
15,000.00	89.98	179.95	7,324.07	-7,428.20	162.58	7,429.89	0.00	0.00	0.00	0.00
15,100.00	89.98	179.95	7,324.11	-7,528.20	162.67	7,529.88	0.00	0.00	0.00	0.00
15,200.00	89.98	179.95	7,324.15	-7,628.20	162.75	7,629.86	0.00	0.00	0.00	0.00
15,300.00	89.98	179.95	7,324.19	-7,728.20	162.84	7,729.85	0.00	0.00	0.00	0.00
15,400.00	89.98	179.95	7,324.23	-7,828.20	162.92	7,829.84	0.00	0.00	0.00	0.00
15,500.00	89.98	179.95	7,324.28	-7,928.20	163.00	7,929.82	0.00	0.00	0.00	0.00
15,600.00	89.98	179.95	7,324.32	-8,028.20	163.09	8,029.81	0.00	0.00	0.00	0.00
15,700.00	89.98	179.95	7,324.36	-8,128.20	163.17	8,129.80	0.00	0.00	0.00	0.00
15,800.00	89.98	179.95	7,324.40	-8,228.20	163.26	8,229.78	0.00	0.00	0.00	0.00
15,900.00	89.98	179.95	7,324.44	-8,328.20	163.34	8,329.77	0.00	0.00	0.00	0.00
16,000.00	89.98	179.95	7,324.49	-8,428.20	163.42	8,429.76	0.00	0.00	0.00	0.00
16,100.00	89.98	179.95	7,324.53	-8,528.20	163.51	8,529.74	0.00	0.00	0.00	0.00
16,200.00	89.98	179.95	7,324.57	-8,628.20	163.59	8,629.73	0.00	0.00	0.00	0.00
16,300.00	89.98	179.95	7,324.61	-8,728.20	163.68	8,729.72	0.00	0.00	0.00	0.00
16,400.00	89.98	179.95	7,324.65	-8,828.20	163.76	8,829.71	0.00	0.00	0.00	0.00
16,500.00	89.98	179.95	7,324.70	-8,928.20	163.84	8,929.69	0.00	0.00	0.00	0.00
16,600.00	89.98	179.95	7,324.74	-9,028.20	163.93	9,029.68	0.00	0.00	0.00	0.00
16,700.00	89.98	179.95	7,324.78	-9,128.20	164.01	9,129.67	0.00	0.00	0.00	0.00
16,800.00	89.98	179.95	7,324.82	-9,228.20	164.09	9,229.65	0.00	0.00	0.00	0.00
16,900.00	89.98	179.95	7,324.86	-9,328.20	164.18	9,329.64	0.00	0.00	0.00	0.00
17,000.00	89.98	179.95	7,324.91	-9,428.20	164.26	9,429.63	0.00	0.00	0.00	0.00
17,100.00	89.98	179.95	7,324.95	-9,528.20	164.35	9,529.61	0.00	0.00	0.00	0.00
17,200.00	89.98	179.95	7,324.99	-9,628.20	164.43	9,629.60	0.00	0.00	0.00	0.00
17,225.61	89.98	179.95	7,325.00	-9,653.81	164.45	9,655.21	0.00	0.00	0.00	0.00

Codell TL (Toe) - Crowder 16C-19HZ_BHL

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	+E/-W (ft)	Comment
600.00	600.00	0.00	0.00	Hold Angle @ 0.00
1,200.00	1,200.00	0.00	0.00	Begin Nudge @ 1200.00ft
1,300.00	1,299.98	1.66	0.54	Nudge Rate = 2.00/100
1,463.97	1,463.60	11.56	3.76	End Nudge @ 1463.97ft
4,000.00	3,988.87	233.47	75.92	Hold Angle @ 5.28
6,720.80	6,698.13	471.55	153.34	Begin Build @ 6720.80ft
7,100.00	7,059.34	381.86	163.44	Build Rate = 10.00/100ft
7,670.79	7,321.00	-99.00	170.00	End Build @ 7670.79ft
12,790.32	7,323.14	-5,218.52	160.74	Begin Turn @ 12790.32ft
12,797.91	7,323.14	-5,226.11	160.74	End Turn @ 12797.91ft
17,225.61	7,325.00	-9,653.81	164.45	Total Depth @ 17225.61ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (ft)	+E/-W (ft)	Start TVD (ft)
Target	Crowder 16C-19HZ_BHL	179.02	Slot	0.00	0.00	0.00

Plan Report for Crowder 16C-19HZ - Plan C Rev 0 Permit**Survey tool program**

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	17,225.61	Plan C Rev 0 Permit	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,670.79	7,321.00	7" Intermediate Casing	7	8-3/4

Formation Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
3,969.00	3,958.00	Parkman		0.00	
4,506.28	4,493.00	Sussex		0.00	
6,981.55	6,954.00	Sharon Springs		0.00	
7,058.82	7,024.00	Niobrara A		0.00	
7,094.85	7,055.00	Niobrara B		0.00	
7,133.62	7,087.00	Niobrara C		0.00	
7,226.36	7,157.00	Fort Hays		0.00	
7,511.71	7,299.00	Codell		0.00	
7,670.79	7,321.00	Codell TL (Heel)		0.00	
17,225.61	7,325.00	Codell TL (Toe)		0.00	

Targets associated with this wellbore

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
Crowder 16C-19HZ_Setback Lines	0.00	0.00	0.00	Polygon
Crowder 16C-19HZ_Section 18/19 Line	0.00	0.00	0.00	Polygon
Crowder 16C-19HZ_Casing Point	7,321.00	-99.00	170.00	Point
Crowder 16C-19HZ_BHL	7,325.00	-9,653.81	164.45	Point
Crowder 16C-19HZ_Section Lines	0.00	0.00	0.00	Polygon
Crowder 16C-19HZ_WPtgt	7,323.14	-5,218.52	160.74	Point
Crowder 16C-19HZ_SHL	0.00	0.00	0.00	Point
Dechant 41-19	0.00	-5,218.52	320.74	Circle

North Reference Sheet for Sec. 18-T2N-R65W - Crowder 16C-19HZ - Plan C 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 16C-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: 1,296,487.355315 ft N, 3,223,550.795026 ft E

Geographical Coordinates of Well: 40° 08' 40.15" N, 104° 42' 01.21" W

Grid Convergence at Surface is: 0.52°

Based upon Minimum Curvature type calculations, at a Measured Depth of 17,225.61ft
the Bottom Hole Displacement is 9,655.21ft in the Direction of 179.02° (True).

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

