

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)
Sec. 11-T1N-R68W
Front Range Farms 37C-14HZ

Plan A

Plan: Rev A0 Permit

Sperry Drilling Services

Proposal Report

04 March, 2014

Well Coordinates: 1,267,057.84 N, 3,150,072.67 E (40° 03' 54.78" N, 104° 57' 49.69" W)

Ground Level: 5,067.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Front Range Farms 37C-14HZ

RKB = 17' @ 5084.00usft (Drilling Rig)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Project: Weld County, CO (NAD 83)
Site: Sec. 11-T1N-R68W
Well: Front Range Farms 37C-14HZ
Wellbore: Plan A
Design: Rev A0 Permit

Anadarko Petroleum Corp.

HALLIBURTON
Sperry Drilling

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	0.00	
3	1689.60	3.79	333.67	1689.46	5.62	-2.78	2.00	333.67	-5.62	
4	7231.60	3.79	333.67	7219.32	334.10	-165.37	0.00	0.00	-334.30	
5	8165.59	90.00	179.93	7826.00	-237.87	-182.49	10.00	-153.68	237.65	Front Range Farms 37C-14HZ_CP
6	15540.28	90.00	179.93	7826.00	-7612.55	-173.87	0.00	0.00	7612.34	Front Range Farms 37C-14HZ_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	
Front Range Farms 37C-14HZ_LD	0.00	0.00	0.00	40° 3' 54.785 N	104° 57' 49.694 W	
Front Range Farms 37C-14HZ_SEC	0.00	0.00	0.00	40° 3' 54.785 N	104° 57' 49.694 W	Polygon
Front Range Farms 37C-14HZ_SHL	0.00	0.00	0.00	40° 3' 54.785 N	104° 57' 49.694 W	
Front Range Farms 37C-14HZ_BHL	7826.00	-7612.55	-173.87	40° 2' 39.556 N	104° 57' 51.930 W	
Front Range Farms 37C-14HZ_CP	7826.00	-237.87	-182.49	40° 3' 52.434 N	104° 57' 52.042 W	Point

WELL DETAILS: Front Range Farms 37C-14HZ

Ground Level: 5067.00

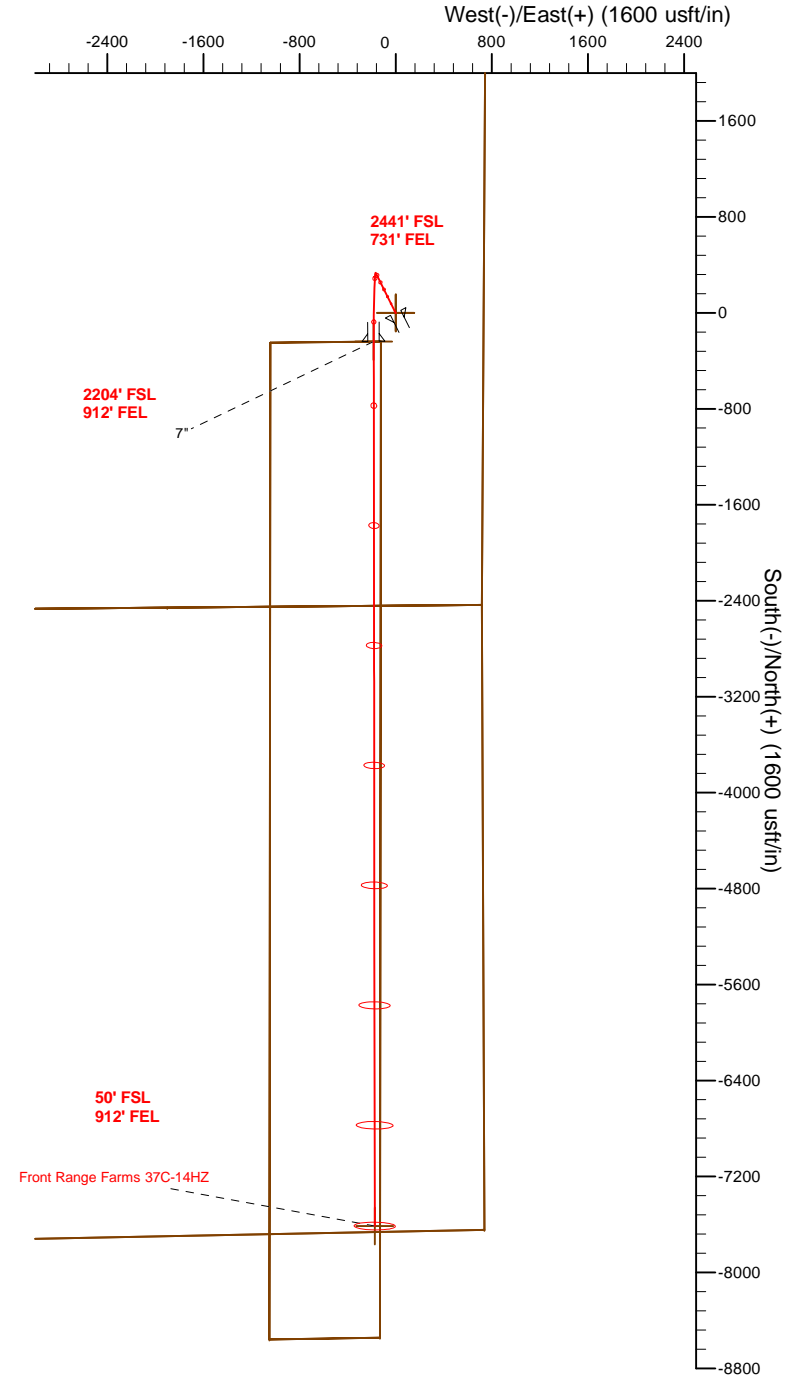
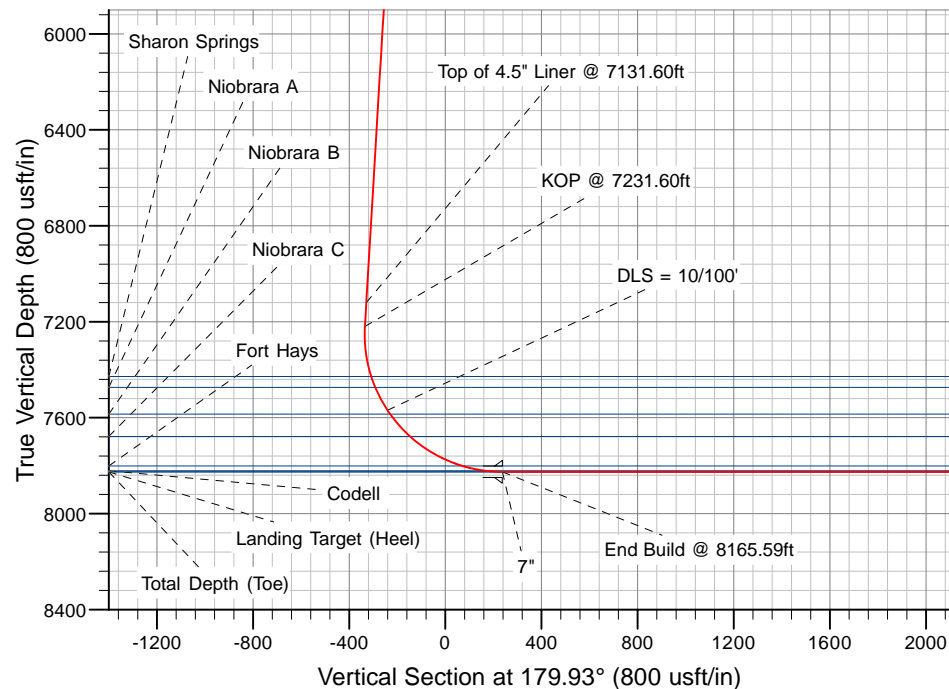
RKB = 17' @ 5084.00usft (Drilling Rig)

Plan: Rev A0 Permit (Front Range Farms 37C-14HZ/Plan A)

Created By: Clint Eshelman Date: 3/4/2014
Reviewed: Date:

TVD MD

7119.55 7131.60 Top of 4.5" Liner @ 7131.60ft
7219.33 7231.60 KOP @ 7231.60ft



Plan Report for Front Range Farms 37C-14HZ - Rev A0 Permit

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Front Range Farms 37C-14HZ_SEC - Front Range Farms 37C-14HZ_SHL - Front Range Farms 37C-14HZ_LD										
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
1,242.00	0.00	0.00	1,242.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Hills Marker										
1,292.00	0.00	0.00	1,292.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 5/8"										
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
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin Nudge @ 1500.00ft										
1,600.00	2.00	333.67	1,599.98	1.56	-0.77	-1.56	2.00	2.00	0.00	333.67
1,689.60	3.79	333.67	1,689.46	5.62	-2.78	-5.62	2.00	2.00	0.00	0.00
End Nudge @ 1689.60ft										
1,700.00	3.79	333.67	1,699.84	6.24	-3.09	-6.24	0.00	0.00	0.00	0.00
1,800.00	3.79	333.67	1,799.62	12.16	-6.02	-12.17	0.00	0.00	0.00	0.00
1,900.00	3.79	333.67	1,899.40	18.09	-8.95	-18.10	0.00	0.00	0.00	0.00
2,000.00	3.79	333.67	1,999.18	24.02	-11.89	-24.03	0.00	0.00	0.00	0.00
2,100.00	3.79	333.67	2,098.96	29.95	-14.82	-29.96	0.00	0.00	0.00	0.00
2,200.00	3.79	333.67	2,198.74	35.87	-17.76	-35.89	0.00	0.00	0.00	0.00
2,300.00	3.79	333.67	2,298.53	41.80	-20.69	-41.82	0.00	0.00	0.00	0.00
2,400.00	3.79	333.67	2,398.31	47.73	-23.62	-47.76	0.00	0.00	0.00	0.00
2,500.00	3.79	333.67	2,498.09	53.65	-26.56	-53.69	0.00	0.00	0.00	0.00
2,600.00	3.79	333.67	2,597.87	59.58	-29.49	-59.62	0.00	0.00	0.00	0.00
2,700.00	3.79	333.67	2,697.65	65.51	-32.42	-65.55	0.00	0.00	0.00	0.00
2,800.00	3.79	333.67	2,797.43	71.43	-35.36	-71.48	0.00	0.00	0.00	0.00
2,900.00	3.79	333.67	2,897.21	77.36	-38.29	-77.41	0.00	0.00	0.00	0.00
3,000.00	3.79	333.67	2,996.99	83.29	-41.23	-83.34	0.00	0.00	0.00	0.00
3,100.00	3.79	333.67	3,096.77	89.22	-44.16	-89.27	0.00	0.00	0.00	0.00
3,200.00	3.79	333.67	3,196.56	95.14	-47.09	-95.20	0.00	0.00	0.00	0.00
3,300.00	3.79	333.67	3,296.34	101.07	-50.03	-101.13	0.00	0.00	0.00	0.00
3,400.00	3.79	333.67	3,396.12	107.00	-52.96	-107.06	0.00	0.00	0.00	0.00
3,500.00	3.79	333.67	3,495.90	112.92	-55.89	-112.99	0.00	0.00	0.00	0.00
3,600.00	3.79	333.67	3,595.68	118.85	-58.83	-118.92	0.00	0.00	0.00	0.00
3,700.00	3.79	333.67	3,695.46	124.78	-61.76	-124.85	0.00	0.00	0.00	0.00
3,800.00	3.79	333.67	3,795.24	130.71	-64.70	-130.78	0.00	0.00	0.00	0.00
3,900.00	3.79	333.67	3,895.02	136.63	-67.63	-136.71	0.00	0.00	0.00	0.00
4,000.00	3.79	333.67	3,994.80	142.56	-70.56	-142.65	0.00	0.00	0.00	0.00
4,100.00	3.79	333.67	4,094.58	148.49	-73.50	-148.58	0.00	0.00	0.00	0.00
4,200.00	3.79	333.67	4,194.37	154.41	-76.43	-154.51	0.00	0.00	0.00	0.00
4,238.72	3.79	333.67	4,233.00	156.71	-77.57	-156.80	0.00	0.00	0.00	0.00
Parkman										
4,300.00	3.79	333.67	4,294.15	160.34	-79.36	-160.44	0.00	0.00	0.00	0.00
4,400.00	3.79	333.67	4,393.93	166.27	-82.30	-166.37	0.00	0.00	0.00	0.00
4,500.00	3.79	333.67	4,493.71	172.19	-85.23	-172.30	0.00	0.00	0.00	0.00
4,600.00	3.79	333.67	4,593.49	178.12	-88.16	-178.23	0.00	0.00	0.00	0.00
4,614.54	3.79	333.67	4,608.00	178.98	-88.59	-179.09	0.00	0.00	0.00	0.00

Plan Report for Front Range Farms 37C-14HZ - Rev A0 Permit

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
Sussex										
4,700.00	3.79	333.67	4,693.27	184.05	-91.10	-184.16	0.00	0.00	0.00	0.00
4,800.00	3.79	333.67	4,793.05	189.98	-94.03	-190.09	0.00	0.00	0.00	0.00
4,900.00	3.79	333.67	4,892.83	195.90	-96.97	-196.02	0.00	0.00	0.00	0.00
5,000.00	3.79	333.67	4,992.61	201.83	-99.90	-201.95	0.00	0.00	0.00	0.00
5,100.00	3.79	333.67	5,092.40	207.76	-102.83	-207.88	0.00	0.00	0.00	0.00
5,200.00	3.79	333.67	5,192.18	213.68	-105.77	-213.81	0.00	0.00	0.00	0.00
5,300.00	3.79	333.67	5,291.96	219.61	-108.70	-219.74	0.00	0.00	0.00	0.00
5,400.00	3.79	333.67	5,391.74	225.54	-111.63	-225.67	0.00	0.00	0.00	0.00
5,500.00	3.79	333.67	5,491.52	231.46	-114.57	-231.60	0.00	0.00	0.00	0.00
5,600.00	3.79	333.67	5,591.30	237.39	-117.50	-237.54	0.00	0.00	0.00	0.00
5,700.00	3.79	333.67	5,691.08	243.32	-120.44	-243.47	0.00	0.00	0.00	0.00
5,800.00	3.79	333.67	5,790.86	249.25	-123.37	-249.40	0.00	0.00	0.00	0.00
5,900.00	3.79	333.67	5,890.64	255.17	-126.30	-255.33	0.00	0.00	0.00	0.00
6,000.00	3.79	333.67	5,990.43	261.10	-129.24	-261.26	0.00	0.00	0.00	0.00
6,100.00	3.79	333.67	6,090.21	267.03	-132.17	-267.19	0.00	0.00	0.00	0.00
6,200.00	3.79	333.67	6,189.99	272.95	-135.10	-273.12	0.00	0.00	0.00	0.00
6,300.00	3.79	333.67	6,289.77	278.88	-138.04	-279.05	0.00	0.00	0.00	0.00
6,400.00	3.79	333.67	6,389.55	284.81	-140.97	-284.98	0.00	0.00	0.00	0.00
6,500.00	3.79	333.67	6,489.33	290.74	-143.91	-290.91	0.00	0.00	0.00	0.00
6,600.00	3.79	333.67	6,589.11	296.66	-146.84	-296.84	0.00	0.00	0.00	0.00
6,700.00	3.79	333.67	6,688.89	302.59	-149.77	-302.77	0.00	0.00	0.00	0.00
6,800.00	3.79	333.67	6,788.67	308.52	-152.71	-308.70	0.00	0.00	0.00	0.00
6,900.00	3.79	333.67	6,888.45	314.44	-155.64	-314.63	0.00	0.00	0.00	0.00
7,000.00	3.79	333.67	6,988.24	320.37	-158.57	-320.56	0.00	0.00	0.00	0.00
7,100.00	3.79	333.67	7,088.02	326.30	-161.51	-326.49	0.00	0.00	0.00	0.00
7,131.60	3.79	333.67	7,119.55	328.17	-162.43	-328.37	0.00	0.00	0.00	0.00
Top of 4.5" Liner @ 7131.60ft										
7,200.00	3.79	333.67	7,187.80	332.22	-164.44	-332.43	0.00	0.00	0.00	0.00
7,231.60	3.79	333.67	7,219.33	334.10	-165.37	-334.30	0.00	0.00	0.00	0.00
KOP @ 7231.60ft										
7,300.00	3.83	205.93	7,287.66	334.07	-167.37	-334.27	10.00	0.05	-186.75	-153.68
7,400.00	13.54	186.93	7,386.41	319.41	-170.25	-319.62	10.00	9.71	-19.00	-26.05
7,443.21	17.84	185.16	7,428.00	307.79	-171.46	-308.00	10.00	9.94	-4.08	-7.19
Sharon Springs										
7,492.27	22.73	183.95	7,474.00	290.84	-172.79	-291.05	10.00	9.96	-2.47	-5.49
Niobrara A										
7,500.00	23.50	183.80	7,481.11	287.81	-172.99	-288.02	10.00	9.97	-1.90	-4.35
7,600.00	33.48	182.48	7,568.89	240.25	-175.51	-240.46	10.00	9.98	-1.33	-4.22
DLS = 10/100'										
7,619.53	35.43	182.30	7,585.00	229.20	-175.97	-229.42	10.00	9.99	-0.92	-3.05
Niobrara B										
7,700.00	43.47	181.71	7,647.09	178.15	-177.73	-178.37	10.00	9.99	-0.73	-2.90
7,745.75	48.04	181.44	7,679.00	145.40	-178.63	-145.62	10.00	9.99	-0.57	-2.44
Niobrara C										
7,800.00	53.46	181.18	7,713.31	103.42	-179.59	-103.64	10.00	9.99	-0.49	-2.26
7,900.00	63.45	180.77	7,765.56	18.31	-181.02	-18.53	10.00	9.99	-0.41	-2.09
7,995.68	73.02	180.45	7,801.00	-70.44	-181.96	70.21	10.00	9.99	-0.34	-1.88
Fort Hays										
8,000.00	73.45	180.43	7,802.25	-74.57	-181.99	74.35	10.00	10.00	-0.32	-1.76
8,089.83	82.43	180.16	7,821.00	-162.33	-182.44	162.10	10.00	10.00	-0.31	-1.75
Codell										
8,100.00	83.44	180.13	7,822.25	-172.42	-182.46	172.20	10.00	10.00	-0.30	-1.69
8,165.59	90.00	179.93	7,826.00	-237.87	-182.49	237.65	10.00	10.00	-0.29	-1.69
End Build @ 8165.59ft - Landing Target (Heel) - 7" - Front Range Farms 37C-14HZ_CP										
8,200.00	90.00	179.93	7,826.00	-272.28	-182.45	272.06	0.00	0.00	0.00	-1.68
8,300.00	90.00	179.93	7,826.00	-372.28	-182.34	372.06	0.00	0.00	0.00	0.00
8,400.00	90.00	179.93	7,826.00	-472.28	-182.22	472.06	0.00	0.00	0.00	0.00

Plan Report for Front Range Farms 37C-14HZ - Rev A0 Permit

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
8,500.00	90.00	179.93	7,826.00	-572.28	-182.10	572.06	0.00	0.00	0.00	0.00
8,600.00	90.00	179.93	7,826.00	-672.28	-181.99	672.06	0.00	0.00	0.00	0.00
8,700.00	90.00	179.93	7,826.00	-772.28	-181.87	772.06	0.00	0.00	0.00	0.00
8,800.00	90.00	179.93	7,826.00	-872.28	-181.75	872.06	0.00	0.00	0.00	0.00
8,900.00	90.00	179.93	7,826.00	-972.28	-181.64	972.06	0.00	0.00	0.00	0.00
9,000.00	90.00	179.93	7,826.00	-1,072.28	-181.52	1,072.06	0.00	0.00	0.00	0.00
9,100.00	90.00	179.93	7,826.00	-1,172.28	-181.40	1,172.06	0.00	0.00	0.00	0.00
9,200.00	90.00	179.93	7,826.00	-1,272.28	-181.28	1,272.06	0.00	0.00	0.00	0.00
9,300.00	90.00	179.93	7,826.00	-1,372.28	-181.17	1,372.06	0.00	0.00	0.00	0.00
9,400.00	90.00	179.93	7,826.00	-1,472.28	-181.05	1,472.06	0.00	0.00	0.00	0.00
9,500.00	90.00	179.93	7,826.00	-1,572.28	-180.93	1,572.06	0.00	0.00	0.00	0.00
9,600.00	90.00	179.93	7,826.00	-1,672.28	-180.82	1,672.06	0.00	0.00	0.00	0.00
9,700.00	90.00	179.93	7,826.00	-1,772.28	-180.70	1,772.06	0.00	0.00	0.00	0.00
9,800.00	90.00	179.93	7,826.00	-1,872.28	-180.58	1,872.06	0.00	0.00	0.00	0.00
9,900.00	90.00	179.93	7,826.00	-1,972.28	-180.47	1,972.06	0.00	0.00	0.00	0.00
10,000.00	90.00	179.93	7,826.00	-2,072.28	-180.35	2,072.06	0.00	0.00	0.00	0.00
10,100.00	90.00	179.93	7,826.00	-2,172.28	-180.23	2,172.06	0.00	0.00	0.00	0.00
10,200.00	90.00	179.93	7,826.00	-2,272.28	-180.11	2,272.06	0.00	0.00	0.00	0.00
10,300.00	90.00	179.93	7,826.00	-2,372.28	-180.00	2,372.06	0.00	0.00	0.00	0.00
10,400.00	90.00	179.93	7,826.00	-2,472.28	-179.88	2,472.06	0.00	0.00	0.00	0.00
10,500.00	90.00	179.93	7,826.00	-2,572.28	-179.76	2,572.06	0.00	0.00	0.00	0.00
10,600.00	90.00	179.93	7,826.00	-2,672.28	-179.65	2,672.06	0.00	0.00	0.00	0.00
10,700.00	90.00	179.93	7,826.00	-2,772.28	-179.53	2,772.06	0.00	0.00	0.00	0.00
10,800.00	90.00	179.93	7,826.00	-2,872.28	-179.41	2,872.06	0.00	0.00	0.00	0.00
10,900.00	90.00	179.93	7,826.00	-2,972.28	-179.30	2,972.06	0.00	0.00	0.00	0.00
11,000.00	90.00	179.93	7,826.00	-3,072.28	-179.18	3,072.06	0.00	0.00	0.00	0.00
11,100.00	90.00	179.93	7,826.00	-3,172.28	-179.06	3,172.06	0.00	0.00	0.00	0.00
11,200.00	90.00	179.93	7,826.00	-3,272.28	-178.95	3,272.06	0.00	0.00	0.00	0.00
11,300.00	90.00	179.93	7,826.00	-3,372.28	-178.83	3,372.06	0.00	0.00	0.00	0.00
11,400.00	90.00	179.93	7,826.00	-3,472.28	-178.71	3,472.06	0.00	0.00	0.00	0.00
11,500.00	90.00	179.93	7,826.00	-3,572.28	-178.59	3,572.06	0.00	0.00	0.00	0.00
11,600.00	90.00	179.93	7,826.00	-3,672.28	-178.48	3,672.06	0.00	0.00	0.00	0.00
11,700.00	90.00	179.93	7,826.00	-3,772.28	-178.36	3,772.06	0.00	0.00	0.00	0.00
11,800.00	90.00	179.93	7,826.00	-3,872.28	-178.24	3,872.06	0.00	0.00	0.00	0.00
11,900.00	90.00	179.93	7,826.00	-3,972.28	-178.13	3,972.06	0.00	0.00	0.00	0.00
12,000.00	90.00	179.93	7,826.00	-4,072.28	-178.01	4,072.06	0.00	0.00	0.00	0.00
12,100.00	90.00	179.93	7,826.00	-4,172.28	-177.89	4,172.06	0.00	0.00	0.00	0.00
12,200.00	90.00	179.93	7,826.00	-4,272.28	-177.78	4,272.06	0.00	0.00	0.00	0.00
12,300.00	90.00	179.93	7,826.00	-4,372.28	-177.66	4,372.06	0.00	0.00	0.00	0.00
12,400.00	90.00	179.93	7,826.00	-4,472.28	-177.54	4,472.06	0.00	0.00	0.00	0.00
12,500.00	90.00	179.93	7,826.00	-4,572.28	-177.42	4,572.06	0.00	0.00	0.00	0.00
12,600.00	90.00	179.93	7,826.00	-4,672.28	-177.31	4,672.06	0.00	0.00	0.00	0.00
12,700.00	90.00	179.93	7,826.00	-4,772.28	-177.19	4,772.06	0.00	0.00	0.00	0.00
12,800.00	90.00	179.93	7,826.00	-4,872.28	-177.07	4,872.06	0.00	0.00	0.00	0.00
12,900.00	90.00	179.93	7,826.00	-4,972.28	-176.96	4,972.06	0.00	0.00	0.00	0.00
13,000.00	90.00	179.93	7,826.00	-5,072.28	-176.84	5,072.06	0.00	0.00	0.00	0.00
13,100.00	90.00	179.93	7,826.00	-5,172.27	-176.72	5,172.06	0.00	0.00	0.00	0.00
13,200.00	90.00	179.93	7,826.00	-5,272.27	-176.61	5,272.06	0.00	0.00	0.00	0.00
13,300.00	90.00	179.93	7,826.00	-5,372.27	-176.49	5,372.06	0.00	0.00	0.00	0.00
13,400.00	90.00	179.93	7,826.00	-5,472.27	-176.37	5,472.06	0.00	0.00	0.00	0.00
13,500.00	90.00	179.93	7,826.00	-5,572.27	-176.26	5,572.06	0.00	0.00	0.00	0.00
13,600.00	90.00	179.93	7,826.00	-5,672.27	-176.14	5,672.06	0.00	0.00	0.00	0.00
13,700.00	90.00	179.93	7,826.00	-5,772.27	-176.02	5,772.06	0.00	0.00	0.00	0.00
13,800.00	90.00	179.93	7,826.00	-5,872.27	-175.90	5,872.06	0.00	0.00	0.00	0.00
13,900.00	90.00	179.93	7,826.00	-5,972.27	-175.79	5,972.06	0.00	0.00	0.00	0.00
14,000.00	90.00	179.93	7,826.00	-6,072.27	-175.67	6,072.06	0.00	0.00	0.00	0.00
14,100.00	90.00	179.93	7,826.00	-6,172.27	-175.55	6,172.06	0.00	0.00	0.00	0.00
14,200.00	90.00	179.93	7,826.00	-6,272.27	-175.44	6,272.06	0.00	0.00	0.00	0.00
14,300.00	90.00	179.93	7,826.00	-6,372.27	-175.32	6,372.06	0.00	0.00	0.00	0.00
14,400.00	90.00	179.93	7,826.00	-6,472.27	-175.20	6,472.06	0.00	0.00	0.00	0.00

Plan Report for Front Range Farms 37C-14HZ - Rev A0 Permit

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	Toolface Azimuth (°)
14,500.00	90.00	179.93	7,826.00	-6,572.27	-175.09	6,572.06	0.00	0.00	0.00	0.00
14,600.00	90.00	179.93	7,826.00	-6,672.27	-174.97	6,672.06	0.00	0.00	0.00	0.00
14,700.00	90.00	179.93	7,826.00	-6,772.27	-174.85	6,772.06	0.00	0.00	0.00	0.00
14,800.00	90.00	179.93	7,826.00	-6,872.27	-174.73	6,872.06	0.00	0.00	0.00	0.00
14,900.00	90.00	179.93	7,826.00	-6,972.27	-174.62	6,972.06	0.00	0.00	0.00	0.00
15,000.00	90.00	179.93	7,826.00	-7,072.27	-174.50	7,072.06	0.00	0.00	0.00	0.00
15,100.00	90.00	179.93	7,826.00	-7,172.27	-174.38	7,172.06	0.00	0.00	0.00	0.00
15,200.00	90.00	179.93	7,826.00	-7,272.27	-174.27	7,272.06	0.00	0.00	0.00	0.00
15,300.00	90.00	179.93	7,826.00	-7,372.27	-174.15	7,372.06	0.00	0.00	0.00	0.00
15,400.00	90.00	179.93	7,826.00	-7,472.27	-174.03	7,472.06	0.00	0.00	0.00	0.00
15,500.00	90.00	179.93	7,826.00	-7,572.27	-173.92	7,572.06	0.00	0.00	0.00	0.00
15,540.28	90.00	179.93	7,826.00	-7,612.55	-173.87	7,612.34	0.00	0.00	0.00	0.00

TD Well @ 15540.28ft - Total Depth (Toe) - Front Range Farms 37C-14HZ_BHL

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,500.00	1,500.00	0.00	0.00	Begin Nudge @ 1500.00ft
1,689.60	1,689.46	5.62	-2.78	End Nudge @ 1689.60ft
7,131.60	7,119.55	328.17	-162.43	Top of 4.5" Liner @ 7131.60ft
7,231.60	7,219.33	334.10	-165.37	KOP @ 7231.60ft
7,600.00	7,568.89	240.25	-175.51	DLS = 10/100'
8,165.59	7,826.00	-237.87	-182.49	End Build @ 8165.59ft
15,540.28	7,826.00	-7,612.55	-173.87	TD Well @ 15540.28ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	179.93	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	8,165.59	Rev A0 Permit	MWD
8,165.59	15,540.28	Rev A0 Permit	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,292.00	1,292.00	9 5/8"	9-5/8	13-1/2
8,165.59	7,826.00	7"	7	8-3/4

Plan Report for Front Range Farms 37C-14HZ - Rev A0 Permit

Formation Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,242.00	1,242.00	Fox Hills Marker		0.00	
4,238.72	4,233.00	Parkman		0.00	
4,614.54	4,608.00	Sussex		0.00	
7,443.21	7,428.00	Sharon Springs		0.00	
7,492.27	7,474.00	Niobrara A		0.00	
7,619.53	7,585.00	Niobrara B		0.00	
7,745.75	7,679.00	Niobrara C		0.00	
7,995.68	7,801.00	Fort Hays		0.00	
8,089.83	7,821.00	Codell		0.00	
8,165.59	7,826.00	Landing Target (Heel)		0.00	
15,540.28	7,826.00	Total Depth (Toe)		0.00	

Targets associated with this wellbore

Target Name	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Shape
Front Range Farms 37C-14HZ_SEC	0.00	0.00	0.00	Polygon
Front Range Farms 37C-14HZ_SHL	0.00	0.00	0.00	Point
Front Range Farms 37C-14HZ_LD	0.00	0.00	0.00	Polygon
Front Range Farms 37C-14HZ_CP	7,826.00	-237.87	-182.49	Point
Front Range Farms 37C-14HZ_BHL	7,826.00	-7,612.55	-173.87	Point

Directional Difficulty Index

Average Dogleg over Survey:	0.63 °/100usft	Maximum Dogleg over Survey:	10.00 °/100usft at 8,165.59 usft
Net Tortosity applicable to Plans:	0.63 °/100usft	Directional Difficulty Index:	6.447

Audit Info

North Reference Sheet for Sec. 11-T1N-R68W - Front Range Farms 37C-14HZ -
Plan A

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' @ 5084.00usft (Drilling Rig). Northing and Easting are relative to Front Range Farms 37C-14HZ
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° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°
False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996206

Grid Coordinates of Well: 1,267,057.84 usft N, 3,150,072.67 usft E
Geographical Coordinates of Well: 40° 03' 54.78" N, 104° 57' 49.69" W
Grid Convergence at Surface is: 0.35°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,540.28usft
the Bottom Hole Displacement is 7,614.54usft in the Direction of 181.31° (True).
Magnetic Convergence at surface is: -8.27° (3 March 2014, , BGGM2013)

