

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 13-T1N-R66W

Lochbuie 4-13 HZ

Plan A 0

Plan: Plan A 0 Permit

Sperry Drilling Services

Proposal Report

09 July, 2013

Well Coordinates: 1,260,354.85 N, 3,214,787.44 E (40° 02' 43.84" N, 104° 43' 58.08" W)

Ground Level: 5,078.00 ft

Local Coordinate Origin:

Centered on Well Lochbuie 4-13 HZ

Viewing Datum:

RKB = 17 @ 5095.00ft (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. 13-T1N-R66W
Well: Lochbuie 4-13 HZ
Wellbore: Plan A 0
Design: Plan A 0 Permit

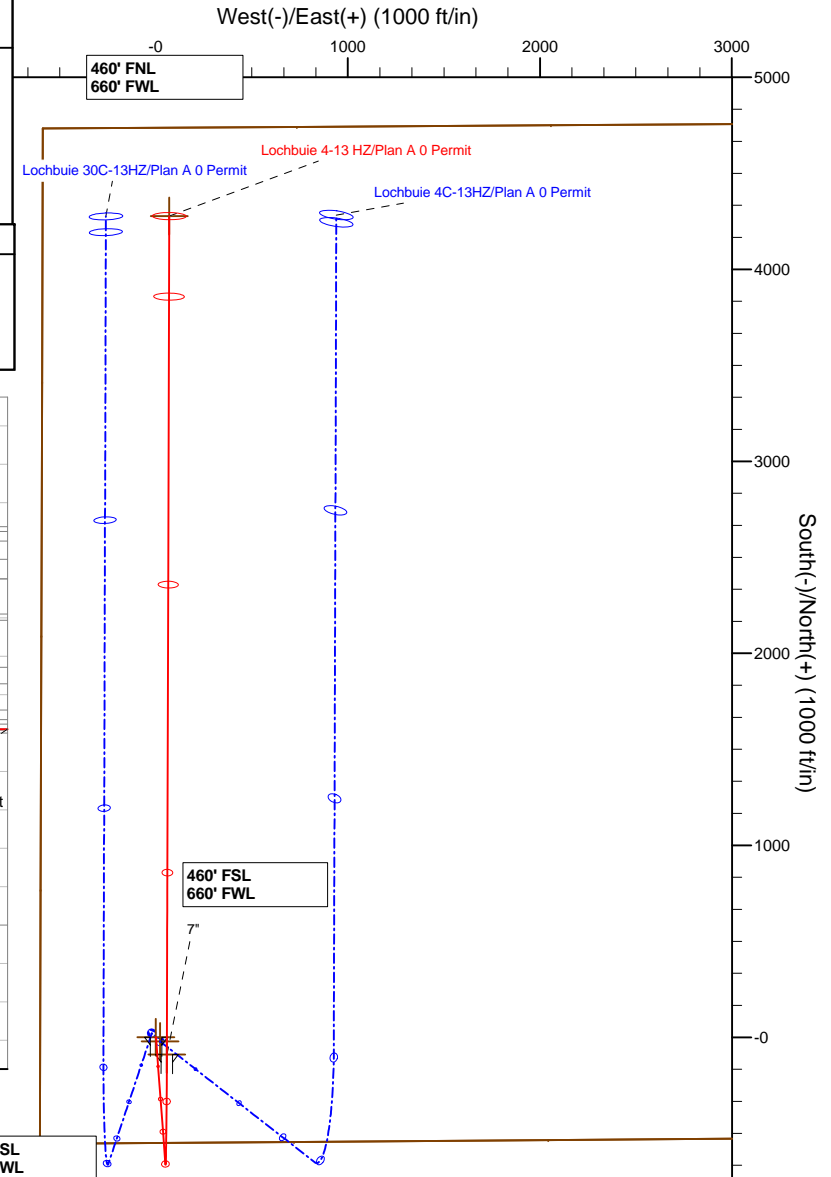
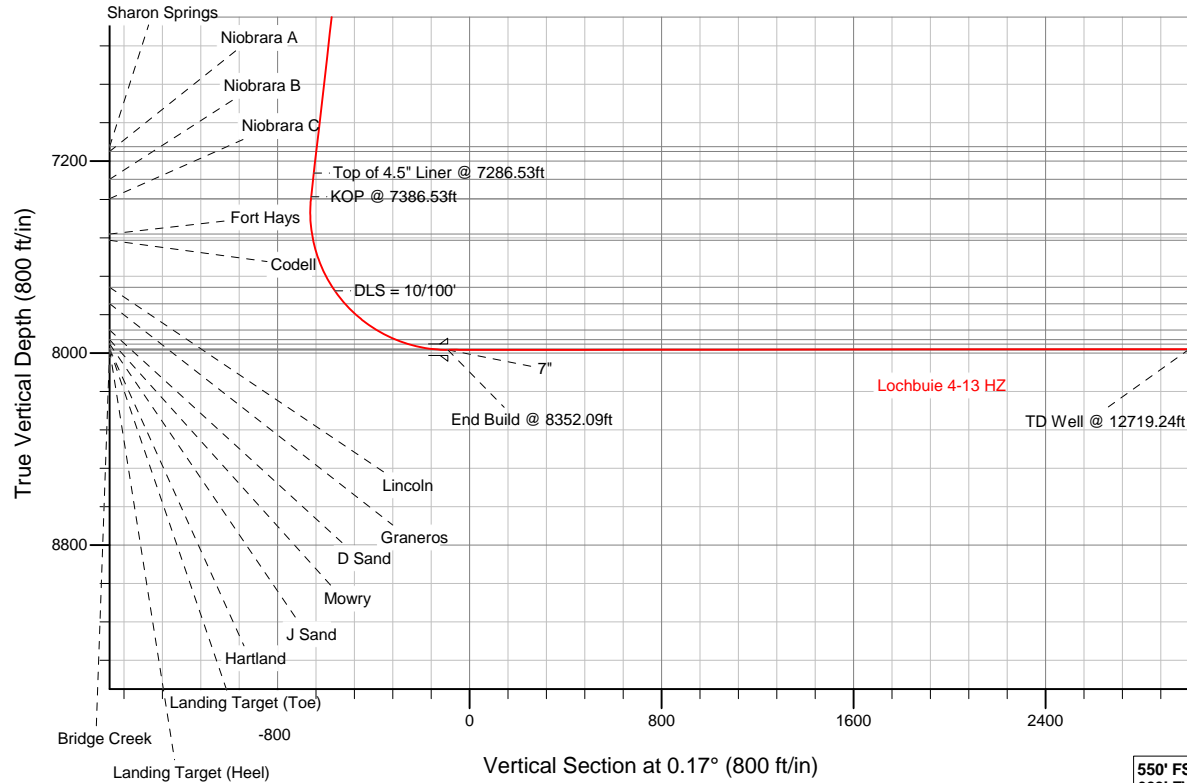


SECTION DETAILS

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	1726.18	6.52	175.70	1725.48	-18.50	1.39	2.00	175.70	-18.49	
4	7386.53	6.52	175.70	7349.17	-659.78	49.65	0.00	0.00	-659.63	LOCH BUIE 4-13 HZ_CP
5	8352.09	90.05	0.17	7987.00	-90.00	57.00	10.00	-175.50	-89.83	LOCH BUIE 4-13 HZ_BHL
6	12719.24	90.05	0.17	7983.00	4277.13	69.70	0.00	0.00	4277.32	

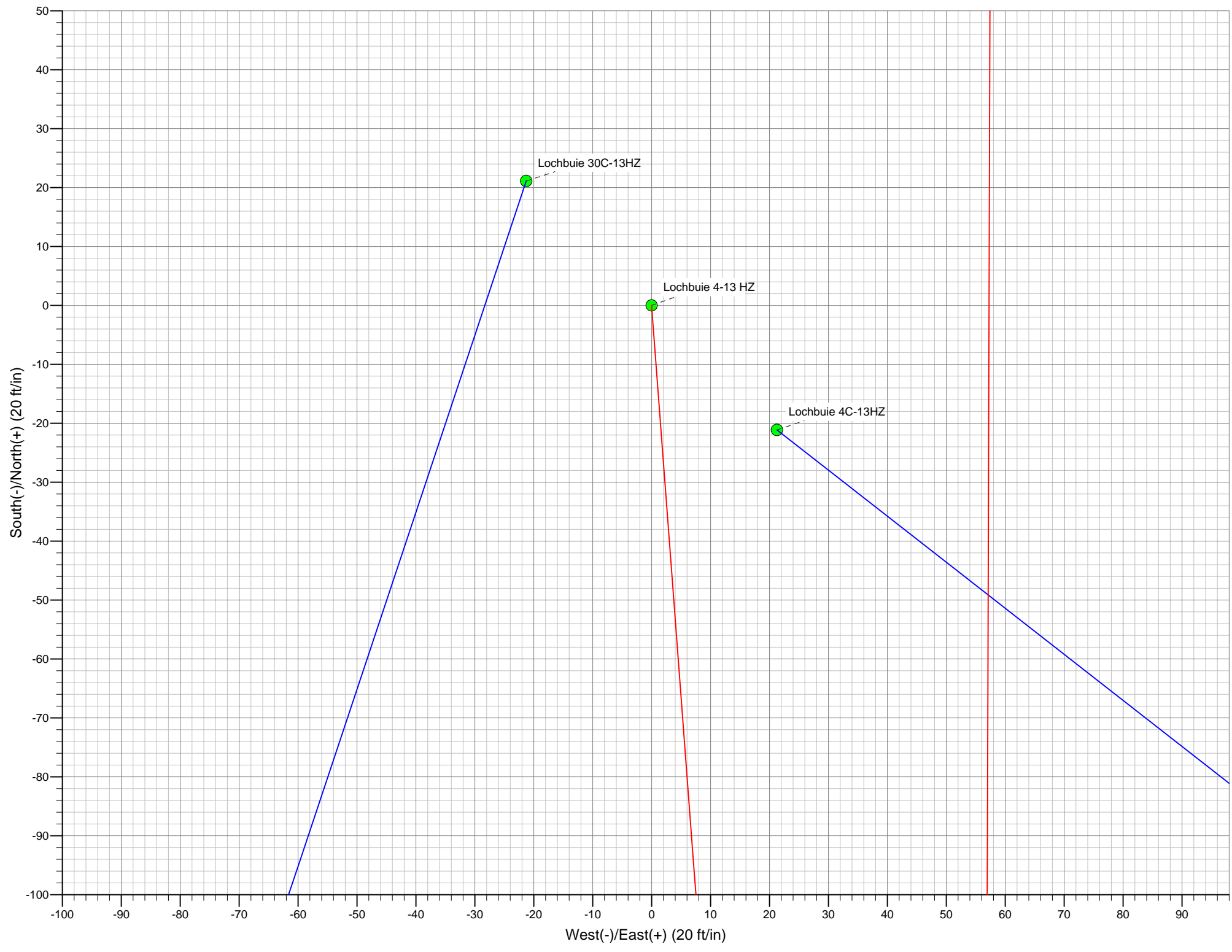
WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
LOCH BUIE 4-13 HZ_SEC	0.00	-21.12	21.28	40.045454	-104.732725	Polygon
LOCH BUIE 4-13 HZ_SHL	0.00	0.01	0.00	40.045512	-104.732801	Point
LOCH BUIE 4-13 HZ_BHL	7983.00	4277.13	69.70	40.057253	-104.732552	Point
LOCH BUIE 4-13 HZ_CP	7987.00	-90.00	57.00	40.045265	-104.732597	Point



TVD			MD		Top of 4.5" Liner @ 7286.53ft		KOP @ 7386.53ft	
7249.82			7286.53					
7349.17			7386.53					

WELL DETAILS: Lochbuie 4-13 HZ	
Ground Level: 5078.00 RKB = 17 @ 5095.00ft (Drilling Rig)	
Plan: Plan A 0 Permit (Lochbuie 4-13 HZ/Plan A 0)	
Created By: Clint Eshelman	Date: 07/08/2013



Plan Report for Lochbuie 4-13 HZ - Plan A 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
1,199.00	0.00	0.00	1,199.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fox Hills Base										
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,249.00	0.00	0.00	1,249.00	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
Begin Nudge @ 1400.00ft										
1,500.00	2.00	175.70	1,499.98	-1.74	0.13	-1.74	2.00	2.00	0.00	175.70
1,600.00	4.00	175.70	1,599.84	-6.96	0.52	-6.96	2.00	2.00	0.00	0.00
1,700.00	6.00	175.70	1,699.45	-15.65	1.18	-15.65	2.00	2.00	0.00	0.00
1,726.18	6.52	175.70	1,725.48	-18.50	1.39	-18.49	2.00	2.00	0.00	0.00
End Nudge @ 1726.18ft										
1,800.00	6.52	175.70	1,798.82	-26.86	2.02	-26.85	0.00	0.00	0.00	0.00
1,900.00	6.52	175.70	1,898.17	-38.19	2.87	-38.18	0.00	0.00	0.00	0.00
2,000.00	6.52	175.70	1,997.52	-49.52	3.73	-49.51	0.00	0.00	0.00	0.00
2,100.00	6.52	175.70	2,096.88	-60.85	4.58	-60.83	0.00	0.00	0.00	0.00
2,200.00	6.52	175.70	2,196.23	-72.18	5.43	-72.16	0.00	0.00	0.00	0.00
2,300.00	6.52	175.70	2,295.58	-83.51	6.28	-83.49	0.00	0.00	0.00	0.00
2,400.00	6.52	175.70	2,394.93	-94.84	7.14	-94.81	0.00	0.00	0.00	0.00
2,500.00	6.52	175.70	2,494.29	-106.17	7.99	-106.14	0.00	0.00	0.00	0.00
2,600.00	6.52	175.70	2,593.64	-117.49	8.84	-117.47	0.00	0.00	0.00	0.00
2,700.00	6.52	175.70	2,692.99	-128.82	9.69	-128.79	0.00	0.00	0.00	0.00
2,800.00	6.52	175.70	2,792.34	-140.15	10.55	-140.12	0.00	0.00	0.00	0.00
2,900.00	6.52	175.70	2,891.70	-151.48	11.40	-151.45	0.00	0.00	0.00	0.00
3,000.00	6.52	175.70	2,991.05	-162.81	12.25	-162.78	0.00	0.00	0.00	0.00
3,100.00	6.52	175.70	3,090.40	-174.14	13.11	-174.10	0.00	0.00	0.00	0.00
3,200.00	6.52	175.70	3,189.75	-185.47	13.96	-185.43	0.00	0.00	0.00	0.00
3,300.00	6.52	175.70	3,289.11	-196.80	14.81	-196.76	0.00	0.00	0.00	0.00
3,400.00	6.52	175.70	3,388.46	-208.13	15.66	-208.08	0.00	0.00	0.00	0.00
3,500.00	6.52	175.70	3,487.81	-219.46	16.52	-219.41	0.00	0.00	0.00	0.00
3,600.00	6.52	175.70	3,587.16	-230.79	17.37	-230.74	0.00	0.00	0.00	0.00
3,700.00	6.52	175.70	3,686.52	-242.12	18.22	-242.06	0.00	0.00	0.00	0.00
3,800.00	6.52	175.70	3,785.87	-253.45	19.07	-253.39	0.00	0.00	0.00	0.00
3,900.00	6.52	175.70	3,885.22	-264.78	19.93	-264.72	0.00	0.00	0.00	0.00
4,000.00	6.52	175.70	3,984.57	-276.11	20.78	-276.04	0.00	0.00	0.00	0.00
4,100.00	6.52	175.70	4,083.93	-287.43	21.63	-287.37	0.00	0.00	0.00	0.00
4,200.00	6.52	175.70	4,183.28	-298.76	22.48	-298.70	0.00	0.00	0.00	0.00
4,300.00	6.52	175.70	4,282.63	-310.09	23.34	-310.02	0.00	0.00	0.00	0.00
4,304.40	6.52	175.70	4,287.00	-310.59	23.37	-310.52	0.00	0.00	0.00	0.00
Parkman										
4,400.00	6.52	175.70	4,381.98	-321.42	24.19	-321.35	0.00	0.00	0.00	0.00
4,500.00	6.52	175.70	4,481.34	-332.75	25.04	-332.68	0.00	0.00	0.00	0.00
4,600.00	6.52	175.70	4,580.69	-344.08	25.89	-344.00	0.00	0.00	0.00	0.00
4,700.00	6.52	175.70	4,680.04	-355.41	26.75	-355.33	0.00	0.00	0.00	0.00
4,800.00	6.52	175.70	4,779.39	-366.74	27.60	-366.66	0.00	0.00	0.00	0.00

Plan Report for Lochbuie 4-13 HZ - Plan A 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	6.52	175.70	4,878.75	-378.07	28.45	-377.98	0.00	0.00	0.00	0.00
5,000.00	6.52	175.70	4,978.10	-389.40	29.30	-389.31	0.00	0.00	0.00	0.00
5,100.00	6.52	175.70	5,077.45	-400.73	30.16	-400.64	0.00	0.00	0.00	0.00
5,200.00	6.52	175.70	5,176.80	-412.06	31.01	-411.96	0.00	0.00	0.00	0.00
5,300.00	6.52	175.70	5,276.16	-423.39	31.86	-423.29	0.00	0.00	0.00	0.00
5,400.00	6.52	175.70	5,375.51	-434.72	32.72	-434.62	0.00	0.00	0.00	0.00
5,500.00	6.52	175.70	5,474.86	-446.05	33.57	-445.94	0.00	0.00	0.00	0.00
5,600.00	6.52	175.70	5,574.21	-457.37	34.42	-457.27	0.00	0.00	0.00	0.00
5,605.83	6.52	175.70	5,580.00	-458.03	34.47	-457.93	0.00	0.00	0.00	0.00
Sussex										
5,700.00	6.52	175.70	5,673.57	-468.70	35.27	-468.60	0.00	0.00	0.00	0.00
5,800.00	6.52	175.70	5,772.92	-480.03	36.13	-479.92	0.00	0.00	0.00	0.00
5,900.00	6.52	175.70	5,872.27	-491.36	36.98	-491.25	0.00	0.00	0.00	0.00
6,000.00	6.52	175.70	5,971.62	-502.69	37.83	-502.58	0.00	0.00	0.00	0.00
6,100.00	6.52	175.70	6,070.98	-514.02	38.68	-513.90	0.00	0.00	0.00	0.00
6,200.00	6.52	175.70	6,170.33	-525.35	39.54	-525.23	0.00	0.00	0.00	0.00
6,300.00	6.52	175.70	6,269.68	-536.68	40.39	-536.56	0.00	0.00	0.00	0.00
6,400.00	6.52	175.70	6,369.03	-548.01	41.24	-547.88	0.00	0.00	0.00	0.00
6,500.00	6.52	175.70	6,468.39	-559.34	42.09	-559.21	0.00	0.00	0.00	0.00
6,600.00	6.52	175.70	6,567.74	-570.67	42.95	-570.54	0.00	0.00	0.00	0.00
6,700.00	6.52	175.70	6,667.09	-582.00	43.80	-581.87	0.00	0.00	0.00	0.00
6,800.00	6.52	175.70	6,766.44	-593.33	44.65	-593.19	0.00	0.00	0.00	0.00
6,900.00	6.52	175.70	6,865.80	-604.66	45.50	-604.52	0.00	0.00	0.00	0.00
7,000.00	6.52	175.70	6,965.15	-615.99	46.36	-615.85	0.00	0.00	0.00	0.00
7,100.00	6.52	175.70	7,064.50	-627.31	47.21	-627.17	0.00	0.00	0.00	0.00
7,175.99	6.52	175.70	7,140.00	-635.92	47.86	-635.78	0.00	0.00	0.00	0.00
Sharon Springs										
7,196.12	6.52	175.70	7,160.00	-638.20	48.03	-638.06	0.00	0.00	0.00	0.00
Niobrara A										
7,200.00	6.52	175.70	7,163.85	-638.64	48.06	-638.50	0.00	0.00	0.00	0.00
7,286.53	6.52	175.70	7,249.82	-648.45	48.80	-648.30	0.00	0.00	0.00	0.00
Top of 4.5" Liner @ 7286.53ft										
7,300.00	6.52	175.70	7,263.21	-649.97	48.91	-649.83	0.00	0.00	0.00	0.00
7,312.88	6.52	175.70	7,276.00	-651.43	49.02	-651.28	0.00	0.00	0.00	0.00
Niobrara B										
7,386.53	6.52	175.70	7,349.17	-659.78	49.65	-659.63	0.00	0.00	0.00	0.00
KOP @ 7386.53ft										
7,394.40	5.74	175.08	7,357.00	-660.61	49.72	-660.46	10.01	-9.97	-7.85	-175.50
Niobrara C										
7,400.00	5.18	174.53	7,362.57	-661.15	49.77	-660.99	10.00	-9.96	-9.87	-174.89
7,450.00	0.53	107.18	7,412.50	-663.46	50.21	-663.31	10.00	-9.29	-134.70	-174.34
7,500.00	4.87	6.17	7,462.44	-661.42	50.66	-661.27	10.00	8.67	-202.01	-107.01
7,541.87	9.05	3.38	7,504.00	-656.36	51.04	-656.21	10.00	9.97	-6.67	-6.03
Fort Hays										
7,550.00	9.86	3.11	7,512.02	-655.03	51.12	-654.88	10.00	9.99	-3.31	-3.25
7,568.31	11.69	2.64	7,530.00	-651.62	51.29	-651.46	10.00	9.99	-2.57	-2.98
Codell										
7,600.00	14.85	2.09	7,560.84	-644.35	51.58	-644.19	10.00	9.99	-1.72	-2.52
7,650.00	19.85	1.58	7,608.55	-629.45	52.05	-629.29	10.00	10.00	-1.02	-1.99
7,700.00	24.85	1.27	7,654.78	-610.45	52.52	-610.29	10.00	10.00	-0.62	-1.50
7,750.00	29.85	1.06	7,699.18	-587.49	52.98	-587.33	10.00	10.00	-0.43	-1.22
7,781.43	32.99	0.95	7,726.00	-571.11	53.27	-570.95	10.00	10.00	-0.33	-1.03
Lincoln										
7,800.00	34.85	0.90	7,741.41	-560.75	53.44	-560.59	10.00	10.00	-0.29	-0.94
DLS = 10/100'										
7,850.00	39.85	0.78	7,781.14	-530.43	53.88	-530.27	10.00	10.00	-0.24	-0.89
7,868.30	41.68	0.74	7,795.00	-518.49	54.04	-518.32	10.00	10.00	-0.21	-0.80
Graneros										

Plan Report for Lochbuie 4-13 HZ - Plan A 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 (°)
7,900.00	44.85	0.68	7,818.09	-496.76	54.31	-496.60	10.00	10.00	-0.19	-0.77
7,950.00	49.85	0.60	7,851.95	-460.01	54.72	-459.84	10.00	10.00	-0.17	-0.72
8,000.00	54.85	0.53	7,882.49	-420.43	55.10	-420.27	10.00	10.00	-0.14	-0.67
8,039.31	58.78	0.48	7,904.00	-387.55	55.39	-387.38	10.00	10.00	-0.13	-0.62
D Sand										
8,050.00	59.85	0.46	7,909.46	-378.35	55.47	-378.19	10.00	10.00	-0.12	-0.60
8,100.00	64.84	0.41	7,932.66	-334.08	55.80	-333.91	10.00	10.00	-0.11	-0.59
8,128.17	67.66	0.38	7,944.00	-308.30	55.98	-308.13	10.00	10.00	-0.11	-0.56
Mowry										
8,150.00	69.84	0.35	7,951.91	-287.95	56.11	-287.79	10.00	10.00	-0.10	-0.55
8,185.14	73.36	0.32	7,963.00	-254.62	56.31	-254.45	10.00	10.00	-0.10	-0.54
J Sand										
8,200.00	74.84	0.31	7,967.07	-240.32	56.38	-240.16	10.00	10.00	-0.10	-0.53
8,250.00	79.84	0.26	7,978.02	-191.56	56.62	-191.39	10.00	10.00	-0.09	-0.53
8,283.82	83.23	0.23	7,983.00	-158.11	56.77	-157.94	10.00	10.00	-0.09	-0.52
Hartland										
8,300.00	84.84	0.21	7,984.68	-142.02	56.83	-141.85	10.00	10.00	-0.09	-0.51
8,352.09	90.05	0.17	7,987.00	-90.00	57.00	-89.83	10.00	10.00	-0.09	-0.51
End Build @ 8352.09ft - Bridge Creek - Landing Target (Heel) - 7" - LOCH BUIE 4-13 HZ_CP										
8,400.00	90.05	0.17	7,986.96	-42.09	57.14	-41.92	0.00	0.00	0.00	-0.51
8,500.00	90.05	0.17	7,986.86	57.91	57.43	58.08	0.00	0.00	0.00	0.00
8,600.00	90.05	0.17	7,986.77	157.91	57.72	158.08	0.00	0.00	0.00	0.00
8,700.00	90.05	0.17	7,986.68	257.91	58.01	258.08	0.00	0.00	0.00	0.00
8,800.00	90.05	0.17	7,986.59	357.91	58.30	358.08	0.00	0.00	0.00	0.00
8,900.00	90.05	0.17	7,986.50	457.91	58.59	458.08	0.00	0.00	0.00	0.00
9,000.00	90.05	0.17	7,986.41	557.91	58.88	558.08	0.00	0.00	0.00	0.00
9,100.00	90.05	0.17	7,986.31	657.91	59.18	658.08	0.00	0.00	0.00	0.00
9,200.00	90.05	0.17	7,986.22	757.91	59.47	758.08	0.00	0.00	0.00	0.00
9,300.00	90.05	0.17	7,986.13	857.91	59.76	858.08	0.00	0.00	0.00	0.00
9,400.00	90.05	0.17	7,986.04	957.91	60.05	958.08	0.00	0.00	0.00	0.00
9,500.00	90.05	0.17	7,985.95	1,057.91	60.34	1,058.08	0.00	0.00	0.00	0.00
9,600.00	90.05	0.17	7,985.86	1,157.91	60.63	1,158.08	0.00	0.00	0.00	0.00
9,700.00	90.05	0.17	7,985.77	1,257.91	60.92	1,258.08	0.00	0.00	0.00	0.00
9,800.00	90.05	0.17	7,985.67	1,357.91	61.21	1,358.08	0.00	0.00	0.00	0.00
9,900.00	90.05	0.17	7,985.58	1,457.91	61.50	1,458.08	0.00	0.00	0.00	0.00
10,000.00	90.05	0.17	7,985.49	1,557.91	61.79	1,558.08	0.00	0.00	0.00	0.00
10,100.00	90.05	0.17	7,985.40	1,657.90	62.08	1,658.08	0.00	0.00	0.00	0.00
10,200.00	90.05	0.17	7,985.31	1,757.90	62.37	1,758.08	0.00	0.00	0.00	0.00
10,300.00	90.05	0.17	7,985.22	1,857.90	62.67	1,858.08	0.00	0.00	0.00	0.00
10,400.00	90.05	0.17	7,985.12	1,957.90	62.96	1,958.08	0.00	0.00	0.00	0.00
10,500.00	90.05	0.17	7,985.03	2,057.90	63.25	2,058.08	0.00	0.00	0.00	0.00
10,600.00	90.05	0.17	7,984.94	2,157.90	63.54	2,158.08	0.00	0.00	0.00	0.00
10,700.00	90.05	0.17	7,984.85	2,257.90	63.83	2,258.08	0.00	0.00	0.00	0.00
10,800.00	90.05	0.17	7,984.76	2,357.90	64.12	2,358.08	0.00	0.00	0.00	0.00
10,900.00	90.05	0.17	7,984.67	2,457.90	64.41	2,458.08	0.00	0.00	0.00	0.00
11,000.00	90.05	0.17	7,984.57	2,557.90	64.70	2,558.08	0.00	0.00	0.00	0.00
11,100.00	90.05	0.17	7,984.48	2,657.90	64.99	2,658.08	0.00	0.00	0.00	0.00
11,200.00	90.05	0.17	7,984.39	2,757.90	65.28	2,758.08	0.00	0.00	0.00	0.00
11,300.00	90.05	0.17	7,984.30	2,857.90	65.57	2,858.08	0.00	0.00	0.00	0.00
11,400.00	90.05	0.17	7,984.21	2,957.90	65.87	2,958.08	0.00	0.00	0.00	0.00
11,500.00	90.05	0.17	7,984.12	3,057.90	66.16	3,058.08	0.00	0.00	0.00	0.00
11,600.00	90.05	0.17	7,984.03	3,157.90	66.45	3,158.08	0.00	0.00	0.00	0.00
11,700.00	90.05	0.17	7,983.93	3,257.90	66.74	3,258.08	0.00	0.00	0.00	0.00
11,800.00	90.05	0.17	7,983.84	3,357.90	67.03	3,358.08	0.00	0.00	0.00	0.00
11,900.00	90.05	0.17	7,983.75	3,457.90	67.32	3,458.08	0.00	0.00	0.00	0.00
12,000.00	90.05	0.17	7,983.66	3,557.90	67.61	3,558.08	0.00	0.00	0.00	0.00
12,100.00	90.05	0.17	7,983.57	3,657.90	67.90	3,658.08	0.00	0.00	0.00	0.00
12,200.00	90.05	0.17	7,983.48	3,757.89	68.19	3,758.08	0.00	0.00	0.00	0.00
12,300.00	90.05	0.17	7,983.38	3,857.89	68.48	3,858.08	0.00	0.00	0.00	0.00

Plan Report for Lochbuie 4-13 HZ - Plan A 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 (°)
12,400.00	90.05	0.17	7,983.29	3,957.89	68.77	3,958.08	0.00	0.00	0.00	0.00
12,500.00	90.05	0.17	7,983.20	4,057.89	69.06	4,058.08	0.00	0.00	0.00	0.00
12,600.00	90.05	0.17	7,983.11	4,157.89	69.36	4,158.08	0.00	0.00	0.00	0.00
12,700.00	90.05	0.17	7,983.02	4,257.89	69.65	4,258.08	0.00	0.00	0.00	0.00
12,719.24	90.05	0.17	7,983.00	4,277.13	69.70	4,277.32	0.00	0.00	0.00	0.00
LOCH BUIE 4-13 HZ_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
1,726.18	1,725.48	-18.50	1.39	End Nudge @ 1726.18ft
7,286.53	7,249.82	-648.45	48.80	Top of 4.5" Liner @ 7286.53ft
7,386.53	7,349.17	-659.78	49.65	KOP @ 7386.53ft
7,800.00	7,741.41	-560.75	53.44	DLS = 10/100'
8,352.09	7,987.00	-90.00	57.00	End Build @ 8352.09ft
12,719.24	7,983.00	4,277.13	69.70	TD Well @ 12719.24ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
User	No Target (Freehand)	0.17	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	12,719.24	Plan A 0 Permit	MWD

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
1,249.00	1,249.00	9 5/8"	9-5/8	13-1/2
8,352.09	7,987.00	7"	7	8-3/4

Plan Report for Lochbuie 4-13 HZ - Plan A 0 Permit

Formation Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,199.00	1,199.00	Fox Hills Base			
4,304.40	4,287.00	Parkman			
5,605.83	5,580.00	Sussex			
7,175.99	7,140.00	Sharon Springs			
7,196.12	7,160.00	Niobrara A			
7,312.88	7,276.00	Niobrara B			
7,394.40	7,357.00	Niobrara C			
7,541.87	7,504.00	Fort Hays			
7,568.31	7,530.00	Codell			
7,781.43	7,726.00	Lincoln			
7,868.30	7,795.00	Graneros			
8,039.31	7,904.00	D Sand			
8,128.17	7,944.00	Mowry			
8,185.14	7,963.00	J Sand			
8,283.82	7,983.00	Hartland			
8,352.09	7,987.00	Bridge Creek			
8,352.09	7,987.00	Landing Target (Heel)			

Targets associated with this wellbore

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
LOCH BUIE 4-13 HZ_BHL	7,983.00	4,277.13	69.70	Point
LOCH BUIE 4-13 HZ_SHL	0.00	0.01	0.00	Point
LOCH BUIE 4-13 HZ_SEC	0.00	-21.12	21.28	Polygon
LOCH BUIE 4-13 HZ_CP	7,987.00	-90.00	57.00	Point

North Reference Sheet for Sec. 13-T1N-R66W - Lochbuie 4-13 HZ - Plan A 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 @ 5095.00ft (Drilling Rig). Northing and Easting are relative to Lochbuie 4-13 HZ

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: 0.99996323

Grid Coordinates of Well: 1,260,354.850634 ft N, 3,214,787.438073 ft E

Geographical Coordinates of Well: 40° 02' 43.84" N, 104° 43' 58.08" W

Grid Convergence at Surface is: 0.50°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,719.24ft
the Bottom Hole Displacement is 4,277.70ft in the Direction of 0.93° (True).

Magnetic Convergence at surface is: -8.08° (25 June 2013, , BGGM2013)

