

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 21-T2N-66W

Lansdown State 4C-21HZ

## Plan A

Plan: Rev A0 Permit

# Sperry Drilling Services

## Proposal Report

18 September, 2013

Well Coordinates: 1,286,944.80 N, 3,198,707.04 E (40° 07' 07.94" N, 104° 47' 22.11" W)

Ground Level: 4,934.00 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 Lansdown State 4C-21HZ

RKB = 17' @ 4951.00usft (Drilling Rig)

N

True

Dec-Deg - API - US Survey Feet - Custom

**HALLIBURTON**

Project: Weld County, CO (NAD 83)  
 Site: Sec. 21-T2N-66W  
 Well: Lansdown State 4C-21HZ  
 Wellbore: Plan A  
 Design: Rev A0 Permit



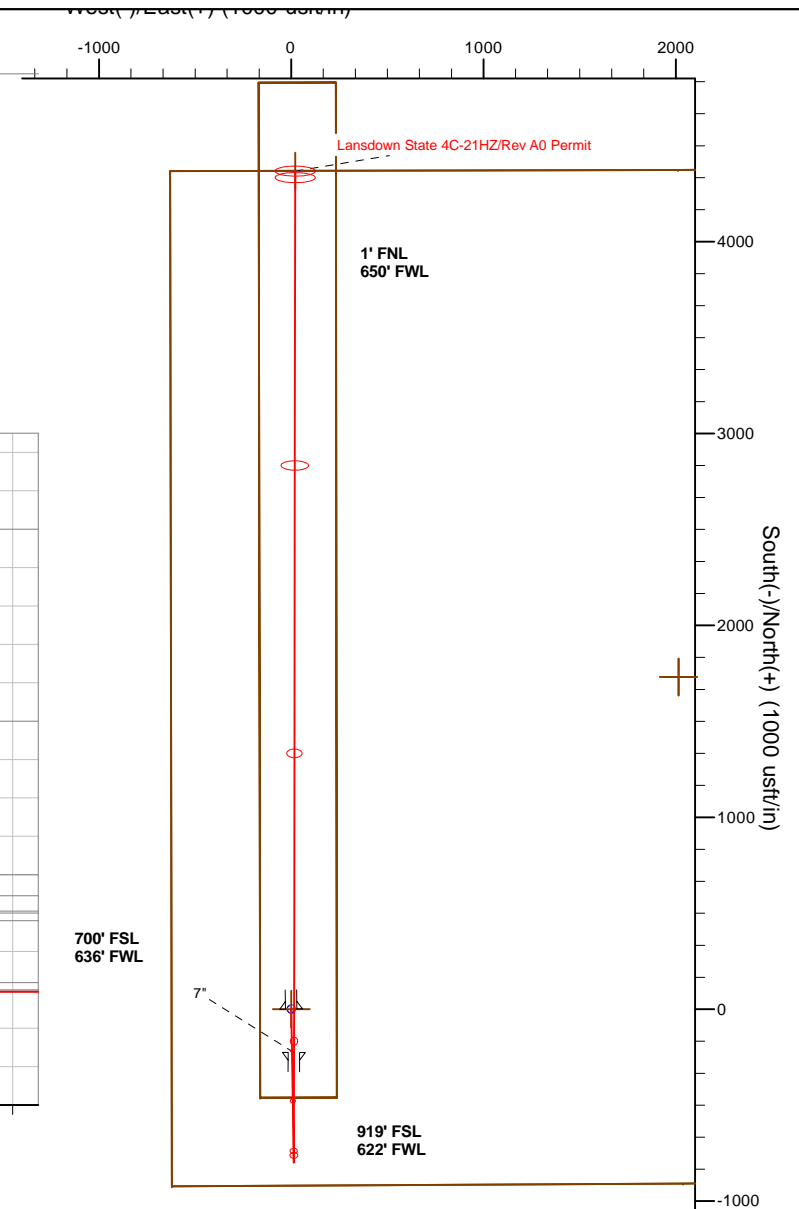
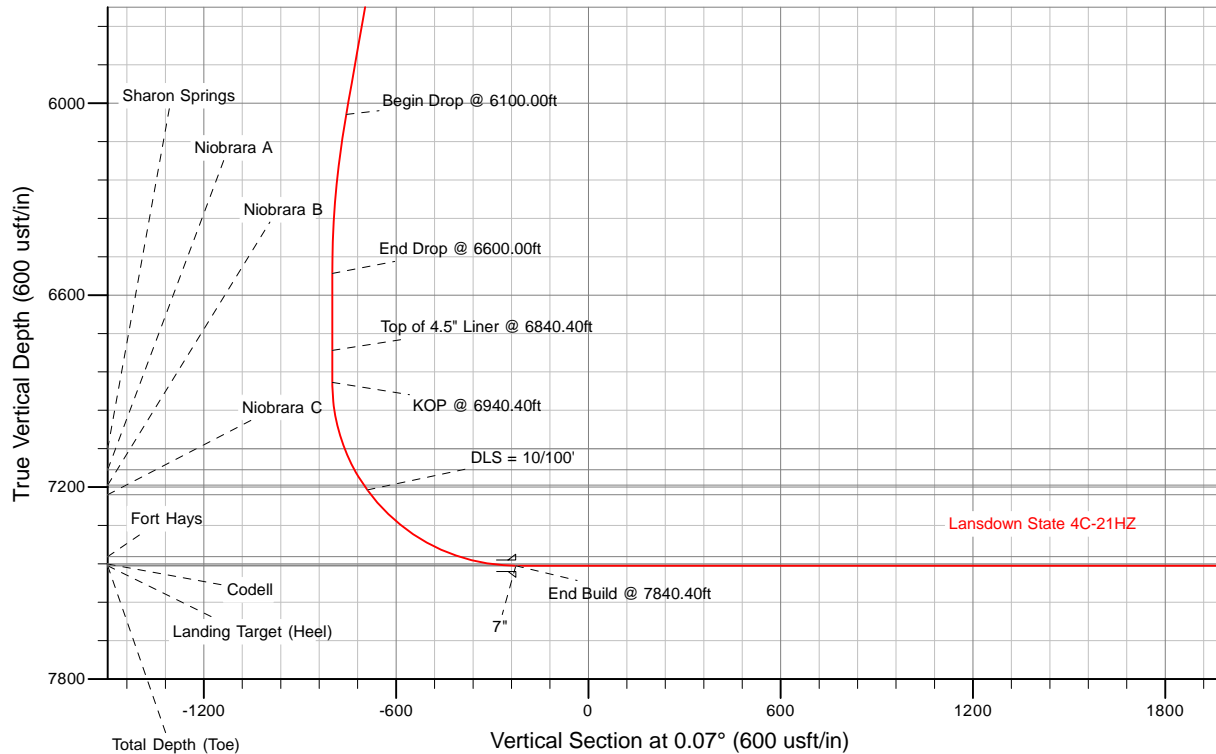
**HALLIBURTON**  
 Sperry Drilling

#### 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	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	0.00	
3	2000.00	10.00	179.00	1997.47	-43.52	0.76	2.00	179.00	-43.51	
4	6100.00	10.00	179.00	6035.18	-755.37	13.18	0.00	0.00	-755.35	
5	6600.00	0.00	0.00	6532.64	-798.88	13.94	2.00	180.00	-798.86	
6	6940.40	0.00	0.00	6873.04	-798.88	13.94	0.00	0.00	-798.86	
7	7840.40	90.00	0.07	7446.00	-225.92	14.69	10.00	0.07	-225.91	
8	2433.86	90.00	0.07	7446.00	4367.53	20.69	0.00	0.00	4367.55	Lansdown 4C-21HZ_BHL

#### WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Lansdown_SEC	-1.00	1731.67	2014.08	40.123624	-104.782273	Polygon
Lansdown 4C-21HZ_LD	0.00	1731.67	2014.08	40.123624	-104.782273	Polygon
Lansdown 4C-21HZ_SHL	0.00	0.01	0.00	40.118871	-104.789475	Point
Lansdown 4C-21HZ_BHL	7446.00	4367.53	20.69	40.130860	-104.789401	Point



WELL DETAILS: Lansdown State 4C-21HZ		
Ground Level: 4934.00		
RKB = 17' @ 4951.00usft (Drilling Rig)		
Plan: Rev A0 Permit (Lansdown State 4C-21HZ/Plan A)		
Created By: Clint Eshelman Date: 09/18/2013		
TVD	MD	
6773.04	6840.40	Top of 4.5" Liner @ 6840.40ft
6873.04	6940.40	KOP @ 6940.40ft

**Plan Report for Lansdown State 4C-21HZ - 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
<b>Lansdown 4C-21HZ_LD - Lansdown 4C-21HZ_SHL - Lansdown_SEC</b>										
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
872.00	0.00	0.00	872.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fox Hills Base</b>										
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
922.00	0.00	0.00	922.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>9 5/8"</b>										
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
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Begin Nudge @ 1500.00ft</b>										
1,600.00	2.00	179.00	1,599.98	-1.74	0.03	-1.74	2.00	2.00	0.00	179.00
1,700.00	4.00	179.00	1,699.84	-6.98	0.12	-6.98	2.00	2.00	0.00	0.00
1,800.00	6.00	179.00	1,799.45	-15.69	0.27	-15.69	2.00	2.00	0.00	0.00
1,900.00	8.00	179.00	1,898.70	-27.88	0.49	-27.88	2.00	2.00	0.00	0.00
2,000.00	10.00	179.00	1,997.47	-43.52	0.76	-43.51	2.00	2.00	0.00	0.00
<b>End Nudge @ 2000.00ft</b>										
2,100.00	10.00	179.00	2,095.95	-60.88	1.06	-60.88	0.00	0.00	0.00	0.00
2,200.00	10.00	179.00	2,194.43	-78.24	1.37	-78.24	0.00	0.00	0.00	0.00
2,300.00	10.00	179.00	2,292.91	-95.60	1.67	-95.60	0.00	0.00	0.00	0.00
2,400.00	10.00	179.00	2,391.39	-112.96	1.97	-112.96	0.00	0.00	0.00	0.00
2,500.00	10.00	179.00	2,489.87	-130.33	2.27	-130.32	0.00	0.00	0.00	0.00
2,600.00	10.00	179.00	2,588.35	-147.69	2.58	-147.69	0.00	0.00	0.00	0.00
2,700.00	10.00	179.00	2,686.83	-165.05	2.88	-165.05	0.00	0.00	0.00	0.00
2,800.00	10.00	179.00	2,785.31	-182.41	3.18	-182.41	0.00	0.00	0.00	0.00
2,900.00	10.00	179.00	2,883.79	-199.78	3.49	-199.77	0.00	0.00	0.00	0.00
3,000.00	10.00	179.00	2,982.27	-217.14	3.79	-217.13	0.00	0.00	0.00	0.00
3,100.00	10.00	179.00	3,080.75	-234.50	4.09	-234.49	0.00	0.00	0.00	0.00
3,200.00	10.00	179.00	3,179.23	-251.86	4.40	-251.86	0.00	0.00	0.00	0.00
3,300.00	10.00	179.00	3,277.72	-269.22	4.70	-269.22	0.00	0.00	0.00	0.00
3,400.00	10.00	179.00	3,376.20	-286.59	5.00	-286.58	0.00	0.00	0.00	0.00
3,500.00	10.00	179.00	3,474.68	-303.95	5.31	-303.94	0.00	0.00	0.00	0.00
3,600.00	10.00	179.00	3,573.16	-321.31	5.61	-321.30	0.00	0.00	0.00	0.00
3,700.00	10.00	179.00	3,671.64	-338.67	5.91	-338.67	0.00	0.00	0.00	0.00
3,800.00	10.00	179.00	3,770.12	-356.04	6.21	-356.03	0.00	0.00	0.00	0.00
3,900.00	10.00	179.00	3,868.60	-373.40	6.52	-373.39	0.00	0.00	0.00	0.00
4,000.00	10.00	179.00	3,967.08	-390.76	6.82	-390.75	0.00	0.00	0.00	0.00
4,100.00	10.00	179.00	4,065.56	-408.12	7.12	-408.11	0.00	0.00	0.00	0.00
4,105.52	10.00	179.00	4,071.00	-409.08	7.14	-409.07	0.00	0.00	0.00	0.00
<b>Parkman</b>										
4,200.00	10.00	179.00	4,164.04	-425.48	7.43	-425.47	0.00	0.00	0.00	0.00
4,300.00	10.00	179.00	4,262.52	-442.85	7.73	-442.84	0.00	0.00	0.00	0.00
4,400.00	10.00	179.00	4,361.00	-460.21	8.03	-460.20	0.00	0.00	0.00	0.00
4,500.00	10.00	179.00	4,459.48	-477.57	8.34	-477.56	0.00	0.00	0.00	0.00
4,600.00	10.00	179.00	4,557.97	-494.93	8.64	-494.92	0.00	0.00	0.00	0.00
4,618.31	10.00	179.00	4,576.00	-498.11	8.69	-498.10	0.00	0.00	0.00	0.00

**Plan Report for Lansdown State 4C-21HZ - 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 (°)
<b>Sussex</b>										
4,700.00	10.00	179.00	4,656.45	-512.29	8.94	-512.28	0.00	0.00	0.00	0.00
4,800.00	10.00	179.00	4,754.93	-529.66	9.25	-529.65	0.00	0.00	0.00	0.00
4,900.00	10.00	179.00	4,853.41	-547.02	9.55	-547.01	0.00	0.00	0.00	0.00
5,000.00	10.00	179.00	4,951.89	-564.38	9.85	-564.37	0.00	0.00	0.00	0.00
5,100.00	10.00	179.00	5,050.37	-581.74	10.15	-581.73	0.00	0.00	0.00	0.00
5,200.00	10.00	179.00	5,148.85	-599.11	10.46	-599.09	0.00	0.00	0.00	0.00
5,300.00	10.00	179.00	5,247.33	-616.47	10.76	-616.45	0.00	0.00	0.00	0.00
5,400.00	10.00	179.00	5,345.81	-633.83	11.06	-633.82	0.00	0.00	0.00	0.00
5,500.00	10.00	179.00	5,444.29	-651.19	11.37	-651.18	0.00	0.00	0.00	0.00
5,600.00	10.00	179.00	5,542.77	-668.55	11.67	-668.54	0.00	0.00	0.00	0.00
5,700.00	10.00	179.00	5,641.25	-685.92	11.97	-685.90	0.00	0.00	0.00	0.00
5,800.00	10.00	179.00	5,739.73	-703.28	12.28	-703.26	0.00	0.00	0.00	0.00
5,900.00	10.00	179.00	5,838.22	-720.64	12.58	-720.62	0.00	0.00	0.00	0.00
6,000.00	10.00	179.00	5,936.70	-738.00	12.88	-737.99	0.00	0.00	0.00	0.00
6,100.00	10.00	179.00	6,035.18	-755.37	13.18	-755.35	0.00	0.00	0.00	0.00
<b>Begin Drop @ 6100.00ft</b>										
6,200.00	8.00	179.00	6,133.94	-771.01	13.46	-770.99	2.00	-2.00	0.00	180.00
6,300.00	6.00	179.00	6,233.19	-783.19	13.67	-783.17	2.00	-2.00	0.00	180.00
6,400.00	4.00	179.00	6,332.80	-791.90	13.82	-791.89	2.00	-2.00	0.00	180.00
6,500.00	2.00	179.00	6,432.66	-797.14	13.91	-797.12	2.00	-2.00	0.00	180.00
6,600.00	0.00	0.00	6,532.64	-798.88	13.94	-798.86	2.00	-2.00	0.00	-180.00
<b>End Drop @ 6600.00ft</b>										
6,700.00	0.00	0.00	6,632.64	-798.88	13.94	-798.86	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,732.64	-798.88	13.94	-798.86	0.00	0.00	0.00	0.00
6,840.40	0.00	0.00	6,773.04	-798.88	13.94	-798.86	0.00	0.00	0.00	0.00
<b>Top of 4.5" Liner @ 6840.40ft</b>										
6,900.00	0.00	0.00	6,832.64	-798.88	13.94	-798.86	0.00	0.00	0.00	0.00
6,940.40	0.00	0.00	6,873.04	-798.88	13.94	-798.86	0.00	0.00	0.00	0.00
<b>KOP @ 6940.40ft</b>										
7,000.00	5.96	0.07	6,932.54	-795.78	13.95	-795.77	10.00	10.00	0.00	0.07
7,100.00	15.96	0.07	7,030.59	-776.80	13.97	-776.78	10.00	10.00	0.00	0.00
7,153.22	21.28	0.07	7,081.00	-759.81	14.00	-759.79	10.00	10.00	0.00	0.00
<b>Sharon Springs</b>										
7,200.00	25.96	0.07	7,123.85	-741.07	14.02	-741.05	10.00	10.00	0.00	0.00
7,224.91	28.45	0.07	7,146.00	-729.68	14.03	-729.67	10.00	10.00	0.00	0.00
<b>Niobrara A</b>										
7,281.08	34.07	0.07	7,194.00	-700.55	14.07	-700.53	10.00	10.00	0.00	0.00
<b>Niobrara B</b>										
7,300.00	35.96	0.07	7,209.50	-689.69	14.09	-689.67	10.00	10.00	0.00	0.00
<b>DLS = 10/100'</b>										
7,318.13	37.77	0.07	7,224.00	-678.81	14.10	-678.80	10.00	10.00	0.00	0.00
<b>Niobrara C</b>										
7,400.00	45.96	0.07	7,284.92	-624.22	14.17	-624.20	10.00	10.00	0.00	0.00
7,500.00	55.96	0.07	7,347.82	-546.65	14.27	-546.63	10.00	10.00	0.00	0.00
7,600.00	65.96	0.07	7,396.30	-459.33	14.39	-459.31	10.00	10.00	0.00	0.00
7,660.54	72.01	0.07	7,418.00	-402.85	14.46	-402.83	10.00	10.00	0.00	0.00
<b>Fort Hays</b>										
7,700.00	75.96	0.07	7,428.88	-364.92	14.51	-364.90	10.00	10.00	0.00	0.00
7,764.65	82.42	0.07	7,441.00	-301.45	14.59	-301.44	10.00	10.00	0.00	0.00
<b>Codell</b>										
7,800.00	85.96	0.07	7,444.58	-266.29	14.64	-266.27	10.00	10.00	0.00	0.00
7,840.40	90.00	0.07	7,446.00	-225.92	14.69	-225.91	10.00	10.00	0.00	0.00
<b>End Build @ 7840.40ft - Landing Target (Heel) - 7"</b>										
7,900.00	90.00	0.07	7,446.00	-166.32	14.77	-166.31	0.00	0.00	0.00	0.00
8,000.00	90.00	0.07	7,446.00	-66.32	14.90	-66.31	0.00	0.00	0.00	0.00
8,100.00	90.00	0.07	7,446.00	33.68	15.03	33.69	0.00	0.00	0.00	0.00
8,200.00	90.00	0.07	7,446.00	133.68	15.16	133.69	0.00	0.00	0.00	0.00

**Plan Report for Lansdown State 4C-21HZ - 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 (°)
8,300.00	90.00	0.07	7,446.00	233.68	15.29	233.69	0.00	0.00	0.00	0.00
8,400.00	90.00	0.07	7,446.00	333.68	15.42	333.69	0.00	0.00	0.00	0.00
8,500.00	90.00	0.07	7,446.00	433.68	15.55	433.69	0.00	0.00	0.00	0.00
8,600.00	90.00	0.07	7,446.00	533.68	15.68	533.69	0.00	0.00	0.00	0.00
8,700.00	90.00	0.07	7,446.00	633.68	15.82	633.69	0.00	0.00	0.00	0.00
8,800.00	90.00	0.07	7,446.00	733.68	15.95	733.69	0.00	0.00	0.00	0.00
8,900.00	90.00	0.07	7,446.00	833.68	16.08	833.69	0.00	0.00	0.00	0.00
9,000.00	90.00	0.07	7,446.00	933.68	16.21	933.69	0.00	0.00	0.00	0.00
9,100.00	90.00	0.07	7,446.00	1,033.68	16.34	1,033.69	0.00	0.00	0.00	0.00
9,200.00	90.00	0.07	7,446.00	1,133.68	16.47	1,133.69	0.00	0.00	0.00	0.00
9,300.00	90.00	0.07	7,446.00	1,233.68	16.60	1,233.69	0.00	0.00	0.00	0.00
9,400.00	90.00	0.07	7,446.00	1,333.67	16.73	1,333.69	0.00	0.00	0.00	0.00
9,500.00	90.00	0.07	7,446.00	1,433.67	16.86	1,433.69	0.00	0.00	0.00	0.00
9,600.00	90.00	0.07	7,446.00	1,533.67	16.99	1,533.69	0.00	0.00	0.00	0.00
9,700.00	90.00	0.07	7,446.00	1,633.67	17.12	1,633.69	0.00	0.00	0.00	0.00
9,800.00	90.00	0.07	7,446.00	1,733.67	17.25	1,733.69	0.00	0.00	0.00	0.00
9,900.00	90.00	0.07	7,446.00	1,833.67	17.38	1,833.69	0.00	0.00	0.00	0.00
10,000.00	90.00	0.07	7,446.00	1,933.67	17.51	1,933.69	0.00	0.00	0.00	0.00
10,100.00	90.00	0.07	7,446.00	2,033.67	17.64	2,033.69	0.00	0.00	0.00	0.00
10,200.00	90.00	0.07	7,446.00	2,133.67	17.77	2,133.69	0.00	0.00	0.00	0.00
10,300.00	90.00	0.07	7,446.00	2,233.67	17.91	2,233.69	0.00	0.00	0.00	0.00
10,400.00	90.00	0.07	7,446.00	2,333.67	18.04	2,333.69	0.00	0.00	0.00	0.00
10,500.00	90.00	0.07	7,446.00	2,433.67	18.17	2,433.69	0.00	0.00	0.00	0.00
10,600.00	90.00	0.07	7,446.00	2,533.67	18.30	2,533.69	0.00	0.00	0.00	0.00
10,700.00	90.00	0.07	7,446.00	2,633.67	18.43	2,633.69	0.00	0.00	0.00	0.00
10,800.00	90.00	0.07	7,446.00	2,733.67	18.56	2,733.69	0.00	0.00	0.00	0.00
10,900.00	90.00	0.07	7,446.00	2,833.67	18.69	2,833.69	0.00	0.00	0.00	0.00
11,000.00	90.00	0.07	7,446.00	2,933.67	18.82	2,933.69	0.00	0.00	0.00	0.00
11,100.00	90.00	0.07	7,446.00	3,033.67	18.95	3,033.69	0.00	0.00	0.00	0.00
11,200.00	90.00	0.07	7,446.00	3,133.67	19.08	3,133.69	0.00	0.00	0.00	0.00
11,300.00	90.00	0.07	7,446.00	3,233.67	19.21	3,233.69	0.00	0.00	0.00	0.00
11,400.00	90.00	0.07	7,446.00	3,333.67	19.34	3,333.69	0.00	0.00	0.00	0.00
11,500.00	90.00	0.07	7,446.00	3,433.67	19.47	3,433.69	0.00	0.00	0.00	0.00
11,600.00	90.00	0.07	7,446.00	3,533.67	19.60	3,533.69	0.00	0.00	0.00	0.00
11,700.00	90.00	0.07	7,446.00	3,633.67	19.73	3,633.69	0.00	0.00	0.00	0.00
11,800.00	90.00	0.07	7,446.00	3,733.67	19.86	3,733.69	0.00	0.00	0.00	0.00
11,900.00	90.00	0.07	7,446.00	3,833.67	20.00	3,833.69	0.00	0.00	0.00	0.00
12,000.00	90.00	0.07	7,446.00	3,933.67	20.13	3,933.69	0.00	0.00	0.00	0.00
12,100.00	90.00	0.07	7,446.00	4,033.67	20.26	4,033.69	0.00	0.00	0.00	0.00
12,200.00	90.00	0.07	7,446.00	4,133.67	20.39	4,133.69	0.00	0.00	0.00	0.00
12,300.00	90.00	0.07	7,446.00	4,233.67	20.52	4,233.69	0.00	0.00	0.00	0.00
12,400.00	90.00	0.07	7,446.00	4,333.67	20.65	4,333.69	0.00	0.00	0.00	0.00
12,433.85	90.00	0.07	7,446.00	4,367.52	20.69	4,367.54	0.00	0.00	0.00	0.00
<b>Total Depth (Toe)</b>										
12,433.86	90.00	0.07	7,446.00	4,367.53	20.69	4,367.55	0.01	0.00	0.00	0.00
<b>TD Well @ 12433.86ft - Lansdown 4C-21HZ_BHL</b>										

## Plan Report for Lansdown State 4C-21HZ - Rev A0 Permit

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
2,000.00	1,997.47	-43.52	0.76	End Nudge @ 2000.00ft
6,100.00	6,035.18	-755.37	13.18	Begin Drop @ 6100.00ft
6,600.00	6,532.64	-798.88	13.94	End Drop @ 6600.00ft
6,840.40	6,773.04	-798.88	13.94	Top of 4.5" Liner @ 6840.40ft
6,940.40	6,873.04	-798.88	13.94	KOP @ 6940.40ft
7,300.00	7,209.50	-689.69	14.09	DLS = 10/100'
7,840.40	7,446.00	-225.92	14.69	End Build @ 7840.40ft
12,433.86	7,446.00	4,367.53	20.69	TD Well @ 12433.86ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.07	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	7,840.40	Rev A0 Permit	MWD
7,840.40	12,433.86	Rev A0 Permit	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
922.00	922.00	9 5/8"	9-5/8	13-1/2
7,840.40	7,446.00	7"	7	8-3/4

Formation Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
872.00	872.00	Fox Hills Base		0.00	
4,105.52	4,071.00	Parkman		0.00	
4,618.31	4,576.00	Sussex		0.00	
7,153.22	7,081.00	Sharon Springs		0.00	
7,224.91	7,146.00	Niobrara A		0.00	
7,281.08	7,194.00	Niobrara B		0.00	
7,318.13	7,224.00	Niobrara C		0.00	
7,660.54	7,418.00	Fort Hays		0.00	
7,764.65	7,441.00	Codell		0.00	
7,840.40	7,446.00	Landing Target (Heel)		0.00	
12,433.85	7,446.00	Total Depth (Toe)		0.00	

## Plan Report for Lansdown State 4C-21HZ - Rev A0 Permit

### *Targets associated with this wellbore*

Target Name	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Shape
Lansdown 4C-21HZ_LD	0.00	1,731.67	2,014.08	Polygon
Lansdown 4C-21HZ_SHL	0.00	0.01	0.00	Point
Lansdown_SEC	-1.00	1,731.67	2,014.08	Polygon
Lansdown 4C-21HZ_BHL	7,446.00	4,367.53	20.69	Point

### Directional Difficulty Index

Average Dogleg over Survey:	0.88 °/100usft	Maximum Dogleg over Survey:	10.00 °/100usft at 7,840.40 usft
Net Tortousity applicable to Plans:	0.88 °/100usft	Directional Difficulty Index:	6.144

### Audit Info

North Reference Sheet for Sec. 21-T2N-66W - Lansdown State 4C-21HZ - 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' @ 4951.00usft (Drilling Rig). Northing and Easting are relative to Lansdown State 4C-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: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995948

Grid Coordinates of Well: 1,286,944.80 usft N, 3,198,707.04 usft E  
Geographical Coordinates of Well: 40° 07' 07.94" N, 104° 47' 22.11" W  
Grid Convergence at Surface is: 0.46°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,433.86usft  
the Bottom Hole Displacement is 4,367.58usft in the Direction of 0.27° (True).  
Magnetic Convergence at surface is: -8.12° (18 September 2013, BGGM2013)

