

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 21-T2N-66W

Lansdown State 3C-21HZ

## Plan A

Plan: Rev A0 Permit

## Sperry Drilling Services

## Proposal Report

18 September, 2013

Well Coordinates: 1,286,940.18 N, 3,198,766.93 E (40° 07' 07.89" N, 104° 47' 21.34" W)

Ground Level: 4,935.00 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 3C-21HZ

RKB = 17' @ 4952.00usft (Drilling Rig)

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

Project: Weld County, CO (NAD 83)  
 Site: Sec. 21-T2N-66W  
 Well: Lansdown State 3C-21HZ  
 Wellbore: Plan A  
 Design: Rev A0 Permit



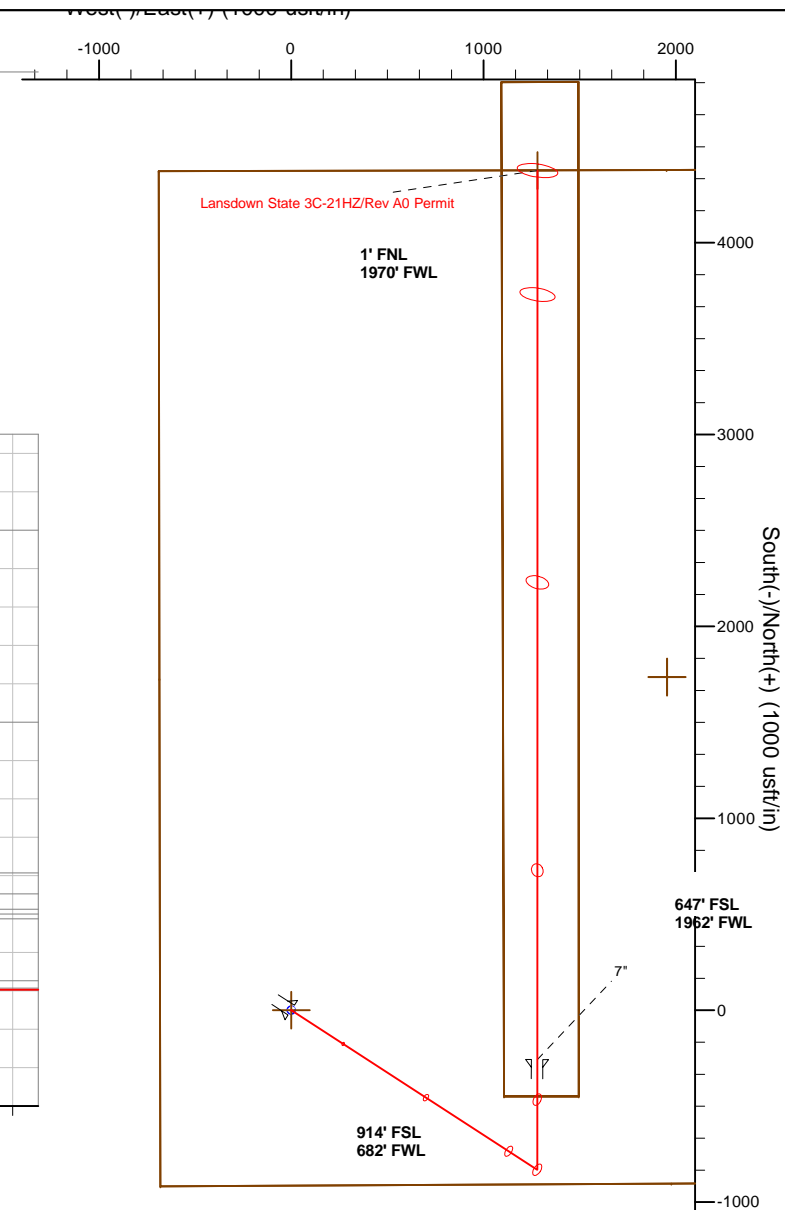
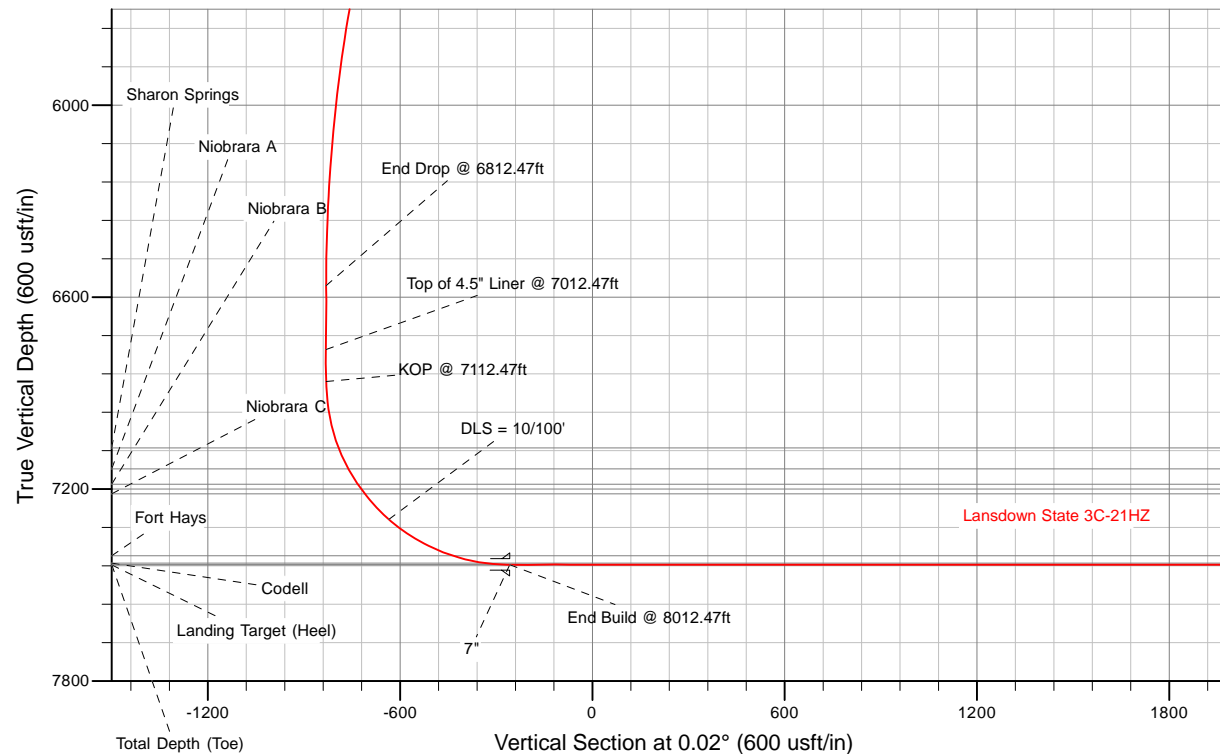
**HALLIBURTON**  
 Sperry Drilling

#### 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	1362.47	0.00	0.00	1362.47	0.00	0.00	0.00	0.00	0.00	
3	2362.47	20.00	123.00	2342.29	-94.10	144.90	2.00	123.00	-94.05	
4	5812.47	20.00	123.00	5584.23	-736.75	1134.50	0.00	0.00	-736.36	
5	6812.47	0.00	0.00	6564.04	-830.85	1279.40	2.00	180.00	-830.40	
6	7112.47	0.00	0.00	6864.04	-830.85	1279.40	0.00	0.00	-830.40	
7	8012.47	90.00	0.02	7437.00	-257.89	1279.57	10.00	0.02	-257.45	
8	2645.94	90.00	0.02	7437.00	4375.58	1280.97	0.00	0.00	4376.02	Lansdown State 3C-21HZ_BHL

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

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Lansdown State 3C-21HZ_LD	0.00	1736.76	1954.24	40° 7' 25.047 N 104° 46' 56.183 W	Polygon	
Lansdown State 3C-21HZ_SHL	0.00	0.00	0.00	40° 7' 7.885 N 104° 47' 21.340 W	Point	
Lansdown_SEC	0.00	1736.76	1954.24	40° 7' 25.047 N 104° 46' 56.183 W	Polygon	
Lansdown State 3C-21HZ_BHL	7437.00	4375.58	1280.97	40° 7' 51.125 N 104° 47' 4.848 W	Point	



WELL DETAILS: Lansdown State 3C-21HZ		
Ground Level: 4935.00		
RKB = 17' @ 4952.00usft (Drilling Rig)		
Plan: Rev A0 Permit (Lansdown State 3C-21HZ/Plan A)		
Created By: Clint Eshelman Date: 09/18/2013		

TVD	MD	
6764.04	7012.47	Top of 4.5" Liner @ 7012.47ft
6864.04	7112.47	KOP @ 7112.47ft

**Plan Report for Lansdown State 3C-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 State 3C-21HZ_LD - Lansdown_SEC - Lansdown State 3C-21HZ_SHL</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
873.00	0.00	0.00	873.00	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
923.00	0.00	0.00	923.00	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
1,362.47	0.00	0.00	1,362.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Begin Nudge @ 1362.47ft</b>										
1,400.00	0.75	123.00	1,400.00	-0.13	0.21	-0.13	2.00	2.00	0.00	123.00
1,500.00	2.75	123.00	1,499.95	-1.80	2.77	-1.80	2.00	2.00	0.00	0.00
1,600.00	4.75	123.00	1,599.73	-5.36	8.25	-5.36	2.00	2.00	0.00	0.00
1,700.00	6.75	123.00	1,699.22	-10.82	16.66	-10.81	2.00	2.00	0.00	0.00
1,800.00	8.75	123.00	1,798.30	-18.16	27.97	-18.15	2.00	2.00	0.00	0.00
1,900.00	10.75	123.00	1,896.85	-27.39	42.17	-27.37	2.00	2.00	0.00	0.00
2,000.00	12.75	123.00	1,994.75	-38.48	59.25	-38.46	2.00	2.00	0.00	0.00
2,100.00	14.75	123.00	2,091.88	-51.42	79.18	-51.39	2.00	2.00	0.00	0.00
2,200.00	16.75	123.00	2,188.12	-66.21	101.95	-66.17	2.00	2.00	0.00	0.00
2,300.00	18.75	123.00	2,283.35	-82.81	127.51	-82.76	2.00	2.00	0.00	0.00
2,362.47	20.00	123.00	2,342.29	-94.10	144.90	-94.05	2.00	2.00	0.00	0.00
<b>End Nudge @ 2362.47ft</b>										
2,400.00	20.00	123.00	2,377.55	-101.09	155.66	-101.03	0.00	0.00	0.00	0.00
2,500.00	20.00	123.00	2,471.52	-119.71	184.34	-119.65	0.00	0.00	0.00	0.00
2,600.00	20.00	123.00	2,565.49	-138.34	213.03	-138.27	0.00	0.00	0.00	0.00
2,700.00	20.00	123.00	2,659.46	-156.97	241.71	-156.89	0.00	0.00	0.00	0.00
2,800.00	20.00	123.00	2,753.43	-175.60	270.40	-175.50	0.00	0.00	0.00	0.00
2,900.00	20.00	123.00	2,847.40	-194.23	299.08	-194.12	0.00	0.00	0.00	0.00
3,000.00	20.00	123.00	2,941.37	-212.85	327.77	-212.74	0.00	0.00	0.00	0.00
3,100.00	20.00	123.00	3,035.34	-231.48	356.45	-231.36	0.00	0.00	0.00	0.00
3,200.00	20.00	123.00	3,129.31	-250.11	385.13	-249.97	0.00	0.00	0.00	0.00
3,300.00	20.00	123.00	3,223.28	-268.74	413.82	-268.59	0.00	0.00	0.00	0.00
3,400.00	20.00	123.00	3,317.24	-287.36	442.50	-287.21	0.00	0.00	0.00	0.00
3,500.00	20.00	123.00	3,411.21	-305.99	471.19	-305.83	0.00	0.00	0.00	0.00
3,600.00	20.00	123.00	3,505.18	-324.62	499.87	-324.45	0.00	0.00	0.00	0.00
3,700.00	20.00	123.00	3,599.15	-343.25	528.56	-343.06	0.00	0.00	0.00	0.00
3,800.00	20.00	123.00	3,693.12	-361.88	557.24	-361.68	0.00	0.00	0.00	0.00
3,900.00	20.00	123.00	3,787.09	-380.50	585.92	-380.30	0.00	0.00	0.00	0.00
4,000.00	20.00	123.00	3,881.06	-399.13	614.61	-398.92	0.00	0.00	0.00	0.00
4,100.00	20.00	123.00	3,975.03	-417.76	643.29	-417.53	0.00	0.00	0.00	0.00
4,192.55	20.00	123.00	4,062.00	-435.00	669.84	-434.77	0.00	0.00	0.00	0.00
<b>Parkman</b>										
4,200.00	20.00	123.00	4,069.00	-436.39	671.98	-436.15	0.00	0.00	0.00	0.00
4,300.00	20.00	123.00	4,162.97	-455.01	700.66	-454.77	0.00	0.00	0.00	0.00
4,400.00	20.00	123.00	4,256.94	-473.64	729.35	-473.39	0.00	0.00	0.00	0.00
4,500.00	20.00	123.00	4,350.91	-492.27	758.03	-492.01	0.00	0.00	0.00	0.00
4,600.00	20.00	123.00	4,444.88	-510.90	786.71	-510.62	0.00	0.00	0.00	0.00

## Plan Report for Lansdown State 3C-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 (°)
4,700.00	20.00	123.00	4,538.85	-529.53	815.40	-529.24	0.00	0.00	0.00	0.00
4,729.96	20.00	123.00	4,567.00	-535.11	823.99	-534.82	0.00	0.00	0.00	0.00
<b>Sussex</b>										
4,800.00	20.00	123.00	4,632.81	-548.15	844.08	-547.86	0.00	0.00	0.00	0.00
4,900.00	20.00	123.00	4,726.78	-566.78	872.77	-566.48	0.00	0.00	0.00	0.00
5,000.00	20.00	123.00	4,820.75	-585.41	901.45	-585.09	0.00	0.00	0.00	0.00
5,100.00	20.00	123.00	4,914.72	-604.04	930.13	-603.71	0.00	0.00	0.00	0.00
5,200.00	20.00	123.00	5,008.69	-622.66	958.82	-622.33	0.00	0.00	0.00	0.00
5,300.00	20.00	123.00	5,102.66	-641.29	987.50	-640.95	0.00	0.00	0.00	0.00
5,400.00	20.00	123.00	5,196.63	-659.92	1,016.19	-659.56	0.00	0.00	0.00	0.00
5,500.00	20.00	123.00	5,290.60	-678.55	1,044.87	-678.18	0.00	0.00	0.00	0.00
5,600.00	20.00	123.00	5,384.57	-697.18	1,073.56	-696.80	0.00	0.00	0.00	0.00
5,700.00	20.00	123.00	5,478.54	-715.80	1,102.24	-715.42	0.00	0.00	0.00	0.00
5,800.00	20.00	123.00	5,572.51	-734.43	1,130.92	-734.04	0.00	0.00	0.00	0.00
5,812.47	20.00	123.00	5,584.23	-736.75	1,134.50	-736.36	0.00	0.00	0.00	0.00
<b>Begin Drop @ 5812.47ft</b>										
5,900.00	18.25	123.00	5,666.92	-752.37	1,158.55	-751.97	2.00	-2.00	0.00	180.00
6,000.00	16.25	123.00	5,762.42	-768.52	1,183.42	-768.11	2.00	-2.00	0.00	180.00
6,100.00	14.25	123.00	5,858.89	-782.85	1,205.48	-782.42	2.00	-2.00	0.00	180.00
6,200.00	12.25	123.00	5,956.23	-795.33	1,224.70	-794.90	2.00	-2.00	0.00	180.00
6,300.00	10.25	123.00	6,054.30	-805.95	1,241.06	-805.52	2.00	-2.00	0.00	180.00
6,400.00	8.25	123.00	6,152.99	-814.71	1,254.54	-814.27	2.00	-2.00	0.00	180.00
6,500.00	6.25	123.00	6,252.19	-821.58	1,265.12	-821.14	2.00	-2.00	0.00	180.00
6,600.00	4.25	123.00	6,351.77	-826.56	1,272.79	-826.12	2.00	-2.00	0.00	180.00
6,700.00	2.25	123.00	6,451.60	-829.65	1,277.55	-829.20	2.00	-2.00	0.00	180.00
6,800.00	0.25	123.00	6,551.57	-830.83	1,279.37	-830.39	2.00	-2.00	0.00	-180.00
6,812.47	0.00	0.00	6,564.04	-830.85	1,279.40	-830.40	2.00	-2.00	0.00	-180.00
<b>End Drop @ 6812.47ft</b>										
6,900.00	0.00	0.00	6,651.57	-830.85	1,279.40	-830.40	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	6,751.57	-830.85	1,279.40	-830.40	0.00	0.00	0.00	0.00
7,012.47	0.00	0.00	6,764.04	-830.85	1,279.40	-830.40	0.00	0.00	0.00	0.00
<b>Top of 4.5" Liner @ 7012.47ft</b>										
7,100.00	0.00	0.00	6,851.57	-830.85	1,279.40	-830.40	0.00	0.00	0.00	0.00
7,112.47	0.00	0.00	6,864.04	-830.85	1,279.40	-830.40	0.00	0.00	0.00	0.00
<b>KOP @ 7112.47ft</b>										
7,200.00	8.75	0.02	6,951.23	-824.18	1,279.40	-823.73	10.00	10.00	0.00	0.02
7,300.00	18.75	0.02	7,048.24	-800.43	1,279.41	-799.99	10.00	10.00	0.00	0.00
7,325.29	21.28	0.02	7,072.00	-791.78	1,279.41	-791.33	10.00	10.00	0.00	0.00
<b>Sharon Springs</b>										
7,396.98	28.45	0.02	7,137.00	-761.65	1,279.42	-761.20	10.00	10.00	0.00	0.00
<b>Niobrara A</b>										
7,400.00	28.75	0.02	7,139.65	-760.20	1,279.42	-759.76	10.00	10.00	0.00	0.00
7,453.15	34.07	0.02	7,185.00	-732.51	1,279.43	-732.07	10.00	10.00	0.00	0.00
<b>Niobrara B</b>										
7,490.20	37.77	0.02	7,215.00	-710.78	1,279.43	-710.33	10.00	10.00	0.00	0.00
<b>Niobrara C</b>										
7,500.00	38.75	0.02	7,222.69	-704.71	1,279.43	-704.27	10.00	10.00	0.00	0.00
7,600.00	48.75	0.02	7,294.83	-635.65	1,279.46	-635.20	10.00	10.00	0.00	0.00
<b>DLS = 10/100'</b>										
7,700.00	58.75	0.02	7,353.88	-555.10	1,279.48	-554.65	10.00	10.00	0.00	0.00
7,800.00	68.75	0.02	7,398.05	-465.53	1,279.51	-465.08	10.00	10.00	0.00	0.00
7,832.61	72.01	0.02	7,409.00	-434.81	1,279.52	-434.36	10.00	10.00	0.00	0.00
<b>Fort Hays</b>										
7,900.00	78.75	0.02	7,426.00	-369.64	1,279.54	-369.19	10.00	10.00	0.00	0.00
7,936.73	82.43	0.02	7,432.00	-333.41	1,279.55	-332.96	10.00	10.00	0.00	0.00
<b>Codell</b>										
8,000.00	88.75	0.02	7,436.86	-270.36	1,279.57	-269.91	10.00	10.00	0.00	0.00
8,012.47	90.00	0.02	7,437.00	-257.89	1,279.57	-257.45	10.00	10.00	0.00	0.00

**Plan Report for Lansdown State 3C-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>End Build @ 8012.47ft - Landing Target (Heel) - 7"</b>										
8,100.00	90.00	0.02	7,437.00	-170.36	1,279.60	-169.92	0.00	0.00	0.00	0.00
8,200.00	90.00	0.02	7,437.00	-70.36	1,279.63	-69.92	0.00	0.00	0.00	0.00
8,300.00	90.00	0.02	7,437.00	29.64	1,279.66	30.08	0.00	0.00	0.00	0.00
8,400.00	90.00	0.02	7,437.00	129.64	1,279.69	130.08	0.00	0.00	0.00	0.00
8,500.00	90.00	0.02	7,437.00	229.64	1,279.72	230.08	0.00	0.00	0.00	0.00
8,600.00	90.00	0.02	7,437.00	329.64	1,279.75	330.08	0.00	0.00	0.00	0.00
8,700.00	90.00	0.02	7,437.00	429.64	1,279.78	430.08	0.00	0.00	0.00	0.00
8,800.00	90.00	0.02	7,437.00	529.64	1,279.81	530.08	0.00	0.00	0.00	0.00
8,900.00	90.00	0.02	7,437.00	629.64	1,279.84	630.08	0.00	0.00	0.00	0.00
9,000.00	90.00	0.02	7,437.00	729.64	1,279.87	730.08	0.00	0.00	0.00	0.00
9,100.00	90.00	0.02	7,437.00	829.64	1,279.90	830.08	0.00	0.00	0.00	0.00
9,200.00	90.00	0.02	7,437.00	929.64	1,279.93	930.08	0.00	0.00	0.00	0.00
9,300.00	90.00	0.02	7,437.00	1,029.64	1,279.96	1,030.08	0.00	0.00	0.00	0.00
9,400.00	90.00	0.02	7,437.00	1,129.64	1,279.99	1,130.08	0.00	0.00	0.00	0.00
9,500.00	90.00	0.02	7,437.00	1,229.64	1,280.02	1,230.08	0.00	0.00	0.00	0.00
9,600.00	90.00	0.02	7,437.00	1,329.64	1,280.05	1,330.08	0.00	0.00	0.00	0.00
9,700.00	90.00	0.02	7,437.00	1,429.64	1,280.08	1,430.08	0.00	0.00	0.00	0.00
9,800.00	90.00	0.02	7,437.00	1,529.64	1,280.11	1,530.08	0.00	0.00	0.00	0.00
9,900.00	90.00	0.02	7,437.00	1,629.64	1,280.14	1,630.08	0.00	0.00	0.00	0.00
10,000.00	90.00	0.02	7,437.00	1,729.64	1,280.17	1,730.08	0.00	0.00	0.00	0.00
10,100.00	90.00	0.02	7,437.00	1,829.64	1,280.20	1,830.08	0.00	0.00	0.00	0.00
10,200.00	90.00	0.02	7,437.00	1,929.64	1,280.23	1,930.08	0.00	0.00	0.00	0.00
10,300.00	90.00	0.02	7,437.00	2,029.64	1,280.26	2,030.08	0.00	0.00	0.00	0.00
10,400.00	90.00	0.02	7,437.00	2,129.64	1,280.29	2,130.08	0.00	0.00	0.00	0.00
10,500.00	90.00	0.02	7,437.00	2,229.64	1,280.32	2,230.08	0.00	0.00	0.00	0.00
10,600.00	90.00	0.02	7,437.00	2,329.64	1,280.35	2,330.08	0.00	0.00	0.00	0.00
10,700.00	90.00	0.02	7,437.00	2,429.64	1,280.38	2,430.08	0.00	0.00	0.00	0.00
10,800.00	90.00	0.02	7,437.00	2,529.64	1,280.41	2,530.08	0.00	0.00	0.00	0.00
10,900.00	90.00	0.02	7,437.00	2,629.64	1,280.44	2,630.08	0.00	0.00	0.00	0.00
11,000.00	90.00	0.02	7,437.00	2,729.64	1,280.47	2,730.08	0.00	0.00	0.00	0.00
11,100.00	90.00	0.02	7,437.00	2,829.64	1,280.50	2,830.08	0.00	0.00	0.00	0.00
11,200.00	90.00	0.02	7,437.00	2,929.64	1,280.53	2,930.08	0.00	0.00	0.00	0.00
11,300.00	90.00	0.02	7,437.00	3,029.64	1,280.57	3,030.08	0.00	0.00	0.00	0.00
11,400.00	90.00	0.02	7,437.00	3,129.64	1,280.60	3,130.08	0.00	0.00	0.00	0.00
11,500.00	90.00	0.02	7,437.00	3,229.64	1,280.63	3,230.08	0.00	0.00	0.00	0.00
11,600.00	90.00	0.02	7,437.00	3,329.64	1,280.66	3,330.08	0.00	0.00	0.00	0.00
11,700.00	90.00	0.02	7,437.00	3,429.64	1,280.69	3,430.08	0.00	0.00	0.00	0.00
11,800.00	90.00	0.02	7,437.00	3,529.64	1,280.72	3,530.08	0.00	0.00	0.00	0.00
11,900.00	90.00	0.02	7,437.00	3,629.64	1,280.75	3,630.08	0.00	0.00	0.00	0.00
12,000.00	90.00	0.02	7,437.00	3,729.64	1,280.78	3,730.08	0.00	0.00	0.00	0.00
12,100.00	90.00	0.02	7,437.00	3,829.64	1,280.81	3,830.08	0.00	0.00	0.00	0.00
12,200.00	90.00	0.02	7,437.00	3,929.64	1,280.84	3,930.08	0.00	0.00	0.00	0.00
12,300.00	90.00	0.02	7,437.00	4,029.64	1,280.87	4,030.08	0.00	0.00	0.00	0.00
12,400.00	90.00	0.02	7,437.00	4,129.64	1,280.90	4,130.08	0.00	0.00	0.00	0.00
12,500.00	90.00	0.02	7,437.00	4,229.64	1,280.93	4,230.08	0.00	0.00	0.00	0.00
12,600.00	90.00	0.02	7,437.00	4,329.64	1,280.96	4,330.08	0.00	0.00	0.00	0.00
12,645.93	90.00	0.02	7,437.00	4,375.57	1,280.97	4,376.01	0.00	0.00	0.00	0.00
<b>Total Depth (Toe)</b>										
12,645.94	90.00	0.02	7,437.00	4,375.58	1,280.97	4,376.02	0.00	0.00	0.00	0.00
<b>TD Well @ 12645.94ft - Lansdown State 3C-21HZ_BHL</b>										

## Plan Report for Lansdown State 3C-21HZ - Rev A0 Permit

### Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,362.47	1,362.47	0.00	0.00	Begin Nudge @ 1362.47ft
2,362.47	2,342.29	-94.10	144.90	End Nudge @ 2362.47ft
5,812.47	5,584.23	-736.75	1,134.50	Begin Drop @ 5812.47ft
6,812.47	6,564.04	-830.85	1,279.40	End Drop @ 6812.47ft
7,012.47	6,764.04	-830.85	1,279.40	Top of 4.5" Liner @ 7012.47ft
7,112.47	6,864.04	-830.85	1,279.40	KOP @ 7112.47ft
7,600.00	7,294.83	-635.65	1,279.46	DLS = 10/100'
8,012.47	7,437.00	-257.89	1,279.57	End Build @ 8012.47ft
12,645.94	7,437.00	4,375.58	1,280.97	TD Well @ 12645.94ft

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.02	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
0.00	8,012.47	Rev A0 Permit	MWD
8,012.47	12,645.94	Rev A0 Permit	MWD

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
923.00	923.00	9 5/8"	9-5/8	13-1/2
8,012.47	7,437.00	7"	7	8-3/4

### Formation Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
873.00	873.00	Fox Hills Base		0.00	
4,192.55	4,062.00	Parkman		0.00	
4,729.96	4,567.00	Sussex		0.00	
7,325.29	7,072.00	Sharon Springs		0.00	
7,396.98	7,137.00	Niobrara A		0.00	
7,453.15	7,185.00	Niobrara B		0.00	
7,490.20	7,215.00	Niobrara C		0.00	
7,832.61	7,409.00	Fort Hays		0.00	
7,936.73	7,432.00	Codell		0.00	
8,012.47	7,437.00	Landing Target (Heel)		0.00	
12,645.93	7,437.00	Total Depth (Toe)		0.00	

## Plan Report for Lansdown State 3C-21HZ - Rev A0 Permit

### Targets associated with this wellbore

Target Name	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Shape
Lansdown State 3C-21HZ_LD	0.00	1,736.76	1,954.24	Polygon
Lansdown_SEC	0.00	1,736.76	1,954.24	Polygon
Lansdown State 3C-21HZ_SHL	0.00	0.00	0.00	Point
Lansdown State 3C-21HZ_BHL	7,437.00	4,375.58	1,280.97	Point

### Directional Difficulty Index

Average Dogleg over Survey:	1.03 °/100usft	Maximum Dogleg over Survey:	10.00 °/100usft at 8,012.47 usft
Net Tortousity applicable to Plans:	1.03 °/100usft	Directional Difficulty Index:	6.311

### Audit Info

**North Reference Sheet for Sec. 21-T2N-66W - Lansdown State 3C-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' @ 4952.00usft (Drilling Rig). Northing and Easting are relative to Lansdown State 3C-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° 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: 0.99995948

Grid Coordinates of Well: 1,286,940.18 usft N, 3,198,766.93 usft E  
 Geographical Coordinates of Well: 40° 07' 07.89" N, 104° 47' 21.34" W  
 Grid Convergence at Surface is: 0.46°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,645.94usft  
 the Bottom Hole Displacement is 4,559.23usft in the Direction of 16.32° ( True).  
 Magnetic Convergence at surface is: -8.12° (18 September 2013 , BGGM2013)

