

# **US ROCKIES WATTENBERG PLANNING**

**WELD-NAD83-UTMFT13N**

**2N-67W-21 COWBOY 24-21HZ PAD**

**COWBOY 21-5HZ**

**Plan A**

**Plan: Permit Rev-1**

SHL Lat/Long: 40.124675/-104.889307

Survey Program: MWD+IFR+MSA

## **Standard Planning Report**

**08 December, 2017**

Project: WELD-NAD83-UTMFT13N  
Site: 2N-67W-21 COWBOY 24-21HZ PAD  
Well: COWBOY 21-5HZ  
Wellbore: Plan A  
Design: Permit Rev-1

# US ROCKIES WATTENBERG PLANNING

## CASING DETAILS

TVD	MD	Size
1500.00	1520.60	9-5/8
7450.00	7931.00	5-1/2

WELL DETAILS: COWBOY 21-5HZ

GL = 5041'

RKB = 17' @ 5058.00usft

## 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	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1250.00	15.00	196.00	1238.62	-125.11	-35.88	1.50	196.00	-124.91	
4	4070.00	15.00	196.00	3962.53	-826.71	-237.05	0.00	0.00	-825.37	
5	4820.00	0.00	0.00	4703.99	-920.54	-263.96	2.00	180.00	-919.05	
6	6929.39	0.00	0.00	6813.38	-920.54	-263.96	0.00	0.00	-919.05	
7	7931.00	90.14	359.09	7450.00	-282.39	-274.08	9.00	359.09	-280.86	
8	18400.46	90.14	359.09	7423.57	10185.72	-440.00	0.00	0.00	10188.02	COWBOY 21-5HZ_tgt
9	18590.00	90.14	1.94	7423.09	10375.23	-438.30	1.50	90.00	10377.52	
10	21398.20	90.14	1.94	7416.00	13181.82	-343.48	0.00	0.00	13183.53	COWBOY 21-5HZ_BHL

## WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
COWBOY 21-5HZ_SHL	0.00	0.00	0.00	40.124675	-104.889307
COWBOY 21-5HZ_BHL	7416.00	13181.82	-343.48	40.160874	-104.890536

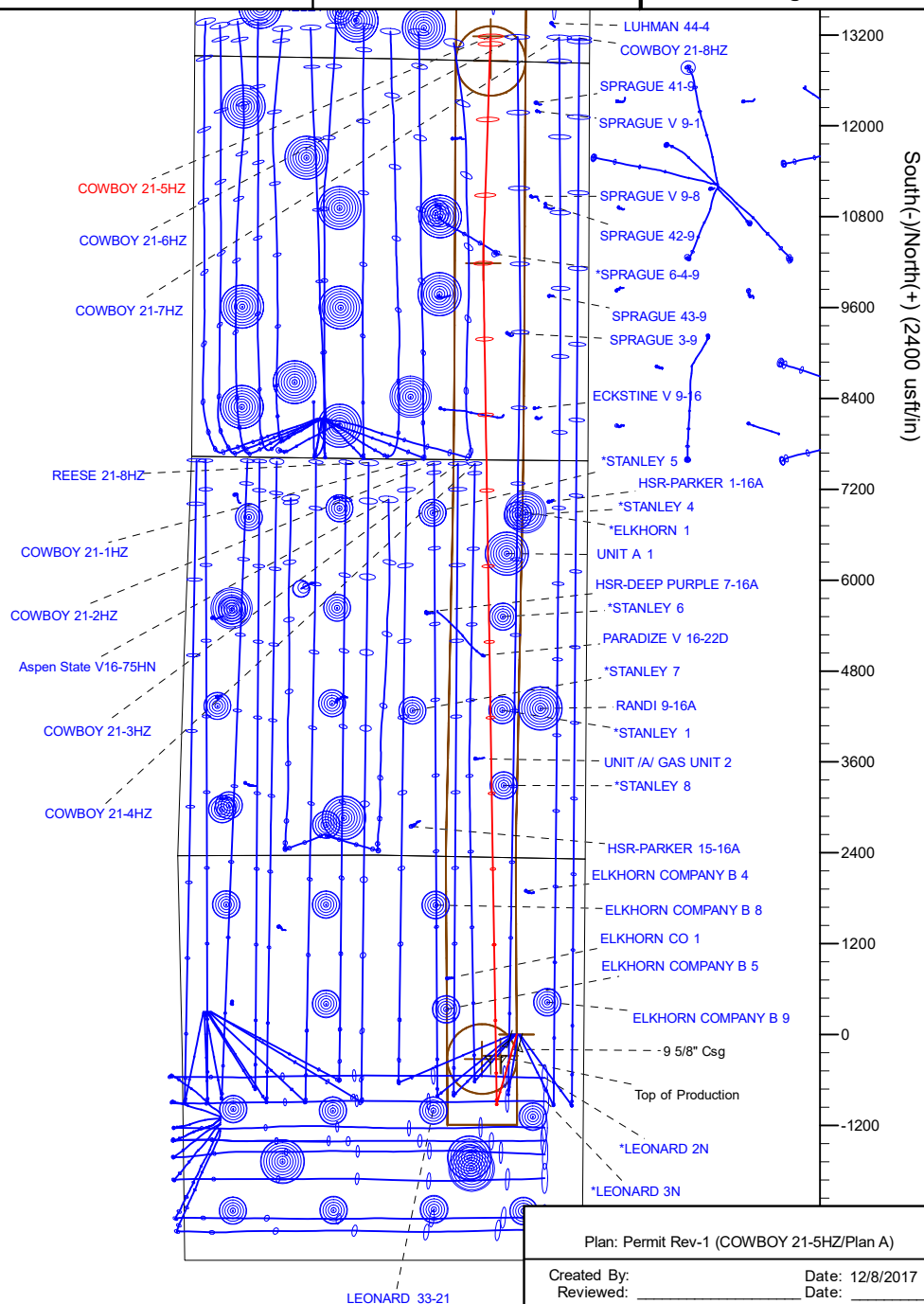
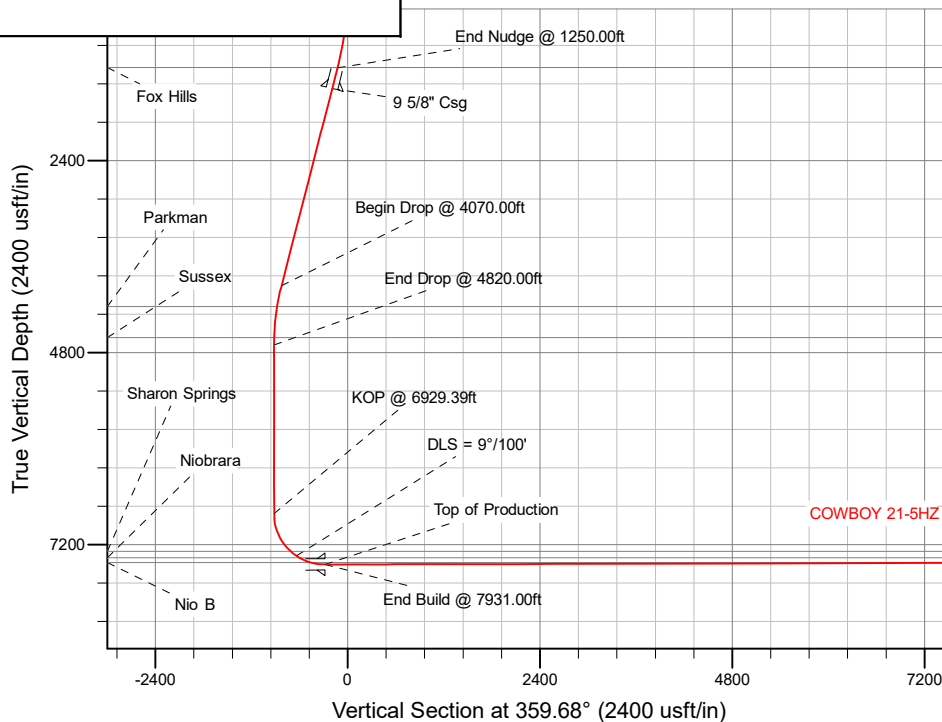
## FORMATION TOP DETAILS

TVDPATH	MDPATH	Formation
1232.00	1243.15	Fox Hills
4224.00	4337.74	Parkman
4609.00	4724.99	Sussex
7287.00	7463.50	Sharon Springs
7364.00	7594.64	Niobrara
7425.00	7750.39	Nio B

**SHL**  
**2334' FNL**  
**886' FEL**

**HEEL**  
**2618' FNL**  
**1155' FEL**

**TOE**  
**325' FSL**  
**1305' FEL**



Plan: Permit Rev-1 (COWBOY 21-5HZ/Plan A)

Created By: \_\_\_\_\_ Date: 12/8/2017  
Reviewed: \_\_\_\_\_ Date: \_\_\_\_\_

Project	WELD-NAD83-UTMFT13N		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Zone 13N (108 W to 102 W)		

Site	2N-67W-21 COWBOY 24-21HZ PAD		
Site Position:		Northing:	14,572,152.72 usft
From:	Lat/Long	Easting:	1,671,300.07 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	40.124676
		Longitude:	-104.889521
		Grid Convergence:	0.07 °

Well	COWBOY 21-5HZ		
Well Position	+N/-S	-0.36 usft	Northing:
	+E/-W	59.82 usft	Easting:
Position Uncertainty	3.28 usft	Wellhead Elevation:	
		Latitude:	40.124675
		Longitude:	-104.889307
		Ground Level:	5,041.00 usft

Wellbore	Plan A				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/30/2017	8.04	66.58	52,292.75821552

Design	Permit Rev-1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	359.68

Plan Survey Tool Program	Date	12/7/2017		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	1,500.00	Permit Rev-1 (Plan A)	APC_ISCWSA REV 2 MWD+II Fixed:v2:crustal field declination
2	1,500.00	21,398.18	Permit Rev-1 (Plan A)	APC_ISCWSA REV 2 MWD+II Fixed:v2:Rockies, crustal dec +

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,250.00	15.00	196.00	1,238.62	-125.11	-35.88	1.50	1.50	0.00	196.00	
4,070.00	15.00	196.00	3,962.53	-826.71	-237.05	0.00	0.00	0.00	0.00	
4,820.00	0.00	0.00	4,703.99	-920.54	-263.96	2.00	-2.00	0.00	180.00	
6,929.39	0.00	0.00	6,813.38	-920.54	-263.96	0.00	0.00	0.00	0.00	
7,931.00	90.14	359.09	7,450.00	-282.39	-274.08	9.00	9.00	-0.09	359.09	
18,400.46	90.14	359.09	7,423.57	10,185.72	-440.00	0.00	0.00	0.00	0.00	COWBOY 21-5HZ_tg
18,590.00	90.14	1.94	7,423.09	10,375.23	-438.30	1.50	0.00	1.50	90.00	
21,398.20	90.14	1.94	7,416.00	13,181.82	-343.48	0.00	0.00	0.00	0.00	COWBOY 21-5HZ_BI

Planned Survey									
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)
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
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin Nudge @ 250.00ft									
300.00	0.75	196.00	300.00	-0.31	-0.09	-0.31	1.50	1.50	0.00
400.00	2.25	196.00	399.96	-2.83	-0.81	-2.83	1.50	1.50	0.00
500.00	3.75	196.00	499.82	-7.86	-2.25	-7.85	1.50	1.50	0.00
600.00	5.25	196.00	599.51	-15.40	-4.42	-15.38	1.50	1.50	0.00
700.00	6.75	196.00	698.96	-25.45	-7.30	-25.41	1.50	1.50	0.00
800.00	8.25	196.00	798.10	-38.00	-10.90	-37.94	1.50	1.50	0.00
900.00	9.75	196.00	896.87	-53.03	-15.21	-52.95	1.50	1.50	0.00
1,000.00	11.25	196.00	995.19	-70.55	-20.23	-70.44	1.50	1.50	0.00
1,100.00	12.75	196.00	1,093.00	-90.54	-25.96	-90.39	1.50	1.50	0.00
1,200.00	14.25	196.00	1,190.24	-112.98	-32.40	-112.79	1.50	1.50	0.00
1,243.15	14.90	196.00	1,232.00	-123.41	-35.39	-123.21	1.50	1.50	0.00
Fox Hills									
1,250.00	15.00	196.00	1,238.62	-125.11	-35.88	-124.91	1.50	1.50	0.00
End Nudge @ 1250.00ft									
1,300.00	15.00	196.00	1,286.91	-137.55	-39.44	-137.33	0.00	0.00	0.00
1,400.00	15.00	196.00	1,383.50	-162.43	-46.58	-162.17	0.00	0.00	0.00
1,500.00	15.00	196.00	1,480.10	-187.31	-53.71	-187.01	0.00	0.00	0.00
1,520.60	15.00	196.00	1,500.00	-192.44	-55.18	-192.13	0.00	0.00	0.00
9 5/8" Csg									
1,600.00	15.00	196.00	1,576.69	-212.19	-60.84	-211.85	0.00	0.00	0.00
1,700.00	15.00	196.00	1,673.28	-237.07	-67.98	-236.69	0.00	0.00	0.00
1,800.00	15.00	196.00	1,769.88	-261.95	-75.11	-261.52	0.00	0.00	0.00
1,900.00	15.00	196.00	1,866.47	-286.83	-82.25	-286.36	0.00	0.00	0.00
2,000.00	15.00	196.00	1,963.06	-311.71	-89.38	-311.20	0.00	0.00	0.00
2,100.00	15.00	196.00	2,059.65	-336.59	-96.51	-336.04	0.00	0.00	0.00
2,200.00	15.00	196.00	2,156.25	-361.47	-103.65	-360.88	0.00	0.00	0.00
2,300.00	15.00	196.00	2,252.84	-386.34	-110.78	-385.72	0.00	0.00	0.00
2,400.00	15.00	196.00	2,349.43	-411.22	-117.92	-410.56	0.00	0.00	0.00
2,500.00	15.00	196.00	2,446.02	-436.10	-125.05	-435.40	0.00	0.00	0.00
2,600.00	15.00	196.00	2,542.62	-460.98	-132.18	-460.24	0.00	0.00	0.00
2,700.00	15.00	196.00	2,639.21	-485.86	-139.32	-485.08	0.00	0.00	0.00
2,800.00	15.00	196.00	2,735.80	-510.74	-146.45	-509.91	0.00	0.00	0.00
2,900.00	15.00	196.00	2,832.39	-535.62	-153.59	-534.75	0.00	0.00	0.00
3,000.00	15.00	196.00	2,928.99	-560.50	-160.72	-559.59	0.00	0.00	0.00
3,100.00	15.00	196.00	3,025.58	-585.38	-167.85	-584.43	0.00	0.00	0.00
3,200.00	15.00	196.00	3,122.17	-610.26	-174.99	-609.27	0.00	0.00	0.00
3,300.00	15.00	196.00	3,218.76	-635.14	-182.12	-634.11	0.00	0.00	0.00
3,400.00	15.00	196.00	3,315.36	-660.02	-189.26	-658.95	0.00	0.00	0.00
3,500.00	15.00	196.00	3,411.95	-684.90	-196.39	-683.79	0.00	0.00	0.00
3,600.00	15.00	196.00	3,508.54	-709.77	-203.52	-708.63	0.00	0.00	0.00
3,700.00	15.00	196.00	3,605.13	-734.65	-210.66	-733.47	0.00	0.00	0.00
3,800.00	15.00	196.00	3,701.73	-759.53	-217.79	-758.31	0.00	0.00	0.00
3,900.00	15.00	196.00	3,798.32	-784.41	-224.93	-783.14	0.00	0.00	0.00
4,000.00	15.00	196.00	3,894.91	-809.29	-232.06	-807.98	0.00	0.00	0.00
4,070.00	15.00	196.00	3,962.53	-826.71	-237.05	-825.37	0.00	0.00	0.00
Begin Drop @ 4070.00ft									
4,100.00	14.40	196.00	3,991.54	-834.03	-239.15	-832.68	2.00	-2.00	0.00
4,200.00	12.40	196.00	4,088.82	-856.30	-245.54	-854.92	2.00	-2.00	0.00
4,300.00	10.40	196.00	4,186.84	-875.30	-250.99	-873.88	2.00	-2.00	0.00
4,337.74	9.65	196.00	4,224.00	-881.61	-252.80	-880.19	2.00	-2.00	0.00
Parkman									
4,400.00	8.40	196.00	4,285.49	-891.00	-255.49	-889.56	2.00	-2.00	0.00
4,500.00	6.40	196.00	4,384.65	-903.38	-259.04	-901.92	2.00	-2.00	0.00
4,600.00	4.40	196.00	4,484.20	-912.43	-261.63	-910.95	2.00	-2.00	0.00
4,700.00	2.40	196.00	4,584.02	-918.13	-263.27	-916.64	2.00	-2.00	0.00
4,724.99	1.90	196.00	4,609.00	-919.03	-263.53	-917.54	2.00	-2.00	0.00
Sussex									
4,800.00	0.40	196.00	4,683.99	-920.47	-263.94	-918.99	2.00	-2.00	0.00
4,820.00	0.00	0.00	4,703.99	-920.54	-263.96	-919.05	2.00	-2.00	0.00
End Drop @ 4820.00ft									
4,900.00	0.00	0.00	4,783.99	-920.54	-263.96	-919.05	0.00	0.00	0.00

Planned Survey										
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)	
5,000.00	0.00	0.00	4,883.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,100.00	0.00	0.00	4,983.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,200.00	0.00	0.00	5,083.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,300.00	0.00	0.00	5,183.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,400.00	0.00	0.00	5,283.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,383.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,600.00	0.00	0.00	5,483.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,583.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,683.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,783.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,000.00	0.00	0.00	5,883.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,100.00	0.00	0.00	5,983.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,200.00	0.00	0.00	6,083.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,300.00	0.00	0.00	6,183.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,283.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,500.00	0.00	0.00	6,383.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,483.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,583.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,683.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,783.99	-920.54	-263.96	-919.05	0.00	0.00	0.00	
6,929.39	0.00	0.00	6,813.38	-920.54	-263.96	-919.05	0.00	0.00	0.00	
KOP @ 6929.39ft										
7,000.00	6.35	359.09	6,883.84	-916.63	-264.02	-915.14	9.00	9.00	0.00	
7,100.00	15.35	359.09	6,981.95	-897.82	-264.32	-896.33	9.00	9.00	0.00	
7,200.00	24.35	359.09	7,075.91	-863.89	-264.86	-862.40	9.00	9.00	0.00	
7,300.00	33.35	359.09	7,163.41	-815.69	-265.62	-814.20	9.00	9.00	0.00	
7,400.00	42.35	359.09	7,242.28	-754.40	-266.59	-752.89	9.00	9.00	0.00	
7,463.50	48.07	359.09	7,287.00	-709.35	-267.31	-707.85	9.00	9.00	0.00	
Sharon Springs										
7,500.00	51.35	359.09	7,310.60	-681.52	-267.75	-680.01	9.00	9.00	0.00	
7,550.00	55.85	359.09	7,340.26	-641.29	-268.39	-639.78	9.00	9.00	0.00	
DLS = 9°/100'										
7,594.64	59.87	359.09	7,364.00	-603.49	-268.99	-601.98	9.00	9.00	0.00	
Niobrara										
7,600.00	60.35	359.09	7,366.67	-598.85	-269.06	-597.34	9.00	9.00	0.00	
7,700.00	69.35	359.09	7,409.12	-508.43	-270.49	-506.91	9.00	9.00	0.00	
7,750.39	73.89	359.09	7,425.00	-460.63	-271.25	-459.10	9.00	9.00	0.00	
Nio B										
7,800.00	78.35	359.09	7,436.89	-412.49	-272.01	-410.96	9.00	9.00	0.00	
7,900.00	87.35	359.09	7,449.32	-313.38	-273.58	-311.84	9.00	9.00	0.00	
7,931.00	90.14	359.09	7,450.00	-282.39	-274.08	-280.86	9.00	9.00	0.00	
End Build @ 7931.00ft - Top of Production										
8,000.00	90.14	359.09	7,449.82	-213.40	-275.17	-211.86	0.00	0.00	0.00	
8,100.00	90.14	359.09	7,449.57	-113.41	-276.75	-111.87	0.00	0.00	0.00	
8,200.00	90.14	359.09	7,449.32	-13.43	-278.34	-11.87	0.00	0.00	0.00	
8,300.00	90.14	359.09	7,449.07	86.56	-279.92	88.12	0.00	0.00	0.00	
8,400.00	90.14	359.09	7,448.81	186.55	-281.51	188.12	0.00	0.00	0.00	
8,500.00	90.14	359.09	7,448.56	286.53	-283.09	288.11	0.00	0.00	0.00	
8,600.00	90.14	359.09	7,448.31	386.52	-284.68	388.11	0.00	0.00	0.00	
8,700.00	90.14	359.09	7,448.06	486.51	-286.26	488.10	0.00	0.00	0.00	
8,800.00	90.14	359.09	7,447.80	586.50	-287.85	588.09	0.00	0.00	0.00	
8,900.00	90.14	359.09	7,447.55	686.48	-289.43	688.09	0.00	0.00	0.00	
9,000.00	90.14	359.09	7,447.30	786.47	-291.02	788.08	0.00	0.00	0.00	
9,100.00	90.14	359.09	7,447.05	886.46	-292.60	888.08	0.00	0.00	0.00	
9,200.00	90.14	359.09	7,446.79	986.44	-294.19	988.07	0.00	0.00	0.00	
9,300.00	90.14	359.09	7,446.54	1,086.43	-295.77	1,088.07	0.00	0.00	0.00	
9,400.00	90.14	359.09	7,446.29	1,186.42	-297.36	1,188.06	0.00	0.00	0.00	
9,500.00	90.14	359.09	7,446.04	1,286.41	-298.94	1,288.06	0.00	0.00	0.00	
9,600.00	90.14	359.09	7,445.78	1,386.39	-300.53	1,388.05	0.00	0.00	0.00	
9,700.00	90.14	359.09	7,445.53	1,486.38	-302.11	1,488.04	0.00	0.00	0.00	
9,800.00	90.14	359.09	7,445.28	1,586.37	-303.70	1,588.04	0.00	0.00	0.00	
9,900.00	90.14	359.09	7,445.03	1,686.35	-305.28	1,688.03	0.00	0.00	0.00	
10,000.00	90.14	359.09	7,444.77	1,786.34	-306.87	1,788.03	0.00	0.00	0.00	
10,100.00	90.14	359.09	7,444.52	1,886.33	-308.45	1,888.02	0.00	0.00	0.00	
10,200.00	90.14	359.09	7,444.27	1,986.32	-310.04	1,988.02	0.00	0.00	0.00	
10,300.00	90.14	359.09	7,444.02	2,086.30	-311.62	2,088.01	0.00	0.00	0.00	

Planned Survey										
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)	
10,400.00	90.14	359.09	7,443.76	2,186.29	-313.21	2,188.01	0.00	0.00	0.00	
10,500.00	90.14	359.09	7,443.51	2,286.28	-314.79	2,288.00	0.00	0.00	0.00	
10,600.00	90.14	359.09	7,443.26	2,386.26	-316.38	2,387.99	0.00	0.00	0.00	
10,700.00	90.14	359.09	7,443.01	2,486.25	-317.96	2,487.99	0.00	0.00	0.00	
10,800.00	90.14	359.09	7,442.75	2,586.24	-319.54	2,587.98	0.00	0.00	0.00	
10,900.00	90.14	359.09	7,442.50	2,686.23	-321.13	2,687.98	0.00	0.00	0.00	
11,000.00	90.14	359.09	7,442.25	2,786.21	-322.71	2,787.97	0.00	0.00	0.00	
11,100.00	90.14	359.09	7,442.00	2,886.20	-324.30	2,887.97	0.00	0.00	0.00	
11,200.00	90.14	359.09	7,441.75	2,986.19	-325.88	2,987.96	0.00	0.00	0.00	
11,300.00	90.14	359.09	7,441.49	3,086.17	-327.47	3,087.96	0.00	0.00	0.00	
11,400.00	90.14	359.09	7,441.24	3,186.16	-329.05	3,187.95	0.00	0.00	0.00	
11,500.00	90.14	359.09	7,440.99	3,286.15	-330.64	3,287.94	0.00	0.00	0.00	
11,600.00	90.14	359.09	7,440.74	3,386.14	-332.22	3,387.94	0.00	0.00	0.00	
11,700.00	90.14	359.09	7,440.48	3,486.12	-333.81	3,487.93	0.00	0.00	0.00	
11,800.00	90.14	359.09	7,440.23	3,586.11	-335.39	3,587.93	0.00	0.00	0.00	
11,900.00	90.14	359.09	7,439.98	3,686.10	-336.98	3,687.92	0.00	0.00	0.00	
12,000.00	90.14	359.09	7,439.73	3,786.08	-338.56	3,787.92	0.00	0.00	0.00	
12,100.00	90.14	359.09	7,439.47	3,886.07	-340.15	3,887.91	0.00	0.00	0.00	
12,200.00	90.14	359.09	7,439.22	3,986.06	-341.73	3,987.90	0.00	0.00	0.00	
12,300.00	90.14	359.09	7,438.97	4,086.05	-343.32	4,087.90	0.00	0.00	0.00	
12,400.00	90.14	359.09	7,438.72	4,186.03	-344.90	4,187.89	0.00	0.00	0.00	
12,500.00	90.14	359.09	7,438.46	4,286.02	-346.49	4,287.89	0.00	0.00	0.00	
12,600.00	90.14	359.09	7,438.21	4,386.01	-348.07	4,387.88	0.00	0.00	0.00	
12,700.00	90.14	359.09	7,437.96	4,485.99	-349.66	4,487.88	0.00	0.00	0.00	
12,800.00	90.14	359.09	7,437.71	4,585.98	-351.24	4,587.87	0.00	0.00	0.00	
12,900.00	90.14	359.09	7,437.45	4,685.97	-352.83	4,687.87	0.00	0.00	0.00	
13,000.00	90.14	359.09	7,437.20	4,785.96	-354.41	4,787.86	0.00	0.00	0.00	
13,100.00	90.14	359.09	7,436.95	4,885.94	-356.00	4,887.85	0.00	0.00	0.00	
13,200.00	90.14	359.09	7,436.70	4,985.93	-357.58	4,987.85	0.00	0.00	0.00	
13,300.00	90.14	359.09	7,436.44	5,085.92	-359.17	5,087.84	0.00	0.00	0.00	
13,400.00	90.14	359.09	7,436.19	5,185.90	-360.75	5,187.84	0.00	0.00	0.00	
13,500.00	90.14	359.09	7,435.94	5,285.89	-362.34	5,287.83	0.00	0.00	0.00	
13,600.00	90.14	359.09	7,435.69	5,385.88	-363.92	5,387.83	0.00	0.00	0.00	
13,700.00	90.14	359.09	7,435.43	5,485.87	-365.51	5,487.82	0.00	0.00	0.00	
13,800.00	90.14	359.09	7,435.18	5,585.85	-367.09	5,587.82	0.00	0.00	0.00	
13,900.00	90.14	359.09	7,434.93	5,685.84	-368.67	5,687.81	0.00	0.00	0.00	
14,000.00	90.14	359.09	7,434.68	5,785.83	-370.26	5,787.80	0.00	0.00	0.00	
14,100.00	90.14	359.09	7,434.43	5,885.81	-371.84	5,887.80	0.00	0.00	0.00	
14,200.00	90.14	359.09	7,434.17	5,985.80	-373.43	5,987.79	0.00	0.00	0.00	
14,300.00	90.14	359.09	7,433.92	6,085.79	-375.01	6,087.79	0.00	0.00	0.00	
14,400.00	90.14	359.09	7,433.67	6,185.78	-376.60	6,187.78	0.00	0.00	0.00	
14,500.00	90.14	359.09	7,433.42	6,285.76	-378.18	6,287.78	0.00	0.00	0.00	
14,600.00	90.14	359.09	7,433.16	6,385.75	-379.77	6,387.77	0.00	0.00	0.00	
14,700.00	90.14	359.09	7,432.91	6,485.74	-381.35	6,487.77	0.00	0.00	0.00	
14,800.00	90.14	359.09	7,432.66	6,585.72	-382.94	6,587.76	0.00	0.00	0.00	
14,900.00	90.14	359.09	7,432.41	6,685.71	-384.52	6,687.75	0.00	0.00	0.00	
15,000.00	90.14	359.09	7,432.15	6,785.70	-386.11	6,787.75	0.00	0.00	0.00	
15,100.00	90.14	359.09	7,431.90	6,885.69	-387.69	6,887.74	0.00	0.00	0.00	
15,200.00	90.14	359.09	7,431.65	6,985.67	-389.28	6,987.74	0.00	0.00	0.00	
15,300.00	90.14	359.09	7,431.40	7,085.66	-390.86	7,087.73	0.00	0.00	0.00	
15,400.00	90.14	359.09	7,431.14	7,185.65	-392.45	7,187.73	0.00	0.00	0.00	
15,500.00	90.14	359.09	7,430.89	7,285.63	-394.03	7,287.72	0.00	0.00	0.00	
15,600.00	90.14	359.09	7,430.64	7,385.62	-395.62	7,387.72	0.00	0.00	0.00	
15,700.00	90.14	359.09	7,430.39	7,485.61	-397.20	7,487.71	0.00	0.00	0.00	
15,800.00	90.14	359.09	7,430.13	7,585.59	-398.79	7,587.70	0.00	0.00	0.00	
15,900.00	90.14	359.09	7,429.88	7,685.58	-400.37	7,687.70	0.00	0.00	0.00	
16,000.00	90.14	359.09	7,429.63	7,785.57	-401.96	7,787.69	0.00	0.00	0.00	
16,100.00	90.14	359.09	7,429.38	7,885.56	-403.54	7,887.69	0.00	0.00	0.00	
16,200.00	90.14	359.09	7,429.12	7,985.54	-405.13	7,987.68	0.00	0.00	0.00	
16,300.00	90.14	359.09	7,428.87	8,085.53	-406.71	8,087.68	0.00	0.00	0.00	
16,400.00	90.14	359.09	7,428.62	8,185.52	-408.30	8,187.67	0.00	0.00	0.00	
16,500.00	90.14	359.09	7,428.37	8,285.50	-409.88	8,287.66	0.00	0.00	0.00	
16,600.00	90.14	359.09	7,428.11	8,385.49	-411.47	8,387.66	0.00	0.00	0.00	
16,700.00	90.14	359.09	7,427.86	8,485.48	-413.05	8,487.65	0.00	0.00	0.00	
16,800.00	90.14	359.09	7,427.61	8,585.47	-414.64	8,587.65	0.00	0.00	0.00	
16,900.00	90.14	359.09	7,427.36	8,685.45	-416.22	8,687.64	0.00	0.00	0.00	

Planned Survey									
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)
17,000.00	90.14	359.09	7,427.11	8,785.44	-417.80	8,787.64	0.00	0.00	0.00
17,100.00	90.14	359.09	7,426.85	8,885.43	-419.39	8,887.63	0.00	0.00	0.00
17,200.00	90.14	359.09	7,426.60	8,985.41	-420.97	8,987.63	0.00	0.00	0.00
17,300.00	90.14	359.09	7,426.35	9,085.40	-422.56	9,087.62	0.00	0.00	0.00
17,400.00	90.14	359.09	7,426.10	9,185.39	-424.14	9,187.61	0.00	0.00	0.00
17,500.00	90.14	359.09	7,425.84	9,285.38	-425.73	9,287.61	0.00	0.00	0.00
17,600.00	90.14	359.09	7,425.59	9,385.36	-427.31	9,387.60	0.00	0.00	0.00
17,700.00	90.14	359.09	7,425.34	9,485.35	-428.90	9,487.60	0.00	0.00	0.00
17,800.00	90.14	359.09	7,425.09	9,585.34	-430.48	9,587.59	0.00	0.00	0.00
17,900.00	90.14	359.09	7,424.83	9,685.32	-432.07	9,687.59	0.00	0.00	0.00
18,000.00	90.14	359.09	7,424.58	9,785.31	-433.65	9,787.58	0.00	0.00	0.00
18,100.00	90.14	359.09	7,424.33	9,885.30	-435.24	9,887.58	0.00	0.00	0.00
18,200.00	90.14	359.09	7,424.08	9,985.29	-436.82	9,987.57	0.00	0.00	0.00
18,300.00	90.14	359.09	7,423.82	10,085.27	-438.41	10,087.56	0.00	0.00	0.00
18,400.00	90.14	359.09	7,423.57	10,185.26	-439.99	10,187.56	0.00	0.00	0.00
18,400.46	90.14	359.09	7,423.57	10,185.72	-440.00	10,188.02	0.00	0.00	0.00
Turn to BHL @ 18400.46ft									
18,500.00	90.14	0.59	7,423.32	10,285.26	-440.28	10,287.56	1.50	0.00	1.50
18,590.00	90.14	1.94	7,423.09	10,375.23	-438.30	10,377.52	1.50	0.00	1.50
End Turn @ 18590.00ft									
18,600.00	90.14	1.94	7,423.07	10,385.23	-437.96	10,387.51	0.00	0.00	0.00
18,700.00	90.14	1.94	7,422.81	10,485.17	-434.59	10,487.43	0.00	0.00	0.00
18,800.00	90.14	1.94	7,422.56	10,585.11	-431.21	10,587.36	0.00	0.00	0.00
18,900.00	90.14	1.94	7,422.31	10,685.05	-427.83	10,687.28	0.00	0.00	0.00
19,000.00	90.14	1.94	7,422.06	10,785.00	-424.46	10,787.20	0.00	0.00	0.00
19,100.00	90.14	1.94	7,421.80	10,884.94	-421.08	10,887.12	0.00	0.00	0.00
19,200.00	90.14	1.94	7,421.55	10,984.88	-417.70	10,987.04	0.00	0.00	0.00
19,300.00	90.14	1.94	7,421.30	11,084.83	-414.33	11,086.97	0.00	0.00	0.00
19,400.00	90.14	1.94	7,421.05	11,184.77	-410.95	11,186.89	0.00	0.00	0.00
19,500.00	90.14	1.94	7,420.79	11,284.71	-407.57	11,286.81	0.00	0.00	0.00
19,600.00	90.14	1.94	7,420.54	11,384.65	-404.20	11,386.73	0.00	0.00	0.00
19,700.00	90.14	1.94	7,420.29	11,484.60	-400.82	11,486.66	0.00	0.00	0.00
19,800.00	90.14	1.94	7,420.04	11,584.54	-397.44	11,586.58	0.00	0.00	0.00
19,900.00	90.14	1.94	7,419.78	11,684.48	-394.07	11,686.50	0.00	0.00	0.00
20,000.00	90.14	1.94	7,419.53	11,784.42	-390.69	11,786.42	0.00	0.00	0.00
20,100.00	90.14	1.94	7,419.28	11,884.37	-387.31	11,886.34	0.00	0.00	0.00
20,200.00	90.14	1.94	7,419.03	11,984.31	-383.94	11,986.27	0.00	0.00	0.00
20,300.00	90.14	1.94	7,418.77	12,084.25	-380.56	12,086.19	0.00	0.00	0.00
20,400.00	90.14	1.94	7,418.52	12,184.19	-377.19	12,186.11	0.00	0.00	0.00
20,500.00	90.14	1.94	7,418.27	12,284.14	-373.81	12,286.03	0.00	0.00	0.00
20,600.00	90.14	1.94	7,418.02	12,384.08	-370.43	12,385.96	0.00	0.00	0.00
20,700.00	90.14	1.94	7,417.76	12,484.02	-367.06	12,485.88	0.00	0.00	0.00
20,800.00	90.14	1.94	7,417.51	12,583.97	-363.68	12,585.80	0.00	0.00	0.00
20,900.00	90.14	1.94	7,417.26	12,683.91	-360.30	12,685.72	0.00	0.00	0.00
21,000.00	90.14	1.94	7,417.01	12,783.85	-356.93	12,785.64	0.00	0.00	0.00
21,100.00	90.14	1.94	7,416.75	12,883.79	-353.55	12,885.57	0.00	0.00	0.00
21,200.00	90.14	1.94	7,416.50	12,983.74	-350.17	12,985.49	0.00	0.00	0.00
21,300.00	90.14	1.94	7,416.25	13,083.68	-346.80	13,085.41	0.00	0.00	0.00
21,398.20	90.14	1.94	7,416.00	13,181.82	-343.48	13,183.53	0.00	0.00	0.00
TD Well @ 21398.20ft									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
1,520.60	1,500.00	9 5/8" Csg	9-5/8	13-1/2	
7,931.00	7,450.00	Top of Production	5-1/2	7-7/8	



Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,243.15	1,232.00	Fox Hills				
4,337.74	4,224.00	Parkman				
4,724.99	4,609.00	Sussex				
7,463.50	7,287.00	Sharon Springs				
7,594.64	7,364.00	Niobrara				
7,750.39	7,425.00	Nio B				

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft	
1,250.00	1,238.62	-125.11	-35.88	End Nudge @ 1250.00ft	
4,070.00	3,962.53	-826.71	-237.05	Begin Drop @ 4070.00ft	
4,820.00	4,703.99	-920.54	-263.96	End Drop @ 4820.00ft	
6,929.39	6,813.38	-920.54	-263.96	KOP @ 6929.39ft	
7,550.00	7,340.26	-641.29	-268.39	DLS = 9°/100'	
7,931.00	7,450.00	-282.39	-274.08	End Build @ 7931.00ft	
18,400.46	7,423.57	10,185.72	-440.00	Turn to BHL @ 18400.46ft	
18,590.00	7,423.09	10,375.23	-438.30	End Turn @ 18590.00ft	
21,398.20	7,416.00	13,181.82	-343.48	TD Well @ 21398.20ft	