

# **US ROCKIES WATTENBERG PLANNING**

**WELD-NAD83-UTMFT13N**

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

**COWBOY 21-6HZ**

## **Plan A**

### **Plan: Permit Rev-2**

SHL Lat/Long: 40.124675/-104.889253

Survey Program: MWD+IFR+MSA

## **Standard Planning Report**

**12 December, 2017**

Project: WELD-NAD83-UTMFT13N  
Site: 2N-67W-21 COWBOY 24-21HZ PAD  
Well: COWBOY 21-6HZ  
Wellbore: Plan A  
Design: Permit Rev-2

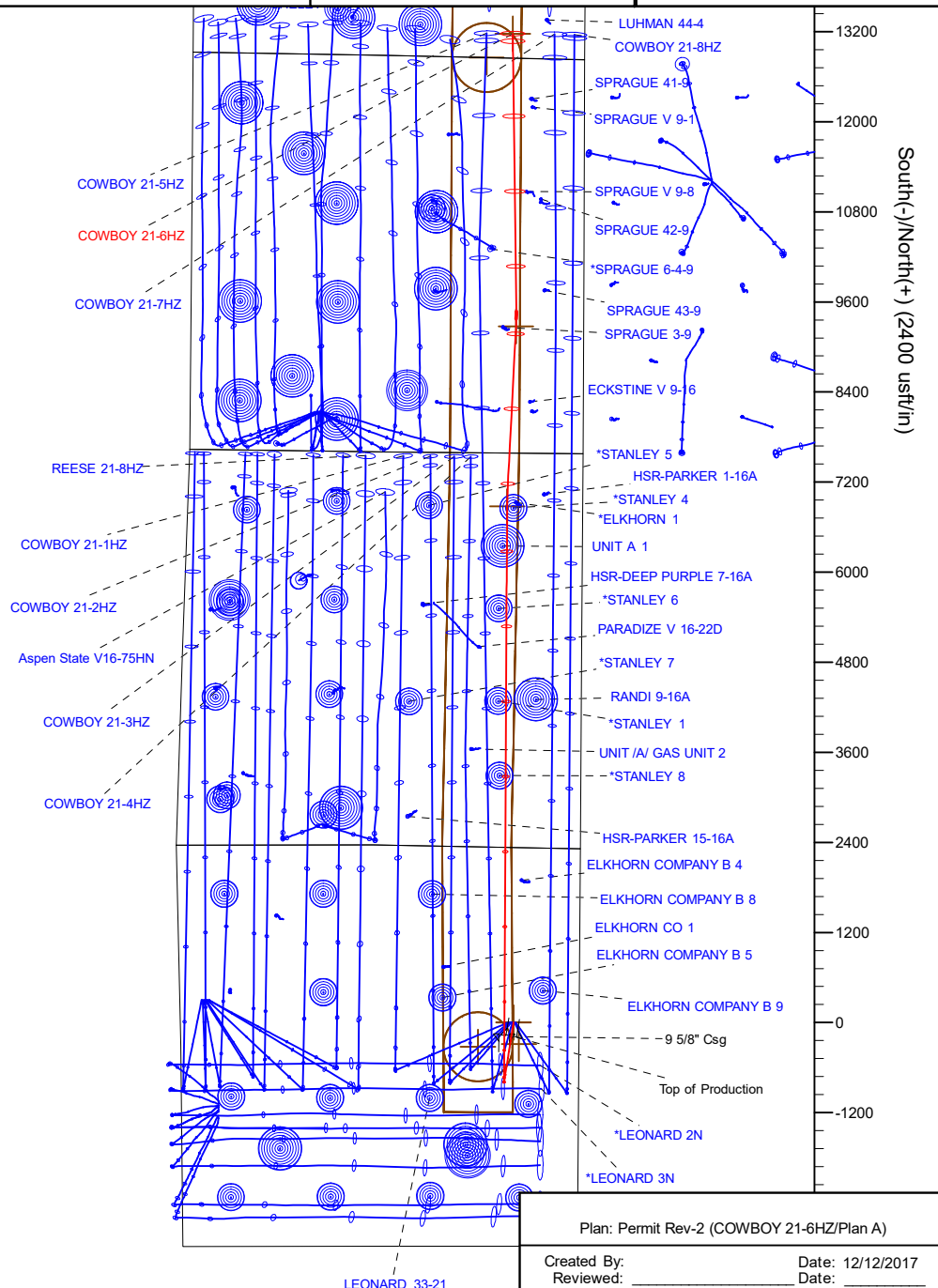
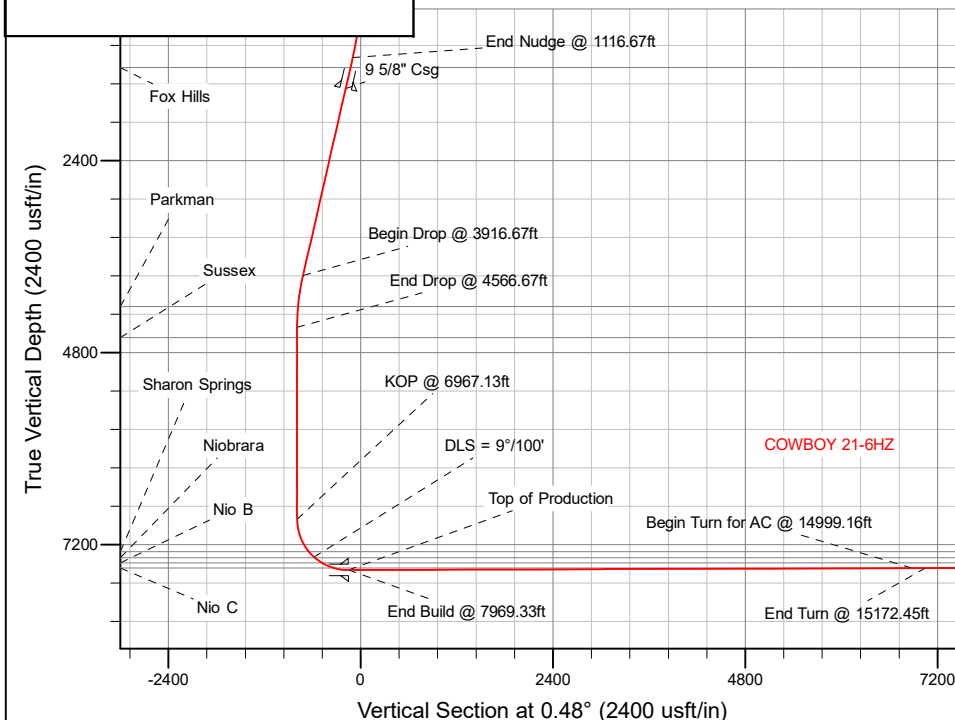
# US ROCKIES WATTENBERG PLANNING

CASING DETAILS			WELL DETAILS: COWBOY 21-6HZ  GL = 5041'  RKB = 17' @ 5058.00usft (Drilling Rig)
TVD	MD	Size	
1500.00 7519.00	1517.70 7969.33	9-5/8 5-1/2	

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	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1116.67	13.00	189.00	1109.25	-96.69	-15.31	1.50	189.00	-96.82	
4	3916.67	13.00	189.00	3837.49	-718.80	-113.85	0.00	0.00	-719.73	
5	4566.67	0.00	0.00	4481.93	-791.32	-125.33	2.00	180.00	-792.35	
6	6967.13	0.00	0.00	6882.39	-791.32	-125.33	0.00	0.00	-792.35	
7	7969.33	90.20	0.30	7519.00	-152.52	-121.95	9.00	0.30	-153.53	
8	14999.16	90.20	0.30	7494.74	6877.18	-84.74	0.00	0.00	6876.23	COWBOY 21-6HZ_tgt
9	15172.45	90.20	2.90	7494.14	7050.38	-79.89	1.50	90.00	7049.47	
10	17401.84	90.20	2.90	7486.46	9276.90	33.00	0.00	0.00	9276.85	COWBOY 21-6HZ_tgt2
11	17644.02	90.20	359.27	7485.62	9518.99	37.59	1.50	-89.99	9518.97	
12	21300.79	90.20	359.27	7473.00	13175.44	-9.00	0.00	0.00	13174.91	COWBOY 21-6HZ_BHL

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
COWBOY 21-6HZ_SHL	0.00	0.00	0.00	40.124675	-104.889253
COWBOY 21-6HZ_BHL	7473.00	13175.44	-9.00	40.160856	-104.889285

FORMATION TOP DETAILS			SHL 2334' FNL 871' FEL	HEEL 2495' FNL 990' FEL	TOE 325' FSL 955' FEL
TVDPath	MDPath	Formation			
1232.00	1242.65	Fox Hills			
4224.00	4308.39	Parkman			
4609.00	4693.74	Sussex			
7289.00	7408.19	Sharon Springs			
7366.00	7516.40	Niobrara			
7427.00	7620.60	Nio B			
7495.00	7791.75	Nio C			



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 21-6HZ		
Well Position	+N/-S	-0.36 usft	Northing:
	+E/-W	74.92 usft	Easting:
Position Uncertainty	3.28 usft		Wellhead Elevation:
			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	52,292.76373162

Design	Permit Rev-2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	7,473.00	0.00	0.00	0.48

Plan Survey Tool Program	Date	12/12/2017		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	1,500.00	Permit Rev-2 (Plan A)	APC_ISCWSA REV 2 MWD+II
				Fixed:v2:crustal field declination
2	1,500.00	21,300.79	Permit Rev-2 (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	
1,116.67	13.00	189.00	1,109.25	-96.69	-15.31	1.50	1.50	0.00	189.00	
3,916.67	13.00	189.00	3,837.49	-718.80	-113.85	0.00	0.00	0.00	0.00	
4,566.67	0.00	0.00	4,481.93	-791.32	-125.33	2.00	-2.00	0.00	180.00	
6,967.13	0.00	0.00	6,882.39	-791.32	-125.33	0.00	0.00	0.00	0.00	
7,969.33	90.20	0.30	7,519.00	-152.52	-121.95	9.00	9.00	0.03	0.30	
14,999.16	90.20	0.30	7,494.74	6,877.18	-84.74	0.00	0.00	0.00	0.00	COWBOY 21-6HZ_tg
15,172.45	90.20	2.90	7,494.14	7,050.38	-79.89	1.50	0.00	1.50	90.00	
17,401.84	90.20	2.90	7,486.46	9,276.90	33.00	0.00	0.00	0.00	0.00	COWBOY 21-6HZ_tg
17,644.02	90.20	359.27	7,485.62	9,518.99	37.59	1.50	0.00	-1.50	-89.99	
21,300.79	90.20	359.27	7,473.00	13,175.44	-9.00	0.00	0.00	0.00	0.00	COWBOY 21-6HZ_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	189.00	300.00	-0.32	-0.05	-0.32	1.50	1.50	0.00	
400.00	2.25	189.00	399.96	-2.91	-0.46	-2.91	1.50	1.50	0.00	
500.00	3.75	189.00	499.82	-8.08	-1.28	-8.09	1.50	1.50	0.00	
600.00	5.25	189.00	599.51	-15.83	-2.51	-15.85	1.50	1.50	0.00	
700.00	6.75	189.00	698.96	-26.15	-4.14	-26.18	1.50	1.50	0.00	
800.00	8.25	189.00	798.10	-39.04	-6.18	-39.09	1.50	1.50	0.00	
900.00	9.75	189.00	896.87	-54.49	-8.63	-54.56	1.50	1.50	0.00	
1,000.00	11.25	189.00	995.19	-72.49	-11.48	-72.58	1.50	1.50	0.00	
1,100.00	12.75	189.00	1,093.00	-93.03	-14.73	-93.15	1.50	1.50	0.00	
1,116.67	13.00	189.00	1,109.25	-96.69	-15.31	-96.82	1.50	1.50	0.00	
End Nudge @ 1116.67ft										
1,200.00	13.00	189.00	1,190.45	-115.21	-18.25	-115.36	0.00	0.00	0.00	
1,242.65	13.00	189.00	1,232.00	-124.68	-19.75	-124.85	0.00	0.00	0.00	
Fox Hills										
1,300.00	13.00	189.00	1,287.88	-137.43	-21.77	-137.60	0.00	0.00	0.00	
1,400.00	13.00	189.00	1,385.32	-159.65	-25.29	-159.85	0.00	0.00	0.00	
1,500.00	13.00	189.00	1,482.76	-181.86	-28.80	-182.10	0.00	0.00	0.00	
1,517.70	13.00	189.00	1,500.00	-185.79	-29.43	-186.03	0.00	0.00	0.00	
9 5/8" Csg										
1,600.00	13.00	189.00	1,580.20	-204.08	-32.32	-204.35	0.00	0.00	0.00	
1,700.00	13.00	189.00	1,677.63	-226.30	-35.84	-226.59	0.00	0.00	0.00	
1,800.00	13.00	189.00	1,775.07	-248.52	-39.36	-248.84	0.00	0.00	0.00	
1,900.00	13.00	189.00	1,872.51	-270.74	-42.88	-271.09	0.00	0.00	0.00	
2,000.00	13.00	189.00	1,969.94	-292.95	-46.40	-293.33	0.00	0.00	0.00	
2,100.00	13.00	189.00	2,067.38	-315.17	-49.92	-315.58	0.00	0.00	0.00	
2,200.00	13.00	189.00	2,164.82	-337.39	-53.44	-337.83	0.00	0.00	0.00	
2,300.00	13.00	189.00	2,262.25	-359.61	-56.96	-360.07	0.00	0.00	0.00	
2,400.00	13.00	189.00	2,359.69	-381.83	-60.48	-382.32	0.00	0.00	0.00	
2,500.00	13.00	189.00	2,457.13	-404.04	-63.99	-404.57	0.00	0.00	0.00	
2,600.00	13.00	189.00	2,554.57	-426.26	-67.51	-426.81	0.00	0.00	0.00	
2,700.00	13.00	189.00	2,652.00	-448.48	-71.03	-449.06	0.00	0.00	0.00	
2,800.00	13.00	189.00	2,749.44	-470.70	-74.55	-471.31	0.00	0.00	0.00	
2,900.00	13.00	189.00	2,846.88	-492.92	-78.07	-493.55	0.00	0.00	0.00	
3,000.00	13.00	189.00	2,944.31	-515.14	-81.59	-515.80	0.00	0.00	0.00	
3,100.00	13.00	189.00	3,041.75	-537.35	-85.11	-538.05	0.00	0.00	0.00	
3,200.00	13.00	189.00	3,139.19	-559.57	-88.63	-560.29	0.00	0.00	0.00	
3,300.00	13.00	189.00	3,236.62	-581.79	-92.15	-582.54	0.00	0.00	0.00	
3,400.00	13.00	189.00	3,334.06	-604.01	-95.67	-604.79	0.00	0.00	0.00	
3,500.00	13.00	189.00	3,431.50	-626.23	-99.18	-627.04	0.00	0.00	0.00	
3,600.00	13.00	189.00	3,528.94	-648.44	-102.70	-649.28	0.00	0.00	0.00	
3,700.00	13.00	189.00	3,626.37	-670.66	-106.22	-671.53	0.00	0.00	0.00	
3,800.00	13.00	189.00	3,723.81	-692.88	-109.74	-693.78	0.00	0.00	0.00	
3,900.00	13.00	189.00	3,821.25	-715.10	-113.26	-716.02	0.00	0.00	0.00	
3,916.67	13.00	189.00	3,837.49	-718.80	-113.85	-719.73	0.00	0.00	0.00	
Begin Drop @ 3916.67ft										
4,000.00	11.33	189.00	3,918.94	-736.15	-116.59	-737.10	2.00	-2.00	0.00	
4,100.00	9.33	189.00	4,017.32	-753.86	-119.40	-754.84	2.00	-2.00	0.00	
4,200.00	7.33	189.00	4,116.26	-768.18	-121.67	-769.17	2.00	-2.00	0.00	
4,300.00	5.33	189.00	4,215.64	-779.07	-123.39	-780.08	2.00	-2.00	0.00	
4,308.39	5.17	189.00	4,224.00	-779.83	-123.51	-780.84	2.00	-2.00	0.00	
Parkman										
4,400.00	3.33	189.00	4,315.35	-786.54	-124.58	-787.55	2.00	-2.00	0.00	
4,500.00	1.33	189.00	4,415.26	-790.56	-125.21	-791.58	2.00	-2.00	0.00	
4,566.67	0.00	0.00	4,481.93	-791.32	-125.33	-792.35	2.00	-2.00	0.00	
End Drop @ 4566.67ft										
4,600.00	0.00	0.00	4,515.26	-791.32	-125.33	-792.35	0.00	0.00	0.00	
4,693.74	0.00	0.00	4,609.00	-791.32	-125.33	-792.35	0.00	0.00	0.00	
Sussex										
4,700.00	0.00	0.00	4,615.26	-791.32	-125.33	-792.35	0.00	0.00	0.00	
4,800.00	0.00	0.00	4,715.26	-791.32	-125.33	-792.35	0.00	0.00	0.00	
4,900.00	0.00	0.00	4,815.26	-791.32	-125.33	-792.35	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	4,915.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,100.00	0.00	0.00	5,015.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,200.00	0.00	0.00	5,115.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,300.00	0.00	0.00	5,215.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,400.00	0.00	0.00	5,315.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,500.00	0.00	0.00	5,415.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,600.00	0.00	0.00	5,515.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,700.00	0.00	0.00	5,615.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,800.00	0.00	0.00	5,715.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
5,900.00	0.00	0.00	5,815.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,000.00	0.00	0.00	5,915.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,100.00	0.00	0.00	6,015.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,200.00	0.00	0.00	6,115.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,300.00	0.00	0.00	6,215.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,400.00	0.00	0.00	6,315.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,500.00	0.00	0.00	6,415.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,600.00	0.00	0.00	6,515.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,700.00	0.00	0.00	6,615.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,800.00	0.00	0.00	6,715.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,900.00	0.00	0.00	6,815.26	-791.32	-125.33	-792.35	0.00	0.00	0.00
6,967.13	0.00	0.00	6,882.39	-791.32	-125.33	-792.35	0.00	0.00	0.00
KOP @ 6967.13ft									
7,000.00	2.96	0.30	6,915.24	-790.47	-125.33	-791.50	9.00	9.00	0.00
7,100.00	11.96	0.30	7,014.29	-777.51	-125.26	-778.53	9.00	9.00	0.00
7,200.00	20.96	0.30	7,110.10	-749.21	-125.11	-750.23	9.00	9.00	0.00
7,300.00	29.96	0.30	7,200.30	-706.27	-124.88	-707.29	9.00	9.00	0.00
7,400.00	38.96	0.30	7,282.66	-649.74	-124.58	-650.76	9.00	9.00	0.00
7,408.19	39.70	0.30	7,289.00	-644.55	-124.56	-645.57	9.00	9.00	0.00
Sharon Springs									
7,500.00	47.96	0.30	7,355.18	-581.03	-124.22	-582.05	9.00	9.00	0.00
DLS = 9°/100'									
7,516.40	49.43	0.30	7,366.00	-568.71	-124.15	-569.73	9.00	9.00	0.00
Niobrara									
7,600.00	56.96	0.30	7,416.05	-501.82	-123.80	-502.84	9.00	9.00	0.00
7,620.60	58.81	0.30	7,427.00	-484.38	-123.71	-485.39	9.00	9.00	0.00
Nio B									
7,700.00	65.96	0.30	7,463.78	-414.07	-123.34	-415.09	9.00	9.00	0.00
7,791.75	74.22	0.30	7,495.00	-327.88	-122.88	-328.90	9.00	9.00	0.00
Nio C									
7,800.00	74.96	0.30	7,497.19	-319.93	-122.84	-320.94	9.00	9.00	0.00
7,900.00	83.96	0.30	7,515.47	-221.72	-122.32	-222.73	9.00	9.00	0.00
7,969.33	90.20	0.30	7,519.00	-152.51	-121.95	-153.53	9.00	9.00	0.00
End Build @ 7969.33ft - Top of Production									
8,000.00	90.20	0.30	7,518.90	-121.84	-121.79	-122.86	0.00	0.00	0.00
8,100.00	90.20	0.30	7,518.55	-21.85	-121.26	-22.86	0.00	0.00	0.00
8,200.00	90.20	0.30	7,518.21	78.15	-120.73	77.14	0.00	0.00	0.00
8,300.00	90.20	0.30	7,517.86	178.15	-120.20	177.14	0.00	0.00	0.00
8,400.00	90.20	0.30	7,517.52	278.15	-119.67	277.14	0.00	0.00	0.00
8,500.00	90.20	0.30	7,517.17	378.15	-119.14	377.14	0.00	0.00	0.00
8,600.00	90.20	0.30	7,516.83	478.14	-118.61	477.13	0.00	0.00	0.00
8,700.00	90.20	0.30	7,516.48	578.14	-118.08	577.13	0.00	0.00	0.00
8,800.00	90.20	0.30	7,516.14	678.14	-117.55	677.13	0.00	0.00	0.00
8,900.00	90.20	0.30	7,515.79	778.14	-117.03	777.13	0.00	0.00	0.00
9,000.00	90.20	0.30	7,515.45	878.14	-116.50	877.13	0.00	0.00	0.00
9,100.00	90.20	0.30	7,515.10	978.14	-115.97	977.13	0.00	0.00	0.00
9,200.00	90.20	0.30	7,514.76	1,078.13	-115.44	1,077.13	0.00	0.00	0.00
9,300.00	90.20	0.30	7,514.41	1,178.13	-114.91	1,177.13	0.00	0.00	0.00
9,400.00	90.20	0.30	7,514.06	1,278.13	-114.38	1,277.13	0.00	0.00	0.00
9,500.00	90.20	0.30	7,513.72	1,378.13	-113.85	1,377.12	0.00	0.00	0.00
9,600.00	90.20	0.30	7,513.37	1,478.13	-113.32	1,477.12	0.00	0.00	0.00
9,700.00	90.20	0.30	7,513.03	1,578.12	-112.79	1,577.12	0.00	0.00	0.00
9,800.00	90.20	0.30	7,512.68	1,678.12	-112.26	1,677.12	0.00	0.00	0.00
9,900.00	90.20	0.30	7,512.34	1,778.12	-111.73	1,777.12	0.00	0.00	0.00
10,000.00	90.20	0.30	7,511.99	1,878.12	-111.20	1,877.12	0.00	0.00	0.00
10,100.00	90.20	0.30	7,511.65	1,978.12	-110.67	1,977.12	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)	
10,200.00	90.20	0.30	7,511.30	2,078.11	-110.14	2,077.12	0.00	0.00	0.00	
10,300.00	90.20	0.30	7,510.96	2,178.11	-109.61	2,177.12	0.00	0.00	0.00	
10,400.00	90.20	0.30	7,510.61	2,278.11	-109.09	2,277.12	0.00	0.00	0.00	
10,500.00	90.20	0.30	7,510.27	2,378.11	-108.56	2,377.11	0.00	0.00	0.00	
10,600.00	90.20	0.30	7,509.92	2,478.11	-108.03	2,477.11	0.00	0.00	0.00	
10,700.00	90.20	0.30	7,509.58	2,578.10	-107.50	2,577.11	0.00	0.00	0.00	
10,800.00	90.20	0.30	7,509.23	2,678.10	-106.97	2,677.11	0.00	0.00	0.00	
10,900.00	90.20	0.30	7,508.89	2,778.10	-106.44	2,777.11	0.00	0.00	0.00	
11,000.00	90.20	0.30	7,508.54	2,878.10	-105.91	2,877.11	0.00	0.00	0.00	
11,100.00	90.20	0.30	7,508.20	2,978.10	-105.38	2,977.11	0.00	0.00	0.00	
11,200.00	90.20	0.30	7,507.85	3,078.09	-104.85	3,077.11	0.00	0.00	0.00	
11,300.00	90.20	0.30	7,507.51	3,178.09	-104.32	3,177.11	0.00	0.00	0.00	
11,400.00	90.20	0.30	7,507.16	3,278.09	-103.79	3,277.10	0.00	0.00	0.00	
11,500.00	90.20	0.30	7,506.82	3,378.09	-103.26	3,377.10	0.00	0.00	0.00	
11,600.00	90.20	0.30	7,506.47	3,478.09	-102.73	3,477.10	0.00	0.00	0.00	
11,700.00	90.20	0.30	7,506.13	3,578.08	-102.20	3,577.10	0.00	0.00	0.00	
11,800.00	90.20	0.30	7,505.78	3,678.08	-101.67	3,677.10	0.00	0.00	0.00	
11,900.00	90.20	0.30	7,505.44	3,778.08	-101.15	3,777.10	0.00	0.00	0.00	
12,000.00	90.20	0.30	7,505.09	3,878.08	-100.62	3,877.10	0.00	0.00	0.00	
12,100.00	90.20	0.30	7,504.75	3,978.08	-100.09	3,977.10	0.00	0.00	0.00	
12,200.00	90.20	0.30	7,504.40	4,078.07	-99.56	4,077.10	0.00	0.00	0.00	
12,300.00	90.20	0.30	7,504.06	4,178.07	-99.03	4,177.09	0.00	0.00	0.00	
12,400.00	90.20	0.30	7,503.71	4,278.07	-98.50	4,277.09	0.00	0.00	0.00	
12,500.00	90.20	0.30	7,503.37	4,378.07	-97.97	4,377.09	0.00	0.00	0.00	
12,600.00	90.20	0.30	7,503.02	4,478.07	-97.44	4,477.09	0.00	0.00	0.00	
12,700.00	90.20	0.30	7,502.68	4,578.06	-96.91	4,577.09	0.00	0.00	0.00	
12,800.00	90.20	0.30	7,502.33	4,678.06	-96.38	4,677.09	0.00	0.00	0.00	
12,900.00	90.20	0.30	7,501.99	4,778.06	-95.85	4,777.09	0.00	0.00	0.00	
13,000.00	90.20	0.30	7,501.64	4,878.06	-95.32	4,877.09	0.00	0.00	0.00	
13,100.00	90.20	0.30	7,501.29	4,978.06	-94.79	4,977.09	0.00	0.00	0.00	
13,200.00	90.20	0.30	7,500.95	5,078.05	-94.26	5,077.09	0.00	0.00	0.00	
13,300.00	90.20	0.30	7,500.60	5,178.05	-93.73	5,177.08	0.00	0.00	0.00	
13,400.00	90.20	0.30	7,500.26	5,278.05	-93.21	5,277.08	0.00	0.00	0.00	
13,500.00	90.20	0.30	7,499.91	5,378.05	-92.68	5,377.08	0.00	0.00	0.00	
13,600.00	90.20	0.30	7,499.57	5,478.05	-92.15	5,477.08	0.00	0.00	0.00	
13,700.00	90.20	0.30	7,499.22	5,578.04	-91.62	5,577.08	0.00	0.00	0.00	
13,800.00	90.20	0.30	7,498.88	5,678.04	-91.09	5,677.08	0.00	0.00	0.00	
13,900.00	90.20	0.30	7,498.53	5,778.04	-90.56	5,777.08	0.00	0.00	0.00	
14,000.00	90.20	0.30	7,498.19	5,878.04	-90.03	5,877.08	0.00	0.00	0.00	
14,100.00	90.20	0.30	7,497.84	5,978.04	-89.50	5,977.08	0.00	0.00	0.00	
14,200.00	90.20	0.30	7,497.50	6,078.03	-88.97	6,077.07	0.00	0.00	0.00	
14,300.00	90.20	0.30	7,497.15	6,178.03	-88.44	6,177.07	0.00	0.00	0.00	
14,400.00	90.20	0.30	7,496.81	6,278.03	-87.91	6,277.07	0.00	0.00	0.00	
14,500.00	90.20	0.30	7,496.46	6,378.03	-87.38	6,377.07	0.00	0.00	0.00	
14,600.00	90.20	0.30	7,496.12	6,478.03	-86.85	6,477.07	0.00	0.00	0.00	
14,700.00	90.20	0.30	7,495.77	6,578.02	-86.32	6,577.07	0.00	0.00	0.00	
14,800.00	90.20	0.30	7,495.43	6,678.02	-85.79	6,677.07	0.00	0.00	0.00	
14,900.00	90.20	0.30	7,495.08	6,778.02	-85.26	6,777.07	0.00	0.00	0.00	
14,999.16	90.20	0.30	7,494.74	6,877.18	-84.74	6,876.23	0.00	0.00	0.00	
Begin Turn for AC @ 14999.16ft										
15,000.00	90.20	0.32	7,494.74	6,878.02	-84.74	6,877.07	1.50	0.00	1.50	
15,100.00	90.20	1.82	7,494.39	6,978.00	-82.88	6,977.06	1.50	0.00	1.50	
15,172.45	90.20	2.90	7,494.14	7,050.38	-79.89	7,049.47	1.50	0.00	1.50	
End Turn @ 15172.45ft										
15,200.00	90.20	2.90	7,494.05	7,077.90	-78.50	7,076.99	0.00	0.00	0.00	
15,300.00	90.20	2.90	7,493.70	7,177.77	-73.43	7,176.90	0.00	0.00	0.00	
15,400.00	90.20	2.90	7,493.36	7,277.64	-68.37	7,276.81	0.00	0.00	0.00	
15,500.00	90.20	2.90	7,493.01	7,377.51	-63.31	7,376.72	0.00	0.00	0.00	
15,600.00	90.20	2.90	7,492.67	7,477.38	-58.24	7,476.63	0.00	0.00	0.00	
15,700.00	90.20	2.90	7,492.32	7,577.25	-53.18	7,576.54	0.00	0.00	0.00	
15,800.00	90.20	2.90	7,491.98	7,677.12	-48.11	7,676.45	0.00	0.00	0.00	
15,900.00	90.20	2.90	7,491.64	7,777.00	-43.05	7,776.36	0.00	0.00	0.00	
16,000.00	90.20	2.90	7,491.29	7,876.87	-37.99	7,876.27	0.00	0.00	0.00	
16,100.00	90.20	2.90	7,490.95	7,976.74	-32.92	7,976.18	0.00	0.00	0.00	
16,200.00	90.20	2.90	7,490.60	8,076.61	-27.86	8,076.09	0.00	0.00	0.00	
16,300.00	90.20	2.90	7,490.26	8,176.48	-22.80	8,176.00	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)
16,400.00	90.20	2.90	7,489.91	8,276.35	-17.73	8,275.91	0.00	0.00	0.00
16,500.00	90.20	2.90	7,489.57	8,376.22	-12.67	8,375.82	0.00	0.00	0.00
16,600.00	90.20	2.90	7,489.22	8,476.09	-7.60	8,475.73	0.00	0.00	0.00
16,700.00	90.20	2.90	7,488.88	8,575.96	-2.54	8,575.64	0.00	0.00	0.00
16,800.00	90.20	2.90	7,488.53	8,675.84	2.52	8,675.55	0.00	0.00	0.00
16,900.00	90.20	2.90	7,488.19	8,775.71	7.59	8,775.46	0.00	0.00	0.00
17,000.00	90.20	2.90	7,487.84	8,875.58	12.65	8,875.37	0.00	0.00	0.00
17,100.00	90.20	2.90	7,487.50	8,975.45	17.72	8,975.28	0.00	0.00	0.00
17,200.00	90.20	2.90	7,487.16	9,075.32	22.78	9,075.19	0.00	0.00	0.00
17,300.00	90.20	2.90	7,486.81	9,175.19	27.84	9,175.10	0.00	0.00	0.00
17,400.00	90.20	2.90	7,486.47	9,275.06	32.91	9,275.01	0.00	0.00	0.00
17,401.84	90.20	2.90	7,486.46	9,276.90	33.00	9,276.85	0.00	0.00	0.00
Begin Turn to BHL @ 17401.84ft									
17,500.00	90.20	1.43	7,486.12	9,374.99	36.71	9,374.97	1.50	0.00	-1.50
17,600.00	90.20	359.93	7,485.78	9,474.98	37.90	9,474.96	1.50	0.00	-1.50
17,644.02	90.20	359.27	7,485.62	9,518.99	37.59	9,518.98	1.50	0.00	-1.50
End Turn @ 17644.02ft									
17,700.00	90.20	359.27	7,485.43	9,574.97	36.88	9,574.94	0.00	0.00	0.00
17,800.00	90.20	359.27	7,485.09	9,674.96	35.60	9,674.92	0.00	0.00	0.00
17,900.00	90.20	359.27	7,484.74	9,774.95	34.33	9,774.90	0.00	0.00	0.00
18,000.00	90.20	359.27	7,484.40	9,874.94	33.05	9,874.87	0.00	0.00	0.00
18,100.00	90.20	359.27	7,484.05	9,974.94	31.78	9,974.85	0.00	0.00	0.00
18,200.00	90.20	359.27	7,483.71	10,074.93	30.51	10,074.83	0.00	0.00	0.00
18,300.00	90.20	359.27	7,483.36	10,174.92	29.23	10,174.81	0.00	0.00	0.00
18,400.00	90.20	359.27	7,483.01	10,274.91	27.96	10,274.78	0.00	0.00	0.00
18,500.00	90.20	359.27	7,482.67	10,374.90	26.68	10,374.76	0.00	0.00	0.00
18,600.00	90.20	359.27	7,482.32	10,474.89	25.41	10,474.74	0.00	0.00	0.00
18,700.00	90.20	359.27	7,481.98	10,574.88	24.14	10,574.71	0.00	0.00	0.00
18,800.00	90.20	359.27	7,481.63	10,674.87	22.86	10,674.69	0.00	0.00	0.00
18,900.00	90.20	359.27	7,481.29	10,774.87	21.59	10,774.67	0.00	0.00	0.00
19,000.00	90.20	359.27	7,480.94	10,874.86	20.31	10,874.65	0.00	0.00	0.00
19,100.00	90.20	359.27	7,480.60	10,974.85	19.04	10,974.62	0.00	0.00	0.00
19,200.00	90.20	359.27	7,480.25	11,074.84	17.77	11,074.60	0.00	0.00	0.00
19,300.00	90.20	359.27	7,479.91	11,174.83	16.49	11,174.58	0.00	0.00	0.00
19,400.00	90.20	359.27	7,479.56	11,274.82	15.22	11,274.55	0.00	0.00	0.00
19,500.00	90.20	359.27	7,479.22	11,374.81	13.94	11,374.53	0.00	0.00	0.00
19,600.00	90.20	359.27	7,478.87	11,474.80	12.67	11,474.51	0.00	0.00	0.00
19,700.00	90.20	359.27	7,478.53	11,574.80	11.40	11,574.48	0.00	0.00	0.00
19,800.00	90.20	359.27	7,478.18	11,674.79	10.12	11,674.46	0.00	0.00	0.00
19,900.00	90.20	359.27	7,477.84	11,774.78	8.85	11,774.44	0.00	0.00	0.00
20,000.00	90.20	359.27	7,477.49	11,874.77	7.57	11,874.42	0.00	0.00	0.00
20,100.00	90.20	359.27	7,477.15	11,974.76	6.30	11,974.39	0.00	0.00	0.00
20,200.00	90.20	359.27	7,476.80	12,074.75	5.03	12,074.37	0.00	0.00	0.00
20,300.00	90.20	359.27	7,476.46	12,174.74	3.75	12,174.35	0.00	0.00	0.00
20,400.00	90.20	359.27	7,476.11	12,274.73	2.48	12,274.32	0.00	0.00	0.00
20,500.00	90.20	359.27	7,475.76	12,374.73	1.20	12,374.30	0.00	0.00	0.00
20,600.00	90.20	359.27	7,475.42	12,474.72	-0.07	12,474.28	0.00	0.00	0.00
20,700.00	90.20	359.27	7,475.07	12,574.71	-1.35	12,574.26	0.00	0.00	0.00
20,800.00	90.20	359.27	7,474.73	12,674.70	-2.62	12,674.23	0.00	0.00	0.00
20,900.00	90.20	359.27	7,474.38	12,774.69	-3.89	12,774.21	0.00	0.00	0.00
21,000.00	90.20	359.27	7,474.04	12,874.68	-5.17	12,874.19	0.00	0.00	0.00
21,100.00	90.20	359.27	7,473.69	12,974.67	-6.44	12,974.16	0.00	0.00	0.00
21,200.00	90.20	359.27	7,473.35	13,074.66	-7.72	13,074.14	0.00	0.00	0.00
21,300.00	90.20	359.27	7,473.00	13,174.66	-8.99	13,174.12	0.00	0.00	0.00
21,300.79	90.20	359.27	7,473.00	13,175.44	-9.00	13,174.91	0.00	0.00	0.00
TD Well @ 21300.79ft									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
1,517.70	1,500.00	9 5/8" Csg	9-5/8	13-1/2	
7,969.33	7,519.00	Top of Production	5-1/2	7-7/8	



Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,242.65	1,232.00	Fox Hills				
4,308.39	4,224.00	Parkman				
4,693.74	4,609.00	Sussex				
7,408.19	7,289.00	Sharon Springs				
7,516.40	7,366.00	Niobrara				
7,620.60	7,427.00	Nio B				
7,791.75	7,495.00	Nio C				

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	
1,116.67	1,109.25	-96.69	-15.31	End Nudge @ 1116.67ft	
3,916.67	3,837.49	-718.80	-113.85	Begin Drop @ 3916.67ft	
4,566.67	4,481.93	-791.32	-125.33	End Drop @ 4566.67ft	
6,967.13	6,882.39	-791.32	-125.33	KOP @ 6967.13ft	
7,500.00	7,355.18	-581.03	-124.22	DLS = 9°/100'	
7,969.33	7,519.00	-152.51	-121.95	End Build @ 7969.33ft	
14,999.16	7,494.74	6,877.18	-84.74	Begin Turn for AC @ 14999.16ft	
15,172.45	7,494.14	7,050.38	-79.89	End Turn @ 15172.45ft	
17,401.84	7,486.46	9,276.90	33.00	Begin Turn to BHL @ 17401.84ft	
17,644.02	7,485.62	9,518.99	37.59	End Turn @ 17644.02ft	
21,300.79	7,473.00	13,175.44	-9.00	TD Well @ 21300.79ft	