

US ROCKIES WATTENBERG PLANNING

**WELD-NAD83-UTMFT13N
2N-66W-23 HENDU 1-23HZ PAD
HENDU 23-12HZ**

Plan A

Plan: Permit Rev-1

SHL Lat/Long: 40.130221/-104.736485
Survey Program: MWD+IFR

Standard Planning Report

09 November, 2017

Project: WELD-NAD83-UTMFT13N
Site: 2N-66W-23 HENDU 1-23HZ PAD
Well: HENDU 23-12HZ
Wellbore: Plan A
Design: Permit Rev-1

US ROCKIES WATTENBERG PLANNING

CASING DETAILS

TVD	MD	Size
1500.00	1508.79	9-5/8
7339.00	7733.17	5-1/2

WELL DETAILS: HENDU 23-12HZ

GL = 5100'

RKB = 17' @ 5117.00usft (Drilling Rig)

SECTION DETAILS

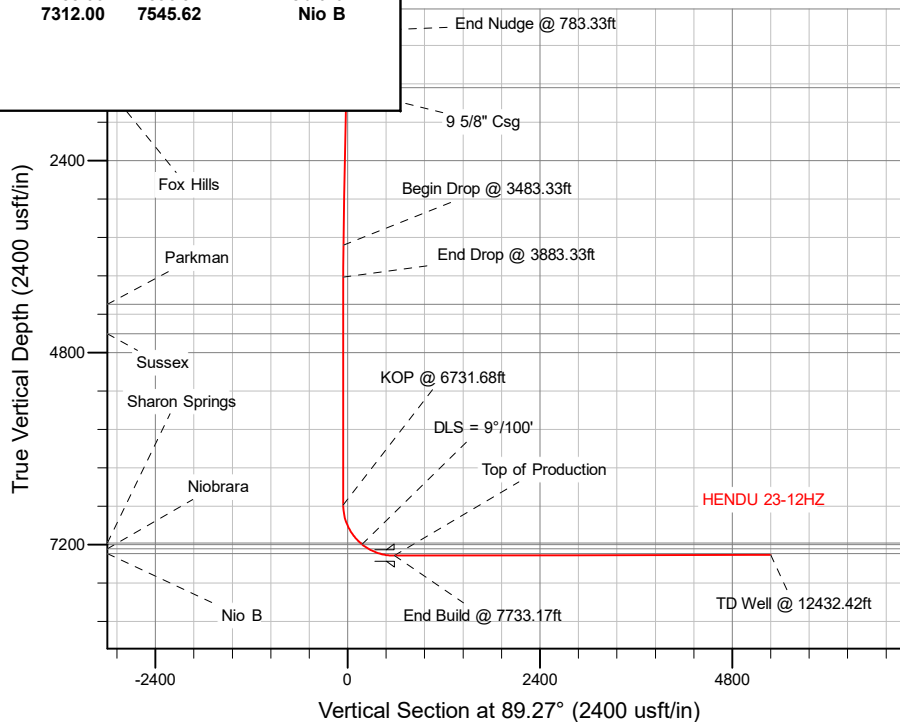
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	783.33	8.00	352.00	781.60	36.81	-5.17	1.50	352.00	-4.70	
4	3483.33	8.00	352.00	3455.33	408.92	-57.47	0.00	0.00	-52.26	
5	3883.33	0.00	0.00	3854.03	436.53	-61.35	2.00	180.00	-55.78	
6	6731.68	0.00	0.00	6702.38	436.53	-61.35	0.00	0.00	-55.78	
7	7733.17	90.13	89.27	7339.00	444.65	576.71	9.00	89.27	582.33	
8	12432.42	90.13	89.27	7328.00	504.45	5275.56	0.00	0.00	5281.56	HENDU 23-12HZ_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HENDU 23-12HZ_SHL	0.00	0.00	0.00	40.130221	-104.736485
HENDU 23-12HZ_BHL	7328.00	504.45	5275.56	40.131605	-104.717611

FORMATION TOP DETAILS

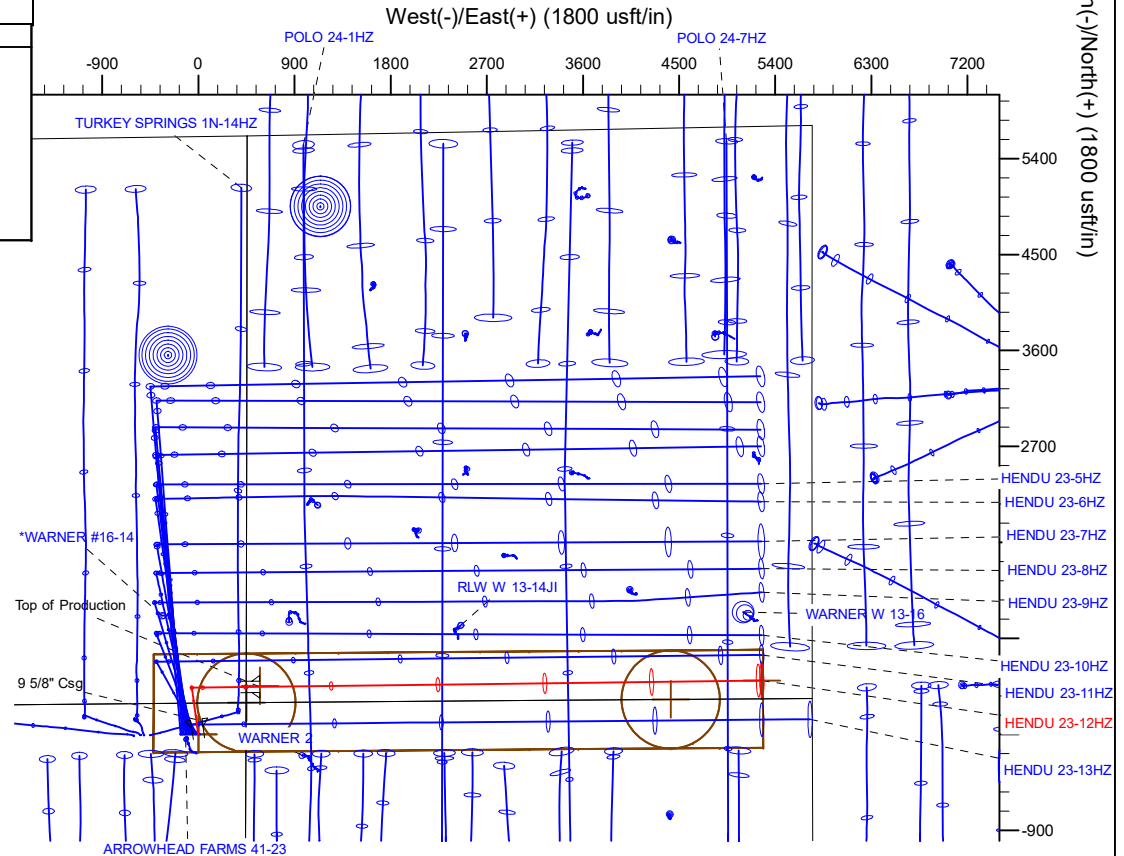
TVDPath	MDPath	Formation
1487.00	1495.66	Fox Hills
4197.00	4226.31	Parkman
4565.00	4594.31	Sussex
7183.00	7276.37	Sharon Springs
7253.00	7396.94	Niobrara
7312.00	7545.62	Nio B



SHL
293' FNL
449' FEL

HEEL
150' FSL
126' FWL

TOE
168' FSL
473' FEL



Plan: Permit Rev-1 (HENDU 23-12HZ/Plan A)

Created By: _____ Date: 11/10/2017
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-66W-23 HENDU 1-23HZ PAD		
Site Position:		Northing:	14,574,259.96 usft
From:	Lat/Long	Easting:	1,713,909.05 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Grid Convergence:	0.17 °

Well	HENDU 23-12HZ		
Well Position	+N/-S	1.46 usft	Northing:
	+E/-W	164.92 usft	Easting:
Position Uncertainty	3.28 usft	Wellhead Elevation:	
		Ground Level:	5,100.00 usft

Wellbore	Plan A				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/2/2017	7.97	66.61	52,318.77724153

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	89.27

Plan Survey Tool Program	Date	11/9/2017		
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	12,432.42	Permit Rev-1 (Plan A)	APC_ISCWSA REV 2 MWD+II
				Fixed:v2:crustal field declination

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	
783.33	8.00	352.00	781.60	36.81	-5.17	1.50	1.50	0.00	352.00	
3,483.33	8.00	352.00	3,455.33	408.92	-57.47	0.00	0.00	0.00	0.00	
3,883.33	0.00	0.00	3,854.03	436.53	-61.35	2.00	-2.00	0.00	180.00	
6,731.68	0.00	0.00	6,702.38	436.53	-61.35	0.00	0.00	0.00	0.00	
7,733.17	90.13	89.27	7,339.00	444.65	576.71	9.00	9.00	8.91	89.27	
12,432.42	90.13	89.27	7,328.00	504.45	5,275.56	0.00	0.00	0.00	0.00	HENDU 23-12HZ_BH

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	352.00	300.00	0.32	-0.05	-0.04	1.50	1.50	0.00
400.00	2.25	352.00	399.96	2.92	-0.41	-0.37	1.50	1.50	0.00
500.00	3.75	352.00	499.82	8.10	-1.14	-1.03	1.50	1.50	0.00
600.00	5.25	352.00	599.51	15.87	-2.23	-2.03	1.50	1.50	0.00
700.00	6.75	352.00	698.96	26.22	-3.68	-3.35	1.50	1.50	0.00
783.33	8.00	352.00	781.60	36.81	-5.17	-4.70	1.50	1.50	0.00
End Nudge @ 783.33ft									
800.00	8.00	352.00	798.11	39.11	-5.50	-5.00	0.00	0.00	0.00
900.00	8.00	352.00	897.13	52.89	-7.43	-6.76	0.00	0.00	0.00
1,000.00	8.00	352.00	996.16	66.67	-9.37	-8.52	0.00	0.00	0.00
1,100.00	8.00	352.00	1,095.19	80.45	-11.31	-10.28	0.00	0.00	0.00
1,200.00	8.00	352.00	1,194.21	94.24	-13.24	-12.04	0.00	0.00	0.00
1,300.00	8.00	352.00	1,293.24	108.02	-15.18	-13.80	0.00	0.00	0.00
1,400.00	8.00	352.00	1,392.27	121.80	-17.12	-15.56	0.00	0.00	0.00
1,495.66	8.00	352.00	1,487.00	134.98	-18.97	-17.25	0.00	0.00	0.00
Fox Hills									
1,500.00	8.00	352.00	1,491.29	135.58	-19.05	-17.33	0.00	0.00	0.00
1,508.79	8.00	352.00	1,500.00	136.79	-19.23	-17.48	0.00	0.00	0.00
9 5/8" Csg									
1,600.00	8.00	352.00	1,590.32	149.36	-20.99	-19.09	0.00	0.00	0.00
1,700.00	8.00	352.00	1,689.35	163.15	-22.93	-20.85	0.00	0.00	0.00
1,800.00	8.00	352.00	1,788.37	176.93	-24.87	-22.61	0.00	0.00	0.00
1,900.00	8.00	352.00	1,887.40	190.71	-26.80	-24.37	0.00	0.00	0.00
2,000.00	8.00	352.00	1,986.43	204.49	-28.74	-26.13	0.00	0.00	0.00
2,100.00	8.00	352.00	2,085.46	218.27	-30.68	-27.89	0.00	0.00	0.00
2,200.00	8.00	352.00	2,184.48	232.05	-32.61	-29.65	0.00	0.00	0.00
2,300.00	8.00	352.00	2,283.51	245.84	-34.55	-31.42	0.00	0.00	0.00
2,400.00	8.00	352.00	2,382.54	259.62	-36.49	-33.18	0.00	0.00	0.00
2,500.00	8.00	352.00	2,481.56	273.40	-38.42	-34.94	0.00	0.00	0.00
2,600.00	8.00	352.00	2,580.59	287.18	-40.36	-36.70	0.00	0.00	0.00
2,700.00	8.00	352.00	2,679.62	300.96	-42.30	-38.46	0.00	0.00	0.00
2,800.00	8.00	352.00	2,778.64	314.75	-44.23	-40.22	0.00	0.00	0.00
2,900.00	8.00	352.00	2,877.67	328.53	-46.17	-41.98	0.00	0.00	0.00
3,000.00	8.00	352.00	2,976.70	342.31	-48.11	-43.74	0.00	0.00	0.00
3,100.00	8.00	352.00	3,075.72	356.09	-50.05	-45.50	0.00	0.00	0.00
3,200.00	8.00	352.00	3,174.75	369.87	-51.98	-47.27	0.00	0.00	0.00
3,300.00	8.00	352.00	3,273.78	383.66	-53.92	-49.03	0.00	0.00	0.00
3,400.00	8.00	352.00	3,372.80	397.44	-55.86	-50.79	0.00	0.00	0.00
3,483.33	8.00	352.00	3,455.33	408.92	-57.47	-52.26	0.00	0.00	0.00
Begin Drop @ 3483.33ft									
3,500.00	7.67	352.00	3,471.84	411.17	-57.79	-52.54	2.00	-2.00	0.00
3,600.00	5.67	352.00	3,571.16	422.67	-59.40	-54.01	2.00	-2.00	0.00
3,700.00	3.67	352.00	3,670.82	430.72	-60.53	-55.04	2.00	-2.00	0.00
3,800.00	1.67	352.00	3,770.71	435.33	-61.18	-55.63	2.00	-2.00	0.00
3,883.33	0.00	0.00	3,854.03	436.53	-61.35	-55.78	2.00	-2.00	0.00
End Drop @ 3883.33ft									
3,900.00	0.00	0.00	3,870.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,000.00	0.00	0.00	3,970.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,100.00	0.00	0.00	4,070.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,200.00	0.00	0.00	4,170.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,226.31	0.00	0.00	4,197.00	436.53	-61.35	-55.78	0.00	0.00	0.00
Parkman									
4,300.00	0.00	0.00	4,270.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,400.00	0.00	0.00	4,370.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,500.00	0.00	0.00	4,470.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,594.31	0.00	0.00	4,565.00	436.53	-61.35	-55.78	0.00	0.00	0.00
Sussex									
4,600.00	0.00	0.00	4,570.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,700.00	0.00	0.00	4,670.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,800.00	0.00	0.00	4,770.69	436.53	-61.35	-55.78	0.00	0.00	0.00
4,900.00	0.00	0.00	4,870.69	436.53	-61.35	-55.78	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	4,970.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,100.00	0.00	0.00	5,070.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,200.00	0.00	0.00	5,170.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,300.00	0.00	0.00	5,270.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,400.00	0.00	0.00	5,370.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,470.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,600.00	0.00	0.00	5,570.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,670.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,770.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,870.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,000.00	0.00	0.00	5,970.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,100.00	0.00	0.00	6,070.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,200.00	0.00	0.00	6,170.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,300.00	0.00	0.00	6,270.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,370.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,500.00	0.00	0.00	6,470.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,570.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,670.69	436.53	-61.35	-55.78	0.00	0.00	0.00	
6,731.68	0.00	0.00	6,702.38	436.53	-61.35	-55.78	0.00	0.00	0.00	
KOP @ 6731.68ft										
6,800.00	6.15	89.27	6,770.56	436.58	-57.69	-52.12	9.00	9.00	0.00	
6,900.00	15.15	89.27	6,868.74	436.81	-39.23	-33.66	9.00	9.00	0.00	
7,000.00	24.15	89.27	6,962.82	437.24	-5.64	-0.07	9.00	9.00	0.00	
7,100.00	33.15	89.27	7,050.49	437.85	42.25	47.82	9.00	9.00	0.00	
7,200.00	42.15	89.27	7,129.58	438.63	103.26	108.84	9.00	9.00	0.00	
7,276.37	49.02	89.27	7,183.00	439.32	157.78	163.36	9.00	9.00	0.00	
Sharon Springs										
7,300.00	51.15	89.27	7,198.16	439.55	175.90	181.48	9.00	9.00	0.00	
DLS = 9°/100'										
7,396.94	59.87	89.27	7,253.00	440.57	255.71	261.31	9.00	9.00	0.00	
Niobrara										
7,400.00	60.15	89.27	7,254.53	440.60	258.36	263.96	9.00	9.00	0.00	
7,500.00	69.15	89.27	7,297.30	441.75	348.63	354.23	9.00	9.00	0.00	
7,545.62	73.25	89.27	7,312.00	442.30	391.81	397.41	9.00	9.00	0.00	
Nio B										
7,600.00	78.15	89.27	7,325.43	442.97	444.48	450.09	9.00	9.00	0.00	
7,700.00	87.15	89.27	7,338.21	444.23	543.55	549.17	9.00	9.00	0.00	
7,733.17	90.13	89.27	7,339.00	444.65	576.70	582.32	9.00	9.00	0.00	
End Build @ 7733.17ft - Top of Production										
7,800.00	90.13	89.27	7,338.84	445.50	643.53	649.15	0.00	0.00	0.00	
7,900.00	90.13	89.27	7,338.61	446.77	743.52	749.15	0.00	0.00	0.00	
8,000.00	90.13	89.27	7,338.37	448.05	843.51	849.15	0.00	0.00	0.00	
8,100.00	90.13	89.27	7,338.14	449.32	943.50	949.15	0.00	0.00	0.00	
8,200.00	90.13	89.27	7,337.90	450.59	1,043.50	1,049.15	0.00	0.00	0.00	
8,300.00	90.13	89.27	7,337.67	451.86	1,143.49	1,149.15	0.00	0.00	0.00	
8,400.00	90.13	89.27	7,337.44	453.14	1,243.48	1,249.15	0.00	0.00	0.00	
8,500.00	90.13	89.27	7,337.20	454.41	1,343.47	1,349.15	0.00	0.00	0.00	
8,600.00	90.13	89.27	7,336.97	455.68	1,443.46	1,449.15	0.00	0.00	0.00	
8,700.00	90.13	89.27	7,336.73	456.95	1,543.45	1,549.15	0.00	0.00	0.00	
8,800.00	90.13	89.27	7,336.50	458.23	1,643.45	1,649.15	0.00	0.00	0.00	
8,900.00	90.13	89.27	7,336.27	459.50	1,743.44	1,749.15	0.00	0.00	0.00	
9,000.00	90.13	89.27	7,336.03	460.77	1,843.43	1,849.15	0.00	0.00	0.00	
9,100.00	90.13	89.27	7,335.80	462.05	1,943.42	1,949.15	0.00	0.00	0.00	
9,200.00	90.13	89.27	7,335.56	463.32	2,043.41	2,049.15	0.00	0.00	0.00	
9,300.00	90.13	89.27	7,335.33	464.59	2,143.40	2,149.15	0.00	0.00	0.00	
9,400.00	90.13	89.27	7,335.10	465.86	2,243.39	2,249.15	0.00	0.00	0.00	
9,500.00	90.13	89.27	7,334.86	467.14	2,343.39	2,349.15	0.00	0.00	0.00	
9,600.00	90.13	89.27	7,334.63	468.41	2,443.38	2,449.15	0.00	0.00	0.00	
9,700.00	90.13	89.27	7,334.39	469.68	2,543.37	2,549.15	0.00	0.00	0.00	
9,800.00	90.13	89.27	7,334.16	470.95	2,643.36	2,649.15	0.00	0.00	0.00	
9,900.00	90.13	89.27	7,333.93	472.23	2,743.35	2,749.15	0.00	0.00	0.00	
10,000.00	90.13	89.27	7,333.69	473.50	2,843.34	2,849.15	0.00	0.00	0.00	
10,100.00	90.13	89.27	7,333.46	474.77	2,943.34	2,949.15	0.00	0.00	0.00	
10,200.00	90.13	89.27	7,333.22	476.04	3,043.33	3,049.15	0.00	0.00	0.00	
10,300.00	90.13	89.27	7,332.99	477.32	3,143.32	3,149.15	0.00	0.00	0.00	
10,400.00	90.13	89.27	7,332.76	478.59	3,243.31	3,249.15	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)	
10,500.00	90.13	89.27	7,332.52	479.86	3,343.30	3,349.15	0.00	0.00	0.00	
10,600.00	90.13	89.27	7,332.29	481.13	3,443.29	3,449.14	0.00	0.00	0.00	
10,700.00	90.13	89.27	7,332.05	482.41	3,543.29	3,549.14	0.00	0.00	0.00	
10,800.00	90.13	89.27	7,331.82	483.68	3,643.28	3,649.14	0.00	0.00	0.00	
10,900.00	90.13	89.27	7,331.59	484.95	3,743.27	3,749.14	0.00	0.00	0.00	
11,000.00	90.13	89.27	7,331.35	486.22	3,843.26	3,849.14	0.00	0.00	0.00	
11,100.00	90.13	89.27	7,331.12	487.50	3,943.25	3,949.14	0.00	0.00	0.00	
11,200.00	90.13	89.27	7,330.88	488.77	4,043.24	4,049.14	0.00	0.00	0.00	
11,300.00	90.13	89.27	7,330.65	490.04	4,143.24	4,149.14	0.00	0.00	0.00	
11,400.00	90.13	89.27	7,330.42	491.31	4,243.23	4,249.14	0.00	0.00	0.00	
11,500.00	90.13	89.27	7,330.18	492.59	4,343.22	4,349.14	0.00	0.00	0.00	
11,600.00	90.13	89.27	7,329.95	493.86	4,443.21	4,449.14	0.00	0.00	0.00	
11,700.00	90.13	89.27	7,329.71	495.13	4,543.20	4,549.14	0.00	0.00	0.00	
11,800.00	90.13	89.27	7,329.48	496.41	4,643.19	4,649.14	0.00	0.00	0.00	
11,900.00	90.13	89.27	7,329.25	497.68	4,743.19	4,749.14	0.00	0.00	0.00	
12,000.00	90.13	89.27	7,329.01	498.95	4,843.18	4,849.14	0.00	0.00	0.00	
12,100.00	90.13	89.27	7,328.78	500.22	4,943.17	4,949.14	0.00	0.00	0.00	
12,200.00	90.13	89.27	7,328.54	501.50	5,043.16	5,049.14	0.00	0.00	0.00	
12,300.00	90.13	89.27	7,328.31	502.77	5,143.15	5,149.14	0.00	0.00	0.00	
12,400.00	90.13	89.27	7,328.08	504.04	5,243.14	5,249.14	0.00	0.00	0.00	
12,432.42	90.13	89.27	7,328.00	504.45	5,275.56	5,281.56	0.00	0.00	0.00	
TD Well @ 12432.42ft										

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (")	Hole Diameter (")
1,508.79	1,500.00	9 5/8" Csg		9-5/8	13-1/2
7,733.17	7,339.00	Top of Production		5-1/2	7-7/8

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,495.66	1,487.00	Fox Hills				
4,226.31	4,197.00	Parkman				
4,594.31	4,565.00	Sussex				
7,276.37	7,183.00	Sharon Springs				
7,396.94	7,253.00	Niobrara				
7,545.62	7,312.00	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	
783.33	781.60	36.81	-5.17	End Nudge @ 783.33ft	
3,483.33	3,455.33	408.92	-57.47	Begin Drop @ 3483.33ft	
3,883.33	3,854.03	436.53	-61.35	End Drop @ 3883.33ft	
6,731.68	6,702.38	436.53	-61.35	KOP @ 6731.68ft	
7,300.00	7,198.16	439.55	175.90	DLS = 9°/100'	
7,733.17	7,339.00	444.65	576.70	End Build @ 7733.17ft	
12,432.42	7,328.00	504.45	5,275.56	TD Well @ 12432.42ft	