



Project: Niobrara CON'83
County: Weld
Site: Bringelson 20-9-58 Pad
Well: 16-20-9-58
Wellbore: 16-20-9-58 OH
Design: Plan #1

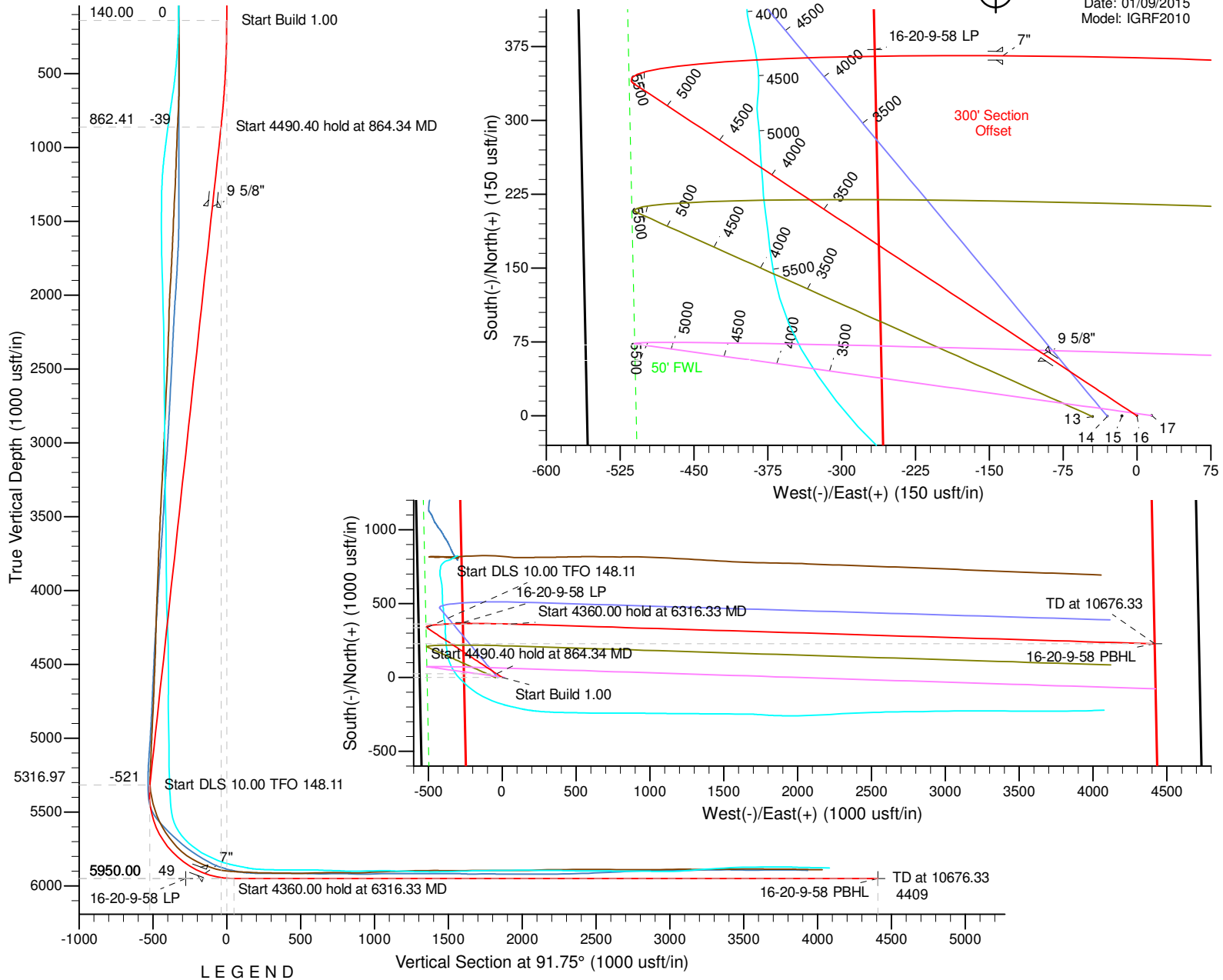


Azimuths to Grid North
True North: -1.04°
Magnetic North: 6.89°

Magnetic Field
Strength: 53017.7snT
Dip Angle: 67.33°
Date: 01/09/2015
Model: IGRF2010

CASING DETAILS

TVD	MD	Name	Size
1400.00	1406.25	9 5/8"	9-5/8
5915.36	6115.87	7"	7



LEGEND

- 1-20-11-9-58, 1-20-11-9-58 OH, 1-20-11-9-58 OH V0
- 3-20-11-9-58 OH, 3-20-11-9-58 OH, 3-20-11-9-58 OH V0
- 2-20-11-9-58, 2-20-11-9-58 OH, 2-20-11-9-58 OH V0
- 14-20-9-58, 14-20-9-58 OH, Plan #1 NS V0
- 13-20-9-58, 13-20-9-58 OH, Plan #1 NS V0
- 17-20-9-58, 17-20-9-58 OH, Plan #1 V0
- Plan #1

SLOTS

Slot Name	+N/-S	+E/-W	Northing	Easting
13	-0.79	-44.99	1515767.89	3444534.59
14	-0.53	-29.99	1515768.15	3444549.59
15	-0.26	-15.00	1515768.42	3444564.58
16	0.00	0.00	1515768.68	3444579.58
17	0.26	15.00	1515768.94	3444594.58

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
16-20-9-58 LP	5950.00	371.96	-266.28	1516140.64	3444313.30	40° 44' 21.004 N	103° 53' 47.653 W	Point
16-20-9-58 PBHL	5950.00	228.41	4418.00	1515997.09	3448997.55	40° 44' 18.744 N	103° 52' 46.844 W	Point

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	140.00	0.00	0.00	140.00	0.00	0.00	0.00	0.00	0.00		Start Build 1.00
3	864.34	7.24	303.44	862.41	25.19	-38.16	1.00	303.44	-38.91		Start 4490.40 hold at 864.34 MD
4	5354.74	7.24	303.44	5316.97	337.15	-510.63	0.00	0.00	-520.69		Start DLS 10.00 TFO 148.11
5	6316.33	90.00	91.75	5950.00	361.94	60.05	10.00	148.11	48.97		Start 4360.00 hold at 6316.33 MD
6	10676.33	90.00	91.75	5950.00	228.41	4418.00	0.00	0.00	4408.97	16-20-9-58 PBHL	TD at 10676.33

Titan Directional Drilling, LLC

Planning Report

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well 16-20-9-58 - Slot 16
Company:	Carrizo Oil & Gas, Inc.	TVD Reference:	WELL @ 4889.00usft (Original Well Elev)
Project:	Niobrara CON'83	MD Reference:	WELL @ 4889.00usft (Original Well Elev)
Site:	Bringelson 20-9-58 Pad	North Reference:	Grid
Well:	16-20-9-58	Survey Calculation Method:	Minimum Curvature
Wellbore:	16-20-9-58 OH		
Design:	Plan #1		

Project	Niobrara CON'83,		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site		Bringelson 20-9-58 Pad, Centered on 17-20-9-58			
Site Position:		Northing:	1,515,768.94 usft	Latitude:	40° 44' 17.281 N
From:	Map	Easting:	3,444,594.58 usft	Longitude:	103° 53' 44.087 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.04 °

Well	16-20-9-58 - Slot 16					
Well Position	+N/-S	-0.26 usft	Northing:	1,515,768.68 usft	Latitude:	40° 44' 17.282 N
	+E/-W	-15.00 usft	Easting:	3,444,579.58 usft	Longitude:	103° 53' 44.282 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	4,889.00 usft	Ground Level:	4,872.00 usft

Wellbore	16-20-9-58 OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	01/09/15	7.93	67.33	53,018

Design	Plan #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	91.75

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	
140.00	0.00	0.00	140.00	0.00	0.00	0.00	0.00	0.00	0.00	
864.34	7.24	303.44	862.41	25.19	-38.16	1.00	1.00	0.00	303.44	
5,354.74	7.24	303.44	5,316.97	337.15	-510.63	0.00	0.00	0.00	0.00	
6,316.33	90.00	91.76	5,950.00	361.94	60.05	10.00	8.61	15.42	148.11	
10,676.33	90.00	91.76	5,950.00	228.41	4,418.00	0.00	0.00	0.00	0.00	16-20-9-58 PBHL

Titan Directional Drilling, LLC

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Project:	Niobrara CON'83	MD Reference:	WELL @ 4889.00usft (Original Well Elev)
Site:	Bringelson 20-9-58 Pad	North Reference:	Grid
Well:	16-20-9-58	Survey Calculation Method:	Minimum Curvature
Wellbore:	16-20-9-58 OH		
Design:	Plan #1		

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
140.00	0.00	0.00	140.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.60	303.44	200.00	0.17	-0.26	-0.27	1.00	1.00	0.00
300.00	1.60	303.44	299.98	1.23	-1.86	-1.90	1.00	1.00	0.00
400.00	2.60	303.44	399.91	3.25	-4.92	-5.02	1.00	1.00	0.00
500.00	3.60	303.44	499.76	6.23	-9.43	-9.62	1.00	1.00	0.00
600.00	4.60	303.44	599.51	10.17	-15.40	-15.70	1.00	1.00	0.00
700.00	5.60	303.44	699.11	15.07	-22.82	-23.27	1.00	1.00	0.00
800.00	6.60	303.44	798.54	20.92	-31.69	-32.31	1.00	1.00	0.00
864.34	7.24	303.44	862.41	25.19	-38.16	-38.91	1.00	1.00	0.00
900.00	7.24	303.44	897.79	27.67	-41.91	-42.74	0.00	0.00	0.00
1,000.00	7.24	303.44	996.99	34.62	-52.43	-53.46	0.00	0.00	0.00
1,100.00	7.24	303.44	1,096.19	41.57	-62.95	-64.19	0.00	0.00	0.00
1,200.00	7.24	303.44	1,195.39	48.51	-73.48	-74.92	0.00	0.00	0.00
1,300.00	7.24	303.44	1,294.60	55.46	-84.00	-85.65	0.00	0.00	0.00
1,400.00	7.24	303.44	1,393.80	62.41	-94.52	-96.38	0.00	0.00	0.00
1,406.25	7.24	303.44	1,400.00	62.84	-95.18	-97.05	0.00	0.00	0.00
9 5/8"									
1,500.00	7.24	303.44	1,493.00	69.35	-105.04	-107.11	0.00	0.00	0.00
1,600.00	7.24	303.44	1,592.20	76.30	-115.56	-117.84	0.00	0.00	0.00
1,700.00	7.24	303.44	1,691.40	83.25	-126.08	-128.57	0.00	0.00	0.00
1,800.00	7.24	303.44	1,790.61	90.20	-136.61	-139.30	0.00	0.00	0.00
1,900.00	7.24	303.44	1,889.81	97.14	-147.13	-150.03	0.00	0.00	0.00
2,000.00	7.24	303.44	1,989.01	104.09	-157.65	-160.76	0.00	0.00	0.00
2,100.00	7.24	303.44	2,088.21	111.04	-168.17	-171.48	0.00	0.00	0.00
2,200.00	7.24	303.44	2,187.41	117.99	-178.69	-182.21	0.00	0.00	0.00
2,300.00	7.24	303.44	2,286.61	124.93	-189.22	-192.94	0.00	0.00	0.00
2,400.00	7.24	303.44	2,385.82	131.88	-199.74	-203.67	0.00	0.00	0.00
2,500.00	7.24	303.44	2,485.02	138.83	-210.26	-214.40	0.00	0.00	0.00
2,600.00	7.24	303.44	2,584.22	145.77	-220.78	-225.13	0.00	0.00	0.00
2,700.00	7.24	303.44	2,683.42	152.72	-231.30	-235.86	0.00	0.00	0.00
2,800.00	7.24	303.44	2,782.62	159.67	-241.83	-246.59	0.00	0.00	0.00
2,900.00	7.24	303.44	2,881.83	166.62	-252.35	-257.32	0.00	0.00	0.00
3,000.00	7.24	303.44	2,981.03	173.56	-262.87	-268.05	0.00	0.00	0.00
3,100.00	7.24	303.44	3,080.23	180.51	-273.39	-278.78	0.00	0.00	0.00
3,200.00	7.24	303.44	3,179.43	187.46	-283.91	-289.50	0.00	0.00	0.00
3,300.00	7.24	303.44	3,278.63	194.40	-294.43	-300.23	0.00	0.00	0.00
3,400.00	7.24	303.44	3,377.84	201.35	-304.96	-310.96	0.00	0.00	0.00
3,500.00	7.24	303.44	3,477.04	208.30	-315.48	-321.69	0.00	0.00	0.00
3,600.00	7.24	303.44	3,576.24	215.25	-326.00	-332.42	0.00	0.00	0.00
3,700.00	7.24	303.44	3,675.44	222.19	-336.52	-343.15	0.00	0.00	0.00
3,800.00	7.24	303.44	3,774.64	229.14	-347.04	-353.88	0.00	0.00	0.00
3,900.00	7.24	303.44	3,873.85	236.09	-357.57	-364.61	0.00	0.00	0.00
4,000.00	7.24	303.44	3,973.05	243.03	-368.09	-375.34	0.00	0.00	0.00
4,100.00	7.24	303.44	4,072.25	249.98	-378.61	-386.07	0.00	0.00	0.00
4,200.00	7.24	303.44	4,171.45	256.93	-389.13	-396.80	0.00	0.00	0.00
4,300.00	7.24	303.44	4,270.65	263.88	-399.65	-407.52	0.00	0.00	0.00
4,400.00	7.24	303.44	4,369.86	270.82	-410.17	-418.25	0.00	0.00	0.00
4,500.00	7.24	303.44	4,469.06	277.77	-420.70	-428.98	0.00	0.00	0.00
4,600.00	7.24	303.44	4,568.26	284.72	-431.22	-439.71	0.00	0.00	0.00
4,700.00	7.24	303.44	4,667.46	291.67	-441.74	-450.44	0.00	0.00	0.00
4,800.00	7.24	303.44	4,766.66	298.61	-452.26	-461.17	0.00	0.00	0.00
4,900.00	7.24	303.44	4,865.87	305.56	-462.78	-471.90	0.00	0.00	0.00
5,000.00	7.24	303.44	4,965.07	312.51	-473.31	-482.63	0.00	0.00	0.00

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Wellbore:	16-20-9-58 OH		
Design:	Plan #1		

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)
5,100.00	7.24	303.44	5,064.27	319.45	-483.83	-493.36	0.00	0.00	0.00
5,200.00	7.24	303.44	5,163.47	326.40	-494.35	-504.09	0.00	0.00	0.00
5,300.00	7.24	303.44	5,262.67	333.35	-504.87	-514.82	0.00	0.00	0.00
5,354.74	7.24	303.44	5,316.97	337.15	-510.63	-520.69	0.00	0.00	0.00
5,400.00	4.15	338.58	5,362.02	340.25	-513.61	-523.76	10.00	-6.83	77.64
5,450.00	5.09	43.21	5,411.89	343.55	-512.75	-523.01	10.00	1.87	129.26
5,500.00	9.19	67.39	5,461.50	346.71	-507.55	-517.90	10.00	8.20	48.37
5,550.00	13.89	76.10	5,510.48	349.69	-498.03	-508.47	10.00	9.40	17.41
5,600.00	18.75	80.41	5,558.45	352.47	-484.27	-494.81	10.00	9.71	8.63
5,650.00	23.66	82.99	5,605.05	355.03	-466.38	-477.00	10.00	9.83	5.16
5,700.00	28.60	84.72	5,649.93	357.36	-444.49	-455.20	10.00	9.88	3.46
5,750.00	33.56	85.98	5,692.74	359.43	-418.77	-429.55	10.00	9.92	2.51
5,800.00	38.53	86.95	5,733.16	361.23	-389.42	-400.27	10.00	9.94	1.93
5,850.00	43.50	87.72	5,770.87	362.75	-356.65	-367.56	10.00	9.95	1.55
5,900.00	48.48	88.37	5,805.60	363.96	-320.72	-331.69	10.00	9.96	1.29
5,950.00	53.46	88.92	5,837.08	364.88	-281.90	-292.91	10.00	9.96	1.11
6,000.00	58.45	89.41	5,865.06	365.48	-240.49	-251.54	10.00	9.97	0.97
6,050.00	63.43	89.84	5,889.34	365.76	-196.80	-207.88	10.00	9.97	0.87
6,100.00	68.42	90.24	5,909.73	365.72	-151.17	-162.26	10.00	9.97	0.80
6,115.87	70.00	90.36	5,915.37	365.64	-136.33	-147.43	10.00	9.97	0.76
7"									
6,150.00	73.40	90.62	5,926.08	365.37	-103.93	-115.04	10.00	9.98	0.74
6,200.00	78.39	90.97	5,938.26	364.69	-55.46	-66.57	10.00	9.98	0.71
6,250.00	83.38	91.31	5,946.17	363.71	-6.12	-17.22	10.00	9.98	0.68
6,300.00	88.37	91.65	5,949.77	362.42	43.72	32.63	10.00	9.98	0.67
6,316.33	90.00	91.76	5,950.00	361.94	60.05	48.97	10.00	9.98	0.67
6,400.00	90.00	91.76	5,950.00	359.38	143.67	132.63	0.00	0.00	0.00
6,500.00	90.00	91.76	5,950.00	356.31	243.63	232.63	0.00	0.00	0.00
6,600.00	90.00	91.76	5,950.00	353.25	343.58	332.63	0.00	0.00	0.00
6,700.00	90.00	91.76	5,950.00	350.19	443.53	432.63	0.00	0.00	0.00
6,800.00	90.00	91.76	5,950.00	347.13	543.49	532.63	0.00	0.00	0.00
6,900.00	90.00	91.76	5,950.00	344.06	643.44	632.63	0.00	0.00	0.00
7,000.00	90.00	91.76	5,950.00	341.00	743.39	732.63	0.00	0.00	0.00
7,100.00	90.00	91.76	5,950.00	337.94	843.35	832.63	0.00	0.00	0.00
7,200.00	90.00	91.76	5,950.00	334.88	943.30	932.63	0.00	0.00	0.00
7,300.00	90.00	91.76	5,950.00	331.81	1,043.25	1,032.63	0.00	0.00	0.00
7,400.00	90.00	91.76	5,950.00	328.75	1,143.20	1,132.63	0.00	0.00	0.00
7,500.00	90.00	91.76	5,950.00	325.69	1,243.16	1,232.63	0.00	0.00	0.00
7,600.00	90.00	91.76	5,950.00	322.63	1,343.11	1,332.63	0.00	0.00	0.00
7,700.00	90.00	91.76	5,950.00	319.56	1,443.06	1,432.63	0.00	0.00	0.00
7,800.00	90.00	91.76	5,950.00	316.50	1,543.02	1,532.63	0.00	0.00	0.00
7,900.00	90.00	91.76	5,950.00	313.44	1,642.97	1,632.63	0.00	0.00	0.00
8,000.00	90.00	91.76	5,950.00	310.38	1,742.92	1,732.63	0.00	0.00	0.00
8,100.00	90.00	91.76	5,950.00	307.31	1,842.88	1,832.63	0.00	0.00	0.00
8,200.00	90.00	91.76	5,950.00	304.25	1,942.83	1,932.63	0.00	0.00	0.00
8,300.00	90.00	91.76	5,950.00	301.19	2,042.78	2,032.63	0.00	0.00	0.00
8,400.00	90.00	91.76	5,950.00	298.13	2,142.74	2,132.63	0.00	0.00	0.00
8,500.00	90.00	91.76	5,950.00	295.06	2,242.69	2,232.63	0.00	0.00	0.00
8,600.00	90.00	91.76	5,950.00	292.00	2,342.64	2,332.63	0.00	0.00	0.00
8,700.00	90.00	91.76	5,950.00	288.94	2,442.60	2,432.63	0.00	0.00	0.00
8,800.00	90.00	91.76	5,950.00	285.88	2,542.55	2,532.63	0.00	0.00	0.00
8,900.00	90.00	91.76	5,950.00	282.81	2,642.50	2,632.63	0.00	0.00	0.00
9,000.00	90.00	91.76	5,950.00	279.75	2,742.45	2,732.63	0.00	0.00	0.00

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Wellbore:	16-20-9-58 OH		
Design:	Plan #1		

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)	
9,100.00	90.00	91.76	5,950.00	276.69	2,842.41	2,832.63	0.00	0.00	0.00	
9,200.00	90.00	91.76	5,950.00	273.63	2,942.36	2,932.63	0.00	0.00	0.00	
9,300.00	90.00	91.76	5,950.00	270.56	3,042.31	3,032.63	0.00	0.00	0.00	
9,400.00	90.00	91.76	5,950.00	267.50	3,142.27	3,132.63	0.00	0.00	0.00	
9,500.00	90.00	91.76	5,950.00	264.44	3,242.22	3,232.63	0.00	0.00	0.00	
9,600.00	90.00	91.76	5,950.00	261.38	3,342.17	3,332.63	0.00	0.00	0.00	
9,700.00	90.00	91.76	5,950.00	258.31	3,442.13	3,432.63	0.00	0.00	0.00	
9,800.00	90.00	91.76	5,950.00	255.25	3,542.08	3,532.63	0.00	0.00	0.00	
9,900.00	90.00	91.76	5,950.00	252.19	3,642.03	3,632.63	0.00	0.00	0.00	
10,000.00	90.00	91.76	5,950.00	249.12	3,741.99	3,732.63	0.00	0.00	0.00	
10,100.00	90.00	91.76	5,950.00	246.06	3,841.94	3,832.63	0.00	0.00	0.00	
10,200.00	90.00	91.76	5,950.00	243.00	3,941.89	3,932.63	0.00	0.00	0.00	
10,300.00	90.00	91.76	5,950.00	239.94	4,041.84	4,032.63	0.00	0.00	0.00	
10,400.00	90.00	91.76	5,950.00	236.87	4,141.80	4,132.63	0.00	0.00	0.00	
10,500.00	90.00	91.76	5,950.00	233.81	4,241.75	4,232.63	0.00	0.00	0.00	
10,600.00	90.00	91.76	5,950.00	230.75	4,341.70	4,332.63	0.00	0.00	0.00	
10,676.33	90.00	91.76	5,950.00	228.41	4,418.00	4,408.97	0.00	0.00	0.00	

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
16-20-9-58 PBHL	0.00	0.00	5,950.00	228.41	4,418.00	1,515,997.09	3,448,997.55	40° 44' 18.744 N	103° 52' 46.844 W	
- hit/miss target										
- Shape										
- plan hits target center										
- Point										
16-20-9-58 LP	0.00	0.00	5,950.00	371.96	-266.28	1,516,140.64	3,444,313.30	40° 44' 21.004 N	103° 53' 47.653 W	
- plan misses target center by 86.50usft at 6018.76usft MD (5874.62 TVD, 365.62 N, -224.35 E)										
- Point										

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
1,406.25	1,400.00	9 5/8"	9-5/8	12-1/4	
6,115.87	5,915.37	7"	7	8-3/4	