

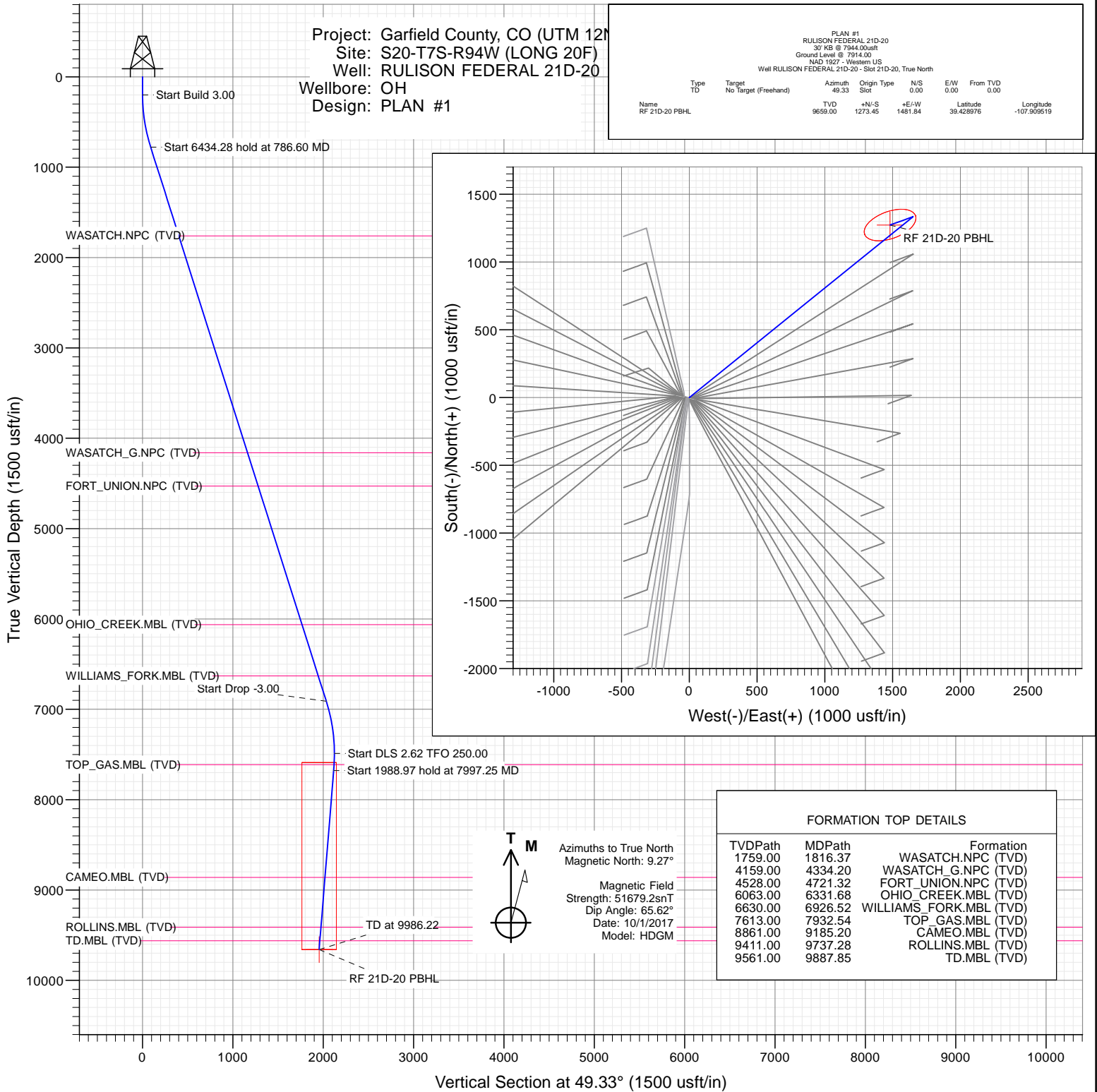


SECTION DETAILS

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	200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	
3	786.60	17.60	51.05	777.42	56.19	69.51	3.00	51.05	89.34	
4	7220.88	17.60	51.05	6910.58	1279.13	1582.33	0.00	0.00	2033.77	
5	7807.47	0.00	0.00	7488.00	1335.32	1651.84	3.00	180.00	2123.10	
6	7997.25	4.98	250.00	7677.54	1332.50	1644.09	2.62	250.00	2115.39	
7	9986.22	4.98	250.00	9659.00	1273.45	1481.84	0.00	0.00	1953.84	RF 21D-20 PBHL

Project: Garfield County, CO (UTM 12N)
Site: S20-T7S-R94W (LONG 20F)
Well: RULISON FEDERAL 21D-20
Wellbore: OH
Design: PLAN #1

PLAN #1 RULISON FEDERAL 21D-20 30' KB @ 7944.00usft Ground Level @ 7914.00 NAD 1927 - Western US Well RULISON FEDERAL 21D-20 - Slot 21D-20, True North									
Type	TD	Target	No Target (Freehand)	Azimuth	Origin Type	N/S	E/W	From TVD	
Name	RF 21D-20 PBHL			TVD					
				9659.00	1273.45	1481.84	Latitude	39.428976	Longitude -107.909519



WELL DETAILS: RULISON FEDERAL 21D-20

		7914.00			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	14331759.80	2511742.70	39.425482	-107.914762

21D-20

CATHEDRAL



Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well RULISON FEDERAL 21D-20 - Slot 21D-20
Company:	Caerus Oil & Gas	TVD Reference:	30' KB @ 7944.00usft
Project:	Garfield County, CO (UTM 12N)	MD Reference:	30' KB @ 7944.00usft
Site:	S20-T7S-R94W (LONG 20F)	North Reference:	True
Well:	RULISON FEDERAL 21D-20	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	PLAN #1		

Project	Garfield County, CO (UTM 12N)		
Map System:	Universal Transverse Mercator (US Survey Feet)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 - Western US		
Map Zone:	Zone 12N (114 W to 108 W)		

Site		S20-T7S-R94W (LONG 20F)			
Site Position:		Northing:	14,331,773.27 usft	Latitude:	39.425526
From:	Map	Easting:	2,511,668.92 usft	Longitude:	-107.915021
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.96 °

Well	RULISON FEDERAL 21D-20 - Slot 21D-20					
Well Position	+N/-S	0.00 usft	Northing:	14,331,759.80 usft	Latitude:	39.425482
	+E/-W	0.00 usft	Easting:	2,511,742.70 usft	Longitude:	-107.914762
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	7,914.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	10/1/2017	9.27	65.62	51,679.20000000

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	49.33

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	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
786.60	17.60	51.05	777.42	56.19	69.51	3.00	3.00	0.00	51.05	
7,220.88	17.60	51.05	6,910.58	1,279.13	1,582.33	0.00	0.00	0.00	0.00	
7,807.47	0.00	0.00	7,488.00	1,335.32	1,651.84	3.00	-3.00	0.00	180.00	
7,997.25	4.98	250.00	7,677.54	1,332.50	1,644.09	2.62	2.62	-57.96	250.00	
9,986.22	4.98	250.00	9,659.00	1,273.45	1,481.84	0.00	0.00	0.00	0.00	RF 21D-20 PBHL

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well RULISON FEDERAL 21D-20 - Slot 21D-20
Company:	Caerus Oil & Gas	TVD Reference:	30' KB @ 7944.00usft
Project:	Garfield County, CO (UTM 12N)	MD Reference:	30' KB @ 7944.00usft
Site:	S20-T7S-R94W (LONG 20F)	North Reference:	True
Well:	RULISON FEDERAL 21D-20	Survey Calculation Method:	Minimum Curvature
Wellbore:	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 (°/100u)	Comments / Formations
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	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	
300.00	3.00	51.05	299.95	1.65	2.04	2.62	3.00	3.00	
400.00	6.00	51.05	399.63	6.58	8.14	10.46	3.00	3.00	
500.00	9.00	51.05	498.77	14.78	18.29	23.50	3.00	3.00	
600.00	12.00	51.05	597.08	26.24	32.46	41.72	3.00	3.00	
700.00	15.00	51.05	694.31	40.91	50.61	65.05	3.00	3.00	
786.60	17.60	51.05	777.42	56.19	69.51	89.34	3.00	3.00	
800.00	17.60	51.05	790.19	58.74	72.66	93.39	0.00	0.00	
900.00	17.60	51.05	885.51	77.74	96.17	123.61	0.00	0.00	
1,000.00	17.60	51.05	980.83	96.75	119.68	153.83	0.00	0.00	
1,100.00	17.60	51.05	1,076.15	115.76	143.19	184.05	0.00	0.00	
1,200.00	17.60	51.05	1,171.47	134.76	166.71	214.27	0.00	0.00	
1,300.00	17.60	51.05	1,266.79	153.77	190.22	244.49	0.00	0.00	
1,400.00	17.60	51.05	1,362.11	172.78	213.73	274.71	0.00	0.00	
1,500.00	17.60	51.05	1,457.43	191.78	237.24	304.93	0.00	0.00	
1,600.00	17.60	51.05	1,552.75	210.79	260.75	335.15	0.00	0.00	
1,700.00	17.60	51.05	1,648.07	229.80	284.27	365.37	0.00	0.00	
1,800.00	17.60	51.05	1,743.39	248.80	307.78	395.59	0.00	0.00	
1,816.37	17.60	51.05	1,759.00	251.91	311.63	400.53	0.00	0.00	WASATCH.NPC (TVD)
1,900.00	17.60	51.05	1,838.72	267.81	331.29	425.81	0.00	0.00	
2,000.00	17.60	51.05	1,934.04	286.82	354.80	456.03	0.00	0.00	
2,100.00	17.60	51.05	2,029.36	305.82	378.31	486.25	0.00	0.00	
2,200.00	17.60	51.05	2,124.68	324.83	401.83	516.47	0.00	0.00	
2,300.00	17.60	51.05	2,220.00	343.84	425.34	546.69	0.00	0.00	
2,400.00	17.60	51.05	2,315.32	362.84	448.85	576.91	0.00	0.00	
2,500.00	17.60	51.05	2,410.64	381.85	472.36	607.13	0.00	0.00	
2,600.00	17.60	51.05	2,505.96	400.86	495.87	637.35	0.00	0.00	
2,700.00	17.60	51.05	2,601.28	419.86	519.39	667.57	0.00	0.00	
2,800.00	17.60	51.05	2,696.60	438.87	542.90	697.79	0.00	0.00	
2,900.00	17.60	51.05	2,791.92	457.88	566.41	728.00	0.00	0.00	
3,000.00	17.60	51.05	2,887.24	476.88	589.92	758.22	0.00	0.00	
3,100.00	17.60	51.05	2,982.56	495.89	613.43	788.44	0.00	0.00	
3,200.00	17.60	51.05	3,077.88	514.90	636.95	818.66	0.00	0.00	
3,300.00	17.60	51.05	3,173.20	533.90	660.46	848.88	0.00	0.00	
3,400.00	17.60	51.05	3,268.52	552.91	683.97	879.10	0.00	0.00	
3,500.00	17.60	51.05	3,363.84	571.92	707.48	909.32	0.00	0.00	
3,600.00	17.60	51.05	3,459.16	590.92	730.99	939.54	0.00	0.00	
3,700.00	17.60	51.05	3,554.48	609.93	754.51	969.76	0.00	0.00	
3,800.00	17.60	51.05	3,649.80	628.94	778.02	999.98	0.00	0.00	
3,900.00	17.60	51.05	3,745.12	647.94	801.53	1,030.20	0.00	0.00	
4,000.00	17.60	51.05	3,840.44	666.95	825.04	1,060.42	0.00	0.00	
4,100.00	17.60	51.05	3,935.76	685.96	848.55	1,090.64	0.00	0.00	
4,200.00	17.60	51.05	4,031.08	704.96	872.07	1,120.86	0.00	0.00	
4,300.00	17.60	51.05	4,126.40	723.97	895.58	1,151.08	0.00	0.00	
4,334.20	17.60	51.05	4,159.00	730.47	903.62	1,161.42	0.00	0.00	WASATCH_G.NPC (TVD)
4,400.00	17.60	51.05	4,221.72	742.98	919.09	1,181.30	0.00	0.00	
4,500.00	17.60	51.05	4,317.04	761.98	942.60	1,211.52	0.00	0.00	
4,600.00	17.60	51.05	4,412.36	780.99	966.11	1,241.74	0.00	0.00	
4,700.00	17.60	51.05	4,507.68	800.00	989.63	1,271.96	0.00	0.00	
4,721.32	17.60	51.05	4,528.00	804.05	994.64	1,278.40	0.00	0.00	FORT_UNION.NPC (TVD)

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well RULISON FEDERAL 21D-20 - Slot 21D-20
Company:	Caerus Oil & Gas	TVD Reference:	30' KB @ 7944.00usft
Project:	Garfield County, CO (UTM 12N)	MD Reference:	30' KB @ 7944.00usft
Site:	S20-T7S-R94W (LONG 20F)	North Reference:	True
Well:	RULISON FEDERAL 21D-20	Survey Calculation Method:	Minimum Curvature
Wellbore:	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 (°/100u)	Comments / Formations
4,800.00	17.60	51.05	4,603.00	819.00	1,013.14	1,302.18	0.00	0.00	
4,900.00	17.60	51.05	4,698.32	838.01	1,036.65	1,332.40	0.00	0.00	
5,000.00	17.60	51.05	4,793.64	857.02	1,060.16	1,362.62	0.00	0.00	
5,100.00	17.60	51.05	4,888.96	876.02	1,083.67	1,392.84	0.00	0.00	
5,200.00	17.60	51.05	4,984.28	895.03	1,107.19	1,423.06	0.00	0.00	
5,300.00	17.60	51.05	5,079.60	914.04	1,130.70	1,453.28	0.00	0.00	
5,400.00	17.60	51.05	5,174.92	933.04	1,154.21	1,483.50	0.00	0.00	
5,500.00	17.60	51.05	5,270.24	952.05	1,177.72	1,513.72	0.00	0.00	
5,600.00	17.60	51.05	5,365.56	971.06	1,201.23	1,543.94	0.00	0.00	
5,700.00	17.60	51.05	5,460.88	990.06	1,224.74	1,574.16	0.00	0.00	
5,800.00	17.60	51.05	5,556.20	1,009.07	1,248.26	1,604.38	0.00	0.00	
5,900.00	17.60	51.05	5,651.52	1,028.08	1,271.77	1,634.60	0.00	0.00	
6,000.00	17.60	51.05	5,746.84	1,047.08	1,295.28	1,664.82	0.00	0.00	
6,100.00	17.60	51.05	5,842.16	1,066.09	1,318.79	1,695.04	0.00	0.00	
6,200.00	17.60	51.05	5,937.48	1,085.10	1,342.30	1,725.26	0.00	0.00	
6,300.00	17.60	51.05	6,032.80	1,104.10	1,365.82	1,755.48	0.00	0.00	
6,331.68	17.60	51.05	6,063.00	1,110.12	1,373.27	1,765.05	0.00	0.00	OHIO_CREEK.MBL (TVD)
6,400.00	17.60	51.05	6,128.12	1,123.11	1,389.33	1,785.70	0.00	0.00	
6,500.00	17.60	51.05	6,223.44	1,142.12	1,412.84	1,815.92	0.00	0.00	
6,600.00	17.60	51.05	6,318.76	1,161.12	1,436.35	1,846.14	0.00	0.00	
6,700.00	17.60	51.05	6,414.08	1,180.13	1,459.86	1,876.36	0.00	0.00	
6,800.00	17.60	51.05	6,509.40	1,199.14	1,483.38	1,906.58	0.00	0.00	
6,900.00	17.60	51.05	6,604.72	1,218.14	1,506.89	1,936.80	0.00	0.00	
6,926.52	17.60	51.05	6,630.00	1,223.18	1,513.12	1,944.81	0.00	0.00	WILLIAMS_FORK.MBL (TVD)
7,000.00	17.60	51.05	6,700.04	1,237.15	1,530.40	1,967.02	0.00	0.00	
7,100.00	17.60	51.05	6,795.36	1,256.16	1,553.91	1,997.24	0.00	0.00	
7,200.00	17.60	51.05	6,890.68	1,275.16	1,577.42	2,027.46	0.00	0.00	
7,220.88	17.60	51.05	6,910.58	1,279.13	1,582.33	2,033.77	0.00	0.00	
7,300.00	15.22	51.05	6,986.48	1,293.18	1,599.72	2,056.11	3.00	-3.00	
7,400.00	12.22	51.05	7,083.61	1,308.10	1,618.16	2,079.82	3.00	-3.00	
7,500.00	9.22	51.05	7,181.85	1,319.79	1,632.63	2,098.42	3.00	-3.00	
7,600.00	6.22	51.05	7,280.94	1,328.24	1,643.08	2,111.85	3.00	-3.00	
7,700.00	3.22	51.05	7,380.58	1,333.42	1,649.49	2,120.08	3.00	-3.00	
7,800.00	0.22	51.05	7,480.53	1,335.31	1,651.83	2,123.09	3.00	-3.00	
7,807.47	0.00	0.00	7,488.00	1,335.32	1,651.84	2,123.10	3.00	-3.00	
7,900.00	2.43	250.00	7,580.50	1,334.65	1,650.00	2,121.27	2.62	2.62	
7,932.54	3.28	250.00	7,613.00	1,334.10	1,648.47	2,119.75	2.62	2.62	TOP_GAS.MBL (TVD)
7,997.25	4.98	250.00	7,677.54	1,332.50	1,644.09	2,115.39	2.62	2.62	
8,000.00	4.98	250.00	7,680.28	1,332.42	1,643.87	2,115.17	0.00	0.00	
8,100.00	4.98	250.00	7,779.90	1,329.45	1,635.71	2,107.05	0.00	0.00	
8,200.00	4.98	250.00	7,879.52	1,326.48	1,627.55	2,098.93	0.00	0.00	
8,300.00	4.98	250.00	7,979.15	1,323.51	1,619.40	2,090.80	0.00	0.00	
8,400.00	4.98	250.00	8,078.77	1,320.54	1,611.24	2,082.68	0.00	0.00	
8,500.00	4.98	250.00	8,178.39	1,317.57	1,603.08	2,074.56	0.00	0.00	
8,600.00	4.98	250.00	8,278.01	1,314.61	1,594.92	2,066.44	0.00	0.00	
8,700.00	4.98	250.00	8,377.64	1,311.64	1,586.76	2,058.31	0.00	0.00	
8,800.00	4.98	250.00	8,477.26	1,308.67	1,578.61	2,050.19	0.00	0.00	
8,900.00	4.98	250.00	8,576.88	1,305.70	1,570.45	2,042.07	0.00	0.00	
9,000.00	4.98	250.00	8,676.50	1,302.73	1,562.29	2,033.95	0.00	0.00	
9,100.00	4.98	250.00	8,776.13	1,299.76	1,554.13	2,025.83	0.00	0.00	
9,185.20	4.98	250.00	8,861.00	1,297.23	1,547.18	2,018.91	0.00	0.00	CAMEO.MBL (TVD)
9,200.00	4.98	250.00	8,875.75	1,296.79	1,545.97	2,017.70	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well RULISON FEDERAL 21D-20 - Slot 21D-20
Company:	Caerus Oil & Gas	TVD Reference:	30' KB @ 7944.00usft
Project:	Garfield County, CO (UTM 12N)	MD Reference:	30' KB @ 7944.00usft
Site:	S20-T7S-R94W (LONG 20F)	North Reference:	True
Well:	RULISON FEDERAL 21D-20	Survey Calculation Method:	Minimum Curvature
Wellbore:	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 (°/100u)	Comments / Formations
9,300.00	4.98	250.00	8,975.37	1,293.82	1,537.82	2,009.58	0.00	0.00	
9,400.00	4.98	250.00	9,074.99	1,290.85	1,529.66	2,001.46	0.00	0.00	
9,500.00	4.98	250.00	9,174.61	1,287.88	1,521.50	1,993.34	0.00	0.00	
9,600.00	4.98	250.00	9,274.24	1,284.92	1,513.34	1,985.21	0.00	0.00	
9,700.00	4.98	250.00	9,373.86	1,281.95	1,505.19	1,977.09	0.00	0.00	
9,737.28	4.98	250.00	9,411.00	1,280.84	1,502.14	1,974.06	0.00	0.00	ROLLINS.MBL (TVD)
9,800.00	4.98	250.00	9,473.48	1,278.98	1,497.03	1,968.97	0.00	0.00	
9,887.85	4.98	250.00	9,561.00	1,276.37	1,489.86	1,961.83	0.00	0.00	TD.MBL (TVD)
9,900.00	4.98	250.00	9,573.10	1,276.01	1,488.87	1,960.85	0.00	0.00	
9,986.22	4.98	250.00	9,659.00	1,273.45	1,481.84	1,953.84	0.00	0.00	

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
RF 21D-20 PBHL - plan hits target center - Ellipse (radii L200.00 W100.00 on 250.00 azi)	0.00	0.00	9,659.00	1,273.45	1,481.84	14,333,083.20	2,513,180.10	39.428976	-107.909519

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,816.37	1,759.00	WASATCH.NPC (TVD)			
4,334.20	4,159.00	WASATCH_G.NPC (TVD)			
4,721.32	4,528.00	FORT_UNION.NPC (TVD)			
6,331.68	6,063.00	OHIO_CREEK.MBL (TVD)			
6,926.52	6,630.00	WILLIAMS_FORK.MBL (TVD)			
7,932.54	7,613.00	TOP_GAS.MBL (TVD)			
9,185.20	8,861.00	CAMEO.MBL (TVD)			
9,737.28	9,411.00	ROLLINS.MBL (TVD)			
9,887.85	9,561.00	TD.MBL (TVD)			