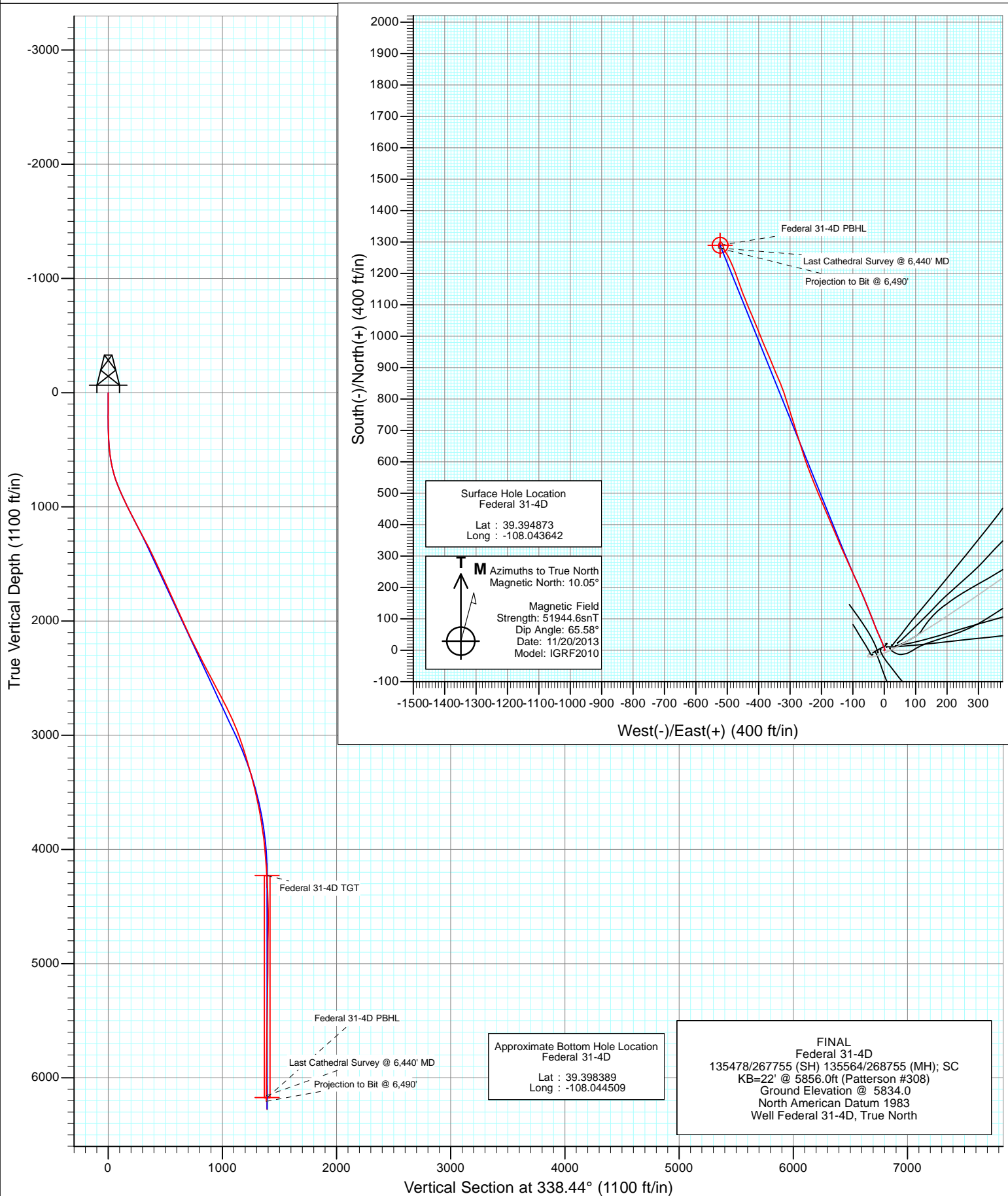


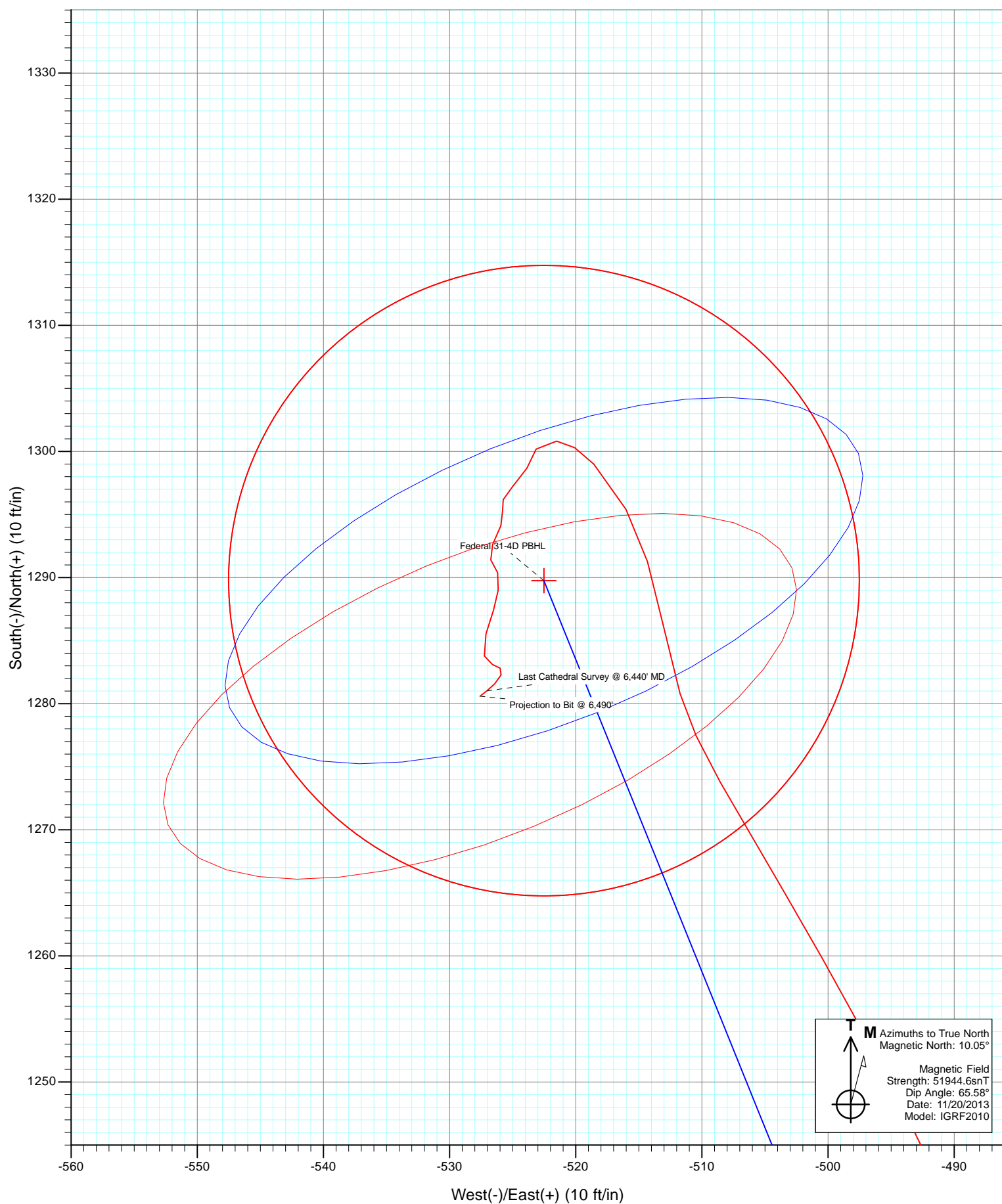


Project: S. Piceance (Parachute)
Site: PF-31 Pad - S31-T7S-R95W
Well: Federal 31-4D
Wellbore: DD
Design: FINAL



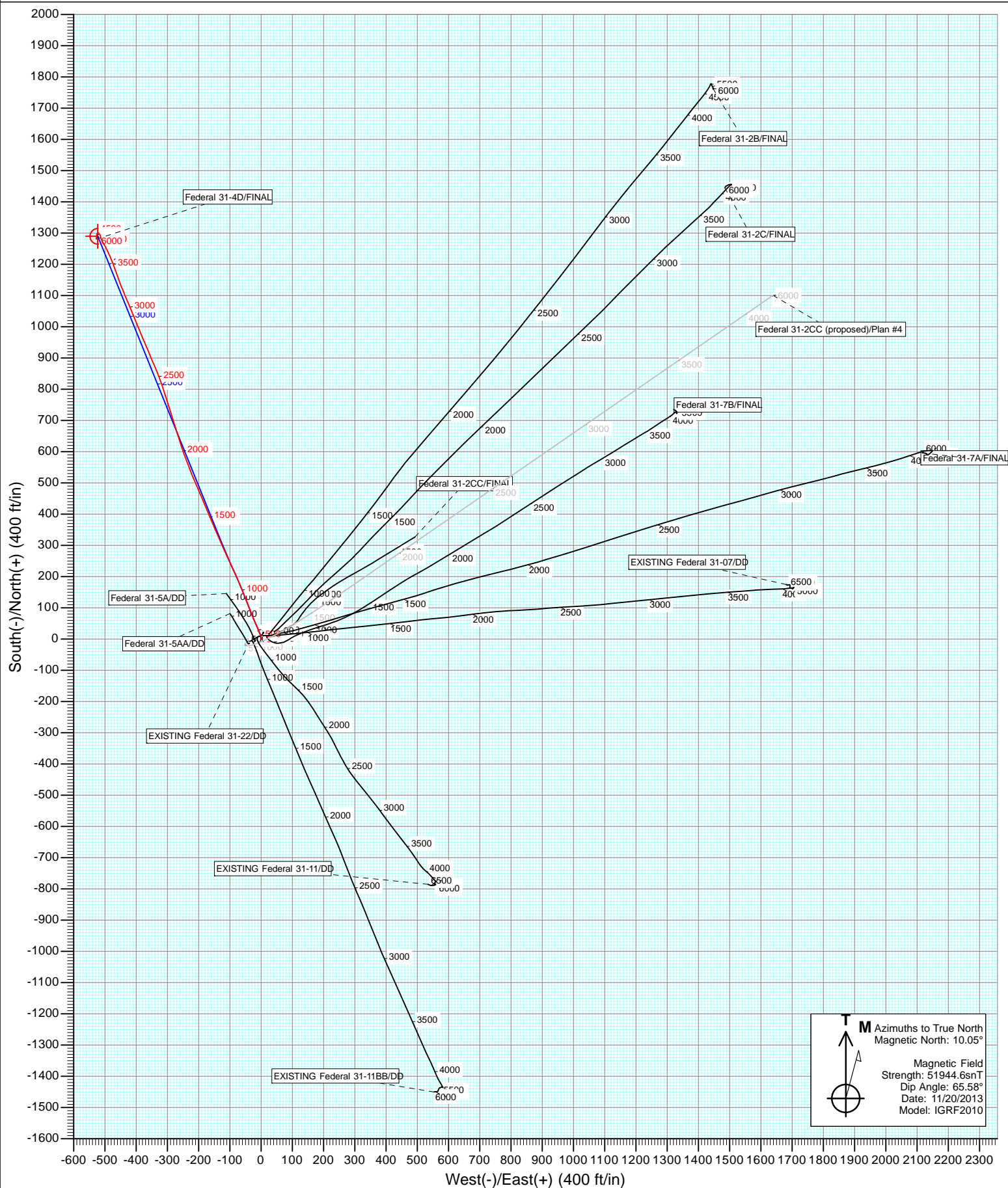


Project: S. Piceance (Parachute)
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Well: Federal 31-4D
Wellbore: DD
Design: FINAL





Project: S. Piceance (Parachute)
Site: PF-31 Pad - S31-T7S-R95W
Well: Federal 31-4D
Wellbore: DD
Design: FINAL



Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Federal 31-4D
Project:	S. Piceance (Parachute)	TVD Reference:	KB=22' @ 5856.0ft (Patterson #308)
Site:	PF-31 Pad - S31-T7S-R95W	MD Reference:	KB=22' @ 5856.0ft (Patterson #308)
Well:	Federal 31-4D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Project	S. Piceance (Parachute), Garfield County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		

Site		PF-31 Pad - S31-T7S-R95W			
Site Position:		Northing:	1,578,802.25 ft	Latitude:	39.394940
From:	Lat/Long	Easting:	2,281,293.81 ft	Longitude:	-108.043490
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-1.60 °

Well	Federal 31-4D					
Well Position	+N/-S	0.0 ft	Northing:	1,578,779.05 ft	Latitude:	39.394873
	+E/-W	0.0 ft	Easting:	2,281,250.18 ft	Longitude:	-108.043642
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	5,834.0 ft

Wellbore	DD				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/20/2013	10.05	65.58	51,945

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	338.44	

Survey Program	Date	11/27/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
182.0	6,490.0	Survey #1 (DD)	Geolink MWD	Geolink MWD	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00		
182.0	0.60	121.90	182.0	-0.5	0.8	-0.8	0.33	0.33		
211.0	0.40	57.60	211.0	-0.5	1.0	-0.9	1.93	-0.69		
241.0	0.90	47.00	241.0	-0.3	1.3	-0.8	1.71	1.67		
272.0	1.20	28.20	272.0	0.1	1.6	-0.5	1.46	0.97		
302.0	1.30	15.20	302.0	0.7	1.9	0.0	1.00	0.33		
333.0	1.80	2.90	333.0	1.6	2.0	0.7	1.93	1.61		
364.0	2.30	352.20	364.0	2.7	1.9	1.8	2.02	1.61		
394.0	2.90	340.90	393.9	4.0	1.6	3.1	2.62	2.00		
425.0	3.40	339.30	424.9	5.6	1.0	4.8	1.64	1.61		
455.0	4.20	338.80	454.8	7.4	0.3	6.8	2.67	2.67		
485.0	5.10	336.10	484.7	9.7	-0.7	9.2	3.09	3.00		
515.0	6.20	337.80	514.6	12.4	-1.8	12.2	3.71	3.67		

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Federal 31-4D
Project:	S. Piceance (Parachute)	TVD Reference:	KB=22' @ 5856.0ft (Patterson #308)
Site:	PF-31 Pad - S31-T7S-R95W	MD Reference:	KB=22' @ 5856.0ft (Patterson #308)
Well:	Federal 31-4D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
546.0	7.20	339.40	545.3	15.8	-3.1	15.8	3.28	3.23	
576.0	8.50	339.00	575.1	19.6	-4.6	19.9	4.34	4.33	
606.0	9.90	338.00	604.7	24.1	-6.3	24.7	4.70	4.67	
637.0	11.60	337.70	635.1	29.4	-8.5	30.5	5.49	5.48	
667.0	13.30	336.70	664.4	35.4	-11.0	37.0	5.71	5.67	
698.0	15.30	336.30	694.5	42.4	-14.1	44.6	6.46	6.45	
728.0	16.90	335.50	723.3	50.0	-17.5	52.9	5.38	5.33	
759.0	18.20	335.80	752.8	58.5	-21.3	62.3	4.20	4.19	
851.0	23.10	339.60	838.9	88.6	-33.5	94.7	5.52	5.33	
942.0	24.80	338.30	922.1	123.0	-46.8	131.6	1.96	1.87	
1,033.0	26.10	337.30	1,004.2	159.2	-61.6	170.7	1.50	1.43	
1,125.0	27.30	336.20	1,086.4	197.2	-77.9	212.0	1.41	1.30	
1,206.0	28.00	335.30	1,158.2	231.5	-93.4	249.6	1.01	0.86	
1,252.0	28.00	335.70	1,198.8	251.1	-102.3	271.1	0.41	0.00	
1,344.0	28.40	335.60	1,279.9	290.7	-120.2	314.6	0.44	0.43	
1,435.0	26.90	336.30	1,360.5	329.3	-137.4	356.8	1.69	-1.65	
1,527.0	25.50	336.70	1,443.0	366.5	-153.6	397.3	1.53	-1.52	
1,618.0	25.10	338.10	1,525.3	402.4	-168.6	436.2	0.79	-0.44	
1,710.0	24.70	336.90	1,608.7	438.2	-183.4	475.0	0.70	-0.43	
1,802.0	24.80	337.00	1,692.3	473.7	-198.5	513.5	0.12	0.11	
1,893.0	24.40	335.90	1,775.0	508.4	-213.6	551.3	0.67	-0.44	
1,984.0	24.50	339.50	1,857.9	543.2	-227.9	589.0	1.64	0.11	
2,076.0	24.00	339.00	1,941.8	578.6	-241.3	626.7	0.59	-0.54	
2,167.0	24.20	341.90	2,024.8	613.6	-253.7	663.9	1.32	0.22	
2,259.0	25.50	342.50	2,108.3	650.4	-265.5	702.4	1.44	1.41	
2,351.0	26.70	342.80	2,190.9	689.0	-277.6	742.8	1.31	1.30	
2,442.0	26.90	342.50	2,272.2	728.2	-289.8	783.7	0.27	0.22	
2,534.0	27.40	342.40	2,354.0	768.2	-302.5	825.6	0.55	0.54	
2,625.0	27.80	342.00	2,434.7	808.3	-315.4	867.7	0.48	0.44	
2,717.0	28.10	337.50	2,515.9	848.8	-330.3	910.8	2.32	0.33	
2,808.0	28.20	337.20	2,596.2	888.4	-346.8	953.7	0.19	0.11	
2,900.0	27.60	337.00	2,677.5	928.0	-363.6	996.7	0.66	-0.65	
2,991.0	26.30	336.40	2,758.6	965.9	-379.9	1,037.9	1.46	-1.43	
3,083.0	24.70	338.80	2,841.6	1,002.5	-395.0	1,077.5	2.07	-1.74	
3,174.0	22.60	337.70	2,925.0	1,036.4	-408.5	1,114.0	2.36	-2.31	
3,266.0	19.90	336.60	3,010.7	1,067.2	-421.5	1,147.4	2.97	-2.93	
3,357.0	18.00	337.40	3,096.8	1,094.4	-433.0	1,176.9	2.11	-2.09	
3,449.0	17.10	337.90	3,184.5	1,120.0	-443.6	1,204.6	0.99	-0.98	
3,540.0	15.90	339.40	3,271.8	1,144.1	-453.0	1,230.5	1.40	-1.32	
3,632.0	15.20	340.50	3,360.4	1,167.2	-461.4	1,255.1	0.83	-0.76	
3,723.0	13.90	340.20	3,448.5	1,188.8	-469.1	1,278.0	1.43	-1.43	
3,815.0	12.70	338.10	3,538.0	1,208.6	-476.6	1,299.1	1.41	-1.30	
3,909.0	10.20	336.30	3,630.1	1,225.8	-483.8	1,317.8	2.69	-2.66	
3,998.0	10.30	335.20	3,717.7	1,240.2	-490.3	1,333.6	0.25	0.11	
4,089.0	8.90	331.50	3,807.4	1,253.8	-497.1	1,348.7	1.68	-1.54	
4,181.0	7.20	329.60	3,898.5	1,265.0	-503.4	1,361.5	1.87	-1.85	
4,272.0	5.60	330.00	3,989.0	1,273.8	-508.5	1,371.5	1.76	-1.76	
4,364.0	4.10	343.30	4,080.6	1,280.8	-511.7	1,379.2	2.03	-1.63	
4,455.0	3.30	349.90	4,171.4	1,286.5	-513.1	1,385.0	0.99	-0.88	
4,546.0	2.90	341.80	4,262.3	1,291.3	-514.3	1,389.9	0.65	-0.44	
4,638.0	2.70	333.10	4,354.2	1,295.4	-516.0	1,394.4	0.51	-0.22	
4,729.0	2.90	316.90	4,445.1	1,299.0	-518.6	1,398.7	0.89	0.22	
4,821.0	1.70	274.70	4,537.0	1,300.8	-521.5	1,401.4	2.17	-1.30	

Cathedral Energy Services

Survey Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Federal 31-4D
Project:	S. Piceance (Parachute)	TVD Reference:	KB=22' @ 5856.0ft (Patterson #308)
Site:	PF-31 Pad - S31-T7S-R95W	MD Reference:	KB=22' @ 5856.0ft (Patterson #308)
Well:	Federal 31-4D	North Reference:	True
Wellbore:	DD	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	USA EDM 5000 Multi Users DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
4,912.0	1.00	201.40	4,628.0	1,300.2	-523.1	1,401.5	1.88	-0.77	
5,004.0	1.10	209.60	4,720.0	1,298.7	-523.9	1,400.3	0.20	0.11	
5,095.0	1.20	225.60	4,811.0	1,297.2	-525.0	1,399.4	0.37	0.11	
5,187.0	0.50	190.80	4,902.9	1,296.2	-525.7	1,398.7	0.91	-0.76	
5,278.0	0.60	177.30	4,993.9	1,295.3	-525.8	1,397.9	0.18	0.11	
5,370.0	0.90	192.20	5,085.9	1,294.1	-525.9	1,396.8	0.39	0.33	
5,461.0	1.20	212.70	5,176.9	1,292.6	-526.6	1,395.7	0.52	0.33	
5,553.0	0.70	136.40	5,268.9	1,291.4	-526.7	1,394.6	1.35	-0.54	
5,644.0	0.80	165.50	5,359.9	1,290.4	-526.2	1,393.5	0.43	0.11	
5,735.0	1.00	188.60	5,450.9	1,289.0	-526.1	1,392.1	0.45	0.22	
5,827.0	1.00	197.90	5,542.9	1,287.4	-526.5	1,390.8	0.18	0.00	
5,918.0	1.50	197.40	5,633.9	1,285.5	-527.1	1,389.3	0.55	0.55	
6,010.0	0.80	158.60	5,725.8	1,283.8	-527.2	1,387.7	1.10	-0.76	
6,102.0	0.50	100.10	5,817.8	1,283.1	-526.6	1,386.9	0.75	-0.33	
6,193.0	0.40	137.40	5,908.8	1,282.8	-526.0	1,386.4	0.33	-0.11	
6,284.0	0.40	203.30	5,999.8	1,282.3	-525.9	1,385.8	0.48	0.00	
6,376.0	0.70	222.60	6,091.8	1,281.6	-526.4	1,385.4	0.38	0.33	
6,440.0	0.80	232.20	6,155.8	1,281.0	-527.0	1,385.1	0.25	0.16	Last Cathedral Survey @ 6,440' MD
6,490.0	0.80	232.20	6,205.8	1,280.6	-527.6	1,384.9	0.00	0.00	Projection to Bit @ 6,490'

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Federal 31-4D TGT	0.00	0.00	4,229.0	1,289.8	-522.5	1,580,082.93	2,280,763.98	39.398414	-108.045491
- hit/miss target									
- actual wellpath misses target center by 8.7ft at 4512.8ft MD (4229.1 TVD, 1289.6 N, -513.8 E)									
- Point									
Federal 31-4D PBHL	0.00	0.00	6,173.0	1,289.8	-522.5	1,580,082.93	2,280,763.98	39.398414	-108.045491
- actual wellpath misses target center by 19.8ft at 6440.0ft MD (6155.8 TVD, 1281.0 N, -527.0 E)									
- Circle (radius 25.0)									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
6,440.0	6,155.8	1,281.0	-527.0	Last Cathedral Survey @ 6,440' MD
6,490.0	6,205.8	1,280.6	-527.6	Projection to Bit @ 6,490'

Checked By: _____	Approved By: _____	Date: _____
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