HALLIBURTON

6360 EAST YELLOWSTONE HWY • EVANSVILLE, WY 82636

TEL: 307-472-5757 • FAX: 307-232-2097

Certified Survey Sheet

Customer:	**Extraction Oil & Gas**
Well:	**GP-CODY FED 20E-15-1– Original Wellbore**
API:	05-123-50286
Legal:	Sec. 20-T05N-R65W
County:	Weld
State:	Colorado

RKB (Patterson 901):	29'; 4,702.0' MSL
Tie-On (Koltek Surveys):	1,575.30' MD
First Sperry MWD+IFR1+MS Survey:	1,677' MD
Last Sperry MWD+IFR1+MS Survey:	13,983' MD
Straight Line Projection to TD:	14,062' MD

I certify that the attached survey is true and correct to the best of my knowledge.

02-10-2020

Kansa Becker
Well Design Senior Technical Professional

HALLIBURTON SPERRY DRILLING SERVICES

CERTIFIED SURVEY WORK SHEET

OPERATOR:	Extraction Oil & Gas
WELL:	GP-CODY FED 20E-15-1
FIELD:	Wattenberg
RIG:	Patterson 901
LEGALS:	Sec. 20 T05N-R65W
COUNTY:	Weld
STATE:	Colorado
CAL. METHOD:	Minimum Curvature
MAG. DECL. APPLIED:	7.765
VERTICAL SEC. DIR. :	84.63

SSDS Job Number :	CA-XX-0906221266
Start Date of Job :	2/6/2020
End Date of Job :	2/8/2020
Lead Directional Drillers	
Other SDS DD's :	
SDS MWD Engineers :	Jonathan Davis
	Pedro Herrera

	Main Hole ==========>		1st Side Track ========>		2nd Side Track ========>		3rd Side Track ========>		4th Side Track ========>	
	0.00	Tie On		Tie On		Tie On		Tie On		Tie On
First Surface Survey	140.30									
Last Surface Survey	1575.30									
First Intermediate Survey	1677.00	MWD								
KOP Depth	6426.00	KOP		KOP-ST1		KOP-ST2		KOP-ST3		KOP-ST4
Last Intermediate Survey	7231.00	MWD								
First Lateral Survey Depth	7326.00	MWD		MWD		MWD		MWD		MWD
Last Lateral Survey Depth	13983.00	MWD		MWD		MWD		MWD		MWD
Bit Extrapolation to TD	14062.00	T.D.		T.D.		T.D.		T.D.		T.D.

The following Halliburton Sperry Drilling Services personnel listed below, do certify the above survey information to be accurate :

Print Name :	Pedro Herrera	**Print Name :**	**Print Name :**
Sign Name :	*Pedro Herrera*	**Sign Name :**	**Sign Name :**
Print Name :	Jonathan Davis	**Print Name :**	**Print Name :**
Sign Name :	*Jonathan Davis*	**Sign Name :**	**Sign Name :**

	TieOn	Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)
Examples of	MWD	Sperry Drilling Services (SDS) Measurement While Drilling (MWD) Survey's
Survey Types:	ESS	Sperry Drilling Services (SDS) Electronic Survey System (ESS) Survey's
	Gyro	Gyro Survey's ; Provided by third party vendor, or by Sperry Drilling Services (SDS)
	SS	Single Shot (SS) Survey's ; Provided by Sperry Drilling Services (SDS) or third party vendor.

Job# 906221266

Patterson 901

Extraction Oil & Gas

Weld County, CO Sec. 20-T05N-R65W (GP Pad)

API# 05-123-50286

GP-CODY FED 20E-15-1

SHL: 670' FNL 1305' FEL

OWB_50286

Design: Corrected Surveys

Sperry Drilling Services

Combo Report

10 February, 2020

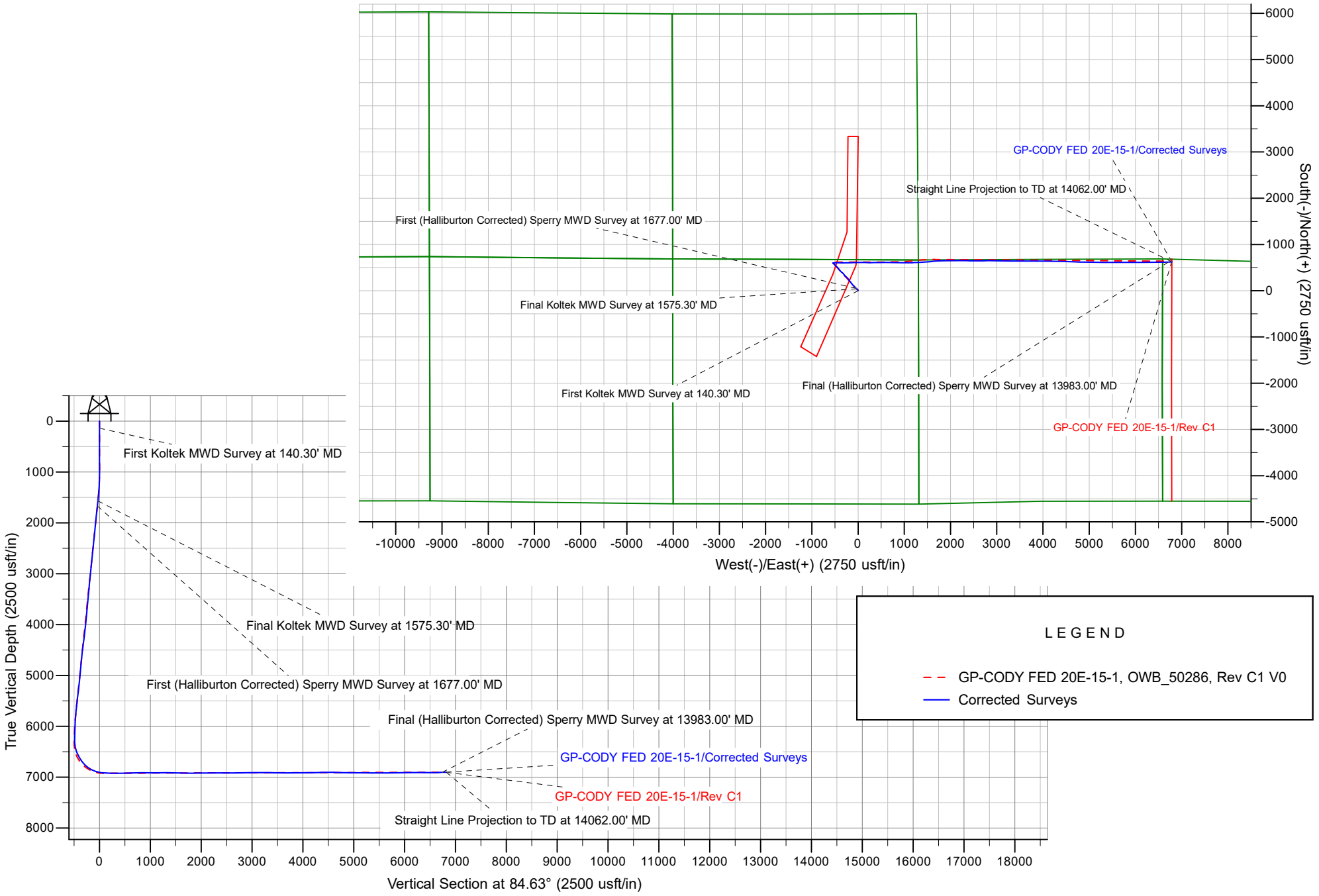
Well Coordinates:	40.390020 -104.682510	North American Datum 1983 Colorado Northern Zone 1,385,974.33 N 3,227,709.72 E
Ground Level: 4,673.00 usft		
Geodetic Scale Factor Applied		
Local Coordinate Origin:		Centered on Well GP-CODY FED 20E-15-1
Viewing Datum:		KB = 29' @ 4702.00usft (Patterson 901)
TVDs to System:		N
North Reference:		**True**
Unit System:		Dec-Deg - API - US Survey Feet - Cust (6 dec)
Geodetic Scale Factor Applied		
Version: 5000.15 Build: 91E		
Report Version: Midcon Combo v1.15		

HALLIBURTON

Project: Weld County, CO
Site: Sec. 20-T05N-R65W (GP Pad)
Well: GP-CODY FED 20E-15-1
Wellbore: OWB_50286
Design: Corrected Surveys

Extraction Oil & Gas
Patterson 901

HALLIBURTON
Sperry Drilling



Design Report for GP-CODY FED 20E-15-1 - Corrected Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	Vertical Depth (usft)	Local Coordinates Northing (usft)	Local Coordinates Easting (usft)	Map Coordinates Northing (usft)	Map Coordinates Easting (usft)	Dogleg Rate (°/100usft)	Vertical Section (usft)	Toolface Angle (°)	Comments
0.00	0.00	0.00	0.00	0.00 N	0.00 E	1,385,974.33	3,227,709.72	0.00	0.00	0.00	
140.30	0.44	46.92	140.30	0.37 N	0.39 E	1,385,974.70	3,227,710.11	0.31	0.43	46.92	First Koltek MWD Survey at 140.30' MD
227.30	0.88	4.82	227.29	1.26 N	0.69 E	1,385,975.60	3,227,710.41	0.72	0.81	-70.15	
315.30	0.70	5.44	315.28	2.47 N	0.80 E	1,385,976.81	3,227,710.50	0.20	1.03	177.59	
402.30	0.26	0.87	402.28	3.20 N	0.85 E	1,385,977.54	3,227,710.55	0.51	1.15	-177.31	
489.30	0.22	15.99	489.28	3.55 N	0.90 E	1,385,977.89	3,227,710.59	0.09	1.23	129.68	
576.30	0.26	1.48	576.28	3.91 N	0.95 E	1,385,978.25	3,227,710.64	0.08	1.32	-64.05	
664.30	0.13	45.25	664.28	4.18 N	1.03 E	1,385,978.52	3,227,710.72	0.21	1.42	151.57	
751.30	0.31	113.81	751.28	4.16 N	1.32 E	1,385,978.50	3,227,711.00	0.33	1.70	93.31	
838.30	0.66	101.77	838.28	3.96 N	2.02 E	1,385,978.31	3,227,711.71	0.42	2.38	-22.31	
925.30	0.31	235.80	925.27	3.73 N	2.32 E	1,385,978.08	3,227,712.01	1.04	2.66	165.72	
1,013.30	0.75	251.71	1,013.27	3.41 N	1.57 E	1,385,977.76	3,227,711.27	0.52	1.89	26.56	
1,100.30	1.45	303.04	1,100.26	3.83 N	0.11 E	1,385,978.16	3,227,709.80	1.31	0.47	82.15	
1,187.30	3.16	317.45	1,187.18	6.20 N	2.43 W	1,385,980.51	3,227,707.23	2.06	-1.84	26.02	
1,275.30	5.63	325.36	1,274.92	11.54 N	6.53 W	1,385,985.81	3,227,703.09	2.88	-5.42	17.75	
1,362.30	7.87	321.32	1,361.31	19.70 N	12.68 W	1,385,993.91	3,227,696.87	2.63	-10.78	-13.98	
1,449.30	8.57	321.49	1,447.41	29.42 N	20.44 W	1,386,003.56	3,227,689.02	0.81	-17.59	2.07	
1,537.30	9.27	309.82	1,534.36	39.09 N	29.96 W	1,386,013.14	3,227,679.40	2.20	-26.17	-74.68	
1,575.30	9.27	310.07	1,571.86	43.02 N	34.66 W	1,386,017.03	3,227,674.67	0.11	-30.48	90.12	Final Koltek MWD Survey at 1575.30' MD
1,677.00	9.26	307.72	1,672.23	53.30 N	47.40 W	1,386,027.19	3,227,661.84	0.37	-42.20	-92.67	First (Halliburton Corrected) Sperry MWD Survey at 1677.00' MD
1,772.00	9.31	317.27	1,766.00	63.62 N	58.66 W	1,386,037.41	3,227,650.48	1.62	-52.44	92.86	
1,867.00	8.85	311.19	1,859.81	74.08 N	69.37 W	1,386,047.77	3,227,639.67	1.12	-62.13	-118.59	
1,963.00	10.95	322.06	1,954.38	86.14 N	80.54 W	1,386,059.72	3,227,628.40	2.92	-72.12	47.11	
2,058.00	10.10	318.63	2,047.78	99.50 N	91.59 W	1,386,072.98	3,227,617.22	1.11	-81.87	-145.28	
2,153.00	9.64	317.50	2,141.38	111.62 N	102.47 W	1,386,085.00	3,227,606.23	0.53	-91.57	-157.72	
2,249.00	8.58	315.53	2,236.16	122.66 N	112.92 W	1,386,095.94	3,227,595.68	1.15	-100.93	-164.57	
2,344.00	9.28	321.98	2,330.01	133.75 N	122.60 W	1,386,106.94	3,227,585.90	1.28	-109.54	58.26	
2,439.00	11.49	324.52	2,423.45	147.49 N	132.81 W	1,386,120.59	3,227,575.56	2.38	-118.42	12.96	
2,534.00	9.78	322.03	2,516.82	161.56 N	143.27 W	1,386,134.55	3,227,564.98	1.86	-127.51	-166.18	
2,648.00	9.28	320.15	2,629.24	176.25 N	155.11 W	1,386,149.13	3,227,553.00	0.52	-137.93	-149.02	
2,743.00	13.34	324.29	2,722.38	191.03 N	166.42 W	1,386,163.81	3,227,541.55	4.36	-147.80	13.35	
2,838.00	13.30	323.85	2,814.83	208.76 N	179.27 W	1,386,181.42	3,227,528.55	0.11	-158.93	-111.75	
2,934.00	11.69	322.64	2,908.55	225.40 N	191.68 W	1,386,197.95	3,227,515.98	1.70	-169.73	-171.35	
3,029.00	10.86	321.89	3,001.72	240.10 N	203.05 W	1,386,212.54	3,227,504.48	0.89	-179.67	-170.35	
3,124.00	9.56	321.32	3,095.21	253.30 N	213.50 W	1,386,225.64	3,227,493.90	1.37	-188.84	-175.84	
3,220.00	7.48	319.60	3,190.14	264.28 N	222.54 W	1,386,236.54	3,227,484.77	2.18	-196.81	-173.87	

Design Report for GP-CODY FED 20E-15-1 - Corrected Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	Vertical Depth (usft)	Local Coordinates Northing (usft)	Local Coordinates Easting (usft)	Map Coordinates Northing (usft)	Map Coordinates Easting (usft)	Dogleg Rate (°/100usft)	Vertical Section (usft)	Toolface Angle (°)	Comments
3,314.00	9.08	319.64	3,283.16	274.59 N	231.30 W	1,386,246.77	3,227,475.91	1.70	-204.58	0.23	
3,410.00	7.31	312.67	3,378.18	284.50 N	240.70 W	1,386,256.59	3,227,466.42	2.11	-213.00	-154.11	
3,504.00	7.73	309.95	3,471.37	292.62 N	249.95 W	1,386,264.62	3,227,457.10	0.59	-221.45	-41.64	
3,599.00	9.04	312.00	3,565.35	301.71 N	260.39 W	1,386,273.62	3,227,446.57	1.41	-230.99	13.87	
3,695.00	6.71	310.30	3,660.44	310.39 N	270.27 W	1,386,282.20	3,227,436.61	2.44	-240.02	-175.13	
3,790.00	9.07	318.44	3,754.54	319.58 N	279.48 W	1,386,291.31	3,227,427.32	2.74	-248.32	29.41	
3,885.00	9.18	317.89	3,848.34	330.81 N	289.52 W	1,386,302.44	3,227,417.17	0.15	-257.27	-38.68	
3,981.00	11.12	322.15	3,942.83	343.80 N	300.34 W	1,386,315.33	3,227,406.24	2.17	-266.83	23.26	
4,075.00	9.88	321.57	4,035.26	357.28 N	310.92 W	1,386,328.71	3,227,395.54	1.32	-276.09	-175.41	
4,171.00	9.88	317.22	4,129.83	369.77 N	321.63 W	1,386,341.11	3,227,384.71	0.78	-285.59	-92.14	
4,266.00	12.21	312.21	4,223.07	382.51 N	334.61 W	1,386,353.72	3,227,371.62	2.65	-297.32	-24.86	
4,361.00	9.80	310.65	4,316.32	394.52 N	348.18 W	1,386,365.61	3,227,357.93	2.56	-309.71	-173.72	
4,456.00	10.66	312.37	4,409.80	405.71 N	360.81 W	1,386,376.68	3,227,345.20	0.96	-321.23	20.40	
4,552.00	9.51	310.82	4,504.32	416.88 N	373.37 W	1,386,387.74	3,227,332.54	1.23	-332.69	-167.48	
4,646.00	10.76	317.18	4,596.85	428.39 N	385.21 W	1,386,399.14	3,227,320.59	1.78	-343.41	45.00	
4,742.00	8.70	312.05	4,691.47	439.83 N	396.70 W	1,386,410.47	3,227,309.00	2.33	-353.77	-159.69	
4,837.00	10.70	324.52	4,785.12	451.83 N	407.15 W	1,386,422.37	3,227,298.44	3.04	-363.06	52.67	
4,930.00	9.35	331.47	4,876.70	465.50 N	415.77 W	1,386,435.96	3,227,289.69	1.95	-370.36	141.52	
5,025.00	10.37	319.55	4,970.30	478.78 N	425.01 W	1,386,449.16	3,227,280.34	2.40	-378.31	-69.40	
5,120.00	9.17	319.67	5,063.92	491.06 N	435.46 W	1,386,461.34	3,227,269.78	1.26	-387.56	179.09	
5,234.00	10.65	313.94	5,176.22	505.30 N	448.92 W	1,386,475.45	3,227,256.18	1.56	-399.63	-36.52	
5,329.00	9.57	310.41	5,269.75	516.51 N	461.26 W	1,386,486.55	3,227,243.74	1.31	-410.86	-151.88	
5,425.00	11.50	314.49	5,364.13	528.39 N	474.16 W	1,386,498.31	3,227,230.73	2.15	-422.60	23.15	
5,520.00	9.60	312.82	5,457.52	540.41 N	486.73 W	1,386,510.21	3,227,218.06	2.03	-433.98	-171.68	
5,615.00	10.30	315.72	5,551.09	551.88 N	498.47 W	1,386,521.57	3,227,206.21	0.91	-444.60	37.03	
5,710.00	7.88	317.40	5,644.89	562.75 N	508.81 W	1,386,532.35	3,227,195.77	2.56	-453.87	174.57	
5,805.00	9.30	314.57	5,738.82	572.93 N	518.68 W	1,386,542.44	3,227,185.80	1.56	-462.75	-17.98	
5,900.00	6.68	314.58	5,832.89	582.20 N	528.09 W	1,386,551.62	3,227,176.31	2.76	-471.25	179.97	
5,996.00	4.77	312.29	5,928.41	588.81 N	535.02 W	1,386,558.16	3,227,169.32	2.00	-477.53	-174.32	
6,090.00	3.26	313.12	6,022.17	593.26 N	539.86 W	1,386,562.57	3,227,164.44	1.61	-481.93	178.21	
6,185.00	1.85	314.13	6,117.08	596.18 N	542.93 W	1,386,565.45	3,227,161.34	1.48	-484.72	178.68	
6,280.00	1.33	313.57	6,212.04	598.00 N	544.83 W	1,386,567.26	3,227,159.42	0.55	-486.44	-178.57	
6,376.00	0.82	310.21	6,308.02	599.22 N	546.17 W	1,386,568.46	3,227,158.08	0.54	-487.65	-174.63	
6,470.00	10.97	80.73	6,401.47	601.10 N	537.82 W	1,386,570.42	3,227,166.40	12.25	-479.17	133.58	
6,565.00	21.09	84.74	6,492.66	604.13 N	511.81 W	1,386,573.69	3,227,192.38	10.71	-452.99	8.19	
6,660.00	27.56	90.34	6,579.20	605.57 N	472.77 W	1,386,575.49	3,227,231.41	7.22	-413.99	22.20	
6,756.00	32.49	89.57	6,662.29	605.63 N	424.75 W	1,386,575.99	3,227,279.43	5.15	-366.17	-4.80	

Design Report for GP-CODY FED 20E-15-1 - Corrected Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	Vertical Depth (usft)	Local Coordinates Northing (usft)	Local Coordinates Easting (usft)	Map Coordinates Northing (usft)	Map Coordinates Easting (usft)	Dogleg Rate (°/100usft)	Vertical Section (usft)	Toolface Angle (°)	Comments
6,850.00	43.18	90.77	6,736.42	605.38 N	367.18 W	1,386,576.28	3,227,337.00	11.40	-308.87	4.42	
6,946.00	52.84	91.52	6,800.57	603.93 N	295.93 W	1,386,575.48	3,227,408.26	10.08	-238.07	3.56	
7,041.00	63.02	89.00	6,850.95	603.66 N	215.54 W	1,386,575.95	3,227,488.64	10.95	-158.06	-12.54	
7,136.00	69.91	86.70	6,888.86	606.97 N	128.56 W	1,386,580.07	3,227,575.57	7.58	-71.16	-17.49	
7,231.00	82.66	88.21	6,911.34	611.03 N	36.56 W	1,386,584.97	3,227,667.54	13.51	20.82	6.76	
7,326.00	87.18	92.58	6,919.76	610.36 N	58.02 E	1,386,585.18	3,227,762.11	6.60	114.92	44.14	
7,421.00	87.41	90.81	6,924.24	607.56 N	152.87 E	1,386,583.25	3,227,856.98	1.88	209.09	-82.63	
7,515.00	91.01	90.01	6,925.54	606.88 N	246.84 E	1,386,583.44	3,227,950.95	3.92	302.59	-12.54	
7,610.00	91.92	89.32	6,923.11	607.44 N	341.81 E	1,386,584.87	3,228,045.90	1.20	397.19	-37.15	
7,706.00	90.07	89.89	6,921.44	608.10 N	437.79 E	1,386,586.42	3,228,141.87	2.02	492.81	162.87	
7,801.00	91.21	89.63	6,920.38	608.50 N	532.78 E	1,386,587.69	3,228,236.85	1.23	587.42	-12.85	
7,896.00	92.22	88.94	6,917.54	609.68 N	627.73 E	1,386,589.75	3,228,331.78	1.29	682.06	-34.32	
7,991.00	89.53	90.54	6,916.09	610.11 N	722.70 E	1,386,591.06	3,228,426.74	3.29	776.66	149.24	
8,086.00	89.97	91.11	6,916.50	608.75 N	817.69 E	1,386,590.56	3,228,521.74	0.76	871.10	52.34	
8,181.00	89.23	91.14	6,917.16	606.88 N	912.67 E	1,386,589.57	3,228,616.72	0.78	965.49	177.68	
8,276.00	90.67	90.43	6,917.25	605.58 N	1,007.66 E	1,386,589.15	3,228,711.72	1.69	1,059.94	-26.25	
8,372.00	91.75	89.85	6,915.22	605.34 N	1,103.63 E	1,386,589.80	3,228,807.69	1.28	1,155.47	-28.23	
8,467.00	89.19	87.37	6,914.44	607.65 N	1,198.59 E	1,386,592.98	3,228,902.61	3.75	1,250.22	-135.89	
8,562.00	89.26	87.04	6,915.72	612.28 N	1,293.47 E	1,386,598.48	3,228,997.44	0.36	1,345.12	-78.03	
8,657.00	90.17	87.63	6,916.20	616.70 N	1,388.36 E	1,386,603.78	3,229,092.28	1.14	1,440.01	32.96	
8,751.00	87.95	84.86	6,917.74	622.85 N	1,482.13 E	1,386,610.79	3,229,185.99	3.78	1,533.94	-128.73	
8,847.00	88.45	84.68	6,920.76	631.60 N	1,577.68 E	1,386,620.42	3,229,281.45	0.55	1,629.90	-19.79	
8,943.00	89.19	84.14	6,922.73	640.95 N	1,673.21 E	1,386,630.65	3,229,376.88	0.95	1,725.87	-36.12	
9,038.00	90.13	89.04	6,923.30	646.60 N	1,768.01 E	1,386,637.17	3,229,471.62	5.25	1,820.79	79.16	
9,133.00	91.44	89.33	6,921.99	647.95 N	1,862.99 E	1,386,639.40	3,229,566.58	1.41	1,915.48	12.48	
9,227.00	89.46	89.35	6,921.26	649.03 N	1,956.97 E	1,386,641.35	3,229,660.55	2.11	2,009.15	179.42	
9,322.00	91.18	88.46	6,920.73	650.84 N	2,051.95 E	1,386,644.04	3,229,755.50	2.04	2,103.88	-27.36	
9,417.00	90.50	91.55	6,919.33	650.84 N	2,146.93 E	1,386,644.90	3,229,850.47	3.33	2,198.44	102.39	
9,512.00	90.34	89.80	6,918.64	649.72 N	2,241.91 E	1,386,644.66	3,229,945.46	1.85	2,292.90	-95.22	
9,607.00	89.73	91.22	6,918.58	648.87 N	2,336.91 E	1,386,644.69	3,230,040.46	1.63	2,387.40	113.25	
9,703.00	90.24	90.57	6,918.60	647.37 N	2,432.89 E	1,386,644.08	3,230,136.45	0.86	2,482.83	-51.88	
9,797.00	90.30	90.16	6,918.16	646.77 N	2,526.89 E	1,386,644.34	3,230,230.44	0.44	2,576.35	-81.67	
9,892.00	90.34	89.71	6,917.63	646.88 N	2,621.89 E	1,386,645.33	3,230,325.43	0.48	2,670.94	-84.92	
9,987.00	90.60	89.01	6,916.85	647.94 N	2,716.88 E	1,386,647.27	3,230,420.41	0.79	2,765.62	-69.62	
10,082.00	90.44	88.49	6,915.99	650.01 N	2,811.85 E	1,386,650.21	3,230,515.35	0.57	2,860.37	-107.10	
10,177.00	90.94	90.79	6,914.84	650.61 N	2,906.84 E	1,386,651.69	3,230,610.32	2.48	2,954.99	77.72	
10,273.00	91.88	89.85	6,912.48	650.07 N	3,002.80 E	1,386,652.03	3,230,706.29	1.38	3,050.48	-44.98	

Design Report for GP-CODY FED 20E-15-1 - Corrected Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	Vertical Depth (usft)	Local Coordinates Northing (usft)	Local Coordinates Easting (usft)	Map Coordinates Northing (usft)	Map Coordinates Easting (usft)	Dogleg Rate (°/100usft)	Vertical Section (usft)	Toolface Angle (°)	Comments
10,368.00	89.80	92.39	6,911.09	648.22 N	3,097.76 E	1,386,651.05	3,230,801.25	3.46	3,144.85	129.29	
10,463.00	90.60	91.76	6,910.76	644.78 N	3,192.70 E	1,386,648.49	3,230,896.21	1.07	3,239.05	-38.22	
10,558.00	87.92	91.00	6,911.98	642.49 N	3,287.65 E	1,386,647.08	3,230,991.18	2.93	3,333.37	-164.17	
10,653.00	88.45	90.64	6,914.99	641.13 N	3,382.60 E	1,386,646.59	3,231,086.13	0.67	3,427.77	-34.18	
10,748.00	89.09	90.39	6,917.03	640.28 N	3,477.57 E	1,386,646.61	3,231,181.10	0.72	3,522.25	-21.34	
10,843.00	89.66	89.77	6,918.07	640.15 N	3,572.56 E	1,386,647.36	3,231,276.09	0.89	3,616.81	-47.41	
10,938.00	90.17	88.84	6,918.21	641.30 N	3,667.56 E	1,386,649.39	3,231,371.06	1.12	3,711.49	-61.26	
11,032.00	90.47	90.92	6,917.68	641.49 N	3,761.55 E	1,386,650.45	3,231,465.05	2.24	3,805.09	81.79	
11,127.00	91.08	90.02	6,916.40	640.72 N	3,856.54 E	1,386,650.55	3,231,560.03	1.14	3,899.59	-55.86	
11,223.00	91.88	90.02	6,913.92	640.68 N	3,952.50 E	1,386,651.40	3,231,655.99	0.83	3,995.13	0.00	
11,318.00	89.26	91.51	6,912.98	639.41 N	4,047.48 E	1,386,651.00	3,231,750.97	3.17	4,089.57	150.36	
11,413.00	90.07	91.23	6,913.53	637.14 N	4,142.45 E	1,386,649.61	3,231,845.96	0.90	4,183.91	-19.07	
11,508.00	91.18	90.59	6,912.49	635.63 N	4,237.43 E	1,386,648.97	3,231,940.94	1.35	4,278.33	-29.96	
11,602.00	92.49	90.09	6,909.48	635.08 N	4,331.38 E	1,386,649.28	3,232,034.89	1.49	4,371.81	-20.87	
11,697.00	89.76	92.31	6,907.62	633.09 N	4,426.32 E	1,386,648.17	3,232,129.84	3.70	4,466.16	140.86	
11,793.00	91.04	92.15	6,906.95	629.35 N	4,522.25 E	1,386,645.32	3,232,225.79	1.34	4,561.31	-7.12	
11,888.00	87.45	92.18	6,908.20	625.76 N	4,617.15 E	1,386,642.61	3,232,320.73	3.78	4,655.46	179.52	
11,984.00	87.95	91.81	6,912.05	622.42 N	4,713.02 E	1,386,640.15	3,232,416.61	0.65	4,750.59	-36.49	
12,079.00	88.59	91.22	6,914.92	619.91 N	4,807.94 E	1,386,638.52	3,232,511.55	0.92	4,844.86	-42.67	
12,174.00	90.27	90.58	6,915.87	618.42 N	4,902.92 E	1,386,637.90	3,232,606.54	1.89	4,939.29	-20.86	
12,269.00	91.65	90.29	6,914.27	617.70 N	4,997.90 E	1,386,638.05	3,232,701.52	1.48	5,033.78	-11.86	
12,365.00	88.39	91.14	6,914.24	616.50 N	5,093.88 E	1,386,637.74	3,232,797.50	3.51	5,129.23	165.38	
12,460.00	89.06	91.09	6,916.36	614.65 N	5,188.84 E	1,386,636.77	3,232,892.47	0.71	5,223.60	-4.27	
12,556.00	89.40	90.92	6,917.65	612.97 N	5,284.81 E	1,386,635.97	3,232,988.45	0.40	5,318.99	-26.56	
12,650.00	89.40	90.47	6,918.63	611.83 N	5,378.80 E	1,386,635.70	3,233,082.44	0.48	5,412.46	-90.00	
12,746.00	90.37	90.43	6,918.82	611.08 N	5,474.80 E	1,386,635.83	3,233,178.44	1.01	5,507.96	-2.36	
12,841.00	90.94	90.07	6,917.74	610.66 N	5,569.79 E	1,386,636.29	3,233,273.42	0.71	5,602.50	-32.27	
12,937.00	91.51	89.80	6,915.68	610.77 N	5,665.77 E	1,386,637.28	3,233,369.39	0.66	5,698.07	-25.34	
13,032.00	89.29	89.91	6,915.02	611.01 N	5,760.76 E	1,386,638.40	3,233,464.37	2.34	5,792.66	177.16	
13,127.00	90.20	89.59	6,915.44	611.43 N	5,855.76 E	1,386,639.69	3,233,559.36	1.02	5,887.28	-19.37	
13,222.00	90.50	89.74	6,914.86	611.98 N	5,950.75 E	1,386,641.12	3,233,654.34	0.35	5,981.91	26.56	
13,317.00	91.65	89.30	6,913.08	612.78 N	6,045.73 E	1,386,642.79	3,233,749.31	1.30	6,076.55	-20.93	
13,411.00	92.59	88.87	6,909.60	614.28 N	6,139.65 E	1,386,645.16	3,233,843.21	1.10	6,170.20	-24.56	
13,507.00	88.76	90.19	6,908.47	615.06 N	6,235.62 E	1,386,646.83	3,233,939.16	4.22	6,265.82	160.97	
13,602.00	89.03	90.00	6,910.30	614.91 N	6,330.61 E	1,386,647.54	3,234,034.14	0.35	6,360.37	-35.13	
13,698.00	89.23	89.81	6,911.76	615.07 N	6,426.59 E	1,386,648.59	3,234,130.12	0.29	6,455.95	-43.53	

Design Report for GP-CODY FED 20E-15-1 - Corrected Surveys

Measured Depth (usft)	Inclination (°)	True Azimuth (°)	Vertical Depth (usft)	Local Coordinates Northing (usft)	Local Coordinates Easting (usft)	Map Coordinates Northing (usft)	Map Coordinates Easting (usft)	Dogleg Rate (°/100usft)	Vertical Section (usft)	Toolface Angle (°)	Comments
13,793.00	90.24	88.77	6,912.20	616.24 N	6,521.58 E	1,386,650.64	3,234,225.09	1.53	6,550.63	-45.84	
13,888.00	91.64	89.02	6,910.64	618.07 N	6,616.55 E	1,386,653.35	3,234,320.03	1.50	6,645.35	10.12	
13,983.00	92.59	88.22	6,907.14	620.36 N	6,711.46 E	1,386,656.51	3,234,414.91	1.31	6,740.06	-40.07	Final (Halliburton Corrected) Sperry MWD Survey at 13983.00' MD
14,062.00	92.59	88.22	6,903.57	622.81 N	6,790.34 E	1,386,659.69	3,234,493.76	0.00	6,818.82	-175.04	Straight Line Projection to TD at 14062.00' MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
140.30	140.30	0.37	0.39	First Koltek MWD Survey at 140.30' MD
1,575.30	1,571.86	43.02	-34.66	Final Koltek MWD Survey at 1575.30' MD
1,677.00	1,672.23	53.30	-47.40	First (Halliburton Corrected) Sperry MWD Survey at 1677.00' MD
13,983.00	6,907.14	620.36	6,711.46	Final (Halliburton Corrected) Sperry MWD Survey at 13983.00' MD
14,062.00	6,903.57	622.81	6,790.34	Straight Line Projection to TD at 14062.00' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Cody-1_PBHL	84.63	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
140.30	1,575.30	Koltek MWD	3_MWD+HRGM
1,677.00	13,983.00	Sperry MWD (Corrected)	3_MWD+IFR1+MS
14,062.00	14,062.00	PTB - No Survey	3_Blind

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,500.00		9 5/8" (WP Est.)	9-5/8	12-1/4

Design Report for GP-CODY FED 20E-15-1 - Corrected Surveys

Design Targets

Target Name - hit/miss target - Shape	Dip Angle ()	Dip Dir. ()	TVD ()	+N/-S ()	+E/-W ()	Northing ()	Easting ()	Latitude	Longitude
()									

Directional Difficulty Index

Average Dogleg over Survey:	2.07 °/100usft	Maximum Dogleg over Survey:	13.51 °/100usft at 7,231.00 usft
Net Tortousity applicable to Plans:	1.14 °/100usft	Directional Difficulty Index:	6.683

Audit Info

North Reference Sheet for Sec. 20-T05N-R65W (GP Pad) - GP-CODY FED 20E-15-1 - OWB_50286

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.
Vertical Depths are relative to KB = 29' @ 4702.00usft (Patterson 901). Northing and Easting are relative to GP- CODY FED 20E-15-1

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980
Projection method is Lambert Conformal Conic (2 parallel)
Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°
False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995979

Grid Coordinates of Well: 1,385,974.33 usft N, 3,227,709.72 usft E
Geographical Coordinates of Well: 40.390020, -104.682510
Grid Convergence at Surface is: 0.53°

Based upon Minimum Curvature type calculations, at a Measured Depth of 14,062.00usft
the Bottom Hole Displacement is 6,818.84usft in the Direction of 84.76° (True).

Magnetic Convergence at surface is: -7.25° (4 January 2020, , BGGM2019)