



Weatherford®

Weatherford International Ltd.

2000 Oil Drive

Casper, WY 82604

Tel. 307-268-7900 Fax 307-235-3958

Colorado Oil & Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

Date: 04/16/2014

Attention:

Re: Shell Exploration & Production Company
WUWV COUNTY, CO

Attached to this letter is a copy of the surveys taken by Precision Energy Services, a Weatherford International Ltd. company, MWD equipment on the subject well. The surveys from 147' to 5500' MD represent, to the best of our knowledge, a true and accurate survey of the wellbore at the time the survey was run

Matt Maydew
Well Planning Department

Cc:



Company:	SHELL E&P	Local Co-ordinate Reference:	Well TROUT CREEK 1-30
Project:	ROUTT COUNTY, CO	TVD Reference:	KB @ 6896.00ft (SAVANA 650)
Site:	TROUT CREEK 1-30	MD Reference:	KB @ 6896.00ft (SAVANA 650)
Well:	TROUT CREEK 1-30	North Reference:	Grid
Wellbore:	TROUT CREEK 1-30	Survey Calculation Method:	Minimum Curvature
Design:	TROUT CREEK 1-30	Database:	EDM 5000.1 Single User Db

Project	ROUTT COUNTY, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		TROUT CREEK 1-30			
Site Position:		Northing:	1,407,429.78 usft	Latitude:	40° 26' 32.860 N
From:	Lat/Long	Easting:	2,590,287.48 usft	Longitude:	106° 58' 19.470 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16"	Grid Convergence:	-0.95 °

Well	TROUT CREEK 1-30					
Well Position	+N/-S	0.00 ft	Northing:	1,407,429.78 usft	Latitude:	40° 26' 32.860 N
	+E/-W	0.00 ft	Easting:	2,590,287.48 usft	Longitude:	106° 58' 19.470 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	6,880.00 ft

Wellbore	TROUT CREEK 1-30				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2012	1/9/2013	9.80	66.63	52,644

Design	TROUT CREEK 1-30				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)		+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00		0.00	0.00	54.85

Survey Program	Date	1/28/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
147.00	5,500.00	WFT Surveys (TROUT CREEK 1-30)	MWD	MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	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	
147.00	0.32	59.87	147.00	0.21	0.36	0.41	0.22	0.22	0.00	
209.00	0.52	86.26	209.00	0.31	0.79	0.82	0.44	0.32	42.56	
306.00	0.75	79.43	305.99	0.46	1.85	1.77	0.25	0.24	-7.04	
368.00	0.65	95.58	367.99	0.50	2.60	2.41	0.36	-0.16	26.05	
428.00	1.01	85.86	427.98	0.50	3.46	3.12	0.64	0.60	-16.20	
490.00	1.04	90.92	489.97	0.53	4.57	4.04	0.15	0.05	8.16	
551.00	1.27	101.69	550.96	0.39	5.79	4.95	0.52	0.38	17.66	
613.00	1.36	99.64	612.94	0.12	7.19	5.95	0.16	0.15	-3.31	
674.00	1.14	105.28	673.93	-0.16	8.48	6.85	0.41	-0.36	9.25	
735.00	0.99	106.59	734.92	-0.47	9.57	7.56	0.25	-0.25	2.15	
797.00	1.22	94.51	796.91	-0.67	10.75	8.40	0.53	0.37	-19.48	
859.00	1.15	92.38	858.89	-0.75	12.03	9.40	0.13	-0.11	-3.44	



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Well:	TROUT CREEK 1-30	North Reference:	Grid
Wellbore:	TROUT CREEK 1-30	Survey Calculation Method:	Minimum Curvature
Design:	TROUT CREEK 1-30	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
922.00	1.54	86.09	921.87	-0.72	13.50	10.63	0.66	0.62	-9.98	
984.00	1.66	86.01	983.85	-0.60	15.23	12.11	0.19	0.19	-0.13	
1,025.00	1.78	88.84	1,024.83	-0.55	16.46	13.14	0.36	0.29	6.90	
1,115.00	2.29	86.80	1,114.78	-0.42	19.65	15.83	0.57	0.57	-2.27	
1,235.00	2.91	76.26	1,234.65	0.44	25.00	20.70	0.65	0.52	-8.78	
1,298.00	3.53	71.33	1,297.55	1.44	28.39	24.05	1.08	0.98	-7.83	
1,361.00	6.17	69.39	1,360.32	3.25	33.40	29.19	4.20	4.19	-3.08	
1,424.00	9.34	58.81	1,422.74	7.09	40.95	37.57	5.50	5.03	-16.79	
1,488.00	11.31	69.23	1,485.71	12.01	51.26	48.83	4.23	3.08	16.28	
1,551.00	13.58	70.58	1,547.22	16.66	64.01	61.93	3.63	3.60	2.14	
1,614.00	16.25	71.50	1,608.09	21.92	79.35	77.50	4.25	4.24	1.46	
1,677.00	18.88	70.31	1,668.15	28.15	97.31	95.77	4.21	4.17	-1.89	
1,740.00	21.59	68.79	1,727.26	35.78	117.72	116.85	4.38	4.30	-2.41	
1,804.00	23.77	66.98	1,786.31	45.09	140.57	140.89	3.58	3.41	-2.83	
1,867.00	25.91	66.02	1,843.47	55.65	164.83	166.81	3.46	3.40	-1.52	
1,930.00	27.94	65.58	1,899.64	67.34	190.85	194.82	3.24	3.22	-0.70	
1,993.00	29.55	64.15	1,954.88	80.22	218.27	224.66	2.78	2.56	-2.27	
2,056.00	31.61	61.11	2,009.12	94.97	246.71	256.40	4.09	3.27	-4.83	
2,120.00	33.55	59.47	2,063.04	112.06	276.63	290.71	3.33	3.03	-2.56	
2,185.00	35.21	58.57	2,116.69	130.96	308.10	327.31	2.67	2.55	-1.38	
2,246.00	36.87	57.29	2,166.01	150.02	338.50	363.15	2.99	2.72	-2.10	
2,309.00	38.52	55.70	2,215.86	171.29	370.61	401.65	3.04	2.62	-2.52	
2,372.00	38.19	54.28	2,265.27	193.72	402.63	440.74	1.49	-0.52	-2.25	
2,436.00	38.09	52.01	2,315.60	217.42	434.26	480.24	2.20	-0.16	-3.55	
2,499.00	37.90	50.14	2,365.25	241.78	464.43	518.94	1.85	-0.30	-2.97	
2,562.00	38.70	48.54	2,414.70	267.22	494.04	557.80	2.02	1.27	-2.54	
2,627.00	39.76	48.32	2,465.04	294.50	524.79	598.65	1.64	1.63	-0.34	
2,688.00	40.12	48.68	2,511.81	320.45	554.12	637.57	0.70	0.59	0.59	
2,752.00	40.24	47.08	2,560.71	348.14	584.75	678.55	1.62	0.19	-2.50	
2,815.00	39.87	45.09	2,608.94	376.26	613.95	718.62	2.12	-0.59	-3.16	
2,878.00	38.87	42.42	2,657.64	405.11	641.59	757.83	3.12	-1.59	-4.24	
2,941.00	37.88	41.64	2,707.03	434.16	667.78	795.96	1.75	-1.57	-1.24	
3,004.00	37.58	44.09	2,756.86	462.41	694.00	833.67	2.43	-0.48	3.89	
3,068.00	37.49	44.50	2,807.61	490.32	721.23	872.00	0.41	-0.14	0.64	
3,130.00	37.81	43.77	2,856.70	517.50	747.60	909.21	0.89	0.52	-1.18	
3,194.00	38.44	44.89	2,907.05	545.76	775.21	948.05	1.46	0.98	1.75	
3,257.00	38.89	45.20	2,956.24	573.57	803.06	986.84	0.78	0.71	0.49	
3,321.00	39.29	45.56	3,005.91	601.92	831.79	1,026.64	0.72	0.63	0.56	
3,384.00	39.95	45.78	3,054.44	629.99	860.53	1,066.30	1.07	1.05	0.35	
3,447.00	40.92	49.14	3,102.40	657.60	890.63	1,106.81	3.79	1.54	5.33	
3,510.00	41.49	48.38	3,149.80	684.96	921.84	1,148.08	1.20	0.90	-1.21	
3,573.00	41.85	47.31	3,196.86	713.07	952.89	1,189.65	1.27	0.57	-1.70	
3,637.00	42.31	45.95	3,244.36	742.52	984.06	1,232.10	1.60	0.72	-2.13	
3,700.00	43.07	46.37	3,290.67	772.11	1,014.87	1,274.32	1.29	1.21	0.67	
3,763.00	43.39	49.15	3,336.57	801.11	1,046.81	1,317.13	3.06	0.51	4.41	
3,826.00	44.10	48.15	3,382.09	829.89	1,079.51	1,360.44	1.57	1.13	-1.59	
3,889.00	44.39	46.48	3,427.22	859.69	1,111.82	1,404.01	1.91	0.46	-2.65	
3,932.00	44.09	45.30	3,458.03	880.57	1,133.36	1,433.64	2.04	-0.70	-2.74	
4,019.00	43.53	43.58	3,520.81	923.56	1,175.53	1,492.87	1.51	-0.64	-1.98	
4,084.00	38.84	42.95	3,569.72	954.71	1,204.86	1,534.79	7.24	-7.22	-0.97	
4,148.00	34.25	44.32	3,621.12	982.30	1,231.13	1,572.16	7.28	-7.17	2.14	
4,211.00	29.13	45.67	3,674.71	1,005.72	1,254.51	1,604.75	8.20	-8.13	2.14	
4,274.00	26.87	50.17	3,730.34	1,025.56	1,276.41	1,634.08	4.91	-3.59	7.14	
4,337.00	26.58	59.39	3,786.63	1,041.86	1,299.49	1,662.33	6.59	-0.46	14.63	



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Wellbore:	TROUT CREEK 1-30	Survey Calculation Method:	Minimum Curvature
Design:	TROUT CREEK 1-30	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,400.00	26.73	59.76	3,842.94	1,056.17	1,323.86	1,690.50	0.36	0.24	0.59	
4,464.00	25.94	55.97	3,900.30	1,071.25	1,347.89	1,718.84	2.90	-1.23	-5.92	
4,527.00	28.13	53.74	3,956.41	1,087.75	1,371.29	1,747.47	3.83	3.48	-3.54	
4,590.00	28.81	52.24	4,011.79	1,105.83	1,395.27	1,777.48	1.57	1.08	-2.38	
4,653.00	21.40	43.02	4,068.82	1,123.56	1,415.15	1,803.94	13.27	-11.76	-14.63	
Intermed Casing										
4,673.39	20.76	43.58	4,087.85	1,128.90	1,420.18	1,811.13	3.30	-3.15	2.73	
4,716.00	19.42	44.85	4,127.87	1,139.39	1,430.38	1,825.51	3.30	-3.14	2.99	
4,779.00	18.43	45.98	4,187.46	1,153.74	1,444.93	1,845.66	1.68	-1.57	1.79	
4,840.00	19.67	46.92	4,245.12	1,167.45	1,459.36	1,865.36	2.09	2.03	1.54	
4,903.00	20.98	50.84	4,304.20	1,181.82	1,475.85	1,887.11	3.00	2.08	6.22	
4,966.00	22.76	55.09	4,362.67	1,195.92	1,494.59	1,910.55	3.78	2.83	6.75	
5,030.00	24.38	57.92	4,421.33	1,210.02	1,515.94	1,936.12	3.09	2.53	4.42	
5,093.00	26.17	57.83	4,478.29	1,224.32	1,538.72	1,962.98	2.84	2.84	-0.14	
5,156.00	24.17	59.80	4,535.31	1,238.21	1,561.63	1,989.71	3.44	-3.17	3.13	
5,224.00	25.20	57.40	4,597.10	1,253.01	1,585.85	2,018.04	2.11	1.51	-3.53	
5,284.00	29.42	56.13	4,650.40	1,268.11	1,608.86	2,045.55	7.10	7.03	-2.12	
5,348.00	32.62	55.10	4,705.24	1,286.75	1,636.07	2,078.52	5.07	5.00	-1.61	
5,411.00	29.59	50.61	4,759.18	1,306.34	1,662.02	2,111.03	6.05	-4.81	-7.13	
5,429.00	28.53	49.16	4,774.91	1,311.97	1,668.71	2,119.74	7.07	-5.89	-8.06	
LAST SVY - PBHL - TROUT CREEK 1-30										
5,500.00	25.30	45.61	4,838.22	1,333.68	1,692.39	2,151.59	5.08	-4.55	-5.00	

Survey Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
5,500.00	4,838.22	1,333.68	1,692.39	LAST SVY	

Checked By: _____	Approved By: _____	Date: _____
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Project: ROUTT COUNTY, CO
Site: TROUT CREEK 1-30
Well: TROUT CREEK 1-30
Wellbore: TROUT CREEK 1-30
Design: TROUT CREEK 1-30
Latitude: 40° 26' 32.860 N
Longitude: 106° 58' 19.470 W
GL: 6880.00
KB: KB @ 6896.00ft (SAVANA 650)
RIG: SAVANA 650



Weatherford®

WELL DETAILS: TROUT CREEK 1-30

+N/-S	+E/-W	Northing	Ground Level: Easting	6880.00 Latitude	Longitude	Slot
0.00	0.00	1407429.78	2590287.48	40° 26' 32.860 N	106° 58' 19.470 W	

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1100.27	0.00	0.00	1100.27	0.00	0.00	0.00	0.00	0.00	Start Build 3.00
2465.94	40.97	55.83	2352.50	262.76	387.05	3.00	55.83	467.82	Start 2248.19 hold at 2465.94 MD
4714.13	40.97	55.83	4050.00	1090.71	1606.61	0.00	0.00	1941.87	Start 1456.85 hold at 4714.13 MD
6170.98	40.97	55.83	5150.00	1627.23	2396.91	0.00	0.00	2897.07	TD at 6170.98

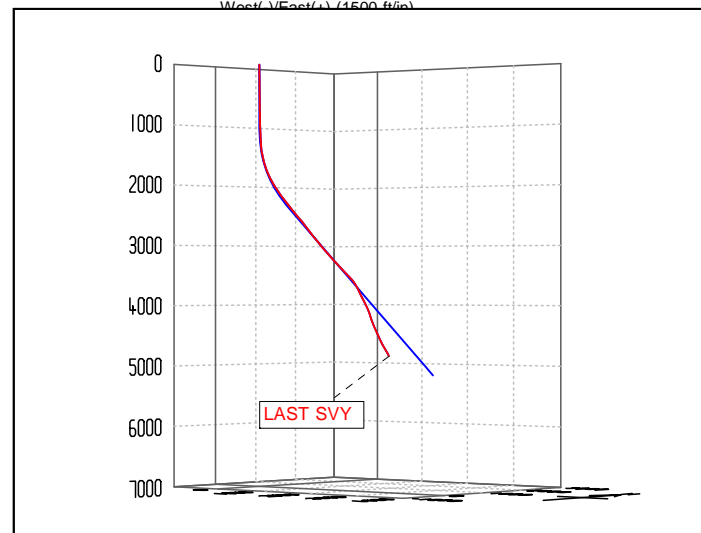
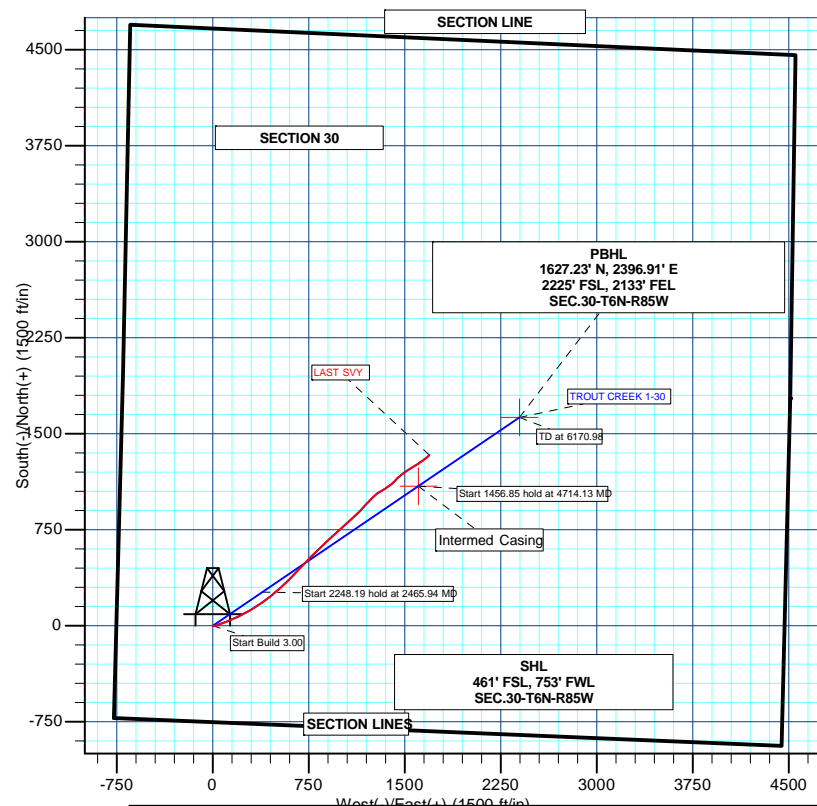
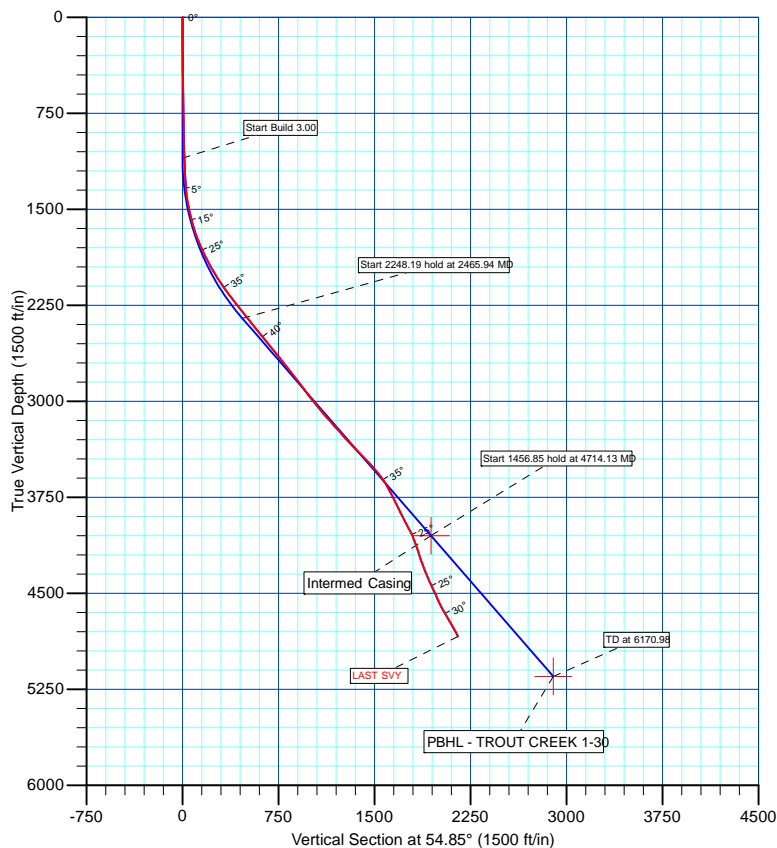
WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape Point
Intermed Casing	4050.00	1090.71	1606.61	1408520.48	2591894.09	40° 26' 43.900 N	106° 57' 48.820 W	
PBHL - TROUT CREEK 1-30	5150.00	1627.23	2396.91	1409057.00	2592684.38	40° 26' 49.330 N	106° 57' 58.926 W	Point



Azimuths to Grid North
True North: 0.95°
Magnetic North: 10.75°

Magnetic Field
Strength: 52644.3nT
Dip Angle: 66.63°
Date: 1/9/2013
Model: BGGM2012



Survey: WFT Surveys (TROUT CREEK 1-30/TROUT CREEK 1-30)

Created By: MATT MAYDEW

Date: 8:45, January 28 2013