

# Conoco Phillips Company

Arapahoe County, Colorado

Sec. 6-T4S-R63W

Converse Family #6-1H

Plan C

Design: Actual Field Surveys

## Sperry Drilling Services

## Standard Report

18 June, 2013

Well Coordinates: 1,692,005.67 N, 3,289,106.26 E (39° 43' 43.93" N, 104° 28' 19.58" W)

Ground Level: 5,602.00 ft

Local Coordinate Origin:

Centered on Well Converse Family #6-1H

Viewing Datum:

RKB 24 ft @ 5626.00ft (H&P 280)

TVDs to System:

N

North Reference:

True

Unit System:

API - US Survey Feet - Custom

Version: 2003.16 Build: 43I

**HALLIBURTON**

## Design Report for Converse Family #6-1H - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
1,797.90	5.26	159.53	1,796.93	-29.60	24.83	-24.91	0.76
<b>Tie-On to Gyro Survey @ 1797.90 ft</b>							
1,841.00	4.88	153.90	1,839.86	-33.10	26.33	-26.42	1.45
<b>First Sperry MWD Survey @ 1841.00 ft (Pilot Hole)</b>							
1,936.00	3.42	153.22	1,934.61	-39.25	29.38	-29.49	1.54
1,999.00	2.95	154.02	1,997.51	-42.39	30.94	-31.05	0.75
2,094.00	1.58	158.29	2,092.43	-45.80	32.49	-32.62	1.45
2,189.00	0.77	144.78	2,187.41	-47.54	33.35	-33.48	0.90
2,284.00	0.19	142.05	2,282.41	-48.19	33.81	-33.94	0.61
2,379.00	0.39	308.00	2,377.41	-48.11	33.65	-33.79	0.61
2,474.00	0.20	195.59	2,472.41	-48.07	33.35	-33.49	0.53
2,569.00	0.85	322.25	2,567.41	-47.68	32.88	-33.01	1.03
2,664.00	0.44	342.55	2,662.40	-46.77	32.34	-32.47	0.49
2,758.00	0.37	5.14	2,756.40	-46.12	32.26	-32.38	0.18
2,853.00	1.21	315.90	2,851.39	-45.10	31.59	-31.71	1.06
2,948.00	1.02	304.98	2,946.37	-43.89	30.20	-30.32	0.30
3,043.00	0.88	309.47	3,041.36	-42.94	28.94	-29.06	0.17
3,138.00	0.94	294.41	3,136.35	-42.16	27.67	-27.78	0.26
3,233.00	0.62	268.72	3,231.34	-41.85	26.44	-26.56	0.49
3,328.00	1.13	318.43	3,326.33	-41.16	25.31	-25.42	0.91
3,423.00	0.89	328.70	3,421.31	-39.83	24.30	-24.41	0.32
3,518.00	0.61	331.22	3,516.30	-38.75	23.68	-23.78	0.30
3,613.00	0.37	297.64	3,611.30	-38.17	23.16	-23.27	0.38
3,708.00	0.12	319.31	3,706.30	-37.95	22.82	-22.93	0.28
3,803.00	0.25	287.63	3,801.30	-37.81	22.56	-22.67	0.17
3,898.00	0.78	2.57	3,896.30	-37.10	22.39	-22.50	0.79
3,993.00	0.65	331.65	3,991.29	-35.98	22.17	-22.27	0.42
4,088.00	0.49	344.71	4,086.28	-35.12	21.80	-21.90	0.22
4,182.00	0.39	317.40	4,180.28	-34.49	21.48	-21.58	0.24
4,277.00	0.53	355.96	4,275.28	-33.82	21.23	-21.32	0.35
4,372.00	0.37	321.62	4,370.28	-33.14	21.01	-21.10	0.32
4,467.00	0.72	346.62	4,465.27	-32.32	20.68	-20.77	0.44
4,562.00	0.72	316.46	4,560.26	-31.30	20.13	-20.22	0.39
4,657.00	0.96	15.45	4,655.26	-30.10	19.93	-20.02	0.90
4,752.00	0.40	327.39	4,750.25	-29.06	19.97	-20.05	0.79
4,847.00	0.65	0.19	4,845.25	-28.24	19.79	-19.87	0.40
4,942.00	0.51	338.76	4,940.24	-27.31	19.64	-19.71	0.27
5,037.00	0.78	309.59	5,035.23	-26.50	18.99	-19.06	0.44
5,132.00	1.35	5.01	5,130.22	-24.97	18.59	-18.65	1.17
5,227.00	1.12	7.55	5,225.20	-22.94	18.81	-18.87	0.25
5,322.00	0.75	353.03	5,320.18	-21.40	18.85	-18.91	0.46
5,417.00	0.93	317.75	5,415.18	-20.21	18.26	-18.31	0.57
5,512.00	0.80	326.72	5,510.16	-19.09	17.38	-17.43	0.20
5,607.00	0.65	341.72	5,605.16	-18.02	16.84	-16.89	0.25
5,702.00	0.62	356.41	5,700.15	-17.00	16.64	-16.69	0.17
5,797.00	0.52	63.59	5,795.15	-16.29	17.00	-17.04	0.67
5,892.00	1.21	96.37	5,890.14	-16.21	18.38	-18.42	0.87
5,986.00	2.07	107.16	5,984.10	-16.82	20.99	-21.03	0.97
6,081.00	1.20	92.98	6,079.06	-17.38	23.62	-23.67	1.00
6,176.00	0.83	30.17	6,174.05	-16.84	24.96	-25.01	1.16

## Design Report for Converse Family #6-1H - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,271.00	0.91	359.47	6,269.04	-15.49	25.30	-25.34	0.49
6,366.00	0.57	359.98	6,364.03	-14.26	25.29	-25.33	0.36
6,461.00	0.44	48.36	6,459.02	-13.55	25.56	-25.60	0.45
6,556.00	0.47	347.17	6,554.02	-12.93	25.75	-25.78	0.49
6,651.00	0.54	62.80	6,649.02	-12.34	26.06	-26.09	0.65
<b>Tie-On to Pilot Hole Survey @ 6651.00 ft</b>							
6,770.00	10.58	277.34	6,767.37	-10.68	15.69	-15.72	9.27
<b>First Sperry MWD Survey @ 6770.00 ft (Lateral)</b>							
6,802.00	12.51	276.97	6,798.72	-9.89	9.34	-9.37	6.04
6,834.00	12.80	277.93	6,829.94	-8.98	2.39	-2.41	1.12
6,865.00	14.08	272.48	6,860.10	-8.34	-4.78	4.76	5.80
6,897.00	17.00	268.82	6,890.92	-8.27	-13.35	13.33	9.62
6,929.00	19.53	267.09	6,921.31	-8.64	-23.37	23.35	8.08
6,960.00	21.95	267.48	6,950.30	-9.15	-34.33	34.31	7.82
6,992.00	24.76	267.93	6,979.67	-9.66	-47.01	46.98	8.80
7,024.00	27.58	268.01	7,008.39	-10.16	-61.11	61.08	8.81
7,055.00	30.74	268.89	7,035.46	-10.56	-76.21	76.18	10.29
7,087.00	33.77	267.41	7,062.52	-11.12	-93.27	93.24	9.78
7,119.00	37.22	268.44	7,088.57	-11.79	-111.84	111.81	10.94
7,150.00	40.56	269.58	7,112.69	-12.12	-131.30	131.26	11.02
7,182.00	43.43	269.72	7,136.47	-12.25	-152.70	152.67	8.97
7,213.00	46.40	269.37	7,158.42	-12.42	-174.59	174.55	9.61
7,245.00	49.36	269.64	7,179.88	-12.63	-198.32	198.29	9.27
7,277.00	52.17	270.69	7,200.12	-12.55	-223.10	223.07	9.14
7,308.00	54.72	270.88	7,218.58	-12.21	-248.00	247.97	8.24
7,340.00	57.97	271.62	7,236.31	-11.62	-274.63	274.59	10.34
7,372.00	61.53	271.90	7,252.43	-10.77	-302.25	302.22	11.15
7,403.00	64.63	272.07	7,266.47	-9.82	-329.87	329.84	10.01
7,435.00	67.57	271.48	7,279.43	-8.91	-359.11	359.09	9.34
7,467.00	70.35	270.25	7,290.92	-8.46	-388.97	388.95	9.40
7,498.00	73.46	269.86	7,300.54	-8.44	-418.43	418.41	10.10
7,530.00	77.05	268.71	7,308.69	-8.83	-449.37	449.35	11.74
7,562.00	80.73	268.77	7,314.85	-9.52	-480.76	480.73	11.50
7,593.00	83.28	269.24	7,319.16	-10.05	-511.45	511.42	8.36
7,627.00	86.58	269.49	7,322.17	-10.42	-545.31	545.28	9.73
7,753.00	91.42	270.85	7,324.37	-10.05	-671.25	671.22	3.99
7,765.00	91.36	270.74	7,324.08	-9.88	-683.25	683.22	1.04
7,828.00	90.43	270.25	7,323.09	-9.34	-746.24	746.21	1.67
7,860.00	90.25	270.01	7,322.90	-9.27	-778.23	778.21	0.94
7,955.00	90.31	269.97	7,322.44	-9.28	-873.23	873.20	0.08
8,049.00	90.86	269.16	7,321.48	-10.00	-967.22	967.19	1.04
8,144.00	90.00	269.22	7,320.76	-11.34	-1,062.21	1,062.18	0.91
8,239.00	90.25	269.10	7,320.56	-12.73	-1,157.20	1,157.16	0.29
8,334.00	90.62	268.91	7,319.84	-14.38	-1,252.18	1,252.14	0.44
8,429.00	89.94	269.17	7,319.37	-15.97	-1,347.17	1,347.12	0.77
8,524.00	90.25	268.88	7,319.21	-17.59	-1,442.15	1,442.10	0.45
8,587.00	89.81	269.58	7,319.18	-18.44	-1,505.15	1,505.09	1.31
8,619.00	89.63	270.23	7,319.34	-18.49	-1,537.15	1,537.09	2.11
8,650.00	89.20	269.98	7,319.65	-18.43	-1,568.15	1,568.09	1.60
8,714.00	90.00	270.53	7,320.10	-18.15	-1,632.14	1,632.09	1.52
8,809.00	90.62	270.93	7,319.59	-16.94	-1,727.13	1,727.08	0.78

## Design Report for Converse Family #6-1H - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,904.00	91.36	271.00	7,317.95	-15.34	-1,822.10	1,822.06	0.78
8,999.00	90.25	270.63	7,316.61	-13.99	-1,917.08	1,917.04	1.23
9,094.00	90.31	270.78	7,316.15	-12.82	-2,012.08	2,012.03	0.17
9,189.00	90.31	270.81	7,315.63	-11.50	-2,107.07	2,107.03	0.03
9,284.00	90.49	270.77	7,314.97	-10.19	-2,202.05	2,202.02	0.19
9,377.00	89.69	270.67	7,314.82	-9.02	-2,295.05	2,295.01	0.87
9,472.00	89.20	270.62	7,315.74	-7.95	-2,390.04	2,390.00	0.52
9,567.00	90.55	271.17	7,315.95	-6.47	-2,485.02	2,484.99	1.53
9,662.00	90.99	271.48	7,314.67	-4.27	-2,579.99	2,579.97	0.57
9,757.00	90.19	270.76	7,313.70	-2.41	-2,674.96	2,674.95	1.13
9,852.00	90.93	270.90	7,312.77	-1.04	-2,769.95	2,769.93	0.79
9,947.00	89.63	270.47	7,312.30	0.10	-2,864.94	2,864.93	1.44
10,042.00	90.43	270.51	7,312.25	0.91	-2,959.93	2,959.92	0.84
10,137.00	90.37	270.76	7,311.59	1.96	-3,054.92	3,054.92	0.27
10,232.00	90.56	270.57	7,310.82	3.07	-3,149.91	3,149.91	0.28
10,327.00	90.80	270.61	7,309.69	4.04	-3,244.90	3,244.90	0.26
10,422.00	89.75	270.43	7,309.24	4.91	-3,339.90	3,339.90	1.12
10,516.00	90.49	270.76	7,309.04	5.88	-3,433.89	3,433.89	0.86
10,611.00	89.88	270.49	7,308.73	6.92	-3,528.88	3,528.89	0.70
10,706.00	90.19	270.03	7,308.67	7.35	-3,623.88	3,623.89	0.58
10,801.00	90.56	269.73	7,308.05	7.15	-3,718.88	3,718.89	0.50
10,896.00	90.80	269.32	7,306.93	6.36	-3,813.87	3,813.87	0.50
10,992.00	90.80	268.55	7,305.58	4.58	-3,909.84	3,909.84	0.80
11,086.00	90.62	269.07	7,304.42	2.63	-4,003.81	4,003.81	0.59
11,182.00	90.12	269.37	7,303.80	1.32	-4,099.80	4,099.79	0.61
11,277.00	90.37	269.35	7,303.39	0.26	-4,194.80	4,194.78	0.26
11,291.00	90.37	269.13	7,303.30	0.07	-4,208.80	4,208.78	1.57
<b>Final Sperry MWD Survey @ 11291.00 ft (Lateral)</b>							
11,354.00	90.40	269.00	7,302.88	-0.95	-4,271.79	4,271.77	0.21
<b>Straight Line Projection to TD @ 11354.00 ft (Lateral)</b>							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,797.90	1,796.93	-29.60	24.83	Tie-On to Gyro Survey @ 1797.90 ft
1,841.00	1,839.86	-33.10	26.33	First Sperry MWD Survey @ 1841.00 ft (Pilot Hole)
6,651.00	6,649.02	-12.34	26.06	Tie-On to Pilot Hole Survey @ 6651.00 ft
6,770.00	6,767.37	-10.68	15.69	First Sperry MWD Survey @ 6770.00 ft (Lateral)
11,291.00	7,303.30	0.07	-4,208.80	Final Sperry MWD Survey @ 11291.00 ft (Lateral)
11,354.00	7,302.88	-0.95	-4,271.79	Straight Line Projection to TD @ 11354.00 ft (Lateral)

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Converse Family 6-1H PBR0 BHL Tgt	270.16	Slot	0.00	0.00	0.00

## Design Report for Converse Family #6-1H - Actual Field Surveys

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
75.50	1,797.90	Gyro surface hole survey	SRG-GYRO-MS
1,841.00	7,646.00	Sperry MWD Survey (Pilot Hole)	MWD
6,770.00	11,354.00	Sperry MWD Survey (Lateral)	MWD

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Converse Family 6-1	0.00	0.00	7,294.69	11.69	-4,272.51	1,691,969.01	3,284,833.89	39° 43' 44.040 N	104° 29' 14.266 W
- actual wellpath misses target center by 15.08ft at 11354.00ft MD (7302.88 TVD, -0.95 N, -4271.79 E)									
- Point									
Converse Family 6-1	0.00	0.00	0.00	0.00	0.00	1,692,005.67	3,289,106.26	39° 43' 43.928 N	104° 28' 19.582 W
- actual wellpath misses target center by 1797.34ft at 1797.90ft MD (1796.93 TVD, -29.60 N, 24.83 E)									
- Polygon									
Point 1			227.56	-1,980.15		1,690,028.22	3,289,356.21		
Point 2			-2,412.05	-1,972.75		1,690,005.76	3,286,716.68		
Point 3			-4,923.11	-1,966.56		1,689,983.54	3,284,205.71		
Point 4			-4,882.10	672.55		1,692,622.94	3,284,216.86		
Point 5			-4,840.82	3,316.40		1,695,267.09	3,284,228.22		
Point 6			-2,306.65	3,321.15		1,695,300.51	3,286,762.18		
Point 7			332.98	3,323.96		1,695,333.19	3,289,401.61		
Point 8			271.13	666.98		1,692,675.68	3,289,369.82		
Converse Family 6-1	0.00	0.00	0.00	0.00	0.00	1,692,005.67	3,289,106.26	39° 43' 43.928 N	104° 28' 19.582 W
- actual wellpath misses target center by 1797.34ft at 1797.90ft MD (1796.93 TVD, -29.60 N, 24.83 E)									
- Polygon									
Point 1			-372.44	-1,380.15		1,690,621.40	3,288,749.46		
Point 2			-2,412.05	-1,372.75		1,690,605.72	3,286,709.89		
Point 3			-4,323.11	-1,366.56		1,690,590.29	3,284,798.89		
Point 4			-4,282.10	672.55		1,692,629.73	3,284,816.82		
Point 5			-4,240.82	2,716.40		1,694,673.92	3,284,834.97		
Point 6			-2,306.65	2,721.15		1,694,700.55	3,286,768.97		
Point 7			-267.02	2,723.96		1,694,726.44	3,288,808.43		
Point 8			-328.87	666.98		1,692,668.89	3,288,769.86		
Converse Family 6-1	0.00	0.00	7,306.00	11.69	-4,272.51	1,691,969.02	3,284,833.89	39° 43' 44.040 N	104° 29' 14.266 W
- actual wellpath misses target center by 13.04ft at 11354.00ft MD (7302.88 TVD, -0.95 N, -4271.79 E)									
- Point									

**North Reference Sheet for Sec. 6-T4S-R63W - Converse Family #6-1H - Plan C**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.

Vertical Depths are relative to RKB 24 ft @ 5626.00ft (H&P 280). Northing and Easting are relative to Converse Family #6-1H

Coordinate System is US State Plane 1983, Colorado Central Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is 105° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:39° 45' 0.000 N°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99999589

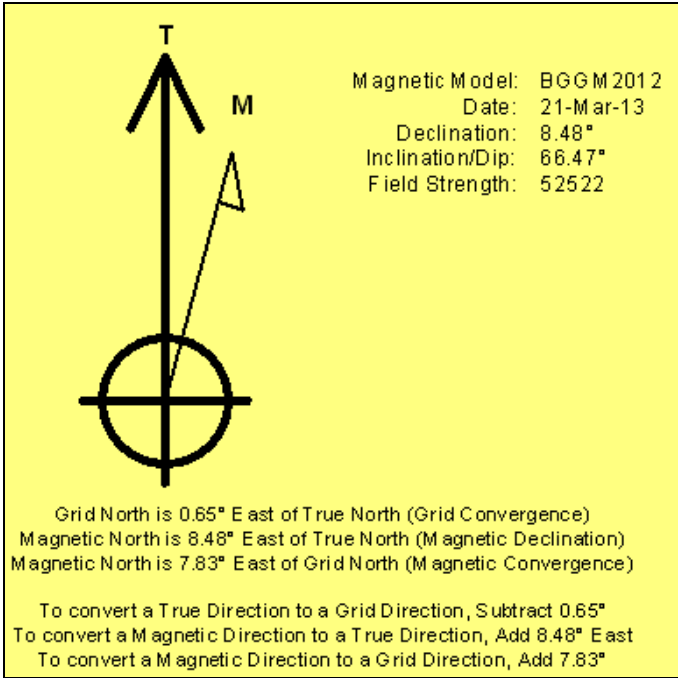
Grid Coordinates of Well: 1,692,005.67 ft N, 3,289,106.26 ft E

Geographical Coordinates of Well: 39° 43' 43.93" N, 104° 28' 19.58" W

Grid Convergence at Surface is: 0.65°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,354.00ft the Bottom Hole Displacement is 4,271.79ft in the Direction of 269.99° (True).

Magnetic Convergence at surface is: -7.83° (21 March 2013, , BGGM2012)

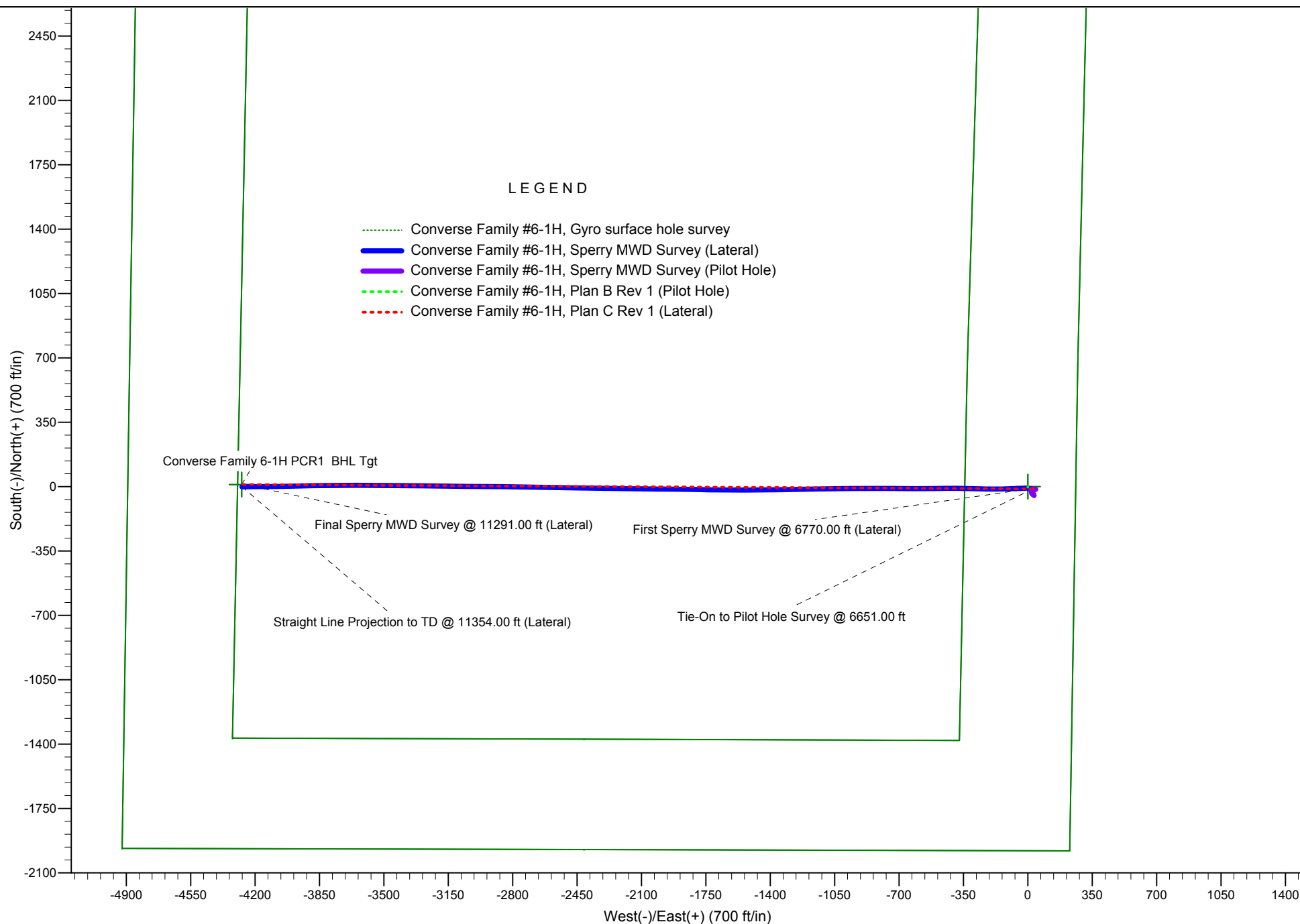


Project: Arapahoe County, Colorado  
Site: Sec. 6-T4S-R63W  
Well: Converse Family #6-1H

# Conoco Phillips Company

**HALLIBURTON**

Sperry Drilling



Project: Arapahoe County, Colorado  
Site: Sec. 6-T4S-R63W  
Well: Converse Family #6-1H

# Conoco Phillips Company

**HALLIBURTON**  
Sperry Drilling

