

# Conoco Phillips Company

Arapahoe County, Colorado

Sec. 36-T4S-R64W

Murphy Family 4-64-36-1H

Plan A

Plan: Plan A Rev 0 (Pilot Hole)

## Sperry Drilling Services

### Proposal Report

10 June, 2013

Well Coordinates: 1,665,215.50 N, 3,283,850.74 E (39° 39' 19.76" N, 104° 29' 30.65" W)

Ground Level: 5,913.00 ft

Local Coordinate Origin: Centered on Well Murphy Family 4-64-36-1H

Viewing Datum: RKB 24 ft @ 5937.00ft (H&P 280)

TVDs to System: N

North Reference: True

Unit System: API - US Survey Feet - Custom

Version: 2003.16 Build: 43I

**HALLIBURTON**

## Plan Report for Murphy Family 4-64-36-1H - Plan A Rev 0 (Pilot Hole)

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Toolface Azimuth (°)
0.00	0.00	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	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,766.00	0.00	0.00	1,766.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Fox Hills Aquifer</b>										
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,922.00	0.00	0.00	1,922.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Pierre Shale</b>										
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Begin Nudge 2200.00 ft</b>										
2,300.00	2.00	19.00	2,299.98	1.65	0.57	1.75	2.00	2.00	0.00	19.00
<b>Build Rate 2.00 °/100 ft</b>										
2,400.00	4.00	19.00	2,399.84	6.60	2.27	6.98	2.00	2.00	0.00	0.00
2,485.00	5.70	19.00	2,484.53	13.39	4.61	14.16	2.00	2.00	0.00	0.00
<b>End Nudge 2485.00 ft</b>										
2,500.00	5.70	19.00	2,499.46	14.80	5.10	15.65	0.00	0.00	0.00	0.00
2,600.00	5.70	19.00	2,598.96	24.19	8.33	25.59	0.00	0.00	0.00	0.00
2,700.00	5.70	19.00	2,698.47	33.58	11.56	35.52	0.00	0.00	0.00	0.00
2,800.00	5.70	19.00	2,797.97	42.97	14.80	45.45	0.00	0.00	0.00	0.00
2,900.00	5.70	19.00	2,897.48	52.37	18.03	55.38	0.00	0.00	0.00	0.00
3,000.00	5.70	19.00	2,996.98	61.76	21.26	65.31	0.00	0.00	0.00	0.00
3,100.00	5.70	19.00	3,096.49	71.15	24.50	75.25	0.00	0.00	0.00	0.00
3,200.00	5.70	19.00	3,195.99	80.54	27.73	85.18	0.00	0.00	0.00	0.00
3,300.00	5.70	19.00	3,295.50	89.93	30.96	95.11	0.00	0.00	0.00	0.00
3,400.00	5.70	19.00	3,395.01	99.32	34.20	105.04	0.00	0.00	0.00	0.00
3,500.00	5.70	19.00	3,494.51	108.71	37.43	114.97	0.00	0.00	0.00	0.00
3,600.00	5.70	19.00	3,594.02	118.10	40.67	124.91	0.00	0.00	0.00	0.00
3,700.00	5.70	19.00	3,693.52	127.49	43.90	134.84	0.00	0.00	0.00	0.00
3,800.00	5.70	19.00	3,793.03	136.88	47.13	144.77	0.00	0.00	0.00	0.00
3,900.00	5.70	19.00	3,892.53	146.27	50.37	154.70	0.00	0.00	0.00	0.00
4,000.00	5.70	19.00	3,992.04	155.66	53.60	164.63	0.00	0.00	0.00	0.00
4,100.00	5.70	19.00	4,091.54	165.06	56.83	174.57	0.00	0.00	0.00	0.00
4,200.00	5.70	19.00	4,191.05	174.45	60.07	184.50	0.00	0.00	0.00	0.00
4,300.00	5.70	19.00	4,290.56	183.84	63.30	194.43	0.00	0.00	0.00	0.00
4,400.00	5.70	19.00	4,390.06	193.23	66.53	204.36	0.00	0.00	0.00	0.00
<b>Hold Inc 5.70°, Azi 19.00°</b>										
4,500.00	5.70	19.00	4,489.57	202.62	69.77	214.29	0.00	0.00	0.00	0.00
4,600.00	5.70	19.00	4,589.07	212.01	73.00	224.23	0.00	0.00	0.00	0.00
4,700.00	5.70	19.00	4,688.58	221.40	76.23	234.16	0.00	0.00	0.00	0.00
4,800.00	5.70	19.00	4,788.08	230.79	79.47	244.09	0.00	0.00	0.00	0.00

## Plan Report for Murphy Family 4-64-36-1H - Plan A Rev 0 (Pilot Hole)

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	Toolface Azimuth (°)
4,900.00	5.70	19.00	4,887.59	240.18	82.70	254.02	0.00	0.00	0.00	0.00
5,000.00	5.70	19.00	4,987.09	249.57	85.93	263.95	0.00	0.00	0.00	0.00
5,100.00	5.70	19.00	5,086.60	258.96	89.17	273.89	0.00	0.00	0.00	0.00
5,200.00	5.70	19.00	5,186.11	268.36	92.40	283.82	0.00	0.00	0.00	0.00
5,300.00	5.70	19.00	5,285.61	277.75	95.64	293.75	0.00	0.00	0.00	0.00
5,400.00	5.70	19.00	5,385.12	287.14	98.87	303.68	0.00	0.00	0.00	0.00
5,500.00	5.70	19.00	5,484.62	296.53	102.10	313.61	0.00	0.00	0.00	0.00
5,600.00	5.70	19.00	5,584.13	305.92	105.34	323.55	0.00	0.00	0.00	0.00
5,700.00	5.70	19.00	5,683.63	315.31	108.57	333.48	0.00	0.00	0.00	0.00
5,800.00	5.70	19.00	5,783.14	324.70	111.80	343.41	0.00	0.00	0.00	0.00
5,900.00	5.70	19.00	5,882.64	334.09	115.04	353.34	0.00	0.00	0.00	0.00
6,000.00	5.70	19.00	5,982.15	343.48	118.27	363.27	0.00	0.00	0.00	0.00
6,100.00	5.70	19.00	6,081.66	352.87	121.50	373.21	0.00	0.00	0.00	0.00
6,200.00	5.70	19.00	6,181.16	362.26	124.74	383.14	0.00	0.00	0.00	0.00
6,300.00	5.70	19.00	6,280.67	371.65	127.97	393.07	0.00	0.00	0.00	0.00
6,400.00	5.70	19.00	6,380.17	381.05	131.20	403.00	0.00	0.00	0.00	0.00
6,419.93	5.70	19.00	6,400.00	382.92	131.85	404.98	0.00	0.00	0.00	0.00
<b>Begin Drop 6419.93 ft</b>										
6,500.00	4.10	19.00	6,479.78	389.38	134.08	411.82	2.00	-2.00	0.00	180.00
6,600.00	2.10	19.00	6,579.63	394.49	135.83	417.22	2.00	-2.00	0.00	-180.00
<b>Drop Rate 2.00 °/100 ft</b>										
6,700.00	0.10	19.00	6,679.60	396.31	136.46	419.14	2.00	-2.00	0.00	180.00
6,704.93	0.00	0.00	6,684.53	396.31	136.46	419.15	2.00	-2.00	0.00	-180.00
<b>End Drop 6704.93 ft</b>										
6,800.00	0.00	0.00	6,779.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,879.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	6,979.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,079.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,179.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,279.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,359.40	0.00	0.00	7,339.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Sharon Springs Shale</b>										
7,400.00	0.00	0.00	7,379.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,470.40	0.00	0.00	7,450.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Niobrara Fm.</b>										
7,500.00	0.00	0.00	7,479.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,530.40	0.00	0.00	7,510.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Niobrara B</b>										
7,579.40	0.00	0.00	7,559.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Niobrara C</b>										
7,600.00	0.00	0.00	7,579.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,646.40	0.00	0.00	7,626.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Niobrara D</b>										
7,700.00	0.00	0.00	7,679.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,798.40	0.00	0.00	7,778.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Fort Hays</b>										
7,800.00	0.00	0.00	7,779.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
7,826.40	0.00	0.00	7,806.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Carlisle Shale</b>										
7,879.40	0.00	0.00	7,859.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Greenhorn</b>										
7,900.00	0.00	0.00	7,879.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	7,979.60	396.31	136.46	419.15	0.00	0.00	0.00	0.00
8,029.40	0.00	0.00	8,009.00	396.31	136.46	419.15	0.00	0.00	0.00	0.00
<b>Total Depth 8029.40 ft</b>										

## Plan Report for Murphy Family 4-64-36-1H - Plan A Rev 0 (Pilot Hole)

### Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,200.00	2,200.00	0.00	0.00	Begin Nudge 2200.00 ft
2,300.00	2,299.98	1.65	0.57	Build Rate 2.00 °/100 ft
2,485.00	2,484.53	13.39	4.61	End Nudge 2485.00 ft
4,400.00	4,390.06	193.23	66.53	Hold Inc 5.70°, Azi 19.00°
6,419.93	6,400.00	382.92	131.85	Begin Drop 6419.93 ft
6,600.00	6,579.63	394.49	135.83	Drop Rate 2.00 °/100 ft
6,704.93	6,684.53	396.31	136.46	End Drop 6704.93 ft
8,029.40	8,009.00	396.31	136.46	Total Depth 8029.40 ft

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
TD	No Target (Freehand)	19.00	Slot	0.00	0.00	0.00

### Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	8,029.40	Plan A Rev 0 (Pilot Hole)	MWD

### Formation Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,766.00	1,766.00	Fox Hills Aquifer			
1,922.00	1,922.00	Pierre Shale			
7,359.40	7,339.00	Sharon Springs Shale			
7,470.40	7,450.00	Niobrara Fm.			
7,530.40	7,510.00	Niobrara B			
7,579.40	7,559.00	Niobrara C			
7,646.40	7,626.00	Niobrara D			
7,798.40	7,778.00	Fort Hays			
7,826.40	7,806.00	Carlisle Shale			
7,879.40	7,859.00	Greenhorn			

### Targets associated with this wellbore

Target Name	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Shape
Sec.36-T4S-R64W SB	0.00	-39.34	0.84	Polygon
Murphy Family 4-64-36-1H PAR0 BHL Tgt	7,627.00	458.64	-4,537.84	Point
Sec.36-T4S-R64W SL	0.00	-39.34	0.84	Polygon

# North Reference Sheet for Sec. 36-T4S-R64W - Murphy Family 4-64-36-1H - Plan A

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 @ 5937.00ft (H&P 280). Northing and Easting are relative to Murphy Family 4-64-36-1H  
 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 -105.50°, 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: 0.99998267  
 Grid Coordinates of Well: 1,665,215.50 ft N, 3,283,850.74 ft E  
 Geographical Coordinates of Well: 39° 39' 19.76" N, 104° 29' 30.65" W  
 Grid Convergence at Surface is: 0.64°

Based upon Minimum Curvature type calculations, at a Measured Depth of 8,029.40ft  
 the Bottom Hole Displacement is 419.15ft in the Direction of 19.00° (True).  
 Magnetic Convergence at surface is: -7.81° (30 June 2013, , BGGM2012)

