

Conoco Phillips Company

Arapahoe County, Colorado

Sec. 17-T4S-R64W

Zukowski 17-1H

Plan B

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

02 August, 2013

Well Coordinates: 1,684,063.23 N, 3,262,874.90 E (39° 42' 28.24" N, 104° 33' 56.35" W)

Ground Level: 5,648.00 ft

Local Coordinate Origin:	Centered on Well Zukowski 17-1H
Viewing Datum:	RKB 24 ft @ 5672.00ft (H&P 280)
TVDs to System:	N
North Reference:	True
Unit System:	API - US Survey Feet - Custom

Version: 2003.16 Build: 431

HALLIBURTON

Design Report for Zukowski 17-1H - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
1,960.00	0.95	353.09	1,959.89	18.82	-2.20	3.42	0.08
Tie-On to Surface Casing Gyro Surveys (Pilot Hole) @ 1960.00 ft							
1,998.00	0.76	346.41	1,997.89	19.38	-2.30	3.55	0.56
First Sperry MWD Survey (Pilot Hole) @ 1998.00 ft							
2,093.00	0.65	316.85	2,092.88	20.39	-2.82	4.13	0.39
2,188.00	0.74	342.34	2,187.87	21.36	-3.37	4.75	0.34
2,283.00	1.14	11.31	2,282.86	22.88	-3.37	4.84	0.64
2,378.00	1.96	13.49	2,377.83	25.38	-2.81	4.44	0.87
2,473.00	1.97	17.77	2,472.77	28.52	-1.93	3.77	0.15
2,568.00	2.61	14.41	2,567.69	32.17	-0.89	2.97	0.69
2,663.00	2.68	15.03	2,662.59	36.41	0.22	2.14	0.08
2,758.00	2.33	15.30	2,757.50	40.41	1.31	1.31	0.37
2,853.00	1.94	14.48	2,852.44	43.83	2.22	0.62	0.41
2,948.00	2.65	12.43	2,947.36	47.54	3.09	-0.01	0.75
3,043.00	2.81	5.73	3,042.25	52.00	3.80	-0.43	0.38
3,138.00	2.53	357.83	3,137.15	56.41	3.95	-0.29	0.49
3,233.00	1.91	351.31	3,232.08	60.07	3.63	0.26	0.70
3,328.00	2.29	355.05	3,327.01	63.53	3.23	0.89	0.43
3,423.00	2.44	353.76	3,421.93	67.43	2.85	1.52	0.17
3,517.00	2.45	352.16	3,515.85	71.41	2.35	2.27	0.07
3,612.00	2.41	9.37	3,610.76	75.39	2.40	2.48	0.77
3,707.00	1.99	8.01	3,705.69	78.99	2.96	2.16	0.45
3,802.00	2.68	1.68	3,800.61	82.85	3.25	2.11	0.77
3,897.00	2.47	3.36	3,895.52	87.11	3.44	2.21	0.23
3,992.00	2.19	5.72	3,990.44	90.96	3.74	2.15	0.31
4,087.00	1.79	353.82	4,085.38	94.24	3.76	2.35	0.60
4,182.00	2.39	5.90	4,180.32	97.69	3.80	2.52	0.78
4,277.00	2.14	6.50	4,275.24	101.42	4.21	2.36	0.26
4,372.00	2.51	7.87	4,370.17	105.24	4.69	2.13	0.39
4,466.00	2.53	14.88	4,464.08	109.29	5.51	1.57	0.33
4,561.00	2.47	19.38	4,558.98	113.24	6.73	0.62	0.22
4,656.00	2.47	21.53	4,653.90	117.08	8.16	-0.56	0.10
4,751.00	1.76	5.45	4,748.83	120.43	9.05	-1.23	0.97
4,845.00	2.01	356.53	4,842.78	123.52	9.08	-1.07	0.41
4,940.00	2.52	5.55	4,937.71	127.26	9.18	-0.93	0.65
5,035.00	2.37	10.80	5,032.62	131.27	9.76	-1.24	0.28
5,130.00	2.65	11.62	5,127.53	135.35	10.57	-1.79	0.30
5,225.00	2.86	10.39	5,222.42	139.83	11.44	-2.36	0.23
5,320.00	2.91	9.64	5,317.30	144.54	12.27	-2.89	0.07
5,415.00	2.91	11.01	5,412.18	149.28	13.13	-3.44	0.07
5,510.00	2.85	5.43	5,507.06	154.00	13.81	-3.82	0.30
5,605.00	3.05	8.66	5,601.93	158.85	14.42	-4.11	0.27
5,700.00	2.99	4.24	5,696.80	163.82	14.98	-4.35	0.25
5,795.00	3.37	3.05	5,791.65	169.08	15.31	-4.34	0.41
5,890.00	3.42	356.92	5,886.49	174.70	15.31	-3.97	0.39
5,985.00	3.02	7.11	5,981.34	180.01	15.47	-3.79	0.73
6,079.00	3.06	354.25	6,075.21	184.96	15.52	-3.52	0.73
6,174.00	2.46	345.68	6,170.10	189.46	14.76	-2.47	0.76
6,269.00	2.59	334.04	6,265.00	193.37	13.32	-0.78	0.56
6,364.00	1.08	315.96	6,359.95	195.94	11.76	0.94	1.68

Design Report for Zukowski 17-1H - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,459.00	0.20	48.71	6,454.95	196.69	11.26	1.49	1.17
6,554.00	0.26	122.48	6,549.95	196.69	11.57	1.18	0.29
6,649.00	0.04	214.04	6,644.95	196.54	11.73	1.01	0.28
6,744.00	0.07	41.97	6,739.95	196.56	11.75	0.99	0.12
6,839.00	0.51	294.77	6,834.95	196.78	11.41	1.35	0.56
6,934.00	0.34	144.94	6,929.94	196.73	11.18	1.57	0.87
Tie-On to Pilot Hole Surveys (Lateral) @ 6934.00 ft							
7,089.00	14.86	274.44	7,083.24	197.90	-8.48	21.27	9.73
First Sperry MWD Survey (Lateral) @ 7089.00 ft							
7,120.00	15.88	274.19	7,113.13	198.51	-16.67	29.48	3.30
7,152.00	15.59	274.42	7,143.93	199.16	-25.33	38.16	0.93
7,184.00	17.12	271.69	7,174.63	199.64	-34.32	47.17	5.35
7,215.00	19.33	267.51	7,204.08	199.55	-44.01	56.83	8.28
7,247.00	21.96	269.87	7,234.02	199.30	-55.29	68.07	8.62
7,278.00	23.86	272.62	7,262.57	199.58	-67.35	80.12	7.03
7,310.00	26.22	273.78	7,291.56	200.34	-80.87	93.66	7.53
7,342.00	28.62	272.83	7,319.97	201.18	-95.58	108.40	7.62
7,373.00	31.64	272.34	7,346.78	201.88	-111.12	123.95	9.77
7,405.00	34.55	271.62	7,373.58	202.48	-128.59	141.42	9.18
7,437.00	38.00	271.18	7,399.38	202.94	-147.51	160.33	10.81
7,468.00	41.17	271.02	7,423.26	203.32	-167.26	180.06	10.23
7,500.00	45.08	269.55	7,446.62	203.42	-189.13	201.89	12.62
7,532.00	48.70	270.46	7,468.48	203.43	-212.48	225.20	11.50
7,563.00	52.12	271.86	7,488.24	203.92	-236.36	249.06	11.57
7,595.00	54.82	272.36	7,507.28	204.86	-262.06	274.76	8.53
7,626.00	57.72	271.95	7,524.49	205.83	-287.82	300.53	9.42
7,658.00	61.00	270.87	7,540.80	206.51	-315.34	328.04	10.65
7,690.00	65.08	270.26	7,555.30	206.78	-343.85	356.51	12.86
7,721.00	69.94	270.60	7,567.16	207.00	-372.48	385.10	15.71
7,753.00	73.62	270.56	7,577.16	207.31	-402.87	415.44	11.50
7,785.00	76.23	270.94	7,585.48	207.71	-433.77	446.30	8.24
7,816.00	78.76	270.95	7,592.20	208.21	-464.02	476.52	8.16
7,848.00	82.23	270.70	7,597.48	208.67	-495.58	508.04	10.87
7,880.00	85.26	270.99	7,600.97	209.14	-527.38	539.81	9.51
7,911.00	86.98	271.06	7,603.06	209.69	-558.30	570.70	5.55
7,985.00	90.06	273.72	7,604.98	212.77	-632.20	644.64	5.50
8,046.00	90.25	273.64	7,604.81	216.69	-693.07	705.64	0.34
8,078.00	90.12	273.71	7,604.71	218.74	-725.01	737.64	0.46
8,109.00	90.12	273.63	7,604.64	220.72	-755.94	768.64	0.26
8,141.00	89.81	273.43	7,604.66	222.69	-787.88	800.64	1.15
8,236.00	89.44	272.76	7,605.28	227.82	-882.74	895.63	0.81
8,299.00	89.75	272.22	7,605.73	230.56	-945.68	958.62	0.99
8,331.00	89.94	272.04	7,605.82	231.75	-977.66	990.60	0.82
8,394.00	90.19	271.63	7,605.74	233.77	-1,040.62	1,053.57	0.76
8,426.00	90.31	271.39	7,605.60	234.61	-1,072.61	1,085.55	0.84
8,521.00	90.62	270.38	7,604.83	236.08	-1,167.60	1,180.43	1.11
8,552.00	90.80	270.49	7,604.45	236.31	-1,198.59	1,211.37	0.68
8,615.00	91.05	270.13	7,603.43	236.65	-1,261.58	1,274.25	0.70
8,647.00	90.68	269.09	7,602.95	236.44	-1,293.58	1,306.17	3.45
8,710.00	91.11	269.38	7,601.96	235.60	-1,356.57	1,368.97	0.82
8,805.00	88.46	269.56	7,602.32	234.72	-1,451.55	1,463.70	2.80

Design Report for Zukowski 17-1H - Actual Field Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,900.00	89.38	269.88	7,604.11	234.25	-1,546.53	1,558.45	1.03
8,995.00	90.68	270.73	7,604.06	234.76	-1,641.53	1,653.28	1.63
9,090.00	92.41	270.93	7,601.50	236.13	-1,736.48	1,748.12	1.83
9,185.00	91.85	270.79	7,597.97	237.56	-1,831.40	1,842.94	0.61
9,280.00	91.24	270.67	7,595.41	238.77	-1,926.36	1,937.77	0.65
9,375.00	90.74	270.59	7,593.77	239.81	-2,021.34	2,032.62	0.53
9,470.00	91.79	270.85	7,591.67	241.01	-2,116.31	2,127.47	1.14
9,533.00	91.54	270.31	7,589.84	241.64	-2,179.28	2,190.35	0.94
9,565.00	91.11	269.95	7,589.10	241.72	-2,211.27	2,222.28	1.75
9,660.00	90.00	270.02	7,588.18	241.69	-2,306.26	2,317.07	1.17
9,755.00	88.89	270.22	7,589.10	241.89	-2,401.26	2,411.88	1.19
9,786.00	89.14	270.34	7,589.63	242.04	-2,432.25	2,442.82	0.89
9,849.00	88.89	270.18	7,590.72	242.33	-2,495.24	2,505.69	0.47
9,913.00	89.88	270.63	7,591.40	242.78	-2,559.24	2,569.58	1.70
9,944.00	89.94	270.57	7,591.45	243.10	-2,590.24	2,600.54	0.27
9,976.00	89.57	270.71	7,591.59	243.46	-2,622.23	2,632.49	1.24
10,039.00	90.56	271.36	7,591.52	244.60	-2,685.22	2,695.42	1.88
10,134.00	91.05	271.32	7,590.18	246.82	-2,780.19	2,790.33	0.52
10,229.00	90.06	271.31	7,589.26	249.00	-2,875.16	2,885.24	1.04
10,261.00	90.31	271.64	7,589.16	249.82	-2,907.14	2,917.22	1.29
10,324.00	89.88	271.98	7,589.05	251.81	-2,970.11	2,980.18	0.87
10,356.00	89.51	271.80	7,589.22	252.87	-3,002.09	3,012.17	1.29
10,419.00	89.38	271.79	7,589.83	254.84	-3,065.06	3,075.13	0.21
10,514.00	89.51	271.98	7,590.75	257.97	-3,160.00	3,170.07	0.24
10,609.00	89.38	272.33	7,591.67	261.54	-3,254.93	3,265.04	0.39
10,704.00	89.20	272.52	7,592.85	265.56	-3,349.84	3,360.00	0.28
10,799.00	88.89	271.79	7,594.44	269.13	-3,444.76	3,454.95	0.83
10,893.00	89.20	271.54	7,596.00	271.86	-3,538.71	3,548.88	0.42
10,988.00	88.95	271.38	7,597.54	274.28	-3,633.66	3,643.80	0.31
11,083.00	89.88	272.09	7,598.51	277.16	-3,728.61	3,738.73	1.23
11,178.00	90.19	271.25	7,598.45	279.93	-3,823.57	3,833.67	0.94
11,273.00	90.68	271.61	7,597.73	282.30	-3,918.54	3,928.59	0.64
11,368.00	89.44	271.03	7,597.63	284.49	-4,013.51	4,023.51	1.44
11,400.00	89.69	271.29	7,597.87	285.13	-4,045.50	4,055.48	1.13
11,463.00	89.01	271.08	7,598.58	286.44	-4,108.49	4,118.41	1.13
11,558.00	89.01	271.02	7,600.23	288.18	-4,203.46	4,213.29	0.06
11,653.00	88.27	270.48	7,602.48	289.42	-4,298.42	4,308.14	0.96
11,748.00	90.37	271.72	7,603.61	291.24	-4,393.39	4,403.03	2.57
11,843.00	90.00	271.83	7,603.30	294.19	-4,488.34	4,497.97	0.41
11,874.00	89.82	271.73	7,603.35	295.15	-4,519.33	4,528.95	0.66
Final Sperry MWD Survey (Lateral) @ 11874.00 ft							
11,935.00	89.40	271.73	7,603.77	296.99	-4,580.30	4,589.92	0.69
Projection of TD (Lateral) @ 11935.00 ft							

Design Report for Zukowski 17-1H - Actual Field Surveys

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,960.00	1,959.89	18.82	-2.20	Tie-On to Surface Casing Gyro Surveys (Pilot Hole) @ 1960.00 ft
1,998.00	1,997.89	19.38	-2.30	First Sperry MWD Survey (Pilot Hole) @ 1998.00 ft
6,934.00	6,929.94	196.73	11.18	Tie-On to Pilot Hole Surveys (Lateral) @ 6934.00 ft
7,089.00	7,083.24	197.90	-8.48	First Sperry MWD Survey (Lateral) @ 7089.00 ft
11,874.00	7,603.35	295.15	-4,519.33	Final Sperry MWD Survey (Lateral) @ 11874.00 ft
11,935.00	7,603.77	296.99	-4,580.30	Projection of TD (Lateral) @ 11935.00 ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/_S (ft)	+E/-W (ft)	
TD	No Target (Freehand)	273.71	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
99.62	1,960.00	GYRO Survey	SRG-GYRO-MS
1,998.00	6,934.00	Sperry MWD (Pilot Hole)	MWD
7,089.00	11,935.00	Sperry MWD (Lateral)	MWD

North Reference Sheet for Sec. 17-T4S-R64W - Zukowski 17-1H - Plan B

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 @ 5672.00ft (H&P 280). Northing and Easting are relative to Zukowski 17-1H

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: 0.99999193

Grid Coordinates of Well: 1,684,063.23 ft N, 3,262,874.90 ft E

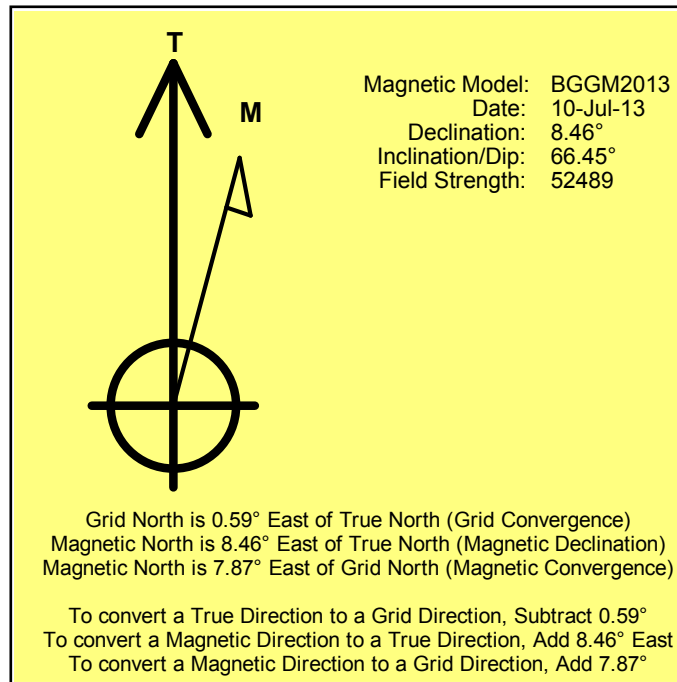
Geographical Coordinates of Well: 39° 42' 28.24" N, 104° 33' 56.35" W

Grid Convergence at Surface is: 0.59°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,935.00ft

the Bottom Hole Displacement is 4,589.92ft in the Direction of 273.71° (True).

Magnetic Convergence at surface is: -7.87° (10 July 2013, , BGGM2013)



LEGEND

- - - Zukowski 17-1H, Rev B1 (Lateral)
- - - Zukowski 17-1H, Plan A Rev 1(Pilot Hole)
- Zukowski 17-1H, GYRO Survey
- Zukowski 17-1H, Sperry MWD (Lateral)
- Zukowski 17-1H, Sperry MWD (Pilot Hole)

