

Shell Exploration & Production Co. Inc.

Barber Co. KS (NAD-27)

Sec 04-T35S-R10W

Schupbach 3510 #4-1H / Job #9504797 / Nabors 180

API 15-007-23853-01-00

Wellbore #1

Survey: MWD Surveys

Sperry Drilling Services Combo Report

21 September, 2012

Surface UWI : API 15-007-23853-01-00

Well Coordinates: 134,055.00 N, 2,025,611.76 E (37° 02' 05.26" N, 098° 24' 44.15" W)

Ground Level: 1,309.00 ft

Local Coordinate Origin:

Centered on Well Schupbach 3510 #4-1H / Job #9504797 / Nabors 180

Viewing Datum:

WELL @ 1332.80ft (Original Well Elev)

TVDs to System:

N

North Reference:

True

Unit System:

API US Survey Feet

Version: 2003.21 Build: 43

HALLIBURTON

Survey Report for Schupbach 3510 #4-1H / Job #9504797 / Nabors 180 - MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)			
0.00	0.00	0.00	-1,332.80	0.00	0.00 N	0.00 E	134,055.00	2,025,611.76	0.00	0.00	
80.00	0.31	239.54	-1,252.80	80.00	0.11 S	0.19 W	134,054.89	2,025,611.57	0.39	-0.09	First Sperry MWD Survey
142.00	0.51	111.31	-1,190.80	142.00	0.30 S	0.07 W	134,054.70	2,025,611.69	1.20	-0.29	
172.00	0.64	87.19	-1,160.80	172.00	0.34 S	0.22 E	134,054.66	2,025,611.98	0.91	-0.36	
202.00	0.86	43.88	-1,130.81	201.99	0.16 S	0.54 E	134,054.84	2,025,612.30	1.97	-0.22	
234.00	1.41	21.30	-1,098.81	233.99	0.38 N	0.85 E	134,055.38	2,025,612.61	2.18	0.28	
269.00	2.25	2.08	-1,063.83	268.97	1.46 N	1.03 E	134,056.46	2,025,612.79	2.94	1.34	
300.00	3.38	358.41	-1,032.87	299.93	2.98 N	1.03 E	134,057.99	2,025,612.79	3.69	2.85	
331.00	4.33	353.54	-1,001.94	330.86	5.06 N	0.87 E	134,060.06	2,025,612.63	3.24	4.94	
362.00	4.92	352.41	-971.04	361.76	7.54 N	0.56 E	134,062.54	2,025,612.32	1.93	7.44	
394.00	5.30	351.83	-939.17	393.63	10.36 N	0.17 E	134,065.36	2,025,611.92	1.20	10.28	
425.00	5.84	348.62	-908.31	424.49	13.33 N	0.34 W	134,068.33	2,025,611.41	2.01	13.29	
456.00	6.31	345.58	-877.49	455.31	16.52 N	1.08 W	134,071.52	2,025,610.67	1.84	16.54	
488.00	6.39	345.19	-845.68	487.12	19.95 N	1.97 W	134,074.95	2,025,609.77	0.28	20.04	
519.00	6.43	344.50	-814.88	517.92	23.29 N	2.87 W	134,078.29	2,025,608.86	0.28	23.46	
613.00	5.78	351.18	-721.41	611.39	33.04 N	5.01 W	134,088.03	2,025,606.72	1.02	33.39	
706.00	5.42	351.34	-628.85	703.95	42.01 N	6.39 W	134,097.00	2,025,605.33	0.39	42.45	
733.00	5.25	351.70	-601.97	730.83	44.49 N	6.76 W	134,099.49	2,025,604.96	0.64	44.96	
804.00	4.59	358.74	-531.23	801.57	50.55 N	7.29 W	134,105.54	2,025,604.42	1.26	51.04	
835.00	4.42	0.33	-500.33	832.47	52.98 N	7.31 W	134,107.97	2,025,604.40	0.68	53.46	
866.00	3.82	0.51	-469.41	863.39	55.21 N	7.29 W	134,110.20	2,025,604.42	1.94	55.67	
897.00	2.68	359.26	-438.46	894.34	56.97 N	7.29 W	134,111.96	2,025,604.41	3.68	57.42	
991.00	0.90	354.84	-344.51	988.29	59.90 N	7.39 W	134,114.89	2,025,604.32	1.90	60.35	
1,084.00	0.79	356.59	-251.52	1,081.28	61.27 N	7.49 W	134,116.26	2,025,604.21	0.12	61.72	
1,178.00	0.61	356.34	-157.52	1,175.28	62.41 N	7.56 W	134,117.40	2,025,604.14	0.19	62.86	
1,272.00	0.43	341.59	-63.53	1,269.27	63.25 N	7.71 W	134,118.24	2,025,604.00	0.24	63.71	
1,367.00	0.52	358.57	31.47	1,364.27	64.02 N	7.83 W	134,119.01	2,025,603.87	0.17	64.49	
1,462.00	0.56	348.54	126.46	1,459.26	64.90 N	7.93 W	134,119.89	2,025,603.77	0.11	65.38	
1,557.00	0.41	356.69	221.46	1,554.26	65.70 N	8.04 W	134,120.69	2,025,603.65	0.17	66.18	
1,746.00	0.53	354.07	410.45	1,743.25	67.24 N	8.17 W	134,122.23	2,025,603.52	0.06	67.73	
1,936.00	0.56	342.18	600.45	1,933.25	69.00 N	8.55 W	134,123.99	2,025,603.15	0.06	69.52	
2,126.00	0.18	22.00	790.44	2,123.24	70.16 N	8.72 W	134,125.15	2,025,602.97	0.23	70.69	
2,315.00	0.65	313.71	979.44	2,312.24	71.17 N	9.38 W	134,126.17	2,025,602.31	0.32	71.77	
2,505.00	0.44	324.80	1,169.43	2,502.23	72.52 N	10.58 W	134,127.51	2,025,601.11	0.12	73.24	
2,694.00	0.34	334.23	1,358.42	2,691.22	73.61 N	11.25 W	134,128.60	2,025,600.45	0.06	74.40	
2,883.00	0.03	108.38	1,547.42	2,880.22	74.10 N	11.44 W	134,129.09	2,025,600.25	0.19	74.91	
3,073.00	0.67	349.08	1,737.42	3,070.22	75.18 N	11.61 W	134,130.17	2,025,600.08	0.36	75.99	
3,263.00	0.83	337.32	1,927.40	3,260.20	77.54 N	12.35 W	134,132.53	2,025,599.34	0.12	78.42	
3,452.00	0.57	13.07	2,116.39	3,449.19	79.72 N	12.66 W	134,134.71	2,025,599.02	0.26	80.62	

Survey Report for Schupbach 3510 #4-1H / Job #9504797 / Nabors 180 - MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)			
3,642.00	0.50	347.24	2,306.38	3,639.18	81.45 N	12.63 W	134,136.43	2,025,599.05	0.13	82.34	
3,832.00	0.31	332.57	2,496.38	3,829.18	82.71 N	13.05 W	134,137.70	2,025,598.63	0.11	83.64	
4,022.00	0.22	306.56	2,686.37	4,019.17	83.38 N	13.58 W	134,138.37	2,025,598.10	0.08	84.37	
4,212.00	0.69	9.68	2,876.37	4,209.17	84.73 N	13.68 W	134,139.72	2,025,598.00	0.33	85.72	
4,243.00	3.63	2.18	2,907.34	4,240.14	85.89 N	13.61 W	134,140.88	2,025,598.07	9.51	86.87	
4,273.00	6.89	358.51	2,937.21	4,270.01	88.64 N	13.62 W	134,143.63	2,025,598.05	10.92	89.60	
4,305.00	10.02	357.88	2,968.86	4,301.66	93.35 N	13.78 W	134,148.33	2,025,597.90	9.79	94.29	
4,336.00	13.07	357.81	2,999.23	4,332.03	99.54 N	14.01 W	134,154.53	2,025,597.66	9.84	100.48	
4,368.00	16.20	357.59	3,030.19	4,362.99	107.62 N	14.34 W	134,162.61	2,025,597.32	9.78	108.54	
4,400.00	19.55	357.84	3,060.64	4,393.44	117.43 N	14.73 W	134,172.42	2,025,596.92	10.47	118.34	
4,431.00	22.58	357.74	3,089.56	4,422.36	128.57 N	15.16 W	134,183.55	2,025,596.48	9.77	129.45	
4,463.00	25.68	357.04	3,118.76	4,451.56	141.63 N	15.76 W	134,196.62	2,025,595.87	9.73	142.51	
4,495.00	28.19	356.15	3,147.29	4,480.09	156.10 N	16.62 W	134,211.09	2,025,594.99	7.94	156.98	
4,526.00	30.87	354.91	3,174.26	4,507.06	171.33 N	17.82 W	134,226.31	2,025,593.78	8.87	172.25	
4,558.00	34.30	353.73	3,201.22	4,534.02	188.48 N	19.53 W	134,243.46	2,025,592.05	10.90	189.48	
4,590.00	37.86	353.51	3,227.08	4,559.88	207.20 N	21.63 W	134,262.18	2,025,589.94	11.13	208.33	
4,621.00	41.40	353.48	3,250.95	4,583.75	226.84 N	23.87 W	134,281.82	2,025,587.68	11.42	228.09	
4,653.00	44.69	353.64	3,274.33	4,607.13	248.55 N	26.32 W	134,303.52	2,025,585.21	10.29	249.93	
4,685.00	46.93	353.89	3,296.64	4,629.44	271.35 N	28.81 W	134,326.33	2,025,582.70	7.02	272.88	
4,716.00	49.45	353.93	3,317.30	4,650.10	294.33 N	31.26 W	134,349.30	2,025,580.22	8.13	295.98	
4,748.00	52.34	353.51	3,337.48	4,670.28	319.01 N	33.98 W	134,373.97	2,025,577.48	9.09	320.81	
4,779.00	54.75	353.27	3,355.90	4,688.70	343.77 N	36.85 W	134,398.74	2,025,574.59	7.80	345.74	
4,811.00	57.48	353.82	3,373.74	4,706.54	370.17 N	39.83 W	134,425.13	2,025,571.58	8.65	372.30	
4,843.00	60.63	353.91	3,390.20	4,723.00	397.45 N	42.76 W	134,452.41	2,025,568.62	9.85	399.75	
4,874.00	62.57	354.20	3,404.94	4,737.74	424.57 N	45.59 W	134,479.53	2,025,565.77	6.31	427.01	
4,906.00	65.38	354.56	3,418.98	4,751.78	453.19 N	48.40 W	134,508.14	2,025,562.93	8.84	455.76	
4,938.00	68.50	354.08	3,431.51	4,764.31	482.48 N	51.32 W	134,537.43	2,025,559.99	9.85	485.20	
4,969.00	71.41	353.99	3,442.14	4,774.94	511.44 N	54.34 W	134,566.39	2,025,556.93	9.39	514.32	
5,001.00	74.37	354.59	3,451.55	4,784.35	541.87 N	57.39 W	134,596.82	2,025,553.87	9.42	544.90	
5,033.00	76.67	355.38	3,459.55	4,792.35	572.74 N	60.09 W	134,627.68	2,025,551.13	7.57	575.87	
5,064.00	78.74	355.67	3,466.15	4,798.95	602.93 N	62.46 W	134,657.87	2,025,548.74	6.74	606.15	
5,096.00	80.90	356.21	3,471.81	4,804.61	634.35 N	64.68 W	134,689.28	2,025,546.48	6.95	637.62	
5,128.00	83.33	356.61	3,476.20	4,809.00	665.98 N	66.67 W	134,720.91	2,025,544.46	7.69	669.28	
5,159.00	86.28	355.82	3,479.00	4,811.80	696.78 N	68.71 W	134,751.71	2,025,542.40	9.85	700.12	
5,254.00	90.40	355.94	3,481.75	4,814.55	791.47 N	75.53 W	134,846.40	2,025,535.49	4.34	794.99	
5,347.00	91.11	355.95	3,480.53	4,813.33	884.23 N	82.10 W	134,939.15	2,025,528.82	0.76	887.92	
5,440.00	89.97	355.54	3,479.65	4,812.45	976.97 N	89.00 W	135,031.88	2,025,521.84	1.30	980.85	
5,535.00	91.11	354.32	3,478.76	4,811.56	1,071.59 N	97.40 W	135,126.50	2,025,513.35	1.76	1,075.83	
5,630.00	91.87	354.62	3,476.29	4,809.09	1,166.12 N	106.55 W	135,221.01	2,025,504.11	0.86	1,170.79	

Survey Report for Schupbach 3510 #4-1H / Job #9504797 / Nabors 180 - MWD Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)			
5,725.00	91.67	352.83	3,473.35	4,806.15	1,260.50 N	116.93 W	135,315.39	2,025,493.65	1.90	1,265.74	
5,820.00	90.22	352.98	3,471.79	4,804.59	1,354.76 N	128.66 W	135,409.63	2,025,481.83	1.53	1,360.71	
5,915.00	90.43	352.89	3,471.25	4,804.05	1,449.03 N	140.34 W	135,503.90	2,025,470.05	0.24	1,455.70	
6,010.00	89.60	352.40	3,471.22	4,804.02	1,543.25 N	152.51 W	135,598.10	2,025,457.80	1.01	1,550.68	
6,105.00	89.97	353.24	3,471.58	4,804.38	1,637.50 N	164.38 W	135,692.34	2,025,445.84	0.97	1,645.67	
6,201.00	90.40	353.93	3,471.27	4,804.07	1,732.90 N	175.11 W	135,787.73	2,025,435.02	0.85	1,741.66	
6,295.00	90.62	353.60	3,470.43	4,803.23	1,826.34 N	185.31 W	135,881.16	2,025,424.73	0.42	1,835.66	
6,390.00	90.12	352.08	3,469.82	4,802.62	1,920.59 N	197.15 W	135,975.40	2,025,412.80	1.68	1,930.64	
6,485.00	89.38	351.51	3,470.23	4,803.03	2,014.62 N	210.71 W	136,069.42	2,025,399.15	0.98	2,025.59	
6,579.00	90.06	352.26	3,470.69	4,803.49	2,107.68 N	223.98 W	136,162.46	2,025,385.80	1.08	2,119.53	
6,674.00	90.06	351.84	3,470.59	4,803.39	2,201.76 N	237.12 W	136,256.54	2,025,372.57	0.44	2,214.49	
6,769.00	90.55	351.68	3,470.09	4,802.89	2,295.78 N	250.74 W	136,350.54	2,025,358.87	0.54	2,309.43	
6,864.00	91.08	351.75	3,468.74	4,801.54	2,389.78 N	264.42 W	136,444.53	2,025,345.09	0.56	2,404.36	
6,959.00	90.83	352.13	3,467.15	4,799.95	2,483.83 N	277.74 W	136,538.56	2,025,331.68	0.48	2,499.30	
7,054.00	90.18	353.88	3,466.31	4,799.11	2,578.11 N	289.31 W	136,632.83	2,025,320.03	1.96	2,594.29	
7,149.00	90.00	354.35	3,466.17	4,798.97	2,672.61 N	299.05 W	136,727.32	2,025,310.20	0.53	2,689.28	
7,244.00	91.48	354.82	3,464.94	4,797.74	2,767.18 N	308.01 W	136,821.88	2,025,301.14	1.63	2,784.26	
7,339.00	90.71	355.07	3,463.12	4,795.92	2,861.79 N	316.38 W	136,916.49	2,025,292.69	0.85	2,879.22	
7,434.00	89.66	354.37	3,462.82	4,795.62	2,956.38 N	325.12 W	137,011.07	2,025,283.85	1.33	2,974.21	
7,529.00	90.03	354.66	3,463.07	4,795.87	3,050.95 N	334.21 W	137,105.63	2,025,274.68	0.49	3,069.20	
7,624.00	90.77	354.35	3,462.41	4,795.21	3,145.51 N	343.30 W	137,200.18	2,025,265.50	0.84	3,164.19	
7,719.00	90.06	353.63	3,461.72	4,794.52	3,239.98 N	353.25 W	137,294.64	2,025,255.46	1.06	3,259.18	
7,814.00	89.29	353.29	3,462.26	4,795.06	3,334.36 N	364.07 W	137,389.01	2,025,244.55	0.89	3,354.18	
7,909.00	89.91	353.65	3,462.92	4,795.72	3,428.74 N	374.87 W	137,483.38	2,025,233.66	0.75	3,449.18	
8,004.00	89.35	353.01	3,463.54	4,796.34	3,523.10 N	385.91 W	137,577.73	2,025,222.54	0.90	3,544.17	
8,099.00	88.37	354.33	3,465.43	4,798.23	3,617.50 N	396.38 W	137,672.11	2,025,211.98	1.73	3,639.15	
8,193.00	90.43	353.91	3,466.41	4,799.21	3,710.99 N	406.01 W	137,765.60	2,025,202.26	2.24	3,733.14	
8,288.00	91.97	354.78	3,464.42	4,797.22	3,805.50 N	415.37 W	137,860.10	2,025,192.81	1.86	3,828.11	
8,383.00	91.39	354.13	3,461.64	4,794.44	3,900.02 N	424.54 W	137,954.61	2,025,183.55	0.92	3,923.06	
8,478.00	89.91	352.30	3,460.56	4,793.36	3,994.34 N	435.76 W	138,048.92	2,025,172.24	2.48	4,018.04	
8,573.00	90.09	352.10	3,460.56	4,793.36	4,088.46 N	448.66 W	138,143.03	2,025,159.26	0.28	4,113.01	
8,667.00	90.37	351.88	3,460.18	4,792.98	4,181.54 N	461.75 W	138,236.10	2,025,146.07	0.38	4,206.96	
8,762.00	90.40	351.60	3,459.54	4,792.34	4,275.56 N	475.40 W	138,330.10	2,025,132.34	0.30	4,301.90	
8,857.00	90.12	351.74	3,459.11	4,791.91	4,369.55 N	489.17 W	138,424.08	2,025,118.48	0.33	4,396.84	
8,952.00	89.10	351.17	3,459.76	4,792.56	4,463.49 N	503.28 W	138,518.01	2,025,104.28	1.23	4,491.76	
9,047.00	89.97	352.05	3,460.53	4,793.33	4,557.47 N	517.14 W	138,611.97	2,025,090.33	1.30	4,586.68	
9,142.00	90.74	352.25	3,459.94	4,792.74	4,651.58 N	530.12 W	138,706.07	2,025,077.27	0.84	4,681.64	
9,237.00	91.29	354.06	3,458.26	4,791.06	4,745.88 N	541.44 W	138,800.36	2,025,065.86	1.99	4,776.62	
9,332.00	87.96	352.72	3,458.88	4,791.68	4,840.23 N	552.37 W	138,894.70	2,025,054.84	3.78	4,871.60	

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)			
9,427.00	88.70	353.01	3,461.65	4,794.45	4,934.46 N	564.16 W	138,988.92	2,025,042.95	0.84	4,966.55	
9,522.00	89.51	353.51	3,463.13	4,795.93	5,028.79 N	575.31 W	139,083.24	2,025,031.72	1.00	5,061.53	
9,617.00	89.63	353.37	3,463.85	4,796.65	5,123.16 N	586.17 W	139,177.60	2,025,020.78	0.19	5,156.53	
9,712.00	89.57	352.48	3,464.51	4,797.31	5,217.44 N	597.87 W	139,271.86	2,025,008.99	0.94	5,251.51	
9,807.00	91.60	353.27	3,463.54	4,796.34	5,311.69 N	609.65 W	139,366.11	2,024,997.12	2.29	5,346.49	Final Sperry MWD Survey
9,880.00	91.60	353.27	3,461.50	4,794.30	5,384.16 N	618.20 W	139,438.57	2,024,988.50	0.00	5,419.46	Projection To TD

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
80.00	80.00	-0.11	-0.19	First Sperry MWD Survey
9,807.00	4,796.34	5,311.69	-609.65	Final Sperry MWD Survey
9,880.00	4,794.30	5,384.16	-618.20	Projection To TD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/_S (ft)	+E/-W (ft)	
User	No Target (Freehand)	353.75	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
80.00	9,880.00	MWD Surveys	MWD+SC

Design Targets

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

Survey Report for Schupbach 3510 #4-1H / Job #9504797 / Nabors 180 - MWD Surveys

Directional Difficulty Index

Average Dogleg over Survey:	1.63 °/100ft	Maximum Dogleg over Survey:	11.42 °/100ft at 4,621.00 ft
Net Tortosity applicable to Plans:	0.09 °/100ft	Directional Difficulty Index:	6.254

Audit Info

North Reference Sheet for Sec 04-T35S-R10W - Schupbach 3510 #4-1H / Job #9504797 / Nabors 180 - Wellbore #1

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

Vertical Depths are relative to WELL @ 1332.80ft (Original Well Elev). Northing and Easting are relative to Schupbach 3510 #4-1H / Job #9504797 / Nabors 180

Coordinate System is US State Plane 1927 (Exact solution), Kansas South 1502 using datum NAD 1927 (NADCON CONUS), ellipsoid Clarke 1866

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is 98° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:37° 16' 0.000 N°

False Easting: 2,000,000.00ft, False Northing: 0.00ft, Scale Reduction: 1.00005366

Grid Coordinates of Well: 134,055.00 ft N, 2,025,611.76 ft E

Geographical Coordinates of Well: 37° 02' 05.26" N, 098° 24' 44.15" W

Grid Convergence at Surface is: 0.05°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,880.00ft

the Bottom Hole Displacement is 5,419.54ft in the Direction of 353.45° (True).

Magnetic Convergence at surface is: -4.83° (2 August 2012, , BGGM2012)

