

Shell Exploration & Production Co. Inc.

Harper Co. KS (NAD-27)

Sec 16-T34S-R7W

Kaup 3407 #16-1H

900034004

Wellbore #1

Design: Wellbore #1

Sperry Drilling Services

Combo Report With Grid North & True North

20 February, 2013

Surface UWI : 900034004

TD Date : 2nd Jan, 2013

Well Coordinates: 150,979.29 N, 2,119,730.03 E (37° 04' 50.10" N, 098° 05' 22.57" W)

Ground Level: 1,359.00 ft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Centered on Well Kaup 3407 #16-1H

WELL @ 1390.70ft (Nabors 102 (31.7'))

N

Grid

API US New

Version: 2003.21 Build: 46

HALLIBURTON

Design Report for Kaup 3407 #16-1H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
0.00	0.00	0.00	0.25	-1,390.70	0.00	0.00 N	0.00 E	150,979.29	2,119,730.03	0.00	0.00	
173.00	1.73	285.58	285.83	-1,217.73	172.97	0.70 N	2.52 W	150,979.99	2,119,727.51	1.00	-0.53	Start MWD @ 173.00 MD
204.00	2.06	281.47	281.72	-1,186.74	203.96	0.94 N	3.51 W	150,980.23	2,119,726.52	1.15	-0.69	
235.00	2.62	279.10	279.35	-1,155.77	234.93	1.16 N	4.76 W	150,980.45	2,119,725.27	1.83	-0.83	
271.00	3.61	275.38	275.63	-1,119.82	270.88	1.40 N	6.70 W	150,980.69	2,119,723.33	2.81	-0.93	
333.00	5.62	258.74	258.99	-1,058.02	332.68	0.99 N	11.62 W	150,980.28	2,119,718.41	3.86	-0.19	
445.00	6.74	241.65	241.90	-946.67	444.03	3.20 S	22.78 W	150,976.09	2,119,707.25	1.91	4.76	
527.00	7.67	240.32	240.57	-865.32	525.38	8.20 S	31.77 W	150,971.09	2,119,698.26	1.15	10.36	
622.00	6.27	243.13	243.38	-771.02	619.68	13.68 S	41.91 W	150,965.61	2,119,688.12	1.52	16.53	
716.00	6.00	241.89	242.14	-677.56	713.14	18.32 S	50.82 W	150,960.97	2,119,679.21	0.32	21.77	
811.00	4.76	251.21	251.46	-582.98	807.72	21.93 S	58.93 W	150,957.36	2,119,671.10	1.59	25.93	
906.00	4.41	251.36	251.61	-488.28	902.42	24.36 S	66.13 W	150,954.93	2,119,663.90	0.37	28.85	
1,093.00	4.67	232.99	233.24	-301.86	1,088.84	31.25 S	79.02 W	150,948.04	2,119,651.01	0.79	36.60	
1,280.00	5.65	236.01	236.26	-115.62	1,275.08	40.97 S	92.73 W	150,938.32	2,119,637.30	0.54	47.25	
1,463.00	6.30	236.92	237.17	66.39	1,457.09	51.49 S	108.61 W	150,927.80	2,119,621.42	0.36	58.83	
1,645.00	5.15	243.97	244.22	247.48	1,638.18	60.53 S	124.32 W	150,918.76	2,119,605.71	0.74	68.93	
1,744.00	5.26	245.51	245.76	346.07	1,736.77	64.36 S	132.44 W	150,914.93	2,119,597.59	0.18	73.31	
1,835.00	3.48	235.44	235.69	436.80	1,827.50	67.65 S	138.51 W	150,911.64	2,119,591.52	2.12	77.01	
1,926.00	3.24	226.92	227.17	527.65	1,918.35	70.98 S	142.67 W	150,908.31	2,119,587.36	0.61	80.61	
2,020.00	3.01	222.25	222.50	621.51	2,012.21	74.62 S	146.27 W	150,904.67	2,119,583.77	0.36	84.49	
2,115.00	4.54	243.20	243.45	716.30	2,107.00	78.16 S	151.30 W	150,901.13	2,119,578.73	2.14	88.37	
2,209.00	5.15	246.80	247.05	809.97	2,200.67	81.50 S	158.50 W	150,897.79	2,119,571.53	0.72	92.20	
2,303.00	5.55	247.44	247.69	903.56	2,294.26	84.90 S	166.57 W	150,894.39	2,119,563.46	0.43	96.15	
2,398.00	5.88	249.02	249.27	998.09	2,388.79	88.41 S	175.36 W	150,890.88	2,119,554.67	0.38	100.25	
2,492.00	4.91	238.79	239.04	1,091.67	2,482.37	92.22 S	183.30 W	150,887.07	2,119,546.74	1.45	104.59	
2,587.00	4.68	234.20	234.45	1,186.34	2,577.04	96.59 S	189.92 W	150,882.70	2,119,540.11	0.47	109.41	
2,681.00	4.71	234.81	235.06	1,280.02	2,670.72	101.06 S	196.18 W	150,878.23	2,119,533.85	0.06	114.30	
2,776.00	4.88	236.02	236.27	1,374.69	2,765.39	105.57 S	202.72 W	150,873.72	2,119,527.31	0.21	119.24	
2,870.00	5.56	241.11	241.36	1,468.30	2,859.00	110.00 S	210.02 W	150,869.29	2,119,520.01	0.87	124.17	
2,964.00	4.19	243.13	243.38	1,561.96	2,952.66	113.75 S	217.07 W	150,865.54	2,119,512.96	1.47	128.40	
3,059.00	3.73	241.50	241.75	1,656.73	3,047.43	116.80 S	222.88 W	150,862.49	2,119,507.15	0.50	131.83	
3,153.00	3.63	225.27	225.52	1,750.54	3,141.24	120.35 S	227.68 W	150,858.94	2,119,502.35	1.11	135.71	
3,248.00	4.93	222.65	222.90	1,845.27	3,235.97	125.47 S	232.59 W	150,853.82	2,119,497.44	1.38	141.15	
3,342.00	4.85	216.60	216.85	1,938.93	3,329.63	131.63 S	237.69 W	150,847.66	2,119,492.34	0.55	147.65	
3,437.00	5.74	220.34	220.59	2,033.52	3,424.22	138.47 S	243.16 W	150,840.82	2,119,486.87	1.00	154.85	
3,531.00	5.98	223.95	224.20	2,127.03	3,517.73	145.58 S	249.60 W	150,833.71	2,119,480.43	0.47	162.39	
3,625.00	4.67	233.29	233.54	2,220.63	3,611.33	151.40 S	256.07 W	150,827.90	2,119,473.96	1.67	168.63	

Design Report for Kaup 3407 #16-1H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
3,720.00	4.17	235.26	235.51	2,315.35	3,706.05	155.68 S	262.01 W	150,823.61	2,119,468.02	0.55	173.31	
3,814.00	4.16	240.24	240.49	2,409.10	3,799.80	159.32 S	267.78 W	150,819.98	2,119,462.25	0.38	177.34	
3,908.00	3.73	240.93	241.18	2,502.87	3,893.57	162.49 S	273.41 W	150,816.80	2,119,456.62	0.46	180.90	
4,003.00	3.30	241.10	241.35	2,597.70	3,988.40	165.32 S	278.50 W	150,813.97	2,119,451.53	0.45	184.06	
4,097.00	2.98	243.64	243.89	2,691.55	4,082.25	167.71 S	283.06 W	150,811.58	2,119,446.97	0.37	186.76	
4,160.00	3.72	236.24	236.49	2,754.45	4,145.15	169.57 S	286.23 W	150,809.72	2,119,443.80	1.36	188.84	
4,191.00	4.48	237.08	237.33	2,785.37	4,176.07	170.79 S	288.08 W	150,808.50	2,119,441.95	2.46	190.18	
4,223.00	6.05	228.33	228.58	2,817.23	4,207.93	172.59 S	290.39 W	150,806.70	2,119,439.64	5.50	192.13	
4,255.00	8.36	215.67	215.92	2,848.98	4,239.68	175.60 S	293.01 W	150,803.69	2,119,437.02	8.72	195.32	
4,286.00	10.75	206.38	206.63	2,879.55	4,270.25	180.02 S	295.61 W	150,799.27	2,119,434.43	9.15	199.91	
4,317.00	13.11	203.55	203.80	2,909.88	4,300.58	185.84 S	298.30 W	150,793.45	2,119,431.74	7.84	205.89	
4,349.00	15.65	199.83	200.08	2,940.87	4,331.57	193.22 S	301.21 W	150,786.07	2,119,428.82	8.44	213.46	
4,380.00	18.58	195.76	196.01	2,970.50	4,361.20	201.91 S	303.97 W	150,777.38	2,119,426.06	10.21	222.32	
4,412.00	21.67	190.21	190.46	3,000.54	4,391.24	212.64 S	306.40 W	150,766.65	2,119,423.63	11.34	233.19	
4,443.00	25.26	188.99	189.24	3,028.97	4,419.67	224.81 S	308.45 W	150,754.48	2,119,421.58	11.69	245.47	
4,475.00	28.55	187.20	187.45	3,057.51	4,448.21	239.14 S	310.48 W	150,740.15	2,119,419.55	10.59	259.91	
4,506.00	32.03	186.97	187.22	3,084.27	4,474.97	254.66 S	312.40 W	150,724.63	2,119,417.63	11.23	275.52	
4,538.00	35.32	186.37	186.62	3,110.90	4,501.60	272.28 S	314.46 W	150,707.01	2,119,415.57	10.33	293.24	
4,569.00	39.02	186.37	186.62	3,135.60	4,526.30	290.89 S	316.54 W	150,688.40	2,119,413.49	11.94	311.95	
4,601.00	41.89	187.14	187.39	3,159.94	4,550.64	311.50 S	318.98 W	150,667.79	2,119,411.05	9.10	332.69	
4,633.00	45.96	187.94	188.19	3,182.99	4,573.69	333.51 S	321.90 W	150,645.79	2,119,408.13	12.84	354.84	
4,664.00	48.70	188.95	189.20	3,204.00	4,594.70	356.05 S	325.25 W	150,623.24	2,119,404.78	9.16	377.56	
4,695.00	51.87	187.91	188.16	3,223.80	4,614.50	379.63 S	328.74 W	150,599.66	2,119,401.29	10.55	401.33	
4,727.00	53.80	186.69	186.94	3,243.13	4,633.83	404.93 S	331.98 W	150,574.36	2,119,398.05	6.75	426.78	
4,758.00	55.94	185.30	185.55	3,260.97	4,651.67	430.14 S	334.62 W	150,549.15	2,119,395.41	7.82	452.12	
4,790.00	58.18	184.25	184.50	3,278.37	4,669.07	456.90 S	336.86 W	150,522.39	2,119,393.17	7.52	478.97	
4,821.00	61.11	183.19	183.44	3,294.03	4,684.73	483.59 S	338.59 W	150,495.70	2,119,391.44	9.90	505.71	
4,853.00	65.31	182.14	182.39	3,308.45	4,699.15	512.12 S	339.91 W	150,467.17	2,119,390.12	13.45	534.26	
4,884.00	70.31	181.85	182.10	3,320.16	4,710.86	540.80 S	340.91 W	150,438.50	2,119,389.12	16.15	562.94	
4,915.00	74.18	180.57	180.82	3,329.61	4,720.31	570.31 S	341.53 W	150,408.99	2,119,388.50	13.09	592.43	
4,947.00	77.02	181.43	181.68	3,337.57	4,728.27	601.29 S	342.07 W	150,378.00	2,119,387.96	9.25	623.38	
4,978.00	79.26	180.49	180.74	3,343.94	4,734.64	631.62 S	342.58 W	150,347.67	2,119,387.45	7.81	653.67	
5,010.00	82.18	181.53	181.78	3,349.10	4,739.80	663.20 S	343.14 W	150,316.09	2,119,386.89	9.67	685.21	
5,042.00	85.18	181.39	181.64	3,352.62	4,743.32	694.99 S	343.95 W	150,284.30	2,119,386.08	9.39	716.98	
5,125.00	90.71	180.72	180.97	3,355.60	4,746.30	777.89 S	345.47 W	150,201.40	2,119,384.56	6.71	799.79	
5,248.00	92.28	180.27	180.52	3,352.39	4,743.09	900.84 S	346.53 W	150,078.45	2,119,383.50	1.33	922.52	
5,341.00	89.11	180.08	180.33	3,351.26	4,741.96	993.82 S	346.82 W	149,985.47	2,119,383.21	3.41	1,015.30	

Design Report for Kaup 3407 #16-1H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
5,435.00	87.74	179.54	179.79	3,353.84	4,744.54	1,087.78 S	346.51 W	149,891.51	2,119,383.52	1.57	1,109.02	
5,528.00	87.54	179.29	179.54	3,357.67	4,748.37	1,180.70 S	345.56 W	149,798.60	2,119,384.47	0.34	1,201.65	
5,620.00	87.75	178.24	178.49	3,361.45	4,752.15	1,272.60 S	343.58 W	149,706.70	2,119,386.45	1.16	1,293.20	
5,711.00	87.88	177.75	178.00	3,364.92	4,755.62	1,363.47 S	340.40 W	149,615.82	2,119,389.63	0.56	1,383.64	
5,802.00	87.75	178.55	178.80	3,368.39	4,759.09	1,454.36 S	337.46 W	149,524.93	2,119,392.57	0.89	1,474.11	
5,893.00	87.38	178.64	178.89	3,372.26	4,762.96	1,545.25 S	335.23 W	149,434.04	2,119,394.80	0.42	1,564.63	
5,984.00	90.03	177.97	178.22	3,374.31	4,765.01	1,636.18 S	332.54 W	149,343.12	2,119,397.49	3.00	1,655.16	
6,075.00	90.92	179.56	179.81	3,373.56	4,764.26	1,727.15 S	330.58 W	149,252.14	2,119,399.45	2.00	1,745.78	
6,166.00	89.91	180.16	180.41	3,372.90	4,763.60	1,818.15 S	330.36 W	149,161.15	2,119,399.67	1.29	1,836.55	
6,261.00	89.82	180.95	181.20	3,373.13	4,763.83	1,913.14 S	331.28 W	149,066.15	2,119,398.75	0.84	1,931.38	
6,356.00	90.06	180.75	181.00	3,373.22	4,763.92	2,008.13 S	332.69 W	148,971.17	2,119,397.34	0.33	2,026.24	
6,451.00	90.09	181.12	181.37	3,373.10	4,763.80	2,103.12 S	334.24 W	148,876.18	2,119,395.79	0.39	2,121.11	
6,546.00	90.15	181.62	181.87	3,372.90	4,763.60	2,198.09 S	336.51 W	148,781.21	2,119,393.52	0.53	2,216.02	
6,640.00	89.32	181.55	181.80	3,373.34	4,764.04	2,292.05 S	339.11 W	148,687.24	2,119,390.92	0.89	2,309.93	
6,735.00	89.54	180.83	181.08	3,374.28	4,764.98	2,387.02 S	341.08 W	148,592.27	2,119,388.95	0.79	2,404.82	
6,829.00	89.91	181.28	181.53	3,374.73	4,765.43	2,481.01 S	342.81 W	148,498.29	2,119,387.22	0.62	2,498.70	
6,924.00	89.08	181.15	181.40	3,375.57	4,766.27	2,575.98 S	344.83 W	148,403.31	2,119,385.21	0.88	2,593.59	
7,018.00	89.29	181.10	181.35	3,376.91	4,767.61	2,669.95 S	346.67 W	148,309.34	2,119,383.36	0.23	2,687.46	
7,112.00	90.25	180.86	181.11	3,377.28	4,767.98	2,763.94 S	348.28 W	148,215.36	2,119,381.75	1.05	2,781.34	
7,207.00	88.09	180.49	180.74	3,378.66	4,769.36	2,858.92 S	349.40 W	148,120.38	2,119,380.63	2.31	2,876.17	
7,301.00	88.28	180.31	180.56	3,381.64	4,772.34	2,952.87 S	350.05 W	148,026.43	2,119,379.98	0.28	2,969.94	
7,395.00	89.41	180.66	180.91	3,383.53	4,774.23	3,046.84 S	350.85 W	147,932.45	2,119,379.18	1.26	3,063.75	
7,490.00	90.86	180.51	180.76	3,383.31	4,774.01	3,141.83 S	351.82 W	147,837.46	2,119,378.21	1.53	3,158.58	
7,584.00	91.05	180.12	180.37	3,381.74	4,772.44	3,235.82 S	352.34 W	147,743.48	2,119,377.70	0.46	3,252.38	
7,679.00	89.75	181.15	181.40	3,381.08	4,771.78	3,330.81 S	353.39 W	147,648.49	2,119,376.64	1.75	3,347.22	
7,774.00	88.86	180.68	180.93	3,382.23	4,772.93	3,425.79 S	354.91 W	147,553.51	2,119,375.13	1.06	3,442.08	
7,868.00	90.12	181.17	181.42	3,383.07	4,773.77	3,519.77 S	356.42 W	147,459.53	2,119,373.61	1.44	3,535.94	
7,963.00	89.91	180.58	180.83	3,383.04	4,773.74	3,614.76 S	357.87 W	147,364.54	2,119,372.16	0.66	3,630.80	
8,057.00	89.17	179.17	179.42	3,383.80	4,774.50	3,708.75 S	357.67 W	147,270.55	2,119,372.36	1.69	3,724.56	
8,151.00	88.24	179.02	179.27	3,385.92	4,776.62	3,802.71 S	356.18 W	147,176.58	2,119,373.85	1.00	3,818.20	
8,246.00	89.69	179.25	179.50	3,387.64	4,778.34	3,897.69 S	354.75 W	147,081.61	2,119,375.28	1.55	3,912.85	
8,340.00	89.60	178.55	178.80	3,388.22	4,778.92	3,991.67 S	352.95 W	146,987.63	2,119,377.08	0.75	4,006.48	
8,435.00	89.41	178.38	178.63	3,389.04	4,779.74	4,086.63 S	350.40 W	146,892.67	2,119,379.63	0.27	4,101.05	
8,529.00	88.86	178.27	178.52	3,390.46	4,781.16	4,180.58 S	347.65 W	146,798.72	2,119,382.38	0.60	4,194.58	
8,624.00	89.91	179.12	179.37	3,391.48	4,782.18	4,275.55 S	345.49 W	146,703.75	2,119,384.54	1.42	4,289.18	
8,718.00	90.25	179.43	179.68	3,391.35	4,782.05	4,369.54 S	344.30 W	146,609.76	2,119,385.73	0.49	4,382.87	
8,813.00	89.26	178.85	179.10	3,391.75	4,782.45	4,464.52 S	342.88 W	146,514.77	2,119,387.16	1.21	4,477.53	

Design Report for Kaup 3407 #16-1H - Wellbore #1

Measured Depth (ft)	Inclination (°)	Grid Azimuth (°)	True Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates (ft)		Map Coordinates (ft)		Dogleg Rate (°/100ft)	Vertical Section (ft)	Comments
						Northing	Easting	Northing	Easting			
8,907.00	91.79	177.35	177.60	3,390.89	4,781.59	4,558.46 S	339.76 W	146,420.84	2,119,390.27	3.13	4,571.03	
9,002.00	91.85	178.80	179.05	3,387.88	4,778.58	4,653.35 S	336.57 W	146,325.95	2,119,393.46	1.53	4,665.48	
9,096.00	91.05	178.63	178.88	3,385.50	4,776.20	4,747.30 S	334.46 W	146,232.00	2,119,395.57	0.87	4,759.06	
9,191.00	89.44	179.19	179.44	3,385.09	4,775.79	4,842.28 S	332.66 W	146,137.02	2,119,397.38	1.79	4,853.69	
9,285.00	89.57	178.84	179.09	3,385.90	4,776.60	4,936.26 S	331.04 W	146,043.04	2,119,398.99	0.40	4,947.34	
9,380.00	89.42	178.52	178.77	3,386.74	4,777.44	5,031.23 S	328.85 W	145,948.07	2,119,401.18	0.37	5,041.94	
9,474.00	89.75	178.33	178.58	3,387.42	4,778.12	5,125.19 S	326.27 W	145,854.11	2,119,403.76	0.41	5,135.50	End MWD @ 9474.00 MD
9,524.00	89.75	178.33	178.58	3,387.64	4,778.34	5,175.17 S	324.81 W	145,804.13	2,119,405.22	0.00	5,185.26	Projection to TD @ 9524.00 MD - Kaup 3407 #16-1H PBHL Plan 6

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
173.00	172.97	0.70	-2.52	Start MWD @ 173.00 MD
9,474.00	4,778.12	-5,125.19	-326.27	End MWD @ 9474.00 MD
9,524.00	4,778.34	-5,175.17	-324.81	Projection to TD @ 9524.00 MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/_S (ft)	+E/-W (ft)	
User	No Target (Freehand)	183.94	Slot	0.00	0.00	0.00



Design Report for Kaup 3407 #16-1H - Wellbore #1

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
173.00	445.00	Run 0100	MWD+SC
527.00	5,125.00	Run 0200	MWD+SC
5,248.00	5,341.00	Run 0300	MWD+SC
5,435.00	5,528.00	Run 0400	MWD+SC
5,620.00	5,711.00	Run 0500	MWD+SC
5,802.00	6,166.00	Run 0600	MWD+SC
6,261.00	6,924.00	Run 0800	MWD+SC
7,018.00	7,868.00	Run 0900	MWD+SC
7,963.00	8,813.00	Run 1000	MWD+SC
8,907.00	9,524.00	Run 1100	MWD+SC

Design Targets

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

Directional Difficulty Index

Average Dogleg over Survey: 1.85 °/100ft Maximum Dogleg over Survey: 16.15 °/100ft at 4,884.00 ft

Net Tortosity applicable to Plans: 0.08 °/100ft Directional Difficulty Index: 6.274

Audit Info

North Reference Sheet for Sec 16-T34S-R7W - Kaup 3407 #16-1H - Wellbore #1

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

Vertical Depths are relative to WELL @ 1390.70ft (Nabors 102 (31.7')). Northing and Easting are relative to Kaup 3407 #16-1H

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: 1.00004178

Grid Coordinates of Well: 150,979.29 ft N, 2,119,730.03 ft E

Geographical Coordinates of Well: 37° 04' 50.10" N, 098° 05' 22.57" W

Grid Convergence at Surface is: 0.25°

Based upon Minimum Curvature type calculations, at a Measured Depth of 9,524.00ft the Bottom Hole Displacement is 5,185.35ft in the Direction of 183.59° (Grid).

Magnetic Convergence at surface is: -4.38° (12 December 2012, , BGGM2012)

