Pioneer Natural Resources University 1-21 3H Reagan County, TX Patterson 230 API# 42-383-38076

April 13, 2013 – May 12, 2013 HD-MJ-0900344979

Sperry Drilling
MWD Survey Report

**Submitted by Scott Immekus** 3950 Interwood Pkwy S. Houston, TX 77032

Ph: 281.986.4400

# **HALLIBURTON**

Drilling and Formation Evaluation

# Survey Report for Pioneer Natural Resources

Rig

Patterson 230

Well Name

University 1-21 3H

**Field Name** 

Spraberry (Trend Area)

Country

USA

**Job Number** 

HD-XX-0900344979

**Job Start Date** 

13-Apr-13

**API Number** 

42-383-38076

Job No: HD-XX-0900344979

Well Name: University 1-21 3H

Survey Report

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#### DIRECTIONAL SURVEY DATA

Tie-in

0.00 0.00 0.00 0.00 0.00 N 0.00 E

Measured Depth	Inclination	Direction	Vertical Depth	Latitude	Departure	Vertical Section	Dogleg
(ft)	(deg)	(deg)	(ft)	(ft)	(ft)	(ft)	(%100')
100.00	0.31	332.60	100.00	0.24 N	0.12 W	0.24	0.31
200.00	0.34	326.31	200.00	0.73 N	0.41 W	0.72	0.05
300.00	0.36	346.49	300.00	1.28 N	0.65 W	1.27	0.12
400.00	0.55	315.91	399.99	1.93 N	1.06 W	1.91	0.30
500.00	0.55	335.91	499.99	2.71 N	1.59 W	2.68	0.19
600.00	0.82	326.75	599.98	3.75 N	2.18 W	3.70	0.29
700.00	0.56	334.55	699.97	4.79 N	2.78 W	4.73	0.28
770.00	0.25	335.76	769.97	5.24 N	2.99 W	5.17	0.44
827.00	0.17	314.26	826.97	5.41 N	3.10 W	5.34	0.19
984.00	2.95	146.08	983.91	2.22 N	1.02 W	2.20	1.98
1079.00	3.63	141.72	1,078.75	2.16 S	2.21 E	-2.12	0.77
1174.00	4.37	127.95	1,173.52	6.75 S	6.93 E	-6.61	1.27
1269.00	4.18	124.01	1,268.26	10.91 S	12.65 E	-10.65	0.37
1365.00	4.35	120.15	1,363.99	14.70 S	18.70 E	-14.31	0.35
1460.00	4.79	127.50	1,458.69	18.92 S	24.96 E	-18.40	0.77
1556.00	5.07	133.65	1,554.33	24.29 S	31.21 E	-23.65	0.62
1651.00	5.41	133.79	1,648.94	30.29 S	37.48 E	-29.51	0.36
1746.00	4.44	134.12	1,743.59	35.95 S	43.35 E	-35.04	1.02
1841.00	4.79	134.88	1,838.28	41.30 S	48.80 E	-40.29	0.37
1937.00	5.28	132.54	1,933.91	47.11 S	54.89 E	-45.97	0.55
2033.00	4.99	127.99	2,029.52	52.67 S	61.43 E	-51.39	0.52
2128.00	4.12	117.23	2,124.22	56.77 S	67.72 E	-55.36	1.29
2223.00	3.67	123.02	2,219.00	59.99 S	73.31 E	-58.47	0.62
2319.00	3.95	137.79	2,314.79	64.11 S	78.11 E	-62.49	1.06
2414.00	4.36	140.13	2,409.54	69.31 S	82.62 E	-67.59	0.46
2510.00	4.67	139.00	2,505.25	75.05 S	87.52 E	-73.24	0.34
2606.00	5.07	140.09	2,600.90	81.26 S	92.81 E	-79.33	0.43
2701.00	4.27	140.00	2,695.58	87.19 S	97.77 E	-85.15	0.84
2797.00	4.14	140.14	2,791.33	92.58 S	102.29 E	-90.46	0.13
2892.00	4.36	138.89	2,886.06	97.94 S	106.86 E	-95.71	0.25
2988.00	4.31	138.28	2,981.79	103.38 S	111.66 E	-101.06	0.07
3083.00	3.96	135.64	3,076.54	108.39 S	116.33 E	-105.97	0.42
3178.00	3.72	137.27	3,171.33	112.99 S	120.71 E	-110.48	0.27
3273.00	3.80	131.63	3,266.13	117.35 S	125.16 E	-114.75	0.40
3369.00	4.11	133.20	3,361.90	121.82 S	130.04 E	-119.11	0.34
3464.00	4.47	131.65	3,456.63	126.60 S	135.29 E	-123.79	0.40
3560.00	4.27	131.29	3,552.35	131.45 S	140.76 E	-128.52	0.21
3655.00	4.18	133.08	3,647.09	136.14 S	145.95 E	-133.11	0.17
3751.00	4.12	131.86	3,742.84	140.83 S	151.07 E	-137.69	0.11
3846.00	3.81	132.90	3,837.62	145.25 S	155.92 E	-142.01	0.33
3941.00	3.46	128.32	3,932.42	149.18 S	160.48 E	-145.84	0.48

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# HALLIBURTON | Sperry Drilling

DIRECTIONAL SURVEY DATA  Measured Depth   Inclination   Direction   Vertical Depth   Latitude   Departure   Vertical Section   Dogleg								
4036.00	3.92	131.90	4,027.23	153.12 S	165.14 E	-149.69	0.55	
4131.00	3.51	128.49	4,122.03	157.10 S	169.84 E	-153.57	0.49	
4226.00	3.88	134.85	4,216.83	161.18 S	174.40 E	-157.56	0.58	
4322.00	3.83	137.05	4,312.61	165.82 S	178.89 E	-162.10	0.16	
4417.00	4.02	131.85	4,407.39	170.37 S	183.53 E	-166.55	0.42	
4512.00	4.36	128.38	4,502.14	174.83 S	188.84 E	-170.91	0.44	
4608.00	4.16	121.42	4,597.87	178.91 S	194.67 E	-174.86	0.58	
4703.00	4.25	125.92	4,692.62	182.77 S	200.46 E	-178.60	0.36	
4798.00	4.38	126.46	4,787.35	186.99 S	206.23 E	-182.71	0.14	
4894.00	3.73	122.09	4,883.11	190.83 S	211.82 E	-186.43	0.76	
4989.00	3.76	124.16	4,977.90	194.22 S	217.01 E	-189.71	0.15	
5084.00	4.00	128.10	5,072.69	198.01 S	222.20 E	-193.39	0.38	
5179.00	3.57	123.28	5,167.48	201.68 S	227.28 E	-196.96	0.57	
5275.00	4.05	121.62	5,263.27	205.10 S	232.67 E	-200.26	0.52	
5370.00	4.76	111.25	5,357.99	208.29 S	239.20 E	-203.32	1.12	
5466.00	4.68	120.75	5,453.66	211.73 S	246.28 E	-206.62	0.82	
5562.00	4,41	120.08	5,549.36	215.59 S	252.85 E	-210.34	0.02	
5657.00	4.45	124.80	5,644.08	219.52 S	259.03 E	-214.14	0.29	
5752.00	3.86	128.21	5,738.83	223.60 S	264.57 E	-218.11	0.67	
5847.00	3.51	120.18	5,833.63	227.05 S	269.60 E	-221.45	0.66	
5943.00	3.87	115.37	5,929.43	229.92 S	275.07 E	-224.20	0.49	
6038.00	4.03	128.17	6,024.21	233.35 S	280.60 E	-227.52	0.49	
6134.00	4.10	143.85	6,119.97	238.21 S	285.27 E	-232.28	1.16	
6229.00	4.12	142.04	6,214.72	243.64 S	289.37 E	-237.63	0.14	
6324.00	3.59	132.20	6,309.51	248.33 S	293.68 E	-242.23	0.14	
6420.00	3.16	119.80	6,405.34	251.66 S	298.20 E	-245.47	0.88	
6515.00	3.45	126.15	6,500.19	251.66 S	302.78 E	-248.36	0.49	
6611.00	3.60	132.10	6,596.00	258.38 S	307.35 E	-251.99	0.49	
6706.00	3.79	126.26	6,690.81	262.23 S	312.10 E	-255.75	0.41	
6802.00	3.49	129.35	6,786.61	265.96 S	316.92 E	-259.38	0.44	
6897.00	3.40	118.46	6,881.44	269.14 S	321.63 E			
6992.00	3.30	114.43	6,976.28	271.61 S	326.60 E	-262.46 -264.83	0.69	
7087.00	2.73	113.04	7,071.15	273.63 S	331.17 E	-266.75		
7132.00	2.61	115.90	7,116.10	273.63 S 274.50 S	333.08 E	-267.58	0.60	
7164.00	2.55	114.38	7,148.07	274.50 S 275.11 S	334.38 E	-268.16	0.41	
7196.00	2.53	114.04	7,180.04	275.69 S	335.68 E	-268.72	0.23	
7228.00	2.20	85.61	7,212.01	275.93 S	336.93 E	-268.93	3.77	
7260.00	3.96	30.95	7,243.97	274.94 S	338.11 E	-267.92	10.08	
7292.00	7.14	12.20	7,275.82	274.94 S	339.10 E	-265.01	11.33	
7323.00	11.87	5.11	7,306.38	266.99 S	339.79 E	-259.93	15.67	
7355.00	15.82	4.40	7,337.45	259.36 S	340.42 E	-252.29	12.37	
7387.00	19.18	3.15	7,367.96	249.76 S	340.42 E	-242.68	10.56	
7418.00	23.64	359.83	7,396.82	249.76 S 238.45 S			-	
7410.00	27.07	358.43	7,396.82	236.45 S 224.75 S	341.31 E	-231.37	14.92	
7481.00	30.81	357.17	7,425.73	224.75 S 209.77 S	341.09 E 340.50 E	-217.68 -202.71	10.87	

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easured Depth	Inclination	Direction	Vertical Depth	Latitude	Departure	Vertical Section	Dogleg
(ft)	(deg)	(deg)	(ft)	(ft)	(ft)	(ft)	(%100')
7513.00	35.07	355.97	7,479.71	192.40 S	339.45 E	-185.37	13.46
7545.00	36.83	354.74	7,505.61	173.68 S	337.92 E	-166.69	5.94
7577.00	39.77	353.54	7,530.72	153.96 S	335.89 E	-147.01	9.50
7608.00	43.59	354.03	7,553.87	133.46 S	333.66 E	-126.56	12.36
7640.00	46.93	354.38	7,576.39	110.85 S	331.37 E	-104.00	10.47
7672.00	50.28	354.83	7,597.54	86.95 S	329.12 E	-80.16	10.52
7704.00	54.93	356.14	7,616.97	61.62 S	327.13 E	-54.87	14.88
7736.00	59.06	357.02	7,634.40	34.83 S	325.53 E	-28.12	13.11
7767.00	62.75	358.04	7,649.47	7.78 S	324.37 E	-1.09	12.22
7799.00	66.71	359.13	7,663.13	21.15 N	323.66 E	27.81	12.76
7831.00	71.72	1.06	7,674.48	51.05 N	323.72 E	57.71	16.64
7863.00	74.22	1.63	7,683.86	81.64 N	324.44 E	88.30	7.99
7895.00	77.17	2.47	7,691.76	112.62 N	325.55 E	119.30	9.57
7926.00	79.19	2.47	7,698.11	142.93 N	326.86 E	149.63	6.52
7958.00	82.54	1.88	7,703.19	174.50 N	328.05 E	181.22	10.63
7990.00	86.89	1.41	7,706.14	206.34 N	328.97 E	213.07	13.65
8021.00	88.74	1.36	7,707.33	237.31 N	329.71 E	244.05	5.97
8053.00	89.17	1.38	7,707.91	269.30 N	330.48 E	276.04	1.35
8149.00	90.68	1.95	7,708.04	365.25 N	333.27 E	372.04	1.68
8244.00	89.05	0.45	7,708.27	460.22 N	335.26 E	467.03	2.34
8340.00	90.65	1.63	7,708.53	556.20 N	337.00 E	563.03	2.07
8435.00	87.19	0.79	7,710.32	651.15 N	339.00 E	657.99	3.74
8530.00	87.36	1.24	7,714.84	746.03 N	340.69 E	752.89	0.50
8625.00	88.21	1.58	7,718.50	840.93 N	343.03 E	847.81	0.96
8720.00	88.55	1.57	7,721.19	935.85 N	345.64 E	942.77	0.36
8816.00	89.82	0.48	7,722.56	1,031.82 N	347.36 E	1038.76	1.74
8911.00	89.85	357.32	7,722.84	1,126.79 N	345.54 E	1133.67	3.32
9007.00	90.49	0.18	7,722.55	1,222.76 N	343.45 E	1229.58	3.05
9102.00	91.18	4.15	7,721.17	1,317.66 N	347.04 E	1324.53	4.24
9197.00	89.11	5.11	7,720.94	1,412.35 N	354.71 E	1419.35	2.40
9293.00	87.63	3.16	7,723.67	1,508.05 N	361.64 E	1515.18	2.55
9388.00	88.52	3.66	7,726.87	1,602.83 N	367.28 E	1610.05	1.07
9483.00	90.62	4.01	7,727.58	1,697.61 N	373.63 E	1704.94	2.24
9579.00	92.19	2.64	7,725.23	1,793.41 N	379.20 E	1800.84	2.17
9674.00	91.48	2.10	7,722.19	1,888.28 N	383.13 E	1895.77	0.93
9770.00	88.62	1.67	7,722.11	1,984.22 N	386.29 E	1991.75	3.02
9865.00	90.09	2.19	7,723.19	2,079.15 N	389.49 E	2086.74	1.65
9961.00	90.86	1.32	7,722.38	2,175.10 N	392.42 E	2182.73	1.21
10055.00	89.91	0.20	7,721.75	2,269.09 N	393.67 E	2276.72	1.56
10151.00	88.06	0.05	7,723.46	2,365.07 N	393.88 E	2372.68	1.93
10246.00	89.41	0.37	7,725.55	2,460.05 N	394.22 E	2467.64	1.47
10342.00	90.37	0.96	7,725.74	2,556.04 N	395.33 E	2563.64	1.17
10437.00	88.55	2.17	7,726.63	2,650.99 N	397.93 E	2658.63	2.30
10533.00	89.35	0.77	7,728.39	2,746.94 N	400.39 E 401.66 E	2754.61	1.68

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# HALLIBURTON | Sperry Drilling

Measured Depth	Inclination	Direction	Vertical Depth	Latitude	Departure	Vertical Section	Dogleg
(ft)	(deg)	(deg)	(ft)	(ft)	(ft)	(ft)	(%100')
10723.00	89.45	1.19	7,727.39	2,936.91 N	403.28 E	2944.59	1.90
10819.00	88.67	1.57	7,728.96	3,032.87 N	405.59 E	3040.58	0.90
10914.00	90.46	2.17	7,729.68	3,127.81 N	408.70 E	3135.56	1.99
11010.00	89.66	1.30	7,729.58	3,223.76 N	411.61 E	3231.56	1.24
11105.00	88.21	359.11	7,731.34	3,318.74 N	411.95 E	3326.52	2.77
11200.00	90.43	1.19	7,732,46	3,413.72 N	412.19 E	3421.49	3.20
11296.00	88.09	358.44	7,733.70	3,509.70 N	411.88 E	3517.43	3.75
11391.00	89.11	359.23	7,736.02	3,604.65 N	409.95 E	3612.32	1.35
11487.00	91.42	0.10	7,735.58	3,700.64 N	409.39 E	3708.28	2.57
11582.00	90.71	0.33	7,733.81	3,795.62 N	409.75 E	3803.25	0.79
11677.00	88.92	2.48	7,734.12	3,890.58 N	412.07 E	3898.24	2.94
11773.00	87.07	2.28	7,737.48	3,986.43 N	416.05 E	3994.16	1.94
11868.00	87.17	2.47	7,742.26	4,081.23 N	419.99 E	4089.02	0.23
11963.00	87.44	2.54	7,746.73	4,176.04 N	424.14 E	4183,89	0.30
12059.00	88.71	- 3.00	7,749.95	4,271.87 N	428.78 E	4279.79	1.40
12154.00	89.51	1.68	7,751.44	4,366.77 N	432.66 E	4374.76	1.62
12249.00	91.42	2.79	7,750.67	4,461.69 N	436.36 E	4469.73	2.32
12345.00	89.48	3.17	7,749.92	4,557.56 N	441.35 E	4565.68	2.06
12440.00	89.66	1.94	7,750.64	4,652.46 N	445.58 E	4660.65	1.31
12535.00	88.83	1.36	7,751,89	4,747.41 N	448.31 E	4755.63	1.07
12631.00	88.89	1.56	7,753.80	4,843.36 N	450.76 E	4851.61	0.22
12726.00	87.62	0.01	7,756.69	4,938.30 N	452.06 E	4946.56	2.11
12821.00	88.33	356.41	7,760.04	5,033.18 N	449.10 E	5041.36	3.86
12917.00	90.00	356.53	7,761.43	5,128.98 N	443.19 E	5137.02	1.74
13012.00	91.57	357.62	7,760.13	5,223.85 N	438.35 E	5231.77	2.01
13107.00	91.69	0.94	7,757.42	5,318.79 N	437.15 E	5326.66	3.50
13202.00	89.97	1.99	7,756.05	5,413.74 N	439.59 E	5421.65	2.12
13298.00	88.31	2.15	7,757.49	5,509.66 N	443.06 E	5517.62	1.74
13393.00	88.46	2.06	7,760.17	5,604.56 N	446.55 E	5612.57	0.19
13489.00	90.74	4.41	7,760.85	5,700.39 N	451.97 E	5708.49	3.41
13584.00	88.65	2.17	7,761.35	5,795.22 N	457.42 E	5803.41	3.23
13680.00	89.57	- 1.21	7,762.85	5,891.17 N	460.25 E	5899.40	1.38
13775.00	90.74	1.62	7,762.59	5,986.14 N	462.60 E	5994.39	1.31
13871.00	91.79	0.95	7,760.48	6,082.09 N	464.75 E	6090.37	1.30
13966.00	90.99	1.54	7,758.18	6,177.04 N	466.82 E	6185.34	1.05
14060.00	89.35	1.38	7,757.90	6,271.00 N	469.21 E	6279.33	1.75
14156.00	89.48	1.69	7,758.88	6,366.96 N	471.79 E	6375.33	0.35
14251.00	89.97	2.06	7,759.34	6,461.91 N	474.90 E	6470.32	0.65
14346.00	89.63	1.44	7,759.67	6,556.86 N	477.81 E	6565.31	0.74
14442.00	88.70	1.01	7,761.06	6,652.83 N	479.86 E	6661.30	1.07
14537.00	89.88	1.47	7,762.24	6,747.80 N	481.91 E	6756.29	1.33
14632.00	89.20	0.96	7,763.01	6,842.77 N	483.92 E	6851.29	0.90
14728.00	90.77	2.09	7,763.03	6,938.73 N	486.48 E	6947.28	2.02
14823.00	87.94	359.63	7,764.11	7,033.70 N	487.91 E	7042.26	3.95
14918.00	88.18	359.44	7,767.33	7,128.64 N	487.13 E	7137.16	0.32

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## HALLIBURTON | Sperry Drilling

DIRECTIONAL SURVEY DATA								
Measured Depth	Inclination	Direction	Vertical Depth	Latitude	Departure	Vertical Section	Dogleg	
(ft)	(deg)	(deg)	(ft)	(ft)	(ft)	(ft)	(%100')	
15013.00	89.54	358.39	7,769.22	7,223.60 N	485.34 E	7232,07	1.80	
15108.00	89.17	0.62	7,770.29	7,318.59 N	484.52 E	7327.01	2.37	
15204.00	90.22	359.49	7,770.81	7,414.58 N	484.61 E	7422.99	1.61	
15299.00	88.24	359.10	7,772.09	7,509.56 N	483.43 E	7517.93	2.12	
15394.00	89.54	359.37	7,773.93	7,604.53 N	482.16 E	7612.85	1.39	
15490.00	91.42	0.03	7,773.13	7,700.52 N	481.65 E	7708.81	2.08	
15585.00	90.28	1.74	7,771.72	7,795.50 N	483.12 E	7803.79	2.17	
15680.00	87.53	2.60	7,773.54	7,890.40 N	486.72 E	7898.75	3.03	
15776.00	88.67	2.78	7,776.72	7,986.24 N	491.22 E	7994.67	1.21	
15871.00	87.57	2.04	7,779.83	8,081.11 N	495.21 E	8089.59	1.40	
15967.00	88.64	2.15	7,783.01	8,176.99 N	498.72 E	8185.52	1.13	
16062.00	89.35	1.95	7,784.67	8,271.91 N	502.12 E	8280.50	0.77	
16157.00	88.98	2.25	7,786.05	8,366.84 N	505.61 E	8375.48	0.50	
16252.00	89.63	3.03	7,787.20	8,461.73 N	509.99 E	8470.44	1.06	
16348.00	89.04	2.30	7,788.31	8,557.62 N	514.45 E	8566.40	0.97	
16443.00	91.45	3.51	7,787.90	8,652.48 N	519.27 E	8661.34	2.83	
16539.00	88.52	1.76	7,787.93	8,748.37 N	523.68 E	8757.30	3.56	
16634.00	87.98	1.59	7,790.83	8,843.28 N	526.46 E	8852.25	0.60	
16730.00	87.81	0.81	7,794.36	8,939.20 N	528.46 E	8948.18	0.83	
16825.00	88.95	1.38	7,797.05	9,034.14 N	530.28 E	9043.14	1.35	
16920.00	87.72	1.59	7,799.80	9,129.07 N	532.74 E	9138.10	1.31	
17015.00	88.09	1.42	7,803.28	9,223.97 N	535.24 E	9233.04	0.42	
17109.00	89.08	2.02	7,805.60	9,317.90 N	538.07 E	9327.00	1.23	
17203.00	90.19	2.48	7,806.21	9,411.82 N	541.76 E	9420.98	1.27	
17297.00	90.06	2.44	7,806.01	9,505.73 N	545.79 E	9514.96	0.14	
17391.00	89.97	2.37	7,805.98	9,599.65 N	549.74 E	9608.94	0.12	
17485.00	90.89	2.94	7,805.27	9,693.55 N	554.09 E	9702.90	1.16	
17580.00	91.88	2.77	7,802.97	9,788.40 N	558.82 E	9797.83	1.05	
17674.00	92.78	2.80	7,799.16	9,882.21 N	563.38 E	9891.72	0.96	
17768.00	94.13	2.73	7,793.49	9,975.93 N	567.91 E	9985.51	1.44	
17831.00	94.13	2.73	7,788.95	10,038.69 N	570.90 E	10048.32	0.00	

SURVEYS CALCULATED USING SHORT COLLAR METHOD

TIE-ON SURVEY ASSUMED VERTICAL AT SURFACE

SURVEYS FROM 100' MD TO 770' MD PROVIDED BY MS SURVEY

SURVEYS FROM 827' MD TO 17768' MD PROVIDED BY SPERRY DRILLING MWD

SURVEY AT 17768' MD HAS BEEN PROJECTED TO TD AT 17831' MD

SPERRY ENGINEERS: S. IMMEKUS, J. MCRAE



### **DIRECTIONAL SURVEY DATA NOTES**

- Calculation based on minimum curvature method.
- Survey coordinates relative to well system reference point.
- TVD values given relative to drilling measurement point.
- Vertical section relative to well head.
- Vertical section is computed along a direction of 1.18 degrees (Grid)
- A total correction of 7.22 deg from Magnetic north to Grid north has been applied
- Horizontal displacement is relative to the well head.
- Horizontal displacement (closure) at 17,831.00 feet is 10,054.91 feet along 3.25 degrees (Grid)

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# HALLIBURTON Sperry Drilling

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