

HALLIBURTON

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State of New Mexico, Lea County

I, STEPHEN HATCHER certify that I am employed by Halliburton Energy Services, Inc. (aka Sperry Drilling) and that on the dates of December 16, 2015 through January 05, 2016, I did conduct or supervise the taking of MWD directional surveys for the Starcaster 18 Fed. Com #3H ST00 well from a depth of 9741' MD to a depth of 14935' MD. This data is true, correct, complete and within the limitations of the tools as set forth by Halliburton Energy Services, Inc. (aka Sperry Drilling). I am authorized and qualified to make this report and these surveys were conducted at the request of Endurance Resources, for the Starcaster 18 Fed. Com #3H ST00 well in Lea County. I have reviewed this report and find that it confirms to the principles and procedures as set forth by Halliburton Energy Services, Inc. (aka Sperry Drilling.)



STEPHEN HATCHER
Field Engineer

MAR 30 2016

Endurance Resources

Starcaster 18 Fed. Com #3H ST00

Lea County, New Mexico

H&P 490

API# 30-025-42917-0000

December 16, 2015 - January 05, 2016

MO-XX-0902991848

Sperry Drilling

MWD Survey Report

Submitted by: STEPHEN HATCHER

3950 Interwood South Parkway Houston, TX 77032

Ph: 281.986.4400

HALLIBURTON

Sperry Drilling

Survey Report for Endurance Resources LLC

Rig	:	H & P 490
Well Name	:	Starcaster 18 Fed 3H PBHL
Field Name	:	Bone Spring
Country	:	USA
Job Number	:	MO-XX-0902991848
Job Start Date	:	16-Dec-15
API Number	:	30-025-42917-0000

DIRECTIONAL SURVEY DATA

Tie-in

0.00 0.00 0.00 0.00 0.00 N 0.00 E

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (°/100')
100.00	0.06	147.74	100.00	0.04 S	0.03 E	0.04	0.06
200.00	0.23	102.79	200.00	0.13 S	0.25 E	0.14	0.19
300.00	0.36	216.71	300.00	0.43 S	0.26 E	0.43	0.50
400.00	0.71	219.39	399.99	1.16 S	0.32 W	1.16	0.35
500.00	0.91	208.14	499.98	2.34 S	1.09 W	2.33	0.25
600.00	0.92	224.34	599.97	3.61 S	2.02 W	3.59	0.26
800.00	0.31	234.83	799.96	5.07 S	3.59 W	5.04	0.31
900.00	0.06	199.08	899.96	5.28 S	3.83 W	5.24	0.26
1000.00	0.09	103.59	999.96	5.35 S	3.77 W	5.31	0.11
1100.00	0.05	92.16	1,099.96	5.37 S	3.65 W	5.33	0.04
1200.00	0.13	57.09	1,199.96	5.31 S	3.51 W	5.27	0.09
1300.00	0.17	155.57	1,299.96	5.38 S	3.35 W	5.35	0.23
1400.00	0.09	61.79	1,399.96	5.48 S	3.22 W	5.45	0.20
1500.00	0.24	209.25	1,499.96	5.62 S	3.26 W	5.59	0.32
1600.00	0.17	250.58	1,599.96	5.86 S	3.50 W	5.82	0.16
1700.00	0.10	252.35	1,699.96	5.93 S	3.72 W	5.90	0.07
1800.00	0.10	50.07	1,799.96	5.90 S	3.74 W	5.87	0.20
1900.00	0.25	69.35	1,899.96	5.77 S	3.47 W	5.74	0.16
2000.00	0.34	41.25	1,999.96	5.47 S	3.07 W	5.44	0.17
2100.00	0.38	31.27	2,099.95	4.96 S	2.70 W	4.94	0.07
2200.00	0.55	0.38	2,199.95	4.20 S	2.52 W	4.17	0.30
2300.00	0.57	15.56	2,299.95	3.24 S	2.39 W	3.22	0.15
2400.00	0.69	15.37	2,399.94	2.18 S	2.09 W	2.16	0.12
2500.00	0.65	40.90	2,499.93	1.17 S	1.56 W	1.16	0.30
2600.00	0.78	28.97	2,599.92	0.15 S	0.86 W	0.14	0.20
2700.00	0.84	23.99	2,699.92	1.12 N	0.23 W	-1.12	0.09
2800.00	0.69	28.51	2,799.91	2.32 N	0.35 E	-2.31	0.16
2900.00	0.56	10.78	2,899.90	3.33 N	0.73 E	-3.32	0.23
3000.00	0.40	28.38	2,999.90	4.11 N	0.99 E	-4.10	0.22
3100.00	0.86	40.57	3,099.89	4.99 N	1.64 E	-4.97	0.48
3200.00	0.78	47.84	3,199.88	6.02 N	2.63 E	-5.99	0.13
3300.00	0.72	56.14	3,299.87	6.82 N	3.66 E	-6.79	0.12
3400.00	0.54	28.66	3,399.87	7.59 N	4.41 E	-7.55	0.35
3500.00	0.19	61.20	3,499.86	8.08 N	4.78 E	-8.04	0.39
3600.00	0.22	51.62	3,599.86	8.28 N	5.08 E	-8.23	0.05
3700.00	0.34	75.60	3,699.86	8.47 N	5.51 E	-8.42	0.17
3800.00	0.69	98.33	3,799.86	8.46 N	6.40 E	-8.40	0.40
3900.00	1.11	93.80	3,899.85	8.31 N	7.96 E	-8.23	0.43
4000.00	1.00	71.91	3,999.83	8.52 N	9.75 E	-8.42	0.41
4100.00	1.07	46.53	4,099.81	9.43 N	11.26 E	-9.32	0.46
4200.00	1.53	34.75	4,199.79	11.17 N	12.70 E	-11.05	0.53

DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (°/100)
4300.00	2.02	28.72	4,299.74	13.81 N	14.31 E	-13.67	0.52
4400.00	2.67	42.44	4,399.66	17.08 N	16.73 E	-16.91	0.85
4500.00	2.42	60.24	4,499.56	19.84 N	20.13 E	-19.65	0.83
4600.00	1.86	82.50	4,599.49	21.10 N	23.57 E	-20.87	0.99
4700.00	1.45	72.65	4,699.45	21.69 N	26.39 E	-21.44	0.50
4800.00	1.26	84.76	4,799.42	22.17 N	28.69 E	-21.89	0.34
4900.00	0.73	82.19	4,899.40	22.36 N	30.42 E	-22.06	0.53
5000.00	0.63	81.52	4,999.40	22.52 N	31.59 E	-22.22	0.10
5100.00	0.09	88.19	5,099.40	22.61 N	32.22 E	-22.30	0.54
5200.00	0.13	138.98	5,199.40	22.52 N	32.37 E	-22.21	0.10
5300.00	0.32	65.29	5,299.39	22.55 N	32.70 E	-22.24	0.31
5400.00	0.18	47.17	5,399.39	22.78 N	33.07 E	-22.46	0.16
5500.00	0.12	134.65	5,499.39	22.81 N	33.26 E	-22.49	0.21
5600.00	0.28	78.17	5,599.39	22.79 N	33.57 E	-22.46	0.24
5700.00	0.21	115.32	5,699.39	22.76 N	33.97 E	-22.43	0.17
5800.00	0.08	34.47	5,799.39	22.74 N	34.18 E	-22.41	0.21
5900.00	0.08	347.82	5,899.39	22.86 N	34.20 E	-22.54	0.06
6000.00	0.19	40.77	5,999.39	23.06 N	34.30 E	-22.73	0.16
6100.00	0.18	129.07	6,099.39	23.09 N	34.53 E	-22.75	0.26
6200.00	0.12	14.76	6,199.39	23.09 N	34.68 E	-22.75	0.25
6300.00	0.12	27.22	6,299.39	23.28 N	34.75 E	-22.95	0.03
6400.00	0.03	134.97	6,399.39	23.36 N	34.82 E	-23.02	0.13
6600.00	0.28	107.49	6,599.39	23.17 N	35.32 E	-22.83	0.13
6700.00	0.08	184.77	6,699.39	23.03 N	35.55 E	-22.69	0.27
6800.00	0.24	87.17	6,799.39	22.97 N	35.75 E	-22.63	0.26
6900.00	0.15	85.19	6,899.39	22.99 N	36.09 E	-22.64	0.09
7000.00	0.31	126.37	6,999.39	22.84 N	36.44 E	-22.49	0.22
7100.00	0.24	109.55	7,099.39	22.61 N	36.85 E	-22.26	0.11
7200.00	0.32	131.21	7,199.39	22.36 N	37.26 E	-22.00	0.13
7300.00	0.20	176.57	7,299.38	22.00 N	37.48 E	-21.64	0.23
7400.00	0.18	194.36	7,399.38	21.67 N	37.45 E	-21.31	0.06
7500.00	0.52	133.20	7,499.38	21.21 N	37.75 E	-20.85	0.46
7600.00	0.60	172.50	7,599.38	20.38 N	38.14 E	-20.01	0.38
7700.00	0.60	170.75	7,699.37	19.34 N	38.30 E	-18.98	0.02
7800.00	0.49	169.04	7,799.37	18.41 N	38.46 E	-18.04	0.11
7900.00	0.60	174.71	7,899.36	17.47 N	38.59 E	-17.10	0.12
8000.00	0.41	171.17	7,999.36	16.59 N	38.70 E	-16.22	0.19
8100.00	0.75	178.87	8,099.35	15.58 N	38.76 E	-15.21	0.35
8200.00	0.77	168.92	8,199.34	14.27 N	38.91 E	-13.90	0.13
8300.00	0.67	182.36	8,299.34	13.03 N	39.01 E	-12.65	0.20
8400.00	0.48	169.76	8,399.33	12.03 N	39.06 E	-11.65	0.23
8500.00	0.49	169.35	8,499.33	11.20 N	39.21 E	-10.82	0.01
8600.00	0.52	175.30	8,599.32	10.33 N	39.33 E	-9.95	0.06
8700.00	0.66	182.84	8,699.32	9.30 N	39.34 E	-8.92	0.16
8800.00	0.50	174.02	8,799.31	8.29 N	39.36 E	-7.91	0.18

DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (°/100')
8900.00	0.27	166.38	8,899.31	7.63 N	39.46 E	-7.25	0.24
9000.00	0.41	196.59	8,999.31	7.05 N	39.41 E	-6.68	0.22
9100.00	0.42	188.38	9,099.31	6.35 N	39.25 E	-5.97	0.06
9200.00	0.72	144.40	9,199.30	5.47 N	39.57 E	-5.09	0.51
9300.00	1.19	88.11	9,299.29	5.00 N	40.97 E	-4.60	0.99
9400.00	0.61	65.38	9,399.28	5.25 N	42.49 E	-4.85	0.67
9500.00	0.42	107.47	9,499.27	5.37 N	43.33 E	-4.95	0.41
9600.00	0.88	102.36	9,599.27	5.09 N	44.43 E	-4.66	0.46
9700.00	1.14	112.23	9,699.25	4.55 N	46.10 E	-4.11	0.31
9741.00	1.57	117.27	9,740.24	4.14 N	46.97 E	-3.69	1.08
9804.00	1.68	96.96	9,803.22	3.63 N	48.65 E	-3.17	0.92
9866.00	1.69	139.47	9,865.19	2.83 N	50.15 E	-2.34	1.97
9898.00	1.86	119.90	9,897.18	2.21 N	50.91 E	-1.72	1.96
9929.00	3.27	172.64	9,928.15	1.08 N	51.46 E	-0.58	8.40
9961.00	6.36	190.70	9,960.03	1.57 S	51.25 E	2.06	10.63
9992.00	9.23	195.49	9,990.74	5.65 S	50.26 E	6.13	9.50
10024.00	12.80	197.23	10,022.15	11.51 S	48.53 E	11.98	11.20
10055.00	15.53	197.50	10,052.20	18.75 S	46.26 E	19.20	8.79
10087.00	19.33	196.06	10,082.73	27.93 S	43.51 E	28.35	11.95
10118.00	23.12	194.59	10,111.62	38.75 S	40.56 E	39.14	12.35
10149.00	27.04	193.53	10,139.69	51.50 S	37.37 E	51.86	12.74
10181.00	30.42	193.44	10,167.75	66.46 S	33.79 E	66.78	10.56
10212.00	32.94	191.69	10,194.13	82.35 S	30.26 E	82.63	8.66
10244.00	34.19	187.83	10,220.79	99.78 S	27.27 E	100.03	7.72
10275.00	36.72	185.14	10,246.05	117.64 S	25.25 E	117.88	9.59
10307.00	40.17	183.26	10,271.11	137.48 S	23.81 E	137.70	11.40
10338.00	44.31	181.50	10,294.05	158.30 S	22.96 E	158.51	13.87
10369.00	48.57	181.09	10,315.41	180.75 S	22.45 E	180.95	13.77
10401.00	53.48	178.97	10,335.54	205.61 S	22.45 E	205.82	16.19
10432.00	57.36	176.66	10,353.13	231.11 S	23.44 E	231.32	13.94
10464.00	61.45	175.76	10,369.41	258.59 S	25.26 E	258.82	13.00
10495.00	65.55	174.31	10,383.24	286.22 S	27.67 E	286.47	13.89
10526.00	70.00	174.74	10,394.96	314.78 S	30.41 E	315.06	14.41
10558.00	73.39	175.67	10,405.01	345.05 S	32.94 E	345.35	10.93
10589.00	77.25	176.12	10,412.87	374.95 S	35.09 E	375.27	12.53
10621.00	81.24	176.52	10,418.84	406.32 S	37.10 E	406.66	12.53
10652.00	85.05	176.53	10,422.54	437.04 S	38.97 E	437.39	12.29
10683.00	88.58	177.06	10,424.26	467.93 S	40.70 E	468.30	11.53
10747.00	91.05	178.35	10,424.47	531.88 S	43.26 E	532.27	4.35
10841.00	91.26	179.24	10,422.57	625.84 S	45.23 E	626.24	0.97
10935.00	92.13	180.14	10,419.79	719.79 S	45.74 E	720.20	1.33
11029.00	91.17	180.50	10,417.09	813.75 S	45.21 E	814.15	1.08
11124.00	87.69	180.19	10,418.03	908.73 S	44.64 E	909.12	3.68
11219.00	89.66	179.30	10,420.23	1,003.70 S	45.06 E	1004.08	2.28
11313.00	87.72	179.19	10,422.38	1,097.66 S	46.29 E	1098.05	2.07

DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (°/100')
11407.00	90.83	179.27	10,423.57	1,191.63 S	47.56 E	1192.03	3.31
11501.00	89.54	180.06	10,423.27	1,285.63 S	48.11 E	1286.03	1.62
11596.00	90.52	180.69	10,423.22	1,380.62 S	47.48 E	1381.02	1.23
11690.00	91.51	180.51	10,421.55	1,474.60 S	46.49 E	1474.98	1.07
11784.00	92.22	181.32	10,418.49	1,568.54 S	44.99 E	1568.90	1.14
11878.00	89.91	181.31	10,416.74	1,662.49 S	42.84 E	1662.83	2.46
11972.00	90.96	181.09	10,416.03	1,756.47 S	40.87 E	1756.78	1.14
12067.00	90.80	179.84	10,414.58	1,851.45 S	40.10 E	1851.75	1.33
12161.00	90.03	179.96	10,413.89	1,945.45 S	40.27 E	1945.74	0.83
12255.00	90.80	180.66	10,413.21	2,039.44 S	39.76 E	2039.73	1.11
12349.00	89.04	181.42	10,413.34	2,133.42 S	38.05 E	2133.69	2.03
12443.00	91.23	182.15	10,413.11	2,227.37 S	35.13 E	2227.61	2.46
12538.00	89.29	181.74	10,412.68	2,322.31 S	31.91 E	2322.51	2.09
12632.00	90.06	182.40	10,413.21	2,416.25 S	28.51 E	2416.41	1.08
12726.00	90.46	181.33	10,412.78	2,510.19 S	25.45 E	2510.32	1.21
12821.00	89.91	178.26	10,412.47	2,605.18 S	25.79 E	2605.31	3.29
12915.00	91.79	177.73	10,411.08	2,699.11 S	29.08 E	2699.26	2.08
13009.00	90.43	177.11	10,409.26	2,792.99 S	33.32 E	2793.18	1.59
13104.00	90.15	176.96	10,408.77	2,887.86 S	38.23 E	2888.10	0.33
13198.00	90.22	178.65	10,408.47	2,981.79 S	41.82 E	2982.06	1.80
13293.00	91.26	179.56	10,407.24	3,076.77 S	43.31 E	3077.04	1.46
13387.00	89.72	179.68	10,406.44	3,170.76 S	43.94 E	3171.04	1.64
13482.00	90.34	180.32	10,406.38	3,265.76 S	43.93 E	3266.03	0.94
13576.00	89.94	180.63	10,406.16	3,359.76 S	43.15 E	3360.02	0.54
13670.00	90.34	180.79	10,405.93	3,453.75 S	41.99 E	3453.99	0.46
13765.00	89.85	181.50	10,405.78	3,548.73 S	40.09 E	3548.95	0.90
13859.00	91.30	181.73	10,404.84	3,642.68 S	37.44 E	3642.88	1.56
13953.00	90.28	181.55	10,403.55	3,736.64 S	34.76 E	3736.80	1.10
14048.00	91.05	181.25	10,402.45	3,831.60 S	32.43 E	3831.74	0.87
14142.00	89.38	182.59	10,402.10	3,925.54 S	29.29 E	3925.64	2.27
14236.00	90.34	183.09	10,402.33	4,019.42 S	24.63 E	4019.48	1.15
14330.00	90.56	182.67	10,401.59	4,113.30 S	19.91 E	4113.30	0.50
14425.00	89.91	180.47	10,401.21	4,208.26 S	17.31 E	4208.23	2.42
14519.00	91.23	178.84	10,400.27	4,302.25 S	17.88 E	4302.22	2.23
14613.00	90.96	178.13	10,398.47	4,396.20 S	20.36 E	4396.19	0.82
14708.00	90.74	178.20	10,397.07	4,491.14 S	23.40 E	4491.16	0.24
14802.00	89.78	179.19	10,396.64	4,585.11 S	25.54 E	4585.15	1.46
14896.00	90.74	179.42	10,396.21	4,679.10 S	26.68 E	4679.14	1.05
14935.00	90.00	179.25	10,395.96	4,718.10 S	27.13 E	4718.14	1.94
14995.00	90.00	179.25	10,395.96	4,778.09 S	27.91 E	4778.14	0.01

SURVEY FOOTER

SURVEYS CALCULATED USING THE SHORT COLLAR METHOD.

WELL ASSUMED VERTICAL AT SURFACE.

SURVEYS FROM 100' MD TO 9700' MD PROVIDED BY VAUGHN ENERGY SERVICES.

SURVEYS FROM 9741' MD TO 14935' MD PROVIDED BY SPERRY DRILLING.

SURVEY FOOTER

SURVEY AT 14935' MD IS PROJECTED TO TD AT 14995' MD
SPERRY DRILLING ENGINEERS: S. HATCHER AND K. JONES

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 179.45 degrees (Grid)
- A total correction of 6.73 deg from Magnetic north to Grid north has been applied
- Horizontal displacement is relative to the well head.
- Horizontal displacement (closure) at 14,995.00 feet is 4,778.17 feet along 179.67 degrees (Grid)

WARRANTY

HALLIBURTON ENERGY SERVICES, INC. WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON ENERGY SERVICES, INC. CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION, AND PRODUCTION OPERATION. HALLIBURTON ENERGY SERVICES, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON ENERGY SERVICES, INC. SERVICES BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON ENERGY SERVICES, INC.