

Devon Energy
Cotton Draw Unit 89 ST01
Eddy County, NM
H&P 223
API# 30-015-31381-0000

May 31, 2012 – June 10, 2012
HD-MJ-0009490063

Sperry Drilling Services MWD Survey Report

Submitted by Andy Naquin
3950 Interwood South Parkway
Houston, TX 77032
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HALLIBURTON

**Drilling and Formation
Evaluation**

Requires tie-in survey to TD 17,400'



Survey Report for Devon Energy

Rig:	H&P 223
Well Name:	Cotton Draw Unit 89 ST 01
Field Name:	Paduca, Upper Penn Shale
Country:	U.S.A.
Job Number:	HD-XX-0009490063
Job Start Date:	31-May-12
API Number:	30-015-31381-0000



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1. Directional Survey Data



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	0.10	99.96	100.00	0.02 S	0.09 E	0.08	0.10
200.00	0.30	141.73	200.00	0.24 S	0.33 E	0.41	0.24
300.00	0.01	348.78	300.00	0.43 S	0.49 E	0.64	0.31
400.00	0.23	87.13	400.00	0.41 S	0.69 E	0.81	0.23
500.00	0.20	118.89	500.00	0.49 S	1.05 E	1.15	0.12
600.00	0.90	198.45	599.99	1.32 S	0.95 E	1.48	0.89
700.00	1.59	204.53	699.97	3.32 S	0.13 E	1.76	0.70
800.00	1.61	204.47	799.93	5.87 S	1.03 W	2.01	0.02
900.00	1.49	204.25	899.89	8.33 S	2.15 W	2.26	0.12
1000.00	1.28	200.92	999.86	10.56 S	3.08 W	2.55	0.22
1100.00	1.02	191.12	1,099.84	12.48 S	3.65 W	3.00	0.33
1200.00	0.87	180.19	1,199.83	14.11 S	3.82 W	3.66	0.23
1300.00	0.86	170.72	1,299.82	15.61 S	3.71 W	4.51	0.14
1400.00	0.85	178.34	1,399.81	17.09 S	3.56 W	5.36	0.11
1500.00	0.60	125.28	1,499.80	18.13 S	3.12 W	6.27	0.69
1600.00	0.84	117.04	1,599.79	18.77 S	2.03 W	7.52	0.26
1700.00	1.05	90.14	1,699.78	19.10 S	0.47 W	9.05	0.48
1800.00	1.28	93.95	1,799.76	19.18 S	1.56 E	10.86	0.24
1900.00	1.51	87.41	1,899.73	19.20 S	4.00 E	12.98	0.28
2000.00	1.39	88.44	1,999.70	19.11 S	6.52 E	15.13	0.12
2100.00	1.47	93.43	2,099.67	19.15 S	9.02 E	17.32	0.15
2200.00	1.58	89.23	2,199.63	19.21 S	11.68 E	19.65	0.16
2300.00	1.45	91.92	2,299.60	19.23 S	14.32 E	21.96	0.15
2400.00	1.54	99.42	2,399.56	19.50 S	16.91 E	24.34	0.22
2500.00	1.45	99.53	2,499.53	19.93 S	19.48 E	26.79	0.09
2600.00	1.29	110.01	2,599.50	20.52 S	21.79 E	29.09	0.30
2700.00	1.46	116.53	2,699.47	21.47 S	23.99 E	31.47	0.23
2800.00	1.37	113.63	2,799.44	22.52 S	26.22 E	33.93	0.11
2900.00	1.58	124.40	2,899.41	23.78 S	28.45 E	36.49	0.35
3000.00	1.42	128.76	2,999.37	25.34 S	30.56 E	39.09	0.20
3100.00	1.43	122.99	3,099.34	26.79 S	32.57 E	41.56	0.14
3200.00	2.13	92.32	3,199.30	27.55 S	35.47 E	44.46	1.16
3300.00	2.16	89.12	3,299.23	27.59 S	39.21 E	47.73	0.12
3400.00	1.94	89.07	3,399.16	27.54 S	42.79 E	50.81	0.22
3500.00	2.08	107.20	3,499.10	28.04 S	46.22 E	54.04	0.65
3600.00	2.28	112.29	3,599.03	29.34 S	49.79 E	57.78	0.28
3700.00	2.85	114.15	3,698.93	31.11 S	53.90 E	62.23	0.58
3800.00	2.90	116.52	3,798.80	33.25 S	58.43 E	67.23	0.13
3900.00	2.88	127.16	3,898.68	35.90 S	62.70 E	72.25	0.54
4000.00	2.94	127.98	3,998.55	39.00 S	66.72 E	77.28	0.07
4100.00	2.73	129.62	4,098.42	42.09 S	70.58 E	82.16	0.23
4200.00	1.58	125.84	4,198.35	44.42 S	73.53 E	85.88	1.16



Directional Survey Data

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (%/100')
4300.00	1.35	127.91	4,298.32	45.95 S	75.58 E	88.41	0.24
4400.00	0.83	132.59	4,398.30	47.16 S	77.04 E	90.28	0.53
4500.00	0.93	142.06	4,498.29	48.29 S	78.07 E	91.74	0.18
4600.00	0.75	151.11	4,598.28	49.51 S	78.89 E	93.05	0.22
4700.00	0.71	150.08	4,698.27	50.62 S	79.51 E	94.14	0.04
4800.00	0.69	152.02	4,798.26	51.69 S	80.10 E	95.19	0.03
4900.00	0.74	149.37	4,898.26	52.77 S	80.71 E	96.26	0.06
5000.00	0.72	153.25	4,998.25	53.89 S	81.33 E	97.34	0.05
5100.00	0.72	156.72	5,098.24	55.03 S	81.86 E	98.36	0.04
5200.00	0.71	151.41	5,198.23	56.15 S	82.40 E	99.39	0.07
5300.00	0.74	146.46	5,298.22	57.23 S	83.06 E	100.50	0.07
5400.00	0.76	146.07	5,398.22	58.32 S	83.78 E	101.67	0.02
5500.00	0.70	148.32	5,498.21	59.39 S	84.47 E	102.80	0.07
5600.00	0.70	149.87	5,598.20	60.44 S	85.10 E	103.86	0.02
5700.00	0.83	151.61	5,698.19	61.60 S	85.75 E	105.00	0.13
5800.00	0.75	161.48	5,798.18	62.86 S	86.30 E	106.11	0.16
5900.00	0.81	164.53	5,898.17	64.16 S	86.70 E	107.09	0.07
6000.00	0.78	154.36	5,998.16	65.46 S	87.18 E	108.16	0.14
6100.00	0.90	162.30	6,098.15	66.82 S	87.72 E	109.29	0.17
6200.00	0.97	161.13	6,198.14	68.37 S	88.23 E	110.51	0.07
6300.00	0.96	163.78	6,298.12	69.98 S	88.74 E	111.74	0.05
6400.00	1.11	170.54	6,398.11	71.73 S	89.13 E	112.95	0.19
6500.00	1.02	163.15	6,498.09	73.54 S	89.55 E	114.21	0.16
6600.00	1.11	155.37	6,598.07	75.27 S	90.21 E	115.64	0.17
6700.00	1.23	153.46	6,698.05	77.12 S	91.09 E	117.32	0.13
6800.00	1.30	154.95	6,798.03	79.10 S	92.05 E	119.14	0.08
6900.00	1.34	154.33	6,898.00	81.18 S	93.04 E	121.03	0.04
7000.00	1.42	158.10	6,997.97	83.39 S	94.01 E	122.96	0.12
7100.00	1.40	155.73	7,097.94	85.65 S	94.97 E	124.92	0.06
7200.00	1.44	153.07	7,197.91	87.89 S	96.04 E	126.95	0.08
7300.00	1.31	150.72	7,297.88	90.00 S	97.17 E	128.98	0.14
7400.00	1.40	157.56	7,397.85	92.13 S	98.20 E	130.93	0.18
7500.00	1.43	157.34	7,497.82	94.41 S	99.14 E	132.88	0.03
7600.00	1.59	158.47	7,597.79	96.85 S	100.13 E	134.95	0.16
7700.00	1.57	154.15	7,697.75	99.37 S	101.24 E	137.16	0.12
7800.00	1.68	152.29	7,797.71	101.91 S	102.52 E	139.52	0.12
7900.00	1.68	151.60	7,897.67	104.49 S	103.90 E	142.00	0.02
8000.00	1.73	156.42	7,997.62	107.17 S	105.20 E	144.45	0.15
8100.00	1.78	150.24	8,097.58	109.90 S	106.57 E	147.00	0.20
8200.00	1.89	150.85	8,197.53	112.69 S	108.15 E	149.75	0.11
8300.00	1.84	151.87	8,297.47	115.54 S	109.71 E	152.52	0.06
8400.00	1.70	149.00	8,397.43	118.23 S	111.23 E	155.17	0.17
8500.00	1.39	151.36	8,497.39	120.56 S	112.57 E	157.49	0.32
8600.00	1.20	165.69	8,597.36	122.64 S	113.41 E	159.25	0.37
8700.00	1.15	179.32	8,697.34	124.66 S	113.69 E	160.49	0.28



Directional Survey Data

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (%/100')
8800.00	1.05	178.31	8,797.32	126.58 S	113.72 E	161.47	0.10
8900.00	1.22	176.57	8,897.31	128.56 S	113.81 E	162.53	0.17
9000.00	1.14	169.55	8,997.28	130.60 S	114.06 E	163.75	0.17
9100.00	1.05	163.71	9,097.27	132.46 S	114.50 E	165.05	0.14
9200.00	1.15	161.00	9,197.25	134.29 S	115.08 E	166.46	0.11
9300.00	1.32	172.57	9,297.22	136.38 S	115.56 E	167.91	0.30
9400.00	1.31	177.92	9,397.20	138.66 S	115.75 E	169.21	0.12
9500.00	1.31	177.77	9,497.17	140.95 S	115.83 E	170.41	0.00
9600.00	1.28	176.70	9,597.15	143.20 S	115.94 E	171.63	0.04
9700.00	1.23	178.40	9,697.12	145.39 S	116.04 E	172.79	0.06
9800.00	1.28	182.55	9,797.10	147.58 S	116.02 E	173.86	0.10
9900.00	1.33	192.50	9,897.07	149.83 S	115.71 E	174.71	0.23
10000.00	1.23	188.47	9,997.05	152.02 S	115.31 E	175.44	0.13
10100.00	1.07	188.17	10,097.03	154.01 S	115.01 E	176.17	0.16
10200.00	0.78	173.12	10,197.01	155.61 S	114.96 E	176.92	0.38
10300.00	0.60	183.49	10,297.01	156.81 S	115.01 E	177.55	0.22
10400.00	0.60	182.66	10,397.00	157.85 S	114.96 E	178.02	0.01
10500.00	0.61	172.39	10,497.00	158.90 S	115.00 E	178.58	0.11
10600.00	0.89	165.39	10,596.99	160.18 S	115.27 E	179.45	0.29
10700.00	1.16	166.29	10,696.97	161.92 S	115.71 E	180.69	0.27
10800.00	1.33	157.74	10,796.95	163.98 S	116.38 E	182.29	0.25
10900.00	1.06	119.41	10,896.93	165.50 S	117.63 E	184.13	0.82
11000.00	0.88	86.95	10,996.91	165.92 S	119.20 E	185.70	0.57
11100.00	0.83	49.43	11,096.90	165.41 S	120.52 E	186.59	0.55
11200.00	0.90	49.40	11,196.89	164.42 S	121.67 E	187.10	0.07
11300.00	1.00	47.32	11,296.88	163.32 S	122.90 E	187.63	0.11
11400.00	1.00	52.19	11,396.86	162.19 S	124.24 E	188.23	0.08
11500.00	1.02	58.24	11,496.85	161.19 S	125.68 E	188.99	0.11
11600.00	0.75	65.61	11,596.83	160.45 S	127.03 E	189.80	0.29
11700.00	0.53	58.92	11,696.83	159.94 S	128.03 E	190.41	0.23
11800.00	0.44	55.13	11,796.83	159.48 S	128.74 E	190.80	0.10
11900.00	0.40	75.40	11,896.82	159.18 S	129.39 E	191.22	0.15
12000.00	0.41	43.69	11,996.82	158.83 S	129.98 E	191.56	0.22
12100.00	0.29	44.38	12,096.82	158.39 S	130.40 E	191.71	0.12
12200.00	0.22	24.40	12,196.82	158.04 S	130.66 E	191.75	0.11
12300.00	0.12	57.65	12,296.82	157.80 S	130.82 E	191.79	0.14
12591.00	3.35	50.16	12,587.65	152.20 S	137.60 E	194.90	1.11
12623.00	2.97	51.08	12,619.60	151.08 S	138.96 E	195.53	1.20
12655.00	3.00	50.89	12,651.55	150.03 S	140.26 E	196.14	0.11
12687.00	3.06	53.99	12,683.51	149.00 S	141.60 E	196.79	0.54
12719.00	2.68	55.66	12,715.47	148.08 S	142.91 E	197.47	1.20
12814.00	1.79	57.55	12,810.39	146.03 S	146.00 E	199.14	0.94
12910.00	1.93	56.10	12,906.34	144.32 S	148.61 E	200.56	0.16
13006.00	1.65	58.98	13,002.30	142.70 S	151.14 E	201.96	0.31
13101.00	1.42	48.51	13,097.26	141.21 S	153.20 E	203.01	0.38

**Directional Survey Data**

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg ("/100')
13197.00	1.00	57.90	13,193.24	139.98 S	154.80 E	203.80	0.48
13208.00	0.97	56.32	13,204.24	139.87 S	154.96 E	203.88	0.40
13250.00	0.85	56.32	13,246.23	139.51 S	155.52 E	204.18	0.29

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 119.67 degrees (Grid)
- A total correction of 7.33 deg from Magnetic north to Grid north has been applied
- Horizontal displacement is relative to the well head.
- Horizontal displacement (closure) at 13,250.00 feet is 208.92 feet along 131.89 degrees (Grid)

SURVEYS CALCULATED USING SHORT COLLAR METHOD

TIE-ON SURVEY ASSUMED VERTICAL AT SURFACE

SURVEYS FROM 100.00' MD TO 12300.00' MD ARE PROVIDED BY GYRO DATA.

SURVEYS FROM 12591.00' MD TO 13208.00' MD ARE PROVIDED BY SPERRY DRILLING MWD

SURVEY AT 13208.00' MD HAS BEEN PROJECTED TO TD AT 13250.00' MD

SPERRY ENGINEERS: ANDY NAQUIN, KENNETH MARSHALL

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HALLIBURTON

Sperry Drilling



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HALLIBURTON

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State of New Mexico, Eddy County

I, Andy Naquin, certify that I am employed by Halliburton Energy Services, Inc. (AKA Sperry Drilling) and that on the dates of 31 May 2012 through 10 June 2012, I did conduct or supervise the taking of MWD directional surveys for the well Cotton Draw Unit 89 ST01 from a depth of 12591' MD to a depth of 13208' 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 this survey which was conducted at the request of Devon Energy for the well of Cotton Draw Unit 89 ST01 API No. 30-015-31381-0000 in Eddy County, New Mexico. 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).


Field Engineer