

**Chevron USA, Inc
Hayhurst 18 Fed 1H
Eddy County, NM
Ensign 767
API# 30-015-41848-1000**

**January 26, 2014 – February 17, 2014
HD-MJ-0901037354**

**Sperry Drilling
Survey Report**

**NM OIL CONSERVATION
ARTESIA DISTRICT
AUG 26 2014**

RECEIVED

**Submitted by Brandon Roberie
3950 Interwood Parkway South
Houston, TX 77032
Ph: 281.986.4400**

HALLIBURTON

**Drilling and Formation
Evaluation**

Survey Report for Chevron USA, Inc

Rig : Ensign 767
Well Name : Hayhurst 18 Fed 1H ST01
Field Name :
Country : USA
Job Number : HD-XX-0901037354
Job Start Date : 26-Jan-14
API Number : 30-015-41848-1000

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)	Longitude (ft)	Vertical Section (ft)	Depth (ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	0.00
100.00	0.55	223.21	100.00	0.35 S	0.33 W	0.34	0.55
200.00	1.29	257.82	199.99	0.94 S	1.76 W	0.87	0.89
300.00	2.20	269.98	299.94	1.18 S	4.78 W	0.98	0.98
400.00	3.34	283.61	399.82	0.49 S	9.53 W	0.10	1.31
512.00	3.61	285.52	511.61	1.22 N	16.10 W	1.87	0.26
596.00	2.36	276.29	595.50	2.12 N	20.37 W	-2.94	1.59
689.00	1.96	269.12	688.43	2.30 N	23.86 W	-3.27	0.52
811.00	1.67	283.56	810.37	2.69 N	27.67 W	-3.81	0.44
999.00	1.18	313.16	998.32	4.66 N	31.74 W	-5.94	0.46
1126.00	1.21	330.97	1,125.29	6.72 N	33.35 W	-8.07	0.29
1316.00	2.22	50.23	1,315.22	10.83 N	31.49 W	-12.10	1.22
1506.00	3.45	61.43	1,504.99	15.92 N	23.64 W	-16.86	0.70
1696.00	4.03	75.89	1,694.59	20.28 N	12.16 W	-20.75	0.58
1789.00	3.76	86.14	1,787.38	21.28 N	5.95 W	-21.50	0.80
1881.00	2.81	88.86	1,879.22	21.53 N	0.68 W	-21.54	1.04
1967.00	2.28	86.49	1,965.14	21.67 N	3.13 E	-21.53	0.64
2067.00	2.11	95.09	2,065.06	21.63 N	6.95 E	-21.33	0.37
2258.00	1.96	94.27	2,255.94	21.08 N	13.70 E	-20.50	0.08
2449.00	2.17	88.60	2,446.82	20.92 N	20.57 E	-20.07	0.15
2639.00	2.16	89.47	2,636.69	21.04 N	27.73 E	-19.90	0.02
2829.00	1.94	94.88	2,826.56	20.80 N	34.51 E	-19.39	0.15
3019.00	1.82	92.32	3,016.46	20.41 N	40.73 E	-18.74	0.08
3210.00	2.01	90.82	3,207.35	20.24 N	47.12 E	-18.31	0.10
3400.00	1.90	94.77	3,397.24	19.93 N	53.59 E	-17.74	0.09
3591.00	1.86	93.57	3,588.14	19.47 N	59.83 E	-17.03	0.03
3780.00	2.07	90.86	3,777.03	19.23 N	66.30 E	-16.53	0.12
3969.00	2.16	86.55	3,965.90	19.39 N	73.27 E	-16.41	0.10
4159.00	1.70	83.46	4,155.79	19.93 N	79.64 E	-16.69	0.25
4349.00	1.28	94.41	4,345.73	20.08 N	84.55 E	-16.65	0.26
4540.00	1.42	91.07	4,536.68	19.88 N	89.06 E	-16.25	0.08
4730.00	1.23	87.11	4,726.63	19.93 N	93.45 E	-16.14	0.11
4920.00	1.31	89.67	4,916.58	20.05 N	97.65 E	-16.08	0.05
5108.00	1.13	95.57	5,104.54	19.88 N	101.63 E	-15.75	0.11
5298.00	1.17	119.91	5,294.50	18.73 N	105.18 E	-14.46	0.26
5488.00	0.93	135.07	5,484.47	16.68 N	107.95 E	-12.29	0.19
5678.00	0.57	199.18	5,674.45	14.70 N	108.73 E	-10.29	0.45
5868.00	0.68	273.01	5,864.45	13.87 N	107.29 E	-9.52	0.40
6058.00	0.63	254.36	6,054.43	13.65 N	105.16 E	-9.38	0.11
6249.00	0.12	267.99	6,245.43	13.35 N	103.93 E	-9.14	0.27
6440.00	0.75	195.20	6,436.42	12.15 N	103.40 E	-7.95	0.38

DIRECTIONAL SURVEY DATA

Measured Depth (m)	KD (m)	Drilling (m)	Vertical Depth (m)	Latitude (°N)	Longitude (°E)	Gamma Ray (API)	Tool Joint (m)
6630.00	1.15	175.51	6,626.40	9.04 N	103.23 E	4.86	0.27
6820.00	1.32	207.73	6,816.35	5.19 N	102.36 E	1.05	0.37
6981.00	23.80	194.01	6,972.50	28.40 S	93.51 E	32.16	13.99
7013.00	28.91	193.83	7,001.17	42.19 S	90.10 E	45.80	15.98
7044.00	32.91	193.44	7,027.76	57.66 S	86.34 E	61.11	12.90
7076.00	35.48	188.89	7,054.23	75.30 S	82.89 E	78.59	11.33
7108.00	38.37	181.70	7,079.82	94.41 S	81.16 E	97.62	16.24
7140.00	40.46	177.77	7,104.54	114.72 S	81.27 E	117.91	10.17
7171.00	42.27	175.62	7,127.81	135.17 S	82.45 E	138.39	7.41
7202.00	42.01	175.79	7,150.80	155.91 S	84.01 E	159.18	0.89
7235.00	44.58	175.29	7,174.81	178.47 S	85.78 E	181.79	7.83
7266.00	47.74	176.04	7,196.28	200.76 S	87.46 E	204.14	10.34
7298.00	51.78	176.55	7,216.95	225.13 S	89.04 E	228.55	12.69
7329.00	55.86	178.44	7,235.25	250.12 S	90.12 E	253.56	14.06
7360.00	59.58	178.58	7,251.80	276.32 S	90.80 E	279.76	12.02
7392.00	63.62	178.53	7,267.02	304.45 S	91.51 E	307.90	12.62
7424.00	66.89	177.89	7,280.41	333.49 S	92.42 E	336.96	10.37
7456.00	70.34	176.65	7,292.08	363.25 S	93.84 E	366.75	11.38
7487.00	73.59	175.79	7,301.68	392.66 S	95.79 E	396.21	10.81
7519.00	76.74	176.02	7,309.87	423.51 S	98.00 E	427.13	9.87
7551.00	80.39	176.50	7,316.21	454.80 S	100.05 E	458.48	11.50
7614.00	86.35	176.39	7,323.48	517.23 S	103.93 E	521.02	9.47
7646.00	87.19	176.60	7,325.28	549.12 S	105.88 E	552.96	2.70
7741.00	90.40	178.71	7,327.27	644.00 S	109.76 E	647.92	4.04
7836.00	91.70	178.75	7,325.53	738.96 S	111.86 E	742.89	1.36
7930.00	89.72	178.00	7,324.37	832.91 S	114.52 E	836.87	2.25
8026.00	89.88	178.35	7,324.71	928.86 S	117.57 E	932.86	0.40
8122.00	90.68	177.81	7,324.24	1,024.81 S	120.78 E	1028.86	1.01
8217.00	89.60	177.84	7,324.01	1,119.74 S	124.39 E	1123.86	1.14
8312.00	89.82	177.52	7,324.50	1,214.66 S	128.22 E	1218.85	0.41
8406.00	91.29	177.13	7,323.59	1,308.55 S	132.61 E	1312.85	1.63
8501.00	88.89	176.42	7,323.43	1,403.39 S	137.95 E	1407.83	2.64
8597.00	89.17	175.52	7,325.06	1,499.14 S	144.70 E	1503.77	0.98
8692.00	89.41	177.57	7,326.23	1,593.95 S	150.42 E	1598.74	2.17
8787.00	90.00	178.07	7,326.72	1,688.88 S	154.03 E	1693.73	0.81
8882.00	91.29	177.80	7,325.64	1,783.81 S	157.45 E	1788.73	1.39
8977.00	89.17	178.86	7,325.26	1,878.77 S	160.22 E	1883.71	2.50
9072.00	89.26	179.17	7,326.57	1,973.74 S	161.86 E	1978.68	0.34
9167.00	90.06	178.82	7,327.13	2,068.73 S	163.52 E	2073.65	0.92
9263.00	89.66	180.19	7,327.36	2,164.72 S	164.34 E	2169.60	1.49
9358.00	90.65	181.04	7,327.10	2,259.71 S	163.32 E	2264.47	1.37
9453.00	92.31	180.54	7,324.65	2,354.67 S	162.01 E	2359.30	1.83
9548.00	90.95	181.57	7,321.95	2,449.61 S	160.26 E	2454.09	1.79
9643.00	87.87	181.39	7,322.92	2,544.56 S	157.80 E	2548.86	3.25
9738.00	87.85	181.81	7,326.47	2,639.46 S	155.15 E	2643.57	0.44

DIRECTIONAL SURVEY DATA							
Measured Depth (ft)	Inclination (deg)	Declination (deg)	True Vertical Depth (ft)	Latitude (N/S)	Departure (ft)	East/West (ft)	Depth (ft)
9833.00	87.87	181.67	7,330.02	2,734.35 S	152.26 E	2738.27	0.15
9929.00	87.50	182.25	7,333.90	2,830.21 S	148.98 E	2833.92	0.72
10024.00	89.03	181.64	7,336.78	2,925.11 S	145.76 E	2928.61	1.74
10117.00	90.56	181.74	7,337.11	3,018.07 S	143.01 E	3021.38	1.64
10212.00	91.60	180.34	7,335.32	3,113.03 S	141.29 E	3116.20	1.84
10307.00	90.34	180.42	7,333.71	3,208.01 S	140.67 E	3211.08	1.33
10402.00	90.59	181.05	7,332.94	3,303.00 S	139.45 E	3305.94	0.71
10498.00	90.00	179.81	7,332.45	3,398.99 S	138.73 E	3401.82	1.43
10592.00	90.83	179.18	7,331.77	3,492.99 S	139.56 E	3495.77	1.11
10687.00	90.03	177.98	7,331.05	3,587.95 S	141.92 E	3590.76	1.52
10782.00	91.02	178.44	7,330.18	3,682.90 S	144.89 E	3685.75	1.15
10878.00	91.88	178.29	7,327.75	3,778.83 S	147.63 E	3781.71	0.91
10973.00	90.62	177.25	7,325.68	3,873.73 S	151.33 E	3876.68	1.72
11067.00	90.71	176.93	7,324.60	3,967.60 S	156.09 E	3970.67	0.35
11162.00	88.67	177.38	7,325.11	4,062.48 S	160.81 E	4065.66	2.19
11257.00	89.60	177.83	7,326.54	4,157.39 S	164.78 E	4160.65	1.08
11352.00	91.54	177.62	7,325.59	4,252.30 S	168.55 E	4255.64	2.06
11447.00	90.68	177.06	7,323.75	4,347.18 S	172.95 E	4350.62	1.08
11542.00	90.56	176.57	7,322.73	4,442.03 S	178.23 E	4445.60	0.53
11637.00	91.60	176.33	7,320.94	4,536.83 S	184.11 E	4540.56	1.13
11733.00	93.02	176.33	7,317.07	4,632.55 S	190.25 E	4636.46	1.48
11800.00	93.02	176.33	7,313.54	4,699.32 S	194.53 E	4703.34	0.00

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 177.68 degrees (Grid)
- A total correction of 7.62 deg from Magnetic north to Grid north has been applied
- Horizontal displacement is relative to the well head.
- Horizontal displacement (closure) at 11,800.00 feet is 4,703.34 feet along 177.63 degrees (Grid)

SURVEYS CALCULATED USING SHORT COLLAR METHOD
WELL ASSUMED VERTICAL AT SURFACE
SURVEYS FROM 100' MD TO 400' MD PROVIDED BY SCIENTIFIC DRILLING
SURVEYS FROM 512' MD TO 11733' MD PROVIDED BY SPERRY DRILLING
SURVEY AT 11733' MD HAS BEEN PROJECTED TO TD AT 11800' MD
SPERRY DRILLING ENGINEERS: BRANDON ROBERIE & KHOA TRAN

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HALLIBURTON Sperry Drilling

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PRODRIFT MWD BY TELEDRIIFT
P.O.Box 94395
Oklahoma City, OK 73143-4395
Ph : 405-631-4882

TELEDRIIFT CANADA
Bay 7 4275 78th Ave SE
Calgary, Alberta P2C2Y4
Ph : 403-203-0840

Survey FileName : 767Ensign-06JAN14.psd
Tool Type : PRODRIFT-X
Job ID : 767Ensign
Well Name : Skeen 2 State SWD 1
Company : Chevron
Contractor : Ensign 767
API Number :
Location : Eddy
Start Date : 06 JAN 14

Notes :

Depth is in feet

Survey Number	Survey Depth	Date	Time	Inc.
Tie_in	0	6 JAN 2014	13:08	0.0
2	234	7 JAN 2014	16:45	1.2
3	276	7 JAN 2014	18:22	1.0
4	336	7 JAN 2014	19:55	0.7
5	396	7 JAN 2014	21:25	0.7
6	456	7 JAN 2014	23:32	0.8
7	488	8 JAN 2014	01:39	1.0
8	580	8 JAN 2014	03:43	1.5
9	668	8 JAN 2014	07:23	1.6
10	757	8 JAN 2014	09:49	1.8
11	851	8 JAN 2014	13:35	2.4
14	880	8 JAN 2014	23:53	2.4
15	912	9 JAN 2014	01:37	2.3
16	941	9 JAN 2014	03:06	2.3
19	1036	9 JAN 2014	13:28	2.2
21	1075	10 JAN 2014	00:30	2.0

22	1134	10 JAN 2014	03:48	2.1
23	1229	10 JAN 2014	09:43	2.2



PRODRIFT MWD BY TELEDRIFT
P.O.Box 94395
Oklahoma City, OK 73143-4395
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TELEDRIFT CANADA
Bay 7 4275 78th Ave SE
Calgary, Alberta P2C2Y4
Ph : 403-203-0840

Survey FileName : 767Ensign-14JAN14.psd
Tool Type : PRODRIFT-X
Job ID : 767Ensign
Well Name : Skeen 2 State SWD 1
Company : Chevron
Contractor : Ensign 767
API Number :
Location : Culberson
Start Date : 14 JAN 14

Notes :

Depth is in feet

Survey Number	Survey Depth	Date	Time	Inc
1	1500	14 JAN 2014	06:37	2.1
2	1795	14 JAN 2014	07:02	2.3
4	1927	14 JAN 2014	08:27	2.7
5	2004	14 JAN 2014	09:37	2.8
6	2108	14 JAN 2014	10:40	3.9
7	2212	14 JAN 2014	13:19	3.9
9	2306	14 JAN 2014	16:30	2.9
10	2396	14 JAN 2014	18:38	2.1
11	2490	14 JAN 2014	19:53	1.4
12	2585	14 JAN 2014	21:19	1.0
13	2679	14 JAN 2014	22:06	1.3
14	2774	14 JAN 2014	22:55	0.9
15	2869	14 JAN 2014	23:43	0.8
16	2963	15 JAN 2014	00:38	0.2
17	3059	15 JAN 2014	01:33	0.8
18	3154	15 JAN 2014	02:28	0.9

19	3248	15 JAN 2014	03:26	0.8
20	3343	15 JAN 2014	04:37	0.3
21	3438	15 JAN 2014	05:22	0.8
22	3353	15 JAN 2014	06:10	0.2
23	3728	15 JAN 2014	07:58	0.8
24	3815	15 JAN 2014	08:57	0.7
25	4009	15 JAN 2014	10:43	1.3
26	4104	15 JAN 2014	11:33	1.4
27	4200	15 JAN 2014	12:37	0.9
28	4295	15 JAN 2014	22:52	1.3
29	4390	16 JAN 2014	00:01	1.4
30	4485	16 JAN 2014	01:08	1.9
31	4580	16 JAN 2014	02:05	2.4
32	4675	16 JAN 2014	03:34	2.5
34	4771	16 JAN 2014	05:07	2.2
35	4866	16 JAN 2014	06:32	1.9
36	4961	16 JAN 2014	07:48	2.1
37	5055	16 JAN 2014	08:59	1.9
38	5149	16 JAN 2014	10:16	2.3
39	5244	16 JAN 2014	11:21	2.0
40	5340	16 JAN 2014	13:19	2.4

HALLIBURTON

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State of New Mexico, Eddy County

I, Brandon Roberie, certify that I am employed by Halliburton Energy Services, Inc. (aka Sperry Drilling) and that on the dates of **26-January-14** through **17-February-14**, I did conduct or supervise the taking of DGWD directional surveys for the well from a depth of **512' MD** to a depth of **11733' 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 **Chevron USA, Inc.** for the **Hayhurst 18 Fed 1H ST01** well, API No. **30-015-41848-1000** in **Eddy County, NM**. I have reviewed this report and find that it conforms to the principles and procedures as set forth by Halliburton Energy Services, Inc. (aka Sperry Drilling).



Brandon Roberie
Field Engineer