

Chevron USA, Inc.

Hayhurst 17 Federal 1H

Ensign 767

Eddy County, New Mexico

API# 30-015-41845

February 25, 2014 – March 15, 2014

HD-XX-0901131719

Sperry Drilling

MWD Survey Report

Submitted by Joshua Buckner

3950 Interwood South Parkway

Houston, TX 77032

Ph: 281.986.4400

HALLIBURTON

**Drilling and Formation
Evaluation**

NM OIL CONSERVATION
ARTESIA DISTRICT
JUN 13 2014
RECEIVED

[REDACTED]



Survey Report for Cheveron USA, Inc.

Rig : Ensign 767
Well Name : Hayhurst 17 Federal 1H
Field Name : Cottonwood Draw; Bone Spring
Country : USA
Job Number : HD-XX-0901131719
Job Start Date : 25-Feb-14
API Number : 30-015-41845



TABLE OF CONTENTS

1. General Information
2. Directional Survey Data



GENERAL INFORMATION

Company : Chevron USA, Inc.
Rig : Ensign 767
Well : Hayhurst 17 Federal 1H
Field : Cottonwood Draw; Bone Spring
Lease Name : NMN113954
State : New Mexico
County : Eddy
Country : USA
API Number : 30-015-41845
Sperry Drilling Job Number : HD-XX-0901131719
Job Start Date : 25-Feb-14
Job End Date : 15-Mar-14
North Reference : Grid
Total Correction (deg) : 7.605
Dip Angle (deg) : 59.908
Total Magnetic Field (nT) : 48220
Date of Magnetic Data : 25 February, 2014
Well Head coordinates N : 32 deg. 8 min 13.41 sec North
Well Head coordinates E : 104 deg. 13 min 11.27 sec West
Vertical section direction (deg) : 172.98
Unit Number : 11900009
MWD Engineers : Joshua Buckner, Chad Stich

Company Representatives : John Akin, Jarod White,
Company Geologist: : Ryan Jensen,



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')
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	0.00
495.00	1.75	207.97	494.92	6.67 S	3.54 W	6.19	0.35
682.00	1.69	210.87	681.84	11.55 S	6.29 W	10.70	0.06
869.00	1.09	200.47	868.78	15.58 S	8.33 W	14.45	0.34
1054.00	1.21	222.69	1,053.75	18.67 S	10.27 W	17.28	0.25
1245.00	1.07	240.71	1,244.71	21.02 S	13.19 W	19.26	0.20
1435.00	0.47	118.25	1,434.70	22.26 S	14.04 W	20.38	0.72
1624.00	0.88	103.00	1,623.69	22.95 S	11.94 W	21.32	0.24
1814.00	2.26	94.93	1,813.61	23.60 S	6.79 W	22.60	0.73
1976.00	1.56	87.90	1,975.52	23.80 S	1.40 W	23.45	0.45
2109.00	0.65	75.39	2,108.49	23.54 S	1.15 E	23.50	0.70
2299.00	0.69	72.00	2,298.48	22.91 S	3.29 E	23.14	0.03
2490.00	0.60	97.11	2,489.47	22.68 S	5.38 E	23.17	0.15
2680.00	0.40	112.98	2,679.46	23.06 S	6.98 E	23.74	0.13
2870.00	0.36	139.40	2,869.46	23.77 S	7.98 E	24.57	0.09
3060.00	0.41	101.93	3,059.45	24.37 S	9.03 E	25.29	0.13
3251.00	0.28	164.15	3,250.45	24.95 S	9.82 E	25.96	0.19
3441.00	0.25	223.31	3,440.45	25.69 S	9.66 E	26.68	0.14
3631.00	0.40	229.58	3,630.45	26.42 S	8.87 E	27.30	0.08
3822.00	0.25	231.38	3,821.44	27.11 S	8.04 E	27.89	0.08
4012.00	0.37	199.85	4,011.44	27.95 S	7.51 E	28.66	0.11
4202.00	0.64	238.80	4,201.43	29.08 S	6.40 E	29.64	0.22
4392.00	0.66	252.57	4,391.42	29.95 S	4.45 E	30.27	0.08
4582.00	0.54	247.30	4,581.41	30.63 S	2.57 E	30.71	0.07
4773.00	0.52	215.36	4,772.40	31.69 S	1.24 E	31.60	0.15
4963.00	0.53	214.22	4,962.40	33.12 S	0.24 E	32.90	0.01
5154.00	0.59	175.46	5,153.39	34.83 S	0.18 W	34.55	0.20
5291.00	0.72	172.56	5,290.38	36.38 S	0.02 W	36.11	0.10
5418.00	0.91	186.35	5,417.36	38.18 S	0.03 W	37.89	0.22
5608.00	1.04	187.14	5,607.34	41.40 S	0.41 W	41.04	0.07
5792.00	1.47	237.66	5,791.30	44.32 S	2.60 W	43.67	0.62
5987.00	0.94	204.13	5,986.26	47.11 S	5.36 W	46.10	0.44
6177.00	1.55	161.18	6,176.21	50.96 S	5.17 W	49.95	0.57
6367.00	1.76	155.60	6,366.14	56.05 S	3.13 W	55.25	0.14
6558.00	1.70	138.42	6,557.05	60.84 S	0.04 W	60.38	0.27
6749.00	1.10	178.43	6,748.00	64.80 S	1.89 E	64.55	0.58
6843.00	1.55	173.48	6,841.97	66.97 S	2.06 E	66.72	0.49
6907.00	5.11	169.38	6,905.85	70.63 S	2.69 E	70.43	5.57
6938.00	8.33	166.95	6,936.64	74.17 S	3.45 E	74.04	10.43
6970.00	11.55	165.99	6,968.15	79.54 S	4.75 E	79.52	10.09
7001.00	14.92	164.54	6,998.32	86.40 S	6.56 E	86.55	10.93



DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (°/100')
7033.00	17.94	164.46	7,029.01	95.12 S	8.98 E	95.51	9.42
7065.00	21.06	166.34	7,059.17	105.46 S	11.66 E	106.09	9.94
7096.00	23.85	165.61	7,087.82	116.94 S	14.54 E	117.84	9.04
7128.00	26.16	165.12	7,116.82	130.03 S	17.96 E	131.25	7.27
7160.00	29.23	166.26	7,145.15	144.44 S	21.62 E	146.00	9.72
7191.00	32.25	167.86	7,171.79	159.88 S	25.16 E	161.76	10.12
7223.00	34.79	167.24	7,198.47	177.13 S	28.97 E	179.35	7.98
7253.00	36.71	166.77	7,222.82	194.21 S	32.92 E	196.78	6.48
7285.00	40.43	166.41	7,247.83	213.61 S	37.54 E	216.60	11.66
7316.00	45.86	166.59	7,270.44	234.22 S	42.49 E	237.66	17.52
7348.00	51.58	167.25	7,291.54	257.64 S	47.92 E	261.56	17.95
7380.00	57.35	167.56	7,310.13	283.04 S	53.60 E	287.47	18.04
7412.00	62.08	167.28	7,326.26	310.00 S	59.62 E	314.97	14.79
7443.00	66.59	166.06	7,339.69	337.18 S	66.06 E	342.73	14.99
7466.00	69.31	165.95	7,348.32	357.87 S	71.22 E	363.89	11.81
7498.00	73.27	166.35	7,358.58	387.29 S	78.47 E	393.97	12.44
7530.00	75.86	167.20	7,367.10	417.31 S	85.53 E	424.64	8.49
7561.00	77.48	167.98	7,374.25	446.77 S	92.01 E	454.67	5.78
7593.00	79.01	169.74	7,380.77	477.51 S	98.06 E	485.91	7.19
7624.00	80.76	172.56	7,386.21	507.66 S	102.75 E	516.41	10.60
7656.00	81.19	172.71	7,391.23	539.00 S	106.81 E	548.01	1.41
7688.00	82.43	173.21	7,395.79	570.43 S	110.69 E	579.69	4.18
7720.00	85.81	174.05	7,399.07	602.06 S	114.22 E	611.51	10.88
7814.00	90.74	174.88	7,401.90	695.55 S	123.29 E	705.41	5.32
7909.00	91.85	174.77	7,399.75	790.14 S	131.85 E	800.33	1.17
8005.00	90.28	173.44	7,397.97	885.61 S	141.71 E	896.29	2.15
8100.00	90.59	172.13	7,397.25	979.85 S	153.64 E	991.29	1.41
8195.00	88.92	171.94	7,397.66	1,073.93 S	166.80 E	1086.27	1.76
8290.00	88.86	171.22	7,399.50	1,167.89 S	180.72 E	1181.22	0.76
8386.00	89.91	171.46	7,400.53	1,262.79 S	195.17 E	1277.18	1.12
8480.00	91.08	170.73	7,399.73	1,355.65 S	209.72 E	1371.12	1.47
8576.00	87.26	171.72	7,401.12	1,450.50 S	224.36 E	1467.05	4.11
8671.00	86.66	171.56	7,406.16	1,544.36 S	238.15 E	1561.89	0.65
8766.00	87.63	171.06	7,410.89	1,638.15 S	252.48 E	1656.73	1.14
8862.00	87.90	171.10	7,414.63	1,732.92 S	267.35 E	1752.60	0.29
8956.00	88.67	170.79	7,417.44	1,825.70 S	282.14 E	1846.50	0.89
9051.00	89.11	171.04	7,419.28	1,919.49 S	297.14 E	1941.42	0.52
9147.00	89.72	170.92	7,420.26	2,014.30 S	312.19 E	2037.35	0.65
9242.00	89.60	174.02	7,420.83	2,108.47 S	324.63 E	2132.34	3.26
9336.00	89.91	174.91	7,421.23	2,202.03 S	333.69 E	2226.30	1.00
9432.00	90.83	174.82	7,420.61	2,297.64 S	342.28 E	2322.25	0.97
9527.00	91.45	174.85	7,418.72	2,392.24 S	350.82 E	2417.18	0.65
9622.00	92.62	174.59	7,415.34	2,486.77 S	359.55 E	2512.07	1.26
9718.00	90.37	174.22	7,412.84	2,582.28 S	368.91 E	2608.01	2.38
9812.00	90.80	173.98	7,411.88	2,675.77 S	378.58 E	2701.98	0.52



DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (°/100')
9908.00	91.42	173.49	7,410.02	2,771.18 S	389.06 E	2797.96	0.82
10003.00	88.40	173.25	7,410.17	2,865.53 S	400.02 E	2892.94	3.19
10098.00	88.28	174.10	7,412.93	2,959.92 S	410.48 E	2987.89	0.90
10193.00	89.08	173.73	7,415.12	3,054.35 S	420.54 E	3082.85	0.93
10288.00	90.03	173.31	7,415.86	3,148.74 S	431.27 E	3177.85	1.10
10384.00	90.77	173.52	7,415.19	3,244.11 S	442.29 E	3273.84	0.80
10479.00	91.54	172.96	7,413.27	3,338.42 S	453.47 E	3368.82	1.01
10574.00	89.48	173.46	7,412.42	3,432.75 S	464.70 E	3463.81	2.24
10670.00	89.75	173.32	7,413.07	3,528.11 S	475.75 E	3559.80	0.33
10765.00	90.80	173.23	7,412.61	3,622.45 S	486.88 E	3654.80	1.10
10859.00	91.67	173.03	7,410.59	3,715.75 S	498.12 E	3748.78	0.95
10954.00	89.44	173.53	7,409.67	3,810.09 S	509.24 E	3843.77	2.40
11049.00	89.72	173.56	7,410.36	3,904.49 S	519.92 E	3938.76	0.29
11144.00	90.86	173.49	7,409.88	3,998.88 S	530.64 E	4033.75	1.20
11239.00	88.68	175.24	7,410.26	4,093.41 S	539.96 E	4128.71	2.95
11336.00	89.23	175.61	7,412.03	4,190.08 S	547.69 E	4225.61	0.68
11431.00	89.69	175.50	7,412.92	4,284.79 S	555.05 E	4320.51	0.50
11526.00	90.31	175.43	7,412.92	4,379.49 S	562.56 E	4415.42	0.65
11621.00	91.36	175.69	7,411.54	4,474.20 S	569.91 E	4510.31	1.14
11717.00	92.61	175.36	7,408.22	4,569.85 S	577.40 E	4606.16	1.35
11812.00	91.54	175.35	7,404.78	4,664.47 S	585.09 E	4701.01	1.13
11907.00	91.69	175.32	7,402.09	4,759.12 S	592.81 E	4795.89	0.16
12003.00	92.93	175.41	7,398.22	4,854.72 S	600.56 E	4891.73	1.29
12083.00	93.80	175.11	7,393.53	4,934.31 S	607.15 E	4971.53	1.15
12151.00	93.80	175.11	7,389.02	5,001.92 S	612.93 E	5039.33	0.01

SURVEY FOOTER

SURVEYS CALCULATED USING SHORT COLLAR METHOD
 WELL ASSUMED VERTICAL AT SURFACE
 SURFACE TO 495' MD WAS DRILLED BY CUSTOMER
 SURVEYS AT 495' MD TO 12083' MD PROVIDED BY SPERRY DRILLING
 SURVEY AT 12083' MD PROJECTED TO TD AT 12151' MD
 SPERRY DRILLING ENGINEERS: JOSHUA BUCKNER, CHAD STICH.

**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 172.98 degrees (Grid)
- A total correction of 7.60 deg from Magnetic north to Grid north has been applied
- Horizontal displacement is relative to the well head.
- Horizontal displacement (closure) at 12,151.00 feet is 5,039.33 feet along 173.01 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.



Halliburton / Sperry Drilling
3950 Interwood S. Pkwy
Houston, TX 77032
Phone: 281-986-4400
Fax: 281-986-4498