

Chevron USA, Inc.

Rustler Bluff 34 24 29 Fed #2H

Eddy County, New Mexico

Ensign 767

API# 30-015-42671-0000

January 11, 2015 – February 3, 2015

MO-MJ-0901990952

NM OIL CONSERVATION
ARTESIA DISTRICT
MAY 09 2016
RECEIVED

Sperry Drilling Services End Of Well Report

Submitted by K. Stolarski

3950 Interwood South Parkway

Houston, TX 77032

Ph: 281.986.4400

HALLIBURTON

**Drilling and Formation
Evaluation**

Provide signature page for survey

[REDACTED]

End of Well Report for Chevron USA, Inc.

Rig : Ensign 767
Well Name : Rustler Bluff 34 24 29 Fed 2H
Field Name : Willowlake
Country : USA
Job Number : MO-XX-0901990952
Job Start Date : 11-Jan-15
API Number : 30-015-42671-0000

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GENERAL INFORMATION

Company	: Chevron USA, Inc.
Rig	: Ensign 767
Well	: Rustler Bluff 34 24 29 Fed 2H
Field	: Willowlake
State	: New Mexico
County	: Eddy County, NM
Country	: USA
API Number	: 30-015-42671-0000
Sperry Drilling Job Number	: MO-XX-0901990952
Job Start Date	: 11-Jan-15
Job End Date	: 03-Feb-15
North Reference	: Grid
Total Correction (deg)	: 7.308
Dip Angle (deg)	: 59.965
Total Magnetic Field (nT)	: 48153
Date of Magnetic Data	: 12 January, 2015
Well Head coordinates N	: 32 deg. 9 min 56.33 sec North
Well Head coordinates E	: 103 deg. 58 min 13.18 sec West
Vertical section direction (deg)	: 358.99
Unit Number	: 10927546
MWD Engineers	: Kevin Stolarski, Justin Corn, Pascal Poupart
 Company Representatives	: John Akin
 Company Geologist:	:

OPERATIONAL OVERVIEW

HALLIBURTON / SPERRY DRILLING WERE CONTRACTED BY CHEVRON USA, INC. TO PROVIDE MWD SERVICES FOR THE WELL RUSTLER BLUFF 34 24 29 FED #2H IN EDDY COUNTY, NM. EQUIPMENT AND PERSONNEL ARRIVED ON LOCATION ON 11-JANUARY-2015 AND RIGGED UP ACCORDINGLY.

RUN 100: TIH on 13-JANUARY-2015. Drilled from 420' MD to 2903' MD. TD intermediate section. POOH to run casing. 100% MWD RUN.

RUN 200: TIH on 18-JANUARY-2015. Drilled from 2903' MD to 2913' MD. POOH due to MWD failure. 0% MWD RUN.

RUN 300: TIH on 18-JANUARY-2015. Drilled from 2913' MD to 7818' MD. POOH to pick up curve/lateral assembly 100% MWD RUN.

RUN 400: TIH on 23-JANUARY-2015. Drilled from 7818' MD to 10140' MD. POOH for Tool Failure with intermitted pulsing.

RUN 500: TIH on 28-JANUARY-2015. Drilled from 10140' MD to 14000' MD. TD Well at 14000' MD. 100% MWD Run.

HALLIBURTON

Sherry Drilling

SUMMARY OF MWD RUNS

Run No.	Rig Run No.	Hole Size (in)	MWD Service	Start Depth (ft)	End Depth (ft)	Drill Pipe Distance (ft)	Run Start Date Time	Run End Date Time	BRT Hrs	Oper. Hrs	Circ. Hrs	Max. Temp. (deg F)	Serv. Int.	Tip for MWD	Failure Type
100	0100	12.25	DWD	420.00	2903.00	2483.00	13-Jan-15 12:00	16-Jan-15 11:00	71.00	71.000	35.000	119.91	No	No	
200	0200	8.75	D/GWD	2903.00	2913.00	10.00	18-Jan-15 00:00	18-Jan-15 13:00	13.00	13.000	2.000	70.00	Yes	Yes	
300	0300	8.75	D/GWD	2913.00	7818.00	4905.00	18-Jan-15 14:00	23-Jan-15 03:00	109.00	109.000	83.000	133.20	No	No	
400	0400	8.75	D/GWD	7818.00	10140.00	2322.00	23-Jan-15 06:00	27-Jan-15 15:00	105.00	105.000	76.000	144.54	Yes	Yes	
500	0500	8.75	D/GWD	10140.00	14000.00	3860.00	28-Jan-15 05:30	03-Feb-15 13:30	152.00	152.000	116.500	158.47	No	No	

BIT RUN SUMMARY

RUN TIME DATA

MWD Run : 100	Run Start : 13-Jan-15 12:00	BRT Hrs : 71.00	Circ. Hrs : 35.00
Rig Run No. : 0100	Run End : 16-Jan-15 11:00	Hole Size (in) : 12.25	Oper. Hrs : 71.00

DRILLING DATA

Start Depth (ft) : 420.00	Footage (ft) : 2483.00	Avg WOB (klb) : 18.0	Avg ROP (fph) : 76.00
End Depth (ft) : 2903.00	Avg Flow Rate(gpm) : 600	Avg TOB (ft-lb) : 7000	Avg SPP (psig) : 1900
Drilling Hrs (hr) : 27.000	Avg RPM (rpm) : 75	Avg Bend (ft-lb) : NA	

MUD DATA

Mud Type :			
Weight (ppg) : 10.10	Viscosity (spqt) : 28.00	PV (cP) : 1	YP (lbf/ft ²) : 3.00
Chlorides (ppm) : 60000	Max Temp (degF) : 119.91	% Solids (%) : 1.00	% Sand (%) : 0.10
pH (pH) : 12.00	Fluid Loss(mptm) : 15	% Oil (%) : 0.00	O:W : 1:99

MWD PERFORMANCE

Tool OD (in) : 8	Type : DWD	Min. Inc. (deg): 0.51	Min. Inc. Depth (ft) : 1512.00
Final Az. (deg) : 132.95	Max Op. Press. (psig) : 1545	Max. Inc. (deg): 4.35	Max. Inc. Depth (ft) : 2832.00
MWD Real Time % : 99		MWD Recorded % : 100	

COMMENTS

RUN 100: TIH on 13-JANUARY-2015. Drilled from 420' MD to 2903' MD. TD in intermediate section. POOH to run casing. 100% MWD RUN.

(1) 6 1/2" Jar
6.50 in OD / 2.50 in ID
SN Rental

(2) 5" HWDP
5.00 in OD / 3.00 in ID

(3) X-Over Sub
8.00 in OD / 2.87 in ID
SN Rig

(4) 10 X 6 1/2" Drill Collar
6.50 in OD / 1.50 in ID
SN Rig

(5) X-Over Sub
8.00 in OD / 2.00 in ID
SN Rig

(6) 3 X 8" Drill Collar
8.00 in OD / 1.50 in ID
SN Rig

(7) X-Over Sub
7.56 in OD / 3.00 in ID
SN Stabil Drill

(8) MWD

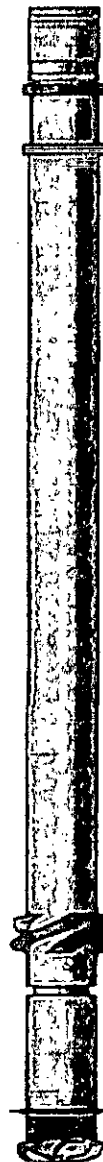
(9) Integral Blade
8.00 in OD / 2.87 in ID
SN Stabil Drill

(10) Shock Sub
8.00 in OD / 2.88 in ID
SN Rental

(11) Float Sub
8.00 in OD / 2.88 in ID
SN SD110986

(12) 8" SperryDrill Lobe 6/7 - 4.0
slg
8.00 in OD / 5.25 in ID
SN 11689829

(13) PDC
8.00 in OD / 2.75 in ID
SN 7150401



Length (ft)	Cumulative Length (ft)
(1) 32.20	567.40
(2) 30.15	535.20
(3) 5.19	505.05
(4) 293.30	499.86
(5) 2.90	206.56
(6) 90.56	203.66
(7) 2.65	113.10
(8) 64.98	110.45
(9) 7.35	45.47
(10) 6.82	38.12
(11) 3.10	31.30
(12) 26.95	28.20
(13) 1.25	1.25

NMDC
8.00 in OD / 3.13 in ID
SN SD51210

HOS
8.00 in OD / 3.25 in ID
SN 11230608
*11 Positive Pulser - SN 10977729
*12 PCM Sonde - SN 11680868
*13 PCDC Sonde - SN 11297474

NMDC
8.00 in OD / 3.13 in ID
SN SD50396



Length (ft)	Sensor Dist From Bit (ft)
31.03	
5.66	[2] 71.87 [3] 67.75
28.29	

BIT RUN SUMMARY
RUN TIME DATA

MWD Run : 200	Run Start : 18-Jan-15 00:00	BRT Hrs : 13.00	Circ. Hrs : 2.00
Rig Run No. : 0200	Run End : 18-Jan-15 13:00	Hole Size (in) : 8.75	Oper. Hrs : 13.00

DRILLING DATA

Start Depth (ft) : 2903.00	Footage (ft) : 10.00	Avg WOB (klb) : 8.0	Avg ROP (fph) : 60.00
End Depth (ft) : 2913.00	Avg Flow Rate(gpm) : 550	Avg TOB (ft-lb) : 5000	Avg SPP (psig) : 1800
Drilling Hrs (hr) : 0.500	Avg RPM (rpm) : 30	Avg Bend (ft-lb) : NA	

MUD DATA

Mud Type : Fresh Water Gel			
Weight (ppg) : 9.10	Viscosity (spqt) : 28.00	PV (cP) : 1	YP (lbf2) : 3.00
Chlorides (ppm) : 60400	Max Temp (degF) : 70.00	% Solids (%) : 0.80	% Sand (%) : 0.10
pH (pH) : 12.00	Fluid Loss(mptm) : 15	% Oil (%) : 0.00	O:W : 1:99

MWD PERFORMANCE

Tool OD (in) : 6.75	Type : D/GWD	Min. Inc. (deg): 4.35	Min. Inc. Depth (ft) : 2832.00
Final Az. (deg) : 132.95	Max Op. Press. (psig) : 1373	Max. Inc. (deg): 4.35	Max. Inc. Depth (ft) : 2832.00
MWD Real Time % : 0	MWD Recorded % : 0		

COMMENTS

RUN 200: TIH on 18-JANUARY-2015. Drilled from 2903' MD to 2913' MD. POOH due to MWD failure. 0% MWD RUN.

(1) 5 X 5" HWDP
5.00 in OD / 3.00 in ID

(2) Jar
6.50 in OD / 2.50 in ID
SN Rental

(3) 9 X 5" HWDP
5.00 in OD / 3.00 in ID

(4) X-Over Sub
8.00 in OD / 2.87 in ID
SN RIG

(5) 15 X 6 1/2" Drill Collar
6.50 in OD / 3.00 in ID
SN RIG

(6) X-Over Sub
6.55 in OD / 2.00 in ID
SN RIG

(7) Float Sub
6.75 in OD / 3.00 in ID
SN SD111217

(8) MWD

(9) Stabilizer
6.75 in OD / 3.00 in ID
SN SD17828

(10) 6 3/4" SperryDrill Lobe 677 -
5.0 stg
6.75 in OD / 4.50 in ID
SN 11111847

(11) PDC
6.00 in OD / 2.00 in ID
SN 7155761

Length (ft)	Cumulative Length (ft)
	1001.10
(1) 152.42	
	848.68
(2) 32.20	
	816.48
(3) 270.66	
	545.82
(4) 1.84	
	543.98
(5) 442.34	
	101.64
(6) 2.40	
	99.24
(7) 3.52	
	95.72
(8) 66.12	
	29.60
(9) 3.86	
	25.74
(10) 24.89	
	0.85
(11) 0.85	

Non Mag Drill Collar
6.50 in OD / 3.00 in ID
SN SD51183

HOS
6.82 in OD / 2.75 in ID
SN 11672177
*[1] Positive Pulser - SN 10492966
*[2] PCM Sonde - SN 11145596
*[3] PCG Sonde - SN 11579822
*[4] PCDC Sonde - SN 11297593

Non Mag Drill Collar
6.55 in OD / 3.00 in ID
SN SD49455

Length (ft)	Sensor Dist From Bit (ft)
30.11	
6.10	[2] 58.08 [3] 52.78 [4] 47.92
29.91	

BIT RUN SUMMARY

RUN TIME DATA

MWD Run	: 300	Run Start	: 18-Jan-15 14:00	BRT Hrs	: 109.00	Circ. Hrs	: 83.00
Rig Run No.	: 0300	Run End	: 23-Jan-15 03:00	Hole Size (in)	: 8.75	Oper. Hrs	: 109.00

DRILLING DATA

Start Depth (ft)	: 2913.00	Footage (ft)	: 4905.00	Avg WOB (klb)	: 20.0	Avg ROP (fph)	: 125.00
End Depth (ft)	: 7818.00	Avg Flow Rate(gpm)	: 500	Avg TOB (ft-lb)	: 6000	Avg SPP (psig)	: 2000
Drilling Hrs (hr)	: 82.000	Avg RPM (rpm)	: 75	Avg Bend (ft-lb)	: 1.00		

MUD DATA

Mud Type	: Fresh Water Gel						
Weight (ppg)	: 9.20	Viscosity (spqt)	: 23.00	PV (cP)	: 1	YP (lbf2)	: 3.00
Chlorides (ppm)	: 84500	Max Temp (degF)	: 133.20	% Solids (%)	: 1.60	% Sand (%)	: 0.10
pH (pH)	: 8.00	Fluid Loss(mptm)	: 15	% Oil (%)	: 0.00	O:W	: 1:99

MWD PERFORMANCE

Tool OD (in)	: 6.75	Type	: D/GWD	Min. Inc. (deg)	: 0.31	Min. Inc. Depth (ft)	: 5296.00
Final Az. (deg)	: 293.63	Max Op. Press. (psig)	: 3746	Max. Inc. (deg)	: 3.54	Max. Inc. Depth (ft)	: 7088.00
MWD Real Time %	: 99	MWD Recorded %	: 100				

COMMENTS

RUN 300, TIH on 18-JANUARY-2015. Drilled from 2913' MD to 7818' MD. POOH to pick up curve/lateral assembly 100% MWD RUN.

	Length (ft)	Cumulative Length (ft)		Length (ft)	Sensor Dist From Bit (ft)
(1) 5 X 5" HWDP 5.00 in OD / 3.00 in ID					
(2) Jar 6.50 in OD / 2.50 in ID SN Rental		1001.10			
(3) 9 X 5" HWDP 5.00 in OD / 3.00 in ID					
(4) X-Over Sub 8.00 in OD / 2.87 in ID SN RIG	(1) 152.42		Non Mag Drill Collar 6.50 in OD / 3.00 in ID SN SD51183	30.11	
(5) 15 X 6 1/2" Drill Collar 6.50 in OD / 3.00 in ID SN RIG		648.68			
(6) X-Over Sub 6.55 in OD / 2.00 in ID SN RIG	(2) 32.20				
(7) Float Sub 6.75 in OD / 3.00 in ID SN SD111217		816.48			
(8) MWD			HOS		[2] 58.08
(9) Stabilizer 6.75 in OD / 3.00 in ID SN SD17828	(3) 270.66		6.82 in OD / 2.75 in ID SN 11672177		[3] 52.78
(10) 6 3/4" SperryDrill Lobe G7 - 5.0 stg 6.75 in OD / 4.50 in ID SN 11111847	(4) 1.84	545.82	*[1] Positive Pulser - SN 11512244 *[2] PCM Sonde - SN 11680888 *[3] PCG Sonde - SN 11293277 *[4] PCDC Sonde - SN 11297474	6.10	[4] 47.92
(11) PDC 6.00 in OD / 2.00 in ID SN 7155761		543.98			
	(5) 442.34		Non Mag Drill Collar 6.55 in OD / 3.00 in ID SN SD49455	29.91	
	(6) 2.40	101.64			
	(7) 3.52	99.24			
		95.72			
	(8) 66.12				
	(9) 3.86	29.60			
	(10) 24.89	25.74			
	(11) 0.85	0.85			

BIT RUN SUMMARY

RUN TIME DATA

MWD Run : 400	Run Start : 23-Jan-15 06:00	BRT Hrs : 105.00	Circ. Hrs : 76.00
Rig Run No. : 0400	Run End : 27-Jan-15 15:00	Hole Size (in) : 8.75	Oper. Hrs : 105.00

DRILLING DATA

Start Depth (ft) : 7818.00	Footage (ft) : 2322.00	Avg WOB (klb) : 12.0	Avg ROP (fph) : 62.60
End Depth (ft) : 10140.00	Avg Flow Rate(gpm) : 490	Avg TOB (ft-lb) : 8854	Avg SPP (psig) : 1666
Drilling Hrs (hr) : 73.000	Avg RPM (rpm) : 39	Avg Bend (ft-lb) : NA	

MUD DATA

Mud Type : Fresh Water Gel			
Weight (ppg) : 9.30	Viscosity (spqt) : 28.00	PV (cP) : 1	YP (lbf2) : 3.00
Chlorides (ppm) : 88500	Max Temp (degF) : 144.54	% Solids(%) : 0.90	% Sand (%) : 0.00
pH (pH) : 11.00	Fluid Loss(mptm) : 100	% Oil (%) : 0.00	O:W : 0:100

MWD PERFORMANCE

Tool OD (in) : 6.75	Type : D/GWD	Min. Inc. (deg): 0.63	Min. Inc. Depth (ft) : 7772.00
Final Az. (deg) : 0.74	Max Op. Press. (psig) 3250	Max. Inc. (deg): 94.26	Max. Inc. Depth (ft) : 9378.00
MWD Real Time % : 95		MWD Recorded % : 100	

COMMENTS

RUN 400: TIH on 23-JANUARY-2015. Drilled from 7818' MD to 10140' MD. POOH for Tool Failure with intermitted pulsing.

(1) Float Sub
6.75 in OD / 3.00 in ID
SN SD111217

(2) MWD

(3) Stabilizer
6.75 in OD / 3.00 in ID
SN SD22042

(4) 6 3/4" SperryDrill Lobe 6'7 -
5.0 stg

6.75 in OD / 4.50 in ID
SN 12067783

(5) PDC
6.00 in OD / 2.00 in ID
SN 12450511



Length (ft)	Cumulative Length (ft)
(1) 3.52	107.14
(2) 66.21	103.62
(3) 5.94	37.41
(4) 30.62	31.47
(5) 0.85	0.85

Non Mag Flex Collar
6.70 in OD / 3.00 in ID
SN SD16425

HOS
6.82 in OD / 2.75 in ID
SN 11672177
*[1]Positive Pulser - SN 10877419
*[2]PCM Sonde - SN 11055874
*[3]PCG Sonde - SN 11579822
*[4]PCDC Sonde - SN 11297593

Non Mag Drill Collar
6.55 in OD / 3.00 in ID
SN SD49455

Length
(ft)

Sensor Dist
From Bit
(ft)



30.20

6.10

29.91

[2] 65.89

[3] 60.59

[4] 55.73

BIT RUN SUMMARY

RUN TIME DATA

MWD Run	: 500	Run Start	: 28-Jan-15 05:30	BRT Hrs	: 152.00	Circ. Hrs	: 116.50
Rig Run No.	: 0500	Run End	: 03-Feb-15 13:30	Hole Size (in)	: 8.75	Oper. Hrs	: 152.00

DRILLING DATA

Start Depth (ft)	: 10140.00	Footage (ft)	: 3860.00	Avg WOB (klb)	: 13.0	Avg ROP (fph)	: 74.66
End Depth (ft)	: 14000.00	Avg Flow Rate(gpm)	: 546	Avg TOB (ft-lb)	: 16380	Avg SPP (psig)	: 2056
Drilling Hrs (hr)	: 99.250	Avg RPM (rpm)	: 54	Avg Bend (ft-lb)	: NA		

MUD DATA

Mud Type	: Salt Water Gel						
Weight (ppg)	: 9.50	Viscosity (spqt)	: 98.00	PV (cP)	: 1	YP (lbf2)	: 3.00
Chlorides (ppm)	: 125500	Max Temp (degF)	: 158.47	% Solids (%)	: 0.80	% Sand (%)	: 0.00
pH (pH)	: 11.50	Fluid Loss(mptm)	: 100	% Oil (%)	: 0.00	O:W	: 0.92

MWD PERFORMANCE

Tool OD (in)	: 6.75	Type	: D/GWD	Min. Inc. (deg)	: 87.66	Min. Inc. Depth (ft)	: 11076.00
Final Az. (deg)	: 0.63	Max Op. Press. (psig)	: 4150	Max. Inc. (deg)	: 95.52	Max. Inc. Depth (ft)	: 13720.00
MWD Real Time %	: 89			MWD Recorded %	: 100		

COMMENTS

RUN 500: TIH on 28-JANUARY-2015. Drilled from 10140' MD to 14000' MD. TD Well at 14000' MD. 100% MWD Run.

(1) 5" X 4 276" - 19 5# 6-5/8" X 2-
3/4" NC 50 (XH)

5 00 in OD / 4 28 in ID

(2) 5 Stands 5" HWDP

5 00 in OD / 3 00 in ID

(3) 60 Stands 5" Drill pipe

5 00 in OD / 4 28 in ID

(4) MWD

(5) Stabilizer

6 75 in OD / 3 00 in ID

SN SD22042

(6) Float Sub

6 75 in OD / 3 00 in ID

SN SD111217

(7) 6 3/4" Sperry Drill Lobe 67

6 0 stg XL

6 75 in OD / 4 50 in ID

SN 11423281

(8) PDC

6 00 in OD / 2 00 in ID

SN 12622639

Length
(ft)

Cumulative
Length (ft)

(1) 1 00

6227 55

6226 55

(2) 453 82

NMDC

6 70 in OD / 3 00 in ID

SN SD51183

5772 73

(3) 5665 42

HOS

6 82 in OD / 2 75 in ID

SN 11672172

*[1] Positive Pulser - SN 11512808

*[2] PCM Sonde - SN 12230608

*[3] PCG Sonde - SN 11293384

*[4] PCDC Sonde - SN 11297627

107 31

(4) 66 30

(5) 5 94

41 01

(6) 3 52

35 07

(7) 30 70

31 55

(8) 0 85

0 85

NMDC

6 55 in OD / 3 00 in ID

SN SD49455

Length
(ft)

Sensor Dist
From Bit
(ft)

30 11

6 28

[2] 64 31

[3] 64 31

[4] 59 45

29 01

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
427.00	0.89	119.43	426.98	1.64 S	2.90 E	-1.69	0.21
487.00	0.90	126.22	486.98	2.14 S	3.69 E	-2.21	0.18
580.00	1.01	137.64	579.96	3.18 S	4.83 E	-3.26	0.24
760.00	1.39	135.36	759.92	5.90 S	7.43 E	-6.03	0.21
944.00	0.96	139.06	943.88	8.66 S	10.01 E	-8.83	0.23
1134.00	0.81	140.63	1,133.86	10.91 S	11.91 E	-11.12	0.08
1323.00	0.61	149.99	1,322.85	12.81 S	13.26 E	-13.05	0.12
1512.00	0.51	169.57	1,511.84	14.50 S	13.92 E	-14.75	0.11
1702.00	1.09	191.17	1,701.82	17.11 S	13.72 E	-17.34	0.34
1890.00	0.96	210.10	1,889.79	20.23 S	12.58 E	-20.45	0.19
2079.00	1.51	238.01	2,078.75	22.92 S	9.67 E	-23.09	0.42
2268.00	1.38	241.00	2,267.69	25.35 S	5.56 E	-25.45	0.08
2456.00	2.04	153.69	2,455.63	29.46 S	5.06 E	-29.54	1.28
2551.00	1.42	128.26	2,550.58	31.70 S	6.73 E	-31.81	1.03
2646.00	2.40	131.06	2,645.53	33.73 S	9.15 E	-33.89	1.04
2740.00	3.93	133.31	2,739.38	37.23 S	12.98 E	-37.46	1.63
2832.00	4.35	132.95	2,831.14	41.77 S	17.82 E	-42.08	0.46
2934.00	3.40	133.93	2,932.91	46.51 S	22.83 E	-46.90	0.93
3029.00	3.14	137.67	3,027.75	50.39 S	26.61 E	-50.85	0.35
3123.00	2.36	139.67	3,121.65	53.77 S	29.60 E	-54.28	0.84
3217.00	2.68	140.02	3,215.55	56.93 S	32.27 E	-57.49	0.34
3311.00	2.52	141.41	3,309.46	60.23 S	34.97 E	-60.83	0.19
3405.00	2.22	135.91	3,403.38	63.15 S	37.52 E	-63.80	0.40
3499.00	2.42	138.50	3,497.30	65.94 S	40.10 E	-66.64	0.25
3593.00	0.70	63.34	3,591.27	67.17 S	41.93 E	-67.90	2.49
3688.00	0.63	39.39	3,686.26	66.51 S	42.78 E	-67.25	0.30
3783.00	1.25	348.15	3,781.25	65.09 S	42.90 E	-65.84	1.04
3878.00	1.39	340.29	3,876.22	62.99 S	42.30 E	-63.73	0.24
4067.00	2.44	305.77	4,065.12	58.48 S	38.26 E	-59.15	0.80
4256.00	2.99	310.11	4,253.91	52.96 S	31.23 E	-53.50	0.31
4445.00	3.06	285.04	4,442.65	48.47 S	22.59 E	-48.86	0.70
4539.00	1.80	268.02	4,536.57	47.87 S	18.69 E	-48.19	1.53
4728.00	0.46	239.88	4,725.53	48.36 S	15.07 E	-48.62	0.74
4918.00	0.48	251.58	4,915.52	48.99 S	13.65 E	-49.23	0.05
5107.00	0.87	265.55	5,104.51	49.36 S	11.46 E	-49.55	0.22
5296.00	0.31	5.34	5,293.50	48.95 S	10.08 E	-49.12	0.52
5484.00	0.64	314.40	5,481.50	47.70 S	9.38 E	-47.86	0.27
5674.00	0.62	274.73	5,671.48	46.87 S	7.59 E	-47.00	0.23
5862.00	0.36	230.11	5,859.48	47.17 S	6.13 E	-47.27	0.24
6050.00	0.57	225.45	6,047.47	48.20 S	5.01 E	-48.28	0.11

DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (ft/100)
6239.00	0.76	224.45	6,236.46	49.74 S	3.47 E	-49.80	0.10
6427.00	0.64	227.45	6,424.45	51.34 S	1.83 E	-51.37	0.06
6616.00	0.62	216.64	6,613.43	52.88 S	0.43 E	-52.88	0.06
6805.00	0.67	238.73	6,802.42	54.28 S	1.13 W	-54.26	0.13
6994.00	2.14	290.70	6,991.37	53.61 S	5.38 W	-53.51	0.95
7088.00	3.54	280.08	7,085.25	52.49 S	9.88 W	-52.30	1.59
7183.00	2.97	295.36	7,180.10	50.92 S	14.99 W	-50.64	1.09
7277.00	2.97	296.31	7,273.97	48.79 S	19.38 W	-48.44	0.05
7372.00	2.08	265.22	7,368.88	47.85 S	23.31 W	-47.43	1.69
7466.00	1.85	250.05	7,462.83	48.50 S	26.44 W	-48.03	0.61
7561.00	1.73	260.75	7,557.78	49.26 S	29.29 W	-48.73	0.37
7655.00	2.10	272.01	7,651.73	49.43 S	32.42 W	-48.85	0.56
7749.00	0.86	293.63	7,745.70	49.08 S	34.78 W	-48.46	1.43
7772.00	0.63	325.32	7,768.69	48.91 S	35.01 W	-48.29	2.00
7867.00	2.21	49.67	7,863.67	47.29 S	33.92 W	-46.69	2.36
7961.00	2.32	56.41	7,957.59	45.07 S	30.95 W	-44.52	0.31
8055.00	2.39	59.77	8,051.51	43.03 S	27.68 W	-42.54	0.16
8149.00	2.82	63.58	8,145.42	41.02 S	23.92 W	-40.59	0.49
8181.00	2.62	63.11	8,177.38	40.34 S	22.56 W	-39.93	0.61
8212.00	3.57	57.53	8,208.34	39.50 S	21.12 W	-39.12	3.20
8244.00	5.95	35.05	8,240.23	37.61 S	19.32 W	-37.26	9.31
8275.00	9.08	23.25	8,270.96	34.04 S	17.44 W	-33.73	11.22
8307.00	11.93	20.30	8,302.42	28.62 S	15.29 W	-28.35	9.05
8338.00	14.61	21.75	8,332.59	21.98 S	12.73 W	-21.75	8.73
8369.00	17.46	22.17	8,362.38	14.04 S	9.53 W	-13.87	9.18
8401.00	19.59	18.66	8,392.72	4.51 S	6.00 W	-4.41	7.52
8433.00	21.34	11.30	8,422.71	6.28 N	3.14 W	6.34	9.72
8464.00	22.61	3.15	8,451.46	17.77 N	1.71 W	17.79	10.65
8495.00	25.14	357.45	8,479.81	30.30 N	1.67 W	30.32	11.02
8527.00	28.02	355.92	8,508.42	44.59 N	2.51 W	44.63	9.26
8559.00	31.73	358.34	8,536.17	60.50 N	3.29 W	60.55	12.19
8590.00	34.89	0.98	8,562.07	77.52 N	3.37 W	77.57	11.22
8622.00	38.28	2.01	8,587.76	96.58 N	2.87 W	96.62	10.76
8653.00	42.28	2.21	8,611.41	116.61 N	2.13 W	116.63	12.89
8685.00	45.97	0.98	8,634.38	138.87 N	1.52 W	138.88	11.84
8716.00	49.62	359.69	8,655.20	161.83 N	1.39 W	161.83	12.17
8748.00	53.72	359.48	8,675.04	186.92 N	1.57 W	186.92	12.83
8780.00	56.85	359.76	8,693.27	213.22 N	1.75 W	213.22	9.81
8811.00	59.55	0.66	8,709.60	239.57 N	1.64 W	239.56	9.07
8843.00	62.40	0.80	8,725.12	267.54 N	1.29 W	267.53	8.91
8874.00	65.32	0.23	8,738.78	295.37 N	1.04 W	295.34	9.56
8906.00	68.22	359.90	8,751.40	324.77 N	1.00 W	324.74	9.12
8937.00	71.42	359.34	8,762.09	353.87 N	1.20 W	353.83	10.45
8969.00	73.21	358.77	8,771.81	384.35 N	1.70 W	384.32	5.84
9000.00	74.53	358.54	8,780.42	414.12 N	2.40 W	414.10	4.34

DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (ft/100)
9032.00	76.14	357.54	8,788.52	445.06 N	3.46 W	445.05	5.87
9063.00	79.19	357.14	8,795.14	475.30 N	4.86 W	475.32	9.91
9095.00	82.09	356.98	8,800.35	506.83 N	6.48 W	506.87	9.09
9158.00	86.67	358.24	8,806.51	569.46 N	9.10 W	569.53	7.53
9189.00	87.47	358.34	8,808.10	600.40 N	10.02 W	600.49	2.60
9284.00	91.76	356.42	8,808.74	695.28 N	14.36 W	695.42	4.94
9378.00	94.26	356.23	8,803.81	788.95 N	20.37 W	789.18	2.67
9473.00	92.59	356.79	8,798.13	883.60 N	26.15 W	883.92	1.85
9568.00	92.84	357.85	8,793.64	978.39 N	30.59 W	978.77	1.14
9663.00	90.71	358.43	8,790.70	1,073.28 N	33.68 W	1073.71	2.32
9757.00	88.67	0.04	8,791.20	1,167.27 N	34.93 W	1167.70	2.76
9820.00	89.66	0.08	8,792.12	1,230.26 N	34.87 W	1230.68	1.57
9851.00	90.37	359.89	8,792.11	1,261.26 N	34.88 W	1261.68	2.36
9946.00	89.07	1.46	8,792.57	1,356.25 N	33.75 W	1356.63	2.14
10040.00	87.04	0.74	8,795.76	1,450.17 N	31.95 W	1450.51	2.30
10132.00	88.61	0.50	8,799.25	1,542.09 N	30.95 W	1542.40	1.73
10226.00	90.68	0.62	8,799.83	1,636.08 N	30.03 W	1636.36	2.20
10321.00	88.67	358.88	8,800.37	1,731.07 N	30.45 W	1731.34	2.80
10415.00	90.59	359.04	8,800.98	1,825.05 N	32.15 W	1825.33	2.04
10509.00	87.72	357.91	8,802.37	1,918.99 N	34.65 W	1919.31	3.28
10604.00	88.40	357.87	8,805.59	2,013.88 N	38.15 W	2014.23	0.72
10699.00	90.92	357.68	8,806.15	2,108.79 N	41.84 W	2109.20	2.67
10793.00	90.15	358.89	8,805.26	2,202.75 N	44.65 W	2203.19	1.52
10888.00	91.57	359.44	8,803.83	2,297.72 N	46.03 W	2298.18	1.60
10950.00	90.22	0.70	8,802.87	2,359.71 N	45.95 W	2360.16	2.98
10982.00	90.09	0.99	8,802.78	2,391.71 N	45.48 W	2392.14	0.98
11076.00	87.66	1.83	8,804.63	2,485.65 N	43.16 W	2486.03	2.74
11170.00	89.35	2.06	8,807.08	2,579.56 N	39.97 W	2579.87	1.82
11264.00	91.20	2.31	8,806.63	2,673.49 N	36.39 W	2673.72	1.98
11359.00	89.26	1.00	8,806.24	2,768.44 N	33.65 W	2768.61	2.46
11454.00	88.27	1.23	8,808.29	2,863.40 N	31.80 W	2863.52	1.07
11548.00	89.60	1.38	8,810.04	2,957.36 N	29.66 W	2957.42	1.42
11643.00	89.44	0.46	8,810.83	3,052.34 N	28.13 W	3052.36	0.98
11737.00	90.55	358.93	8,810.83	3,146.34 N	28.64 W	3146.35	2.01
11832.00	89.85	358.52	8,810.50	3,241.31 N	30.75 W	3241.35	0.86
11926.00	91.39	359.49	8,809.48	3,335.29 N	32.39 W	3335.34	1.94
12021.00	89.54	359.55	8,808.72	3,430.28 N	33.18 W	3430.33	1.95
12115.00	89.51	359.52	8,809.50	3,524.27 N	33.95 W	3524.32	0.05
12210.00	88.43	357.86	8,811.22	3,619.23 N	36.12 W	3619.30	2.08
12304.00	89.88	357.50	8,812.61	3,713.14 N	39.93 W	3713.26	1.59
12398.00	91.76	356.98	8,811.27	3,807.01 N	44.46 W	3807.21	2.07
12493.00	90.65	358.23	8,809.28	3,901.91 N	48.43 W	3902.15	1.75
12588.00	89.07	358.11	8,809.51	3,996.85 N	51.47 W	3997.14	1.66
12682.00	90.37	358.28	8,809.96	4,090.80 N	54.43 W	4091.13	1.39
12777.00	90.96	357.26	8,808.86	4,185.72 N	58.12 W	4186.10	1.24

DIRECTIONAL SURVEY DATA

Measured Depth (ft)	Inclination (deg)	Direction (deg)	Vertical Depth (ft)	Latitude (ft)	Departure (ft)	Vertical Section (ft)	Dogleg (°/100)
12871.00	90.31	358.09	8,807.82	4,279.64 N	61.93 W	4280.07	1.12
12965.00	90.71	358.16	8,806.99	4,373.59 N	65.01 W	4374.05	0.43
13060.00	90.15	358.41	8,806.27	4,468.54 N	67.85 W	4469.04	0.64
13154.00	88.52	356.89	8,807.36	4,562.45 N	71.70 W	4563.00	2.37
13249.00	89.57	356.84	8,808.94	4,657.29 N	76.90 W	4657.92	1.11
13343.00	91.36	355.42	8,808.18	4,751.07 N	83.24 W	4751.80	2.42
13437.00	93.46	358.11	8,804.24	4,844.82 N	88.54 W	4845.63	3.63
13531.00	92.56	0.36	8,799.30	4,938.68 N	89.79 W	4939.49	2.57
13625.00	93.56	2.62	8,794.28	5,032.50 N	87.36 W	5033.26	2.63
13657.00	94.20	3.04	8,792.11	5,064.39 N	85.78 W	5065.12	2.39
13720.00	95.52	2.50	8,786.78	5,127.09 N	82.74 W	5127.75	2.27
13751.00	94.15	1.74	8,784.16	5,157.96 N	81.60 W	5158.59	5.05
13783.00	92.16	1.26	8,782.40	5,189.90 N	80.76 W	5190.51	6.40
13814.00	90.34	0.70	8,781.73	5,220.88 N	80.23 W	5221.49	6.15
13846.00	90.71	0.27	8,781.43	5,252.88 N	79.96 W	5253.47	1.77
13877.00	89.94	0.17	8,781.26	5,283.88 N	79.84 W	5284.47	2.52
13909.00	89.26	0.31	8,781.48	5,315.88 N	79.70 W	5316.46	2.17
13938.00	89.60	0.63	8,781.77	5,344.88 N	79.46 W	5345.45	1.60
14000.00	89.60	0.63	8,782.20	5,406.87 N	78.78 W	5407.42	0.00

SURVEY FOOTER

SURVEYS CALCULATED USING SHORT COLLAR METHOD
 TIE ON SURVEY ASSUMED VERTICAL AT SURFACE
 SURVEYS FROM 427' MD TO 13938' MD PROVIDED BY SPERRY DRILLING MWD
 SURVEY AT 13938' MD HAS BEEN PROJECTED TO TD AT 14000' MD.
 SPERRY ENGINEERS: K. Stolarski, P. Poupart

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 358.99 degrees (Grid)
- A total correction of 7.31 deg from Magnetic north to Grid north has been applied
- Horizontal displacement is relative to the well head.
- Horizontal displacement (closure) at 14,000.00 feet is 5,407.44 feet along 359.17 degrees (Grid)

WARRANTY

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SERVICE INTERRUPT REPORT

MWD Run Number	:200	Time / Date of Failure	:18-Jan-15 04:04
Rig Bit Number	:0200	Depth at Time of Failure (ft)	:2913
MWD Run Start Time / Date	:18-Jan-15 12:00	Lost Rig Hours	:18
MWD Run End Time / Date	:18-Jan-15 01:00		

RIG ACTIVITY

Tripping in hole, Drilling cement and drilling 10' of new formation.

DESCRIPTION OF FAILURE

MO-XX-0901990952r200: When doing the shallow pulse test the pressure was real weak. It was decided to TIH and see if more pressure would result in bigger pulses. When getting to bottom pulses were not there. Upon getting to surface it was discovered that the O-rings on the pulser were not put on during the build.

ACTION TAKEN

When on bottom we tried flowing on the high end of the tool. Then tried flowing 50 GPM over high end of tool. Then tried to isolate the pump. Also checked different pressure gauges on rig floor to verify that the standpipe pressure was not pulsing.

OPERATION IMPACT
REASON FOR FAILURE

SERVICE INTERRUPT REPORT

MWD Run Number	:300	Time / Date of Failure	:23-Jan-15 09:24
Rig Bit Number	:0300	Depth at Time of Failure (ft)	:0
MWD Run Start Time / Date	:18-Jan-15 02:00	Lost Rig Hours	:0
MWD Run End Time / Date	:23-Jan-15 03:00		

RIG ACTIVITY

Drilling vertical section of well and pulling out of hole to go ahead and pick up curvilinear assembly. No NPT was associated with this failure.

DESCRIPTION OF FAILURE

MO-XX-0901990952r300: While sliding the pulser began to flat line but while pumping the slug to come out of hole the pulser began to pulse again. Upon reaching surface it was discovered that the both motor and bit were damaged. Also there was extreme wear on flow gear due to some environmental factors. While performing post run test the pulser failed the resistance test and there was excessive vibration, so the entire tool string was failed.

ACTION TAKEN

While trying to solve the initial flat line issue we tried to flow on the high end of the flow limits for tool. That did not show any pulses for the first couple minutes. Then we isolated each pump to see if there was a pump issue and again the same results. It was decided then to pull out of the hole because we were already having issues sliding. While pumping the slug to come out the tool began to pulse again. It had already been decided to come out of hole for other reasons so we continued out of the hole. There was no NPT associated with this failure.

OPERATION IMPACT

REASON FOR FAILURE

SERVICE INTERRUPT REPORT

MWD Run Number	:400	Time / Date of Failure	:27-Jan-15 05:29
Rig Bit Number	:0400	Depth at Time of Failure (ft)	:10140
MWD Run Start Time / Date	:23-Jan-15 06:00	Lost Rig Hours	:36
MWD Run End Time / Date	:27-Jan-15 03:00		

RIG ACTIVITY

Drilling in lateral part of well right after making a connection.

DESCRIPTION OF FAILURE

MO-XX-0901990952r400: The pulser began the flat line and then come back on. When the pulser came back on it would be in the survey list, so the tool had completely shut down and started again. The tool even swapped data rates with the pumps being shut off. When we got the tool on surface we found nothing wrong with read reports or confidence test. Put pulser in the running rig for 1 hour and the tool pulsed the entire hour. All we found was more wash underneath the stator on the stator support tube and the key, but does not seem to be enough to cause our issues. Failing the whole string for further testing.

ACTION TAKEN

We tried to isolate pumps to see if anything was wrong with the pump and found nothing. We were changed list to try to reset the PCM and still had same problem. The data rate had changed by itself with the pumps on and never turning off and that also did nothing to fix the intermittent pulsing.

OPERATION IMPACT

REASON FOR FAILURE

SERVICE INTERRUPT REPORT

MWD Run Number	:500	Time / Date of Failure	:03-Feb-15 01:28
Rig Bit Number	:0500	Depth at Time of Failure (ft)	:0
MWD Run Start Time / Date	:28-Jan-15 05:30	Lost Rig Hours	:0
MWD Run End Time / Date	:03-Feb-15 01:30		

RIG ACTIVITY

Laying down BHA after TD well.

DESCRIPTION OF FAILURE

MO-XX-0901990952r500: The tool string exceeding the vibration limits. The vibration hours varied drastically on each probe.

ACTION TAKEN

Vibration mitigation was attempted with no success decision was made to drill ahead.

OPERATION IMPACT

REASON FOR FAILURE

HALLIBURTON | Sperry Drilling

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