

HALLIBURTON

iCem[®] Service

GREAT WESTERN OIL & GAS LLC

Date: Wednesday, January 21, 2015

GREAT WESTERN WILLOW BEND LD 18-361HC

Case 1

Sincerely,
Joshua Prudhomme

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1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Willow Bend 18-361 HC cement Surface** casing job. A pre-job safety meeting was held before the job where details of the job were discussed, potential safety hazards were reviewed, and environmental compliance procedures were outlined.

Halliburton maintains a continuous quality improvement process and appreciates any comments or suggestions that you may have. Halliburton again thanks you for the opportunity to perform service work on this well. We hope to be your solutions provider for future projects.

Respectfully,

Halliburton [Brighton]

Job Times

	Date	Time	Time Zone
On Location	12/6/2014	00:30:00	MTN
Job Started	12/6/2014	06:38:26	MTN
Job Completed	12/6/2014	08:42:28	MTN

1.2 Cementing Job Summary

Sold To #: 346459		Ship To #: 3627362		Quote #:		Sales Order #: 0901910184				
Customer: GREAT WESTERN OIL & GAS LLC - eBUS				Customer Rep:						
Well Name: Willow Bend		Well #: LD 18-361H		API/UWI #:						
Field:	City (SAP): BRIGHTON	County/Parish: ADAMS		State: COLORADO						
Legal Description:										
Contractor:				Rig/Platform Name/Num: Craig 4						
Job BOM: 7521										
Well Type: GAS										
Sales Person: HALAMERICA\HB21661				Srvc Supervisor: Bradley Hinkle						
Job										
Formation Name										
Formation Depth (MD)		Top	Bottom							
Form Type				BHST						
Job depth MD		1303ft	Job Depth TVD							
Water Depth				Wk Ht Above Floor						
Perforation Depth (MD)		From	To							
Well Data										
Description	New / Used	Size in	ID in	Weight lbm/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
Casing		9.625	8.921	36	STC	J-55	0	1303	0	0
Open Hole Section			13.5				0	1318	0	0
Tools and Accessories										
Type	Size in	Qty	Make	Depth ft		Type	Size in	Qty	Make	
Guide Shoe	9.625			1303		Top Plug	9.625		HES	
Float Shoe	9.625					Bottom Plug	9.625		HES	
Float Collar	9.625			1258		SSR plug set	9.625		HES	
Insert Float	9.625					Plug Container	9.625		HES	
Stage Tool	9.625					Centralizers	9.625		HES	
Miscellaneous Materials										
Gelling Agt		Conc		Surfactant		Conc	Acid Type		Qty	Conc
Treatment Fld		Conc		Inhibitor		Conc	Sand Type		Size	Qty
Fluid Data										
Stage/Plug #: 1										
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
1	Fresh Water Spacer	Fresh Water, Red Dye added 2nd 10 bbls.	20	bbl	8.33			3		
Fluid Data										
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal	
2	SwiftCem B2	SWIFTCM (TM) SYSTEM	575	sack	14.2	1.54		5.5	7.69	

7.69 Gal		FRESH WATER							
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft3/sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
3	Displacement	Fresh Water	97	bbl	8.33			5	

1.3 Planned Pumping Schedule

- 1. Fill Lines with Water**
 - a. Density = 8.33 lb/gal
 - b. Volume = 2 bbl
- 2. Pressure Test Lines to 4500psi**
- 3. Pump Fresh Water Spacer**
 - a. Density = 8.33 lb/gal
 - b. Volume = 20 bbl
 - c. Rate = 5 bpm
- 4. Pump SwiftCem (Lead)**
 - a. Density = 14.2 lb/gal
 - b. Yield = 1.54 ft³/sk
 - c. Water Requirement = 7.69 gal/sk
 - d. Volume = 575 sks (157.7 bbls)
 - e. Rate = 5 bpm
- 5. Drop Top Plug**
- 6. Start Displacement**
- 7. Pump Displacement Water**
 - a. Density = 8.33 lb/gal
 - b. Volume = 97 bbls
 - c. Rate = 5 bpm
- 8. Land Plug – Anticipated Final Circulation Pressure 451 psi**

Calculated Total Displacement = 97 bbls

1.4 Job Overview

		Units	Description
1	Surface temperature at time of job	°F	34
2	Mud type (OBM, WBM, SBM, Water, Brine)	-	WBM
3	Actual mud density	lb/gal	8.7
4	Time circulated before job	HH:MM	1:00
5	Mud volume circulated	Bbls	240
6	Rate at which well was circulated	Bpm	4
7	Pipe movement during hole circulation	Y/N	N
8	Rig pressure while circulating	Psi	35
9	Time from end mud circulation to start of job	HH:MM	0:30
10	Pipe movement during cementing	Y/N	N
11	Calculated displacement	Bbls	97
12	Job displaced by	Rig/HES	HES
13	Annular before job)?	Y/N	N
14	Annular flow after job	Y/N	N
15	Length of rat hole	Ft	15
16	Units of gas detected while circulating	Units	0
17	Was lost circulation experienced at any time ?	Y/N	N

1.5 Water Field Test

Item	Recorded Test Value	Units	Max. Acceptable Limit	Potential Problems in Exceeding Limit
pH	70	----	6.0 - 8.0	Chemicals in the water can cause severe retardation
Chlorides	0	ppm	3000 ppm	Can shorten thickening time of cement
Sulfates	>200	ppm	1500 ppm	Will greatly decrease the strength of cement
Total Hardness		ppm	500 mg/L	High concentrations will accelerate the set of the cement
Calcium		ppm	500 ppm	High concentrations will accelerate the set of the cement
Total Alkalinity		ppm	1000 ppm	Cement is greatly retarded to the point where it may not set up at all (typically occurs @ pH ≥ 8.3).
Bicarbonates		ppm	1000 ppm	Cement is greatly retarded to the point where it may not set up at all
Potassium	0	ppm	5000 ppm	High concentrations will shorten the pump time of cement (indicates the presence of chlorides, therefore if Potassium levels are measured as high, so should the chlorides)
Iron		ppm	300 ppm	High concentrations will accelerate the set of the cement
Temperature	52	°F	50-80 °F	High temps will accelerate; Low temps may risk freezing in cold weather

Submitted Respectfully by: _____

1.6 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	DH Density (ppg)	Comb Pump Rate (bbl/min)	PS Pump Press (psi)	Comment
Event	1	Arrive at Location from Service Center	Arrive at Location from Service Center	12/6/2014	00:30:00	USER				PERFORM A SITE ASSESSMENT AND PRE-RIG UP SAFETY MEETING. RIG JUST STARTED RUNNING CASING.
Event	2	Safety Meeting	Safety Meeting	12/6/2014	06:15:00	USER	0.45	0.00	5.00	PRE-JOB SAFETY MEETING WITH ALL PERSONNEL ON LOCATION.
Event	3	Start Job	Start Job	12/6/2014	06:38:26	COM5	8.82	0.00	7.00	
Event	4	Test Lines	Test Lines	12/6/2014	06:40:46	COM5	8.87	0.50	52.00	PRESSURE TEST LINES.
Event	5	Pump Spacer 1	Pump Spacer 1	12/6/2014	06:45:13	COM5	9.00	0.00	9.00	PUMP 10 BBLS FRESH WATER.
Event	6	Pump Spacer 2	Pump Spacer 2	12/6/2014	06:52:02	COM5	8.32	1.90	34.00	PUMP 10 BBLS FRESH WATER WITH RED DYE ADDED.
Event	7	Pump Lead Cement	Pump Lead Cement	12/6/2014	06:56:56	COM5	9.36	2.60	43.00	PUMP 158 BBLS (575 SACKS) SWIFTCEM USING SUPPLIED WATER. DENSITY VERIFIED BY SCALES.
Event	8	Shutdown	Shutdown	12/6/2014	07:36:40	COM5	14.26	0.00	6.00	
Event	9	Drop Top Plug	Drop Top Plug	12/6/2014	07:37:37	COM5	13.21	0.00	5.00	TOP PLUG PRELOADED.
Event	10	Pump Displacement	Pump Displacement	12/6/2014	07:37:55	COM5	13.80	0.70	7.00	PUMP 97 BBLS FRESH WATER. GOOD RETURNS THROUGHOUT.
Event	11	Bump Plug	Bump Plug	12/6/2014	08:02:34	COM5	8.31	2.20	537.00	BUMP PLUG AT 451 PSI AND INCREASED PRESSURE TO 1200 PSI. HELD FOR 2 MINUTES.
Event	12	Check Floats	Check Floats	12/6/2014	08:07:05	USER	8.36	0.00	1083.00	FLOATS HELD. 1 BBL BACK.
Event	13	Other	Other	12/6/2014	08:10:10	COM5	8.39	0.00	2450.00	CASING PRESSURE TEST TO 2400 PSI FOR 30 MINUTES.
Event	14	Check Floats	Check Floats	12/6/2014	08:41:40	USER	8.48	0.00	2224.00	FLOATS HELD. 1 BBL BACK.
Event	15	End Job	End Job	12/6/2014	08:42:28	COM5	8.34	0.00	21.00	
Event	16	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	12/6/2014	08:43:14	USER	8.37	0.00	12.00	PRE-RIG DOWN SAFETY MEETING WITH HES PERSONNEL.

2.0 Attachments

2.1 GREAT WESTERN WILLOW BEND LD 19-361HC.png

