

HALLIBURTON

iCem[®] Service

ANADARKO PETROLEUM CORP - EBUS

Date: Thursday, March 19, 2015

Griswold 3C-11HZ

Surface

Job Date: Monday, February 09, 2015

Sincerely,

Justin Lansdale

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Table of Contents

1.0	Cementing Job Summary	4
1.1	Executive Summary	4
1.2	Planned Pumping Schedule	6
1.3	Job Overview	7
1.4	Water Field Test.....	7
2.0	Real-Time Job Summary	8
2.1	Job Event Log	8
2.2	Custom Graph.....	10

1.0 Cementing Job Summary

1.1 Executive Summary

Halliburton appreciates the opportunity to perform the cementing services on the **Griswold 3C-11HZ** 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 [Fort Lupton]

	Date	Time (24hr)
Callout:	2/9/2015	18:00
On Location:	2/10/2015	0:00
Job Started:	2/10/2015	0:38
Job Completed:	2/10/2015	2:04
Departed Location:	2/10/2015	3:50
Verified Ticket With:	Korianna	



Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 300466	Ship To #: 3642200	Quote #:	Sales Order #: 0902125023
Customer: ANADARKO PETROLEUM CORP - EBUS		Customer Rep:	
Well Name: GRISWOLD	Well #: 3C-11HZ	API/UWI #: 05-123-40982-00	
Field: WATTENBERG	City (SAP): IONE	County/Parish: WELD	State: COLORADO
Legal Description: SE SW-11-1N-66W-560FSL-1998FWL			
Contractor: ADVANCED ENERGY		Rig/Platform Name/Num: ADVANCED 10	
Job BOM: 7521			
Well Type: HORIZONTAL GAS			
Sales Person: HALAMERICA\HB60191		Srcv Supervisor:	
Job			

Formation Name			
Formation Depth (MD)	Top		Bottom
Form Type			BHST
Job depth MD	1765		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		J-55	0	1755.48		
Open Hole Section			13.5				0	1765		

Tools and Accessories									
Type	Size in	Qty	Make	Depth ft	Type	Size in	Qty	Make	
Guide Shoe	9.625			850	Top Plug	9.625		HES	
Float Shoe	9.625				Bottom Plug	9.625		N/A	
Float Collar	9.625				SSR plug set	9.625		N/A	
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 ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
1	Fresh Water Spacer	Fresh Water Spacer	20	bbl	8.33			4.5	
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal

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Cementing Job Summary

2	Fresh Water Spacer with Red Dye	Fresh Water Spacer with Red Dye	10	bbl	8.33			4.5	
Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
3	Lead Cement	SWIFCEM (TM) SYSTEM	706	sack	14.2	1.54		8	7.65

Fluid #	Stage Type	Fluid Name	Qty	Qty UoM	Mixing Density lbm/gal	Yield ft ³ /sack	Mix Fluid Gal	Rate bbl/min	Total Mix Fluid Gal
4	Displacement	Displacement	132	bbl	8.33			8	
Cement Left In Pipe		Amount	Reason		Shoe Joint				
		42 ft							
Mix Water:		pH7 ##	Mix Water Chloride:		##100 ppm				
Cement Temperature:		## °F °C	Plug Displaced by:		## 8.33lb/gal				
Plug Bumped?		Yes	Bump Pressure:		###1100 psi				
Cement Returns:		## bbl m3	Returns Density:		## lb/gal kg/m3				
Returns Temperature:		## °F °C							
Comment									

1.2 Planned Pumping Schedule

1.3 Pump Schedule

Description	Stage No.	Density (ppg)	Rate (bbl/min)	Yield (ft ³ /sack)	Water Req. (gal/sack)	Volume (bbl)	Bulk Cement (sacks)	Duration (min)
Anadarko MUD	1	9.00	5.00			0.00		0.00
Water	2	8.33	6.00			20.00		3.33
Anadarko 14.2 ppg Surface SwiftCem	3-1	14.20	6.00	1.5380	7.650	193.39	706.00	32.23
Shutdown	3-2			1.5380	7.650		0.00	10.00
Top Plug/Start Displacement								
Anadarko MUD	4	9.00	6.00			136.45		22.74
Total:						349.84		68.31

*Pump schedule may include additional rows for displacement if "Automatic Rate Adjustment" was enabled and ECDs approached the fracture gradient.

1.3 Job Overview

Job Overview

		Units	Description
1	Surface temperature at time of job	°F	38
2	Mud type (OBM, WBM, SBM, Water, Brine)	-	WBM
3	Actual mud density	lb/gal	8.8
4	Time circulated before job	HH:MM	1:30
5	Mud volume circulated	bbls	2 bttms up
6	Rate at which well was circulated	bpm	4
7	Pipe movement during circulation	Y/N	n
8	Rig pressure while circulating	psi	110
9	Time from end mud circulation to start of job	HH:MM	0:10
10	Pipe movement during cementing	Y/N	n
11	Calculated displacement	bbls	132
12	Job displaced by	Rig/HES	HES
13	Annular before Job	Y/N	y
14	Annular flow after job	Y/N	n
15	Length of rat hole	ft	10.48
16	Units of gas detected while circulating	Units	0
17	Was lost circulation experienced at any time?	Y/N	n

1.4 Water Field Test

Cement Mix Water Requirements

Item	Recorded Test Value	Max Acceptable Limit	Potential Problems in Exceeding Limit
pH	7	5 to 8.5	Chemicals in water can cause severe retardation
Chlorides	300	3000 mg/L	Can accelerate the set time on cement 1% ~ 4800 mg/L
Sulfates	200	1500 mg/L	Will greatly decrease its strength to the point where it may not set up at all
Total Hardness or Alkalinity	0	500 mg/L	Will retard cement and decrease its strength (only occurs @ pH ≥ 8.3)
Calcium	0	500 mg/L	High concentrations will accelerate the set of cement
Bicarbonates	0	1000 mg/L	Will greatly decrease its strength to the point where it may not set up at all
Iron	0	300 mg/L	High concentrations will accelerate the set of cement
Potassium	0	5000 ppm	High concentrations will accelerate the set of cement
Water Temp	74	50F to 80F	High temps will accelerate; Low temps may risk freezing in cold weather

2.0 Real-Time Job Summary

2.1 Job Event Log

Type	Seq. No.	Activity	Graph Label	Date	Time	Source	Pass-Side Pump Pressure (psi)	Downhole Density (ppg)	Combined Pump Rate (bbl/min)	Comments
Event	1	Call Out	Call Out	2/9/2015	18:00:00	USER				
Event	2	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	2/9/2015	20:50:00	USER				Discussed route, driving safety and driving hazards
Event	3	Depart from Service Center or Other Site	Depart from Service Center or Other Site	2/9/2015	21:00:00	USER				
Event	4	Arrive At Loc	Arrive At Loc	2/9/2015	22:00:00	USER				TP- 1755.48', TD- 1765', CAS- 9 5/8", 36#, Oh- 13 1/2', WF- 8.8#, ST- 42.32'. Ran top plug- Halliburton HWE supplied by company man.
Event	5	Pre-Rig Up Safety Meeting	Pre-Rig Up Safety Meeting	2/9/2015	22:10:00	USER				Did site assessment, discussed safety and hazards.
Event	6	Rig-Up Equipment	Rig-Up Equipment	2/9/2015	22:20:00	USER				
Event	7	Rig-Up Completed	Rig-Up Completed	2/9/2015	23:00:00	USER				
Event	8	Circulate Well	Circulate Well	2/9/2015	23:01:00	USER				Rig circulating @ 4 bbls/min 110 psi
Event	9	Pre-Job Safety Meeting	Pre-Job Safety Meeting	2/10/2015	00:00:01	USER				Discussed job procedures, safety and hazards.
Event	10	Start Job	Start Job	2/10/2015	00:48:48	COM4				
Event	11	Test Lines	Test Lines	2/10/2015	00:52:21	COM4				Tested lines to 2500 psi. Had good test.
Event	12	Pump Spacer 1	Pump Spacer 1	2/10/2015	00:55:59	COM4	76	8.46	4.4	Pumped 30 bbls of fresh water with dye @ 4.5 bbls/min, 74 psi

Event	13	Pump Lead Cement	Pump Lead Cement	2/10/2015	01:09:07	COM4	12.00	8.46	1.00	Pumped 194 bbls of 14.2# Lead cement @ 8 BBLs/MIN, 320 psi
Event	14	Check Weight	Check weight	2/10/2015	01:13:01	COM4	197.00	14.15	6.20	14.2
Event	15	Check Weight	Check weight	2/10/2015	01:25:21	COM4	335.00	14.28	8.00	14.3
Event	16	Drop Top Plug	Drop Top Plug	2/10/2015	01:38:52	COM4				Dropped top plug
Event	17	Pump Displacement	Pump Displacement	2/10/2015	01:38:58	COM4				Pumped 132 bbls of 8.33# fresh water @ 8 bbls/min. with a pressure range from 12 psi to 670 psi. Got 15 bbls of cement to surface.
Event	18	Bump Plug	Bump Plug	2/10/2015	02:08:07	COM4	1221.00	8.35	0.00	Bumped plug @ calculated displacement 500 psi over final circulating pressure. 600 psi to 1100 psi
Event	19	End Job	End Job	2/10/2015	02:15:00	COM4				
Event	20	Pre-Rig Down Safety Meeting	Pre-Rig Down Safety Meeting	2/10/2015	02:30:00	USER				Discussed safety and hazards.
Event	21	Rig-Down Equipment	Rig-Down Equipment	2/10/2015	02:40:00	USER				
Event	22	Rig-Down Completed	Rig-Down Completed	2/10/2015	03:30:00	USER				
Event	23	Pre-Convoy Safety Meeting	Pre-Convoy Safety Meeting	2/10/2015	03:40:00	USER				Discussed route, driving safety and driving hazards.
Event	24	Depart Location	Depart Location	2/10/2015	03:50:00	USER				

2.2 Custom Graph

