

## Plug and Sidetrack Procedure

**Well:** Griffiths13C-20HZ  
**County:** Weld Co., Colorado  
**TD MD:** 8012ft  
**Rig:** H&P307

**CEMENTING PROGRAM: - Halliburton Cementing – Dispatch - 303.655.4700**

- **Engineering (on call) – 303.655.4782 (Matt)**

**Plug 1: 220 sacks, 45 bbl, (1.15 cf/sk) Class G Cement + .75% bwoc FR + 0.25% bwoc Retarder**

Slurry Weight, ppg:	15.8
Slurry Yield, cf/sx:	1.15
Mix Water, gps:	4.95

**Plug 2: 310 sacks, 45 bbl, (0.94 cf/sk) Class G Cement + .75% bwoc FR + 0.25% bwoc Retarder**

Slurry Weight, ppg:	17.5
Slurry Yield, cf/sx:	0.94
Mix Water, gps:	3.32

Thickening time (pump time) estimated at 2-3hrs. (Lab results from previous plug set – our specific lab results are pending.)

**ON SITE PREPARATION (PRIOR TO SETTING PLUG)**

1. Check that all the necessary equipment is on location and is in good condition.
2. Review procedure and conduct pre job safety meeting.

**PLUG AND SIDETRACK PROCEDURE:**

1. TIH 4” DP and approx. 700’ of 2-3/8” tubing to 8,000ft. Strap while TIH. Do not tag bottom (TD at 8,012ft).
2. Circulate hole.

PLUG CEMENT PROGRAM								
Slurry	Density ppg	Yield Ft <sup>3</sup> /sk	Mix Fluid Gal/sk	Top / Bottom MD	Fill	Volume		
						Bbls	SX	Excess
<b>Spacer</b> Tuned Spacer III	11					34		
<b>Plug</b> Class G Cement	15.8	1.15	4.95	8,000ft – 7,400ft	600ft	45	220	0%
<b>Spacer</b> Tuned Spacer III	11					5.6		
TOOH SLOWLY to 7,100’ MD; Circulate Bottoms Up; TIH to 7,380ft								
<b>Spacer</b> Tuned Spacer III	11					35		
<b>Plug</b> Class G Cement	17.5	0.94	3.32	7,3800ft- 6,780				15%
<b>Spacer</b> Tuned Spacer III	11					5.6		
<b>Remarks</b>	Run balanced plug equations and make sure APC representative numbers match the Halliburton representative numbers.							

3. Pump 35 bbls of 11 ppg Tuned Spacer III – confirm calculations for balanced plug with Halliburton representative.
4. Mix and pump 220 sacks (45 bbls) of 15.8 ppg Class G Cement (see above for additives, 0.94 cf/sk, 4.95gps mix water). Get wet samples while pumping.
5. Displace with 5.6bbls 11ppg Tuned Spacer III spacer and 58bbls mud. Top of plug is estimated at 7,400ft once pipe is pulled out.
6. **SLOWLY** pull DP out of cement to +/- 7,100 (+/- 300ft above top of cement).
7. Reverse out cement until no cement returns are observed.
8. TIH to 7,380' (approximately 20' above top of cement)
9. Pump 35bbls of 11 ppg Tuned Spacer III – confirm calculations for balanced plug with Halliburton representative.
10. Mix and pump 310 sacks (52 bbls) of 17.5 ppg Class G Cement (see above for additives, 0.94 cf/sk, 3.32gps mix water). Get wet samples while pumping.
11. Displace with 5.6bbls 11ppg Tuned Spacer III spacer. Top of plug is estimated at 6,780ft.
12. **SLOWLY** pull DP out of cement to 6,800ft.
13. Circulate conventional way at maximum rate for at least two bottoms up. Verify there are no more cement in returns.
14. R/D Halliburton, then TOH and make up curve BHA with baker 2.36 degree motor and Smith bit.
15. TIH and stay inside surface casing while WOC.
16. WOC approximately 12hrs and TIH to 6,000ft. Time it so we are at that depth right at the 12hrs wait time.
17. Slowly TIH to tag top of plug.
18. Dress plug 100ft and begin kick off. If unable to kickoff within 100ft please inform Superintendent, Levi Hancock.
19. Once kicked off follow current directional plan until update is sent out.

**NEW WELL DESIGNATION:**

ONCE KICK OFF IS COMPLETED THE NEW WELLBORE WILL BE KNOWN AS GRIFFITHS 13C-20HZX. ALL WORK IN OPEN WELLS WILL BE IN THIS WELLBORE. IF THERE ARE ANY QUESTIONS CONTACT TODD McMANUS.

ALL BILLING FROM THIS POINT ON SHOULD HAVE NEW WELL NAME.

NEW API NUMBER WILL BE: 05-123366370100.

**NOV Grant Prideco**

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**Drill Pipe Performance Sheet**

**Drill Pipe Configuration**



Pipe Body OD	(in)	4.000
Pipe Body Wall Thickness	(in)	0.330
Pipe Body Grade		S-135
Drill Pipe Length		Range3
Connection		XT39
Tool Joint OD	(in)	4.875
Tool Joint ID	(in)	2.688
Pin Tong	(in)	10
Box Tong	(in)	15

Nominal Weight Designation		14.00
Drill Pipe Approximate Length	(ft)	43.8
SmoothEdge Height	(in)	3/32 Raised
Tool Joint SMYS	(psi)	120,000
Upset Type		IJ
Max Upset OD (DTE)	(in)	4.188

**Drill Pipe Performance**



**Performance of Drill Pipe with Pipe Body at 80% Inspection Class**

	Applied Make-up Torque (ft-lbs)	Operational Torque (ft-lbs)	Max Tension (lbs)
Recommended MUT	21,200	18,300	403,500
Minimum MUT	17,700	14,500	361,700

**Drill-Pipe Length Range3**

	Best Estimates		Nominal
	(without Coating)	(with Coating)	(least accurate)
Drill Pipe Adjusted Weight (lbs/ft)	15.47		14.87
Fluid Displacement (gal/ft)	0.24		0.23
Fluid Displacement (Bbls/ft)	0.0056		0.0054
Fluid Capacity (gal/ft)	0.44	0.43	0.45
Fluid Capacity (bbls/ft)	0.0104	0.0103	0.0106
Drift Size (in)	2.563		

Note: Oil field barrel equals 42 US gallons

Note: Drill pipe assembly values are best estimates and may vary due to pipe body mill tolerance, internal plastic coating, and other factors

**Connection Performance**



XT39 ( 4.875 (in) OD X 2.688 (in) ID ) 120,000 (psi)

	Applied Make-up Torque (ft-lbs)	Tension at Shoulder Separation (lbs)	Tension at Connection Yield (lbs)
Recommended Make-up Torque	21,200	Tensile Limited	553,300
Minimum Make-up Torque	17,700	647,200	662,200

Note: Recommended make-up torque is the maximum make-up torque that should be applied.  
Note: To maximize connection operational tensile, a MUT (T4) of 18,100 (ft-lbs) should be applied.

Tool Joint Dimensions	
Balanced OD	(in) 4.926
Minimum Tool Joint OD for API Premium Class	(in) 4.652
Minimum Tool Joint OD for Connections	(in) 4.652

**Elevator Shoulder Information**



Elevator OD 3/32 Raised 5.062 (in)

	SmoothEdge Height 3/32 Raised	Nominal Tool Joint OD	Worn to Bevel Diameter	Worn to Min TJ OD for API Premium Class
Box OD	(in) 5.062	4.875	4.786	4.652
Elevator Capacity	(lbs) 631,200	470,100	395,700	286,300
Assumed Elevator Bore	(in) 4.281			

Note: Elevator capacity based on assumed Elevator Bore, no wear factor and contact stress of 110,100psi  
Note: A raised elevator OD increases elevator capacity without affecting make-up torque.

**Pipe Body Slip Crushing Capacity**



Pipe Body Configuration ( 4 (in) OD 0.330 (in) Wall S-135 )

	Nominal	80% Inspection Class	API Premium Class
Slip Crushing Capacity	(ft-lbs) 454,400	358,500	358,500
Assumed Slip Length	(in) 23		
Transverse Load Factor (K)	2.6		

Note: Slip Crushing: Slip crushing load is calculated with the Spri-Reinhold equation from "Why Does Drill Pipe Fail in the Slip Area" World Oil, 1959 for the slip length and transverse load factor shown and is for reference only. Slip crushing is dependent on the slip design and condition, coefficient of friction, loading conditions, time of slip, drill pipe OD and wall variation, and other factors. Consult with the slip manufacturer for additional information.

**Pipe Body Performance**



Pipe Body Configuration ( 4 (in) OD 0.330 (in) Wall S-135 )

	Nominal	80% Inspection Class	API Premium Class
Pipe Tensile Strength	(lbs) 513,600	403,500	403,500
Pipe Torsional Strength	(ft-lbs) 41,900	32,800	32,800
TJ/Pipe Body Torsional Ratio	0.84	1.08	1.08
80% Pipe Torsional Strength	(ft-lbs) 33,500	26,200	26,200
Burst	(psi) 19,491	17,820	17,820
Collapse	(psi) 20,141	13,836	13,836
Pipe OD	(in) 4.000	3.868	3.868
Wall Thickness	(in) 0.330	0.264	0.264
Nominal Pipe ID	(in) 3.340	3.340	3.340
Cross Sectional Area of Pipe Body	(in <sup>2</sup> ) 3.805	2.989	2.989
Cross Sectional Area of OD	(in <sup>2</sup> ) 12.566	11.751	11.751
Cross Sectional Area of ID	(in <sup>2</sup> ) 8.762	8.762	8.762
Section Modulus	(in <sup>3</sup> ) 3.229	2.523	2.523
Polar Section Modulus	(in <sup>3</sup> ) 6.458	5.046	5.046

Note: Nominal Burst calculated at 87.5% RBW per API.

Note: The technical information contained herein, including the product performance sheet and other attached documents, is for reference only and should not be construed as a recommendation. The user is fully responsible for the accuracy and suitability of use of the technical information. NOV Grant Prideco cannot assume responsibility for the results obtained through the use of the material. No expressed or implied warranty is intended. Drill pipe assembly properties are calculated based on uniform OD and wall thickness. No safety factor is applied. The information provided for various inspection classes and for various wear conditions (remaining body wall) is for information only and does not represent or imply acceptable operating limits. It is the responsibility of the customer and the end user to determine the appropriate performance ratings, acceptable use of the product, maintain safe operational practices, and to apply a prudent safety factor suitable for the application. For API connections that have different pin and box ID's, tool joint ID refers to the pin ID. Per Chapter B, Section 4 VII of the IADC drilling manual, it is recommended that drilling torque should not exceed 80% of MUT.

