



Rocky Mountain Natural Gas, LLC

Lab Report

Test/Iteration 13288-1
Prod Tail

8/5/2019



Lab Report

Rocky Mountain Natural Gas, LLC
1515 Wynkoop Street #500 | Denver, CO 80202
8/5/2019

Dear Rocky Mountain Natural Gas, LLC,

Thank you for the opportunity to submit a lab report for cementing services on the attached wellbore. BJ Services' priority is providing premium customer service while operating in a safe, efficient manner. If you have any questions regarding the proposal or services offered, please contact BJ Services at any time.

Sincerely,

Zen Keith

Technical Specialist-II | (307) 757-7178 | Zen.Keith@bjservices.com

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Phone: (307) 360-3062

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1 General Lab Test Information

Date:	8/5/2019
Well Name:	WOLF CREEK 9-D3
Well API #:	05-097-06017
Fluid Type:	Tail
Job Type:	Production
Test Type	Pilot
TMD:	5185 ft
TVD:	5608 ft
BHCT:	109 °F
BHST:	140 °F
Temperature Gradient:	1.20 °F/100ft
Surface Temperature:	80 °F
Density:	13.50 lb/gal
Yield:	1.50 ft ³ /sk
Water Requirement:	7.24 gal/sk
Sack Weight:	84.00 lbs
Fluid SG:	1.62
Service District:	Rifle

2 Material Weigh-up Information

No	Material	Function	Type	Form	Concen.	Uom	SG	Weight (g)	Volume (mL)	Lot
1	Class G	Cement	Base	Dry	50.00	%	3.14	326.00	103.82	
2	Fly Ash (Pozzolan)	Extender	Base	Dry	50.00	%	2.46	256.64	104.33	
3	Gypsum	Extender	Additive	Dry	3.00	%BWOB	2.70	17.48	6.47	
4	FP-25	Defoamer	Additive	Dry	0.30	%BWOB	1.94	1.75	0.90	
5	BA-90	Extender	Additive	Dry	3.00	lb/sk	2.52	20.81	8.26	
6	FL-66	FluidLoss	Additive	Dry	0.40	%BWOB	1.47	2.33	1.59	
7	SODIUM METASILICATE, A-2	Extender	Additive	Dry	0.50	%BWOB	2.40	2.91	1.21	
8	IntegraSeal PHENO	LostCirculation	Additive	Dry	1.00	lb/sk	1.40	6.94	4.95	
	Water	-	-	-	-	-	1.00	418.47	418.47	
								1053.32	650.00	

Density: **13.50 lb/gal** Yield: **1.50 ft³/sk** SG: **1.62** Water Req.: **7.24 gal/sk** Water Src: **Tap** Water SG: **1.00**

3 Test Analysis/Results

Mixability Analysis

	#1
Vortex:	Half Dollar Size @ 12,000 RPM

Free Fluid Analysis

	#1
Sample size:	250 mL
Measured Free Fluid:	0 mL
% Free Fluid:	0
Channeling:	None

Fluid Loss Analysis

	#1
Measured Fluid Loss:	61 ml
Test Time:	0:05:23 min
ISO Fluid Loss:	288.00 ml

Rheology Analysis

	#1	#2
Test Temperature:	70 °F	109 °F
Conditioning Time:	0	30
YP:	16.4 lb/100ft ²	14.6 lb/100ft ²
PV:	24.6 cP	20.4 cP
600 rpm:	65.6	55.4
300 rpm:	41	35
200 rpm:	36	29
100 rpm:	30	21
60 rpm:	28	18
30 rpm:	26	16
6 rpm:	21.2	132.0
3 rpm:	18.6	11.2

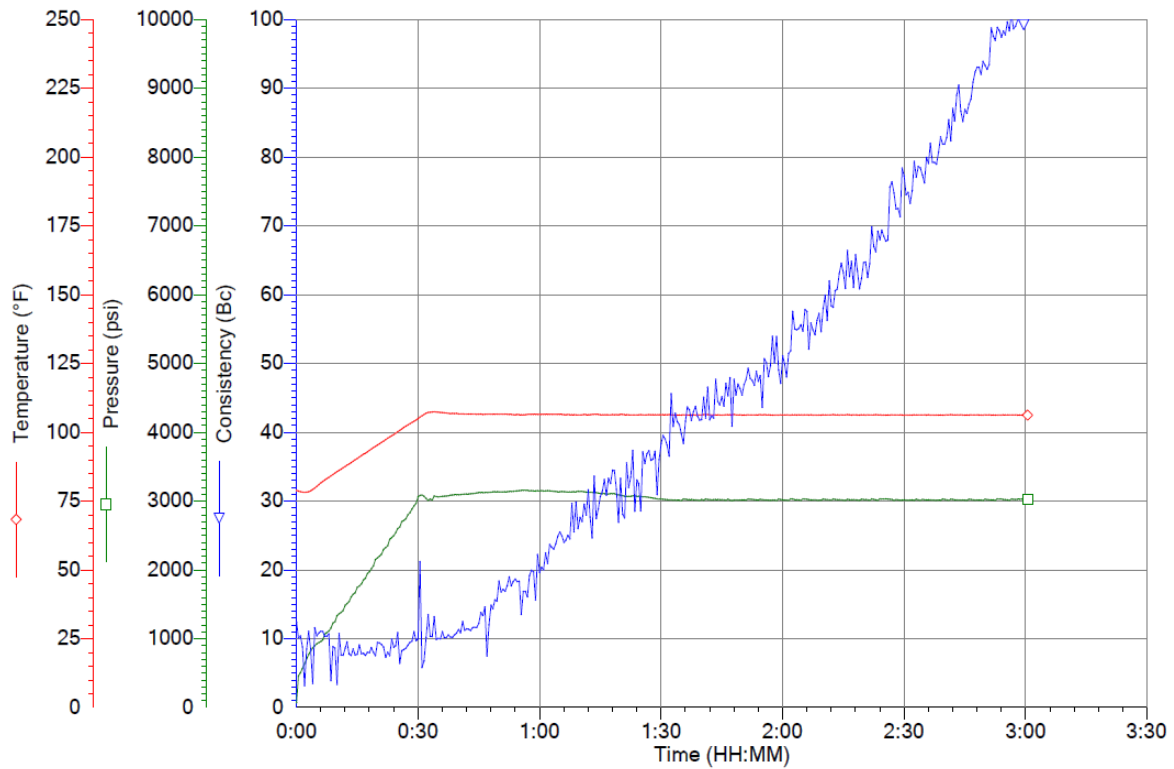
Thickening Time Analysis

	#1
Initial Consistency:	12 bc
30 bc:	1:11 (HH:MM)
50 bc:	1:55 (HH:MM)
70 bc:	2:26 (HH:MM)
100 bc:	2:55 (HH:MM)
Termination Time:	3:00 (HH:MM)
Termination Consistency:	101 bc

Instrument: 01-615
50 Bc: 1:55:30
Tech:

Initial Consistency: 12 Bc
70 Bc: 2:26:30

30 Bc: 1:15:00
100 Bc: 3:00:00



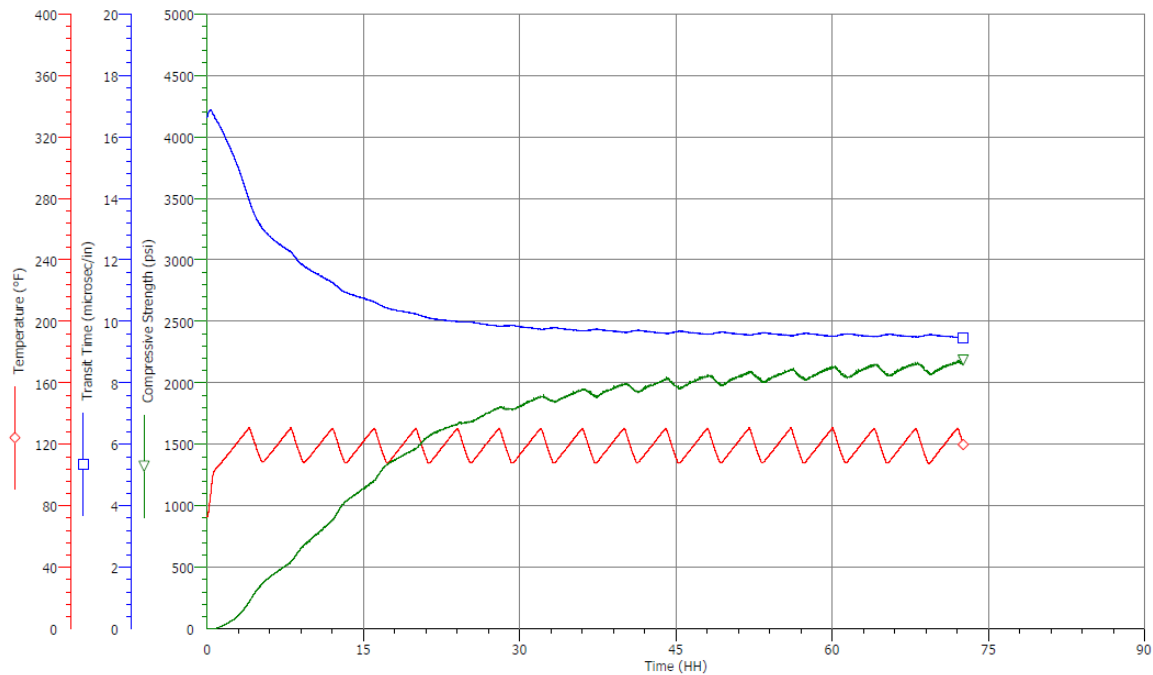
UCA Compressive Strength Analysis

	#1
Test Temperature:	135 °F
Time to 50 psi:	2:05 (HH:MM)
Time to 500 psi:	7:20 (HH:MM)
6h Strength:	419 psi
12h Strength:	881 psi
24h Strength:	1664 psi
48h Strength:	2051 psi
72h Strength:	2167 psi
Algorithm:	A

Well ID:
Test Start: 7/26/2019 11:21:47 AM
Test Stop:

Customer:
Strength: 2184 psi
Algorithm: Compressive strength type A (less than 14 lb/gal)

BHST:
50 psi @ 2:05:00
500 psi @ 7:20:00



4 Conditioning Schedules

Fluid Loss #1

No	Time (min)	Temp (°F)	Pressure (psi)	Conditioning	Static
1	30	109	0	Yes	No

Thickening Time #1

No	Time (min)	Temp (°F)	Pressure (psi)	Conditioning	Static
1	0	80	409	Yes	No
2	30	109	3011	Yes	No
3	999	109	3011	Yes	No

Rheology #2

No	Time (min)	Temp (°F)	Pressure (psi)	Conditioning	Static
1	30	109	0	Yes	No

UCA Compressive Strength #1

No	Time (min)	Temp (°F)	Pressure (psi)	Conditioning	Static
1	0	80	0	Yes	No
2	30	109	0	Yes	No
3	60	109	0	Yes	No
4	0	80	800	No	Yes
5	27	105	800	No	Yes
6	213	135	800	No	Yes
7	4080	135	800	No	Yes

Free Fluid #1

No	Time (min)	Temp (°F)	Pressure (psi)	Conditioning	Static
1	30	109	0	Yes	No