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FracCAT Treatment Report

Well : MIP UNIT5H
Field : UNDESIGNAT
Formation : Marcellus

Well Location : Westover
County : Monongalia
State : West Virginia
Country : United States

Prepared for
Client : NORTHEAST NATURAL ENERGY LLC
Client Rep : Mr. Max Oliver
Proposal No : 1
Date Prepared : 11-1-2015

Prepared by
Name : Robert Boner
Division : Schlumberger
Phone :
Service Point : Weston
Fax Number :

Comments : Stage 15

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Country: United States
Loadcase: Stage 15

Section 1: Stage 15, Propped Frac: Designed Pump Sched. - Ramp

Designed Pump Schedule Ramp

Step #	Step Name	Slurry Volume (bbl)	Pump Rate (bbl/min)	Pump Time (min)	Fluid Name	Fluid Volume (gal)	Prop Name	Prop Conc (PPA)	Prop Mass (lb)
1	Rate	20.0	30.0	0.7	Slickwater	840		0.0	0
2	Acid 7.5% HC	36.0	15.0	2.4	HCl 07.5	1512		0.0	0
3	spacer	60.0	15.0	4.0	Slickwater	2520		0.0	0
4	Acid 7.5% HC	36.0	15.0	2.4	HCl 07.5	1512		0.0	0
5	PAD	595.0	80.0	7.4	Slickwater	24990		0.0	0
6	0.25 PPA	288.2	80.0	3.6	Slickwater	11970	100 Mesh Sand	0.2	2992
7	0.5 PPA	306.8	80.0	3.8	Slickwater	12600	100 Mesh Sand	0.5	6300
8	0.75 PPA	413.6	80.0	5.2	Slickwater	16800	100 Mesh Sand	0.7	12600
9	1.00 PPA	522.7	80.0	6.5	Slickwater	21000	100 Mesh Sand	1.0	21000
10	1.50 PPA	814.9	80.0	10.2	Slickwater	32046	100 Mesh Sand	1.5	48069
11	2.00 PPA	635.9	80.0	7.9	Slickwater	24486	100 Mesh Sand	2.0	48972
12	0.50 PPA	511.4	80.0	6.4	Slickwater	21000	40/70 White	0.5	10500
13	0.75 PPA	413.7	80.0	5.2	Slickwater	16800	40/70 White	0.8	12600
14	1.00 PPA	418.2	80.0	5.2	Slickwater	16800	40/70 White	1.0	16800
15	1.50 PPA	747.8	80.0	9.3	Slickwater	29400	40/70 White	1.5	44100
16	2.00 PPA	1091.1	80.0	13.6	Slickwater	42000	40/70 White	2.0	84000
17	2.5 PPA	557.0	80.0	7.0	Slickwater	21000	40/70 White	2.5	52500
18	3.0 PPA	341.0	80.0	4.3	Slickwater	12600	40/70 White	3.0	37800
19	Flush	256.0	80.0	3.2	Slickwater	10752		0.0	0

Designed Ramp Totals

Slurry (bbl)	Pump Time (min)	Clean Fluid (gal)	Proppant (lb)
8065.4	108.4	320628	398233

Section 2: Stage 15, Propped Frac: As Measured Pump Schedule

As Measured Pump Schedule

Step #	Step Name	Slurry Volume (bbl)	Slurry Rate (bbl/min)	Pump Time (min)	Fluid Name	Fluid Volume (gal)	Proppant Name	Max Prop Conc (PPA)	Prop Conc (PPA)	Prop Mass (lb)
1	Rate	11.8	13.1	1.2	Slickwater	485		0.0	0.0	0
2	Acid 7.5% HC	31.5	15.0	2.1	HCl 07.5	1500		0.0	0.0	0
3	spacer	60.0	15.1	4.0	Slickwater	2520		0.0	0.0	0
4	Acid 7.5% HC	30.6	15.1	2.0	HCl 07.5	1500		0.0	0.0	0
5	PAD	595.0	61.5	14.8	Slickwater	24941		0.0	0.0	0
6	0.25 PPA	288.2	87.7	3.3	Slickwater	11975	100 Mesh Sand	0.4	0.2	2836
7	0.5 PPA	306.8	88.0	3.5	Slickwater	12603	100 Mesh Sand	0.5	0.3	6210

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As Measured Pump Schedule

Step #	Step Name	Slurry Volume (bbl)	Slurry Rate (bbl/min)	Pump Time (min)	Fluid Name	Fluid Volume (gal)	Proppant Name	Max Prop Conc (PPA)	Prop Conc (PPA)	Prop Mass (lb)
8	0.75 PPA	413.6	88.0	4.7	Slickwater	16805	100 Mesh Sand	0.7	0.6	12481
9	1.00 PPA	522.7	88.0	5.9	Slickwater	21004	100 Mesh Sand	1.0	0.5	20888
10	1.50 PPA	814.9	89.6	9.2	Slickwater	32050	100 Mesh Sand	1.5	0.2	47938
11	2.00 PPA	645.4	89.6	7.2	Slickwater	24858	100 Mesh Sand	2.0	0.0	49558
12	0.50 PPA	511.4	91.0	5.6	Slickwater	20975	40/70 White	2.0	0.4	11042
13	0.75 PPA	413.7	95.2	4.3	Slickwater	16806	40/70 White	0.7	0.0	12463
14	1.00 PPA	418.2	95.2	4.4	Slickwater	16804	40/70 White	1.0	0.4	16691
15	1.50 PPA	747.8	95.2	7.9	Slickwater	29405	40/70 White	1.5	0.2	43964
16	2.00 PPA	1091.1	95.2	11.5	Slickwater	42005	40/70 White	2.0	0.7	83862
17	2.5 PPA	557.0	95.2	5.9	Slickwater	21013	40/70 White	2.5	0.7	52183
18	3.0 PPA	392.4	95.2	4.1	Slickwater	14740	40/70 White	3.0	0.0	38320
19	Flush	253.6	94.3	2.8	Slickwater	10720		0.0	0.0	0

Stage Pressures & Rates

Step #	Step Name	Average Slurry Rate (bbl/min)	Maximum Slurry Rate (bbl/min)	Average Treating Pressure (psi)	Maximum Treating Pressure (psi)	Minimum Treating Pressure (psi)
1	Rate	13.1	15.0	5112	5650	3796
2	Acid 7.5% HC	15.0	15.0	5972	6114	5650
3	spacer	15.1	15.1	6177	6226	6067
4	Acid 7.5% HC	15.1	15.1	6058	6089	6031
5	PAD	61.5	84.9	8107	9171	5941
6	0.25 PPA	87.7	88.1	8750	8774	8630
7	0.5 PPA	88.0	88.1	8700	8796	8618
8	0.75 PPA	88.0	88.1	8576	8626	8543
9	1.00 PPA	88.0	88.1	8525	8556	8503
10	1.50 PPA	89.6	89.7	8591	8600	8444
11	2.00 PPA	89.6	89.7	8577	8607	8549
12	0.50 PPA	91.0	95.2	8616	8781	8415
13	0.75 PPA	95.2	95.3	8759	8786	8731
14	1.00 PPA	95.2	95.3	8717	8734	8693
15	1.50 PPA	95.2	95.4	8683	8732	8646
16	2.00 PPA	95.2	95.3	8635	8662	8600
17	2.5 PPA	95.2	95.4	8644	8719	8581
18	3.0 PPA	95.2	95.3	8623	8723	8512
19	Flush	94.3	95.3	8668	8883	5525

As Measured Totals

Slurry (bbl)	Pump Time (min)	Clean Fluid (gal)	Proppant (lb)
8105.8	104.2	322316	403160

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Average Treating Pressure:	8648 psi
Maximum Treating Pressure:	9171 psi
Minimum Treating Pressure:	3796 psi
Average Injection Rate:	93.7 bbl/min
Maximum Injection Rate:	95.4 bbl/min
Average Horsepower:	19867.1 hhp
Maximum Horsepower:	20727.2 hhp
Maximum Prop Concentration:	3.0 PPA
Open Psi	3799psi
Breakdown	6453psi
Breakdown Rate	15.1bbl/min
Breakdown Vol.	244bbl
ISIP	5403psi
FG	1.16
5min	4770psi
10min	4603psi
15min	4496psi

Section 3: Stage 15, Propped Frac: Material Balance

Material Balance	
Material Name	**Quantity Pumped**
Slickwater	319709 gal
HCl 07.5	2607 gal
100 Mesh Sand	140060lb
40/70 White	263100 lb
B385	105 gal
B317, Scale	30 gal
J609, Water Friction-Reducing Agent	220 gal
A264, Corros	3gal
L058, Iron C	15 lb

Section 4: Stage 15, Propped Frac: Job Messages

Message Log							
#	**Time**	**Message**	**Treating Pressure** (psi)	**Annulus Pressure** (psi)	**Total Slurry** (bbl)	**Slurry Rate** (bbl/min)	**Prop. Conc.** (PPA)
1		Reset Executed Steps	0	0	0.0	0.0	0.0
2		Reset Executed Steps	0	0	0.0	0.0	0.0
3	14:59:07	Remark	2949	8	0.0	0.0	0.0
4	14:59:30	Remark	2902	7	0.0	0.0	0.0
5	14:59:36	Remark	2127	7	0.0	0.0	0.0
6	15:01:13	Remark	9523	8	0.0	0.0	0.0
7	15:04:13	Remark	9427	8	0.0	0.0	0.0
8	15:16:27	Start Rate Automatically	3797	9	0.0	0.0	0.0
9	15:16:27	Start Propped Frac Automatically	3797	9	0.0	0.0	0.0
10	15:16:27	Start Stage 15 Automatically	3797	9	0.0	0.0	0.0
11	15:16:27	Started Pumping	3797	9	0.0	0.0	0.0
12	15:17:45	Start Acid 7.5% HC Manually	5690	8	11.8	15.0	0.0
13	15:19:29	Activated Extend Stage	6083	8	37.8	15.0	0.0
14	15:19:51	Deactivated Extend Stage	6117	9	43.3	15.0	0.0

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Message Log

#	Time	Message	Treating Pressure (psi)	Annulus Pressure (psi)	Total Slurry (bbl)	Slurry Rate (bbl/min)	Prop. Conc. (PPA)
15	15:19:51	Start spacer Manually	6117	9	43.3	15.0	0.0
16	15:23:50	Start Acid 7.5% HC Automatically	6088	8	103.4	15.1	0.0
17	15:25:51	Start PAD Manually	6027	9	133.9	15.1	0.0
18	15:34:40	Stage at Perfs: Rate	7767	9	284.1	41.1	0.0
19	15:34:57	Stage at Perfs: Acid 7.5% HC	7815	8	295.7	41.1	0.0
20	15:35:34	Stage at Perfs: spacer	8284	9	327.3	62.3	0.0
21	15:36:24	Stage at Perfs: Acid 7.5% HC	8797	9	387.8	78.1	0.0
22	15:36:47	Stage at Perfs: PAD	8732	9	418.0	79.1	0.0
23	15:40:40	Start 0.25 PPA Automatically	8663	9	730.1	84.8	0.0
24	15:40:40	Started Pumping Prop	8663	9	730.1	84.8	0.0
25	15:43:54	Stage at Perfs: 0.25 PPA	8767	8	1013.9	88.1	0.3
26	15:43:57	Start 0.5 PPA Automatically	8771	8	1018.3	88.2	0.3
27	15:47:11	Stage at Perfs: 0.5 PPA	8628	9	1302.9	87.9	0.5
28	15:47:26	Start 0.75 PPA Automatically	8612	9	1324.9	88.1	0.5
29	15:50:40	Stage at Perfs: 0.75 PPA	8549	8	1609.6	88.2	0.7
30	15:52:08	Start 1.00 PPA Automatically	8558	8	1738.7	88.1	0.7
31	15:55:22	Stage at Perfs: 1.00 PPA	8509	9	2023.3	88.1	1.0
32	15:58:04	Start 1.50 PPA Automatically	8516	7	2261.0	88.0	1.0
33	16:01:18	Stage at Perfs: 1.50 PPA	8438	7	2545.6	87.9	1.5
34	16:07:13	Start 2.00 PPA Automatically	8576	7	3075.4	89.5	1.5
35	16:07:19	Activated Extend Stage	8579	7	3084.4	89.7	2.0
36	16:10:23	Stage at Perfs: 2.00 PPA	8568	7	3359.2	89.7	2.0
37	16:14:25	Deactivated Extend Stage	8542	7	3720.6	89.5	2.0
38	16:14:25	Start 0.50 PPA Manually	8542	7	3720.6	89.5	2.0
39	16:17:35	Stage at Perfs: 0.50 PPA	8585	7	4004.5	89.7	0.5
40	16:20:03	Start 0.75 PPA Automatically	8775	7	4233.2	95.3	0.5
41	16:23:02	Stage at Perfs: 0.75 PPA	8747	7	4517.2	95.4	0.7
42	16:24:23	Start 1.00 PPA Automatically	8731	7	4645.8	95.1	0.7
43	16:27:22	Stage at Perfs: 1.00 PPA	8707	9	4929.8	95.1	1.0
44	16:28:47	Start 1.50 PPA Automatically	8722	7	5064.6	95.2	1.0
45	16:31:46	Stage at Perfs: 1.50 PPA	8665	7	5348.7	95.1	1.5
46	16:36:38	Start 2.00 PPA Automatically	8646	7	5811.9	95.3	1.5
47	16:39:37	Stage at Perfs: 2.00 PPA	8613	6	6095.8	95.0	2.0
48	16:48:06	Start 2.5 PPA Automatically	8616	7	6903.4	94.9	2.0
49	16:51:05	Stage at Perfs: 2.5 PPA	8634	7	7187.4	95.3	2.5
50	16:53:57	Start 3.0 PPA Automatically	8710	8	7460.3	95.0	2.5
51	16:54:16	Activated Extend Stage	8729	8	7490.4	95.3	3.0
52	16:56:56	Stage at Perfs: 3.0 PPA	8578	7	7744.3	95.1	3.0
53	16:57:29	Cut Prop	8558	7	7796.7	95.3	3.0
54	16:58:04	Deactivated Extend Stage	8531	7	7852.2	95.2	0.0
55	16:58:04	Start Flush Manually	8531	7	7852.2	95.2	0.0
56	16:58:07	Activated Extend Stage	8555	7	7856.9	95.1	0.0
57	17:00:53	Stopped Pumping Prop	5741	8	8105.8	0.0	0.0
58	17:00:53	Stopped Pumping	5741	8	8105.8	0.0	0.0

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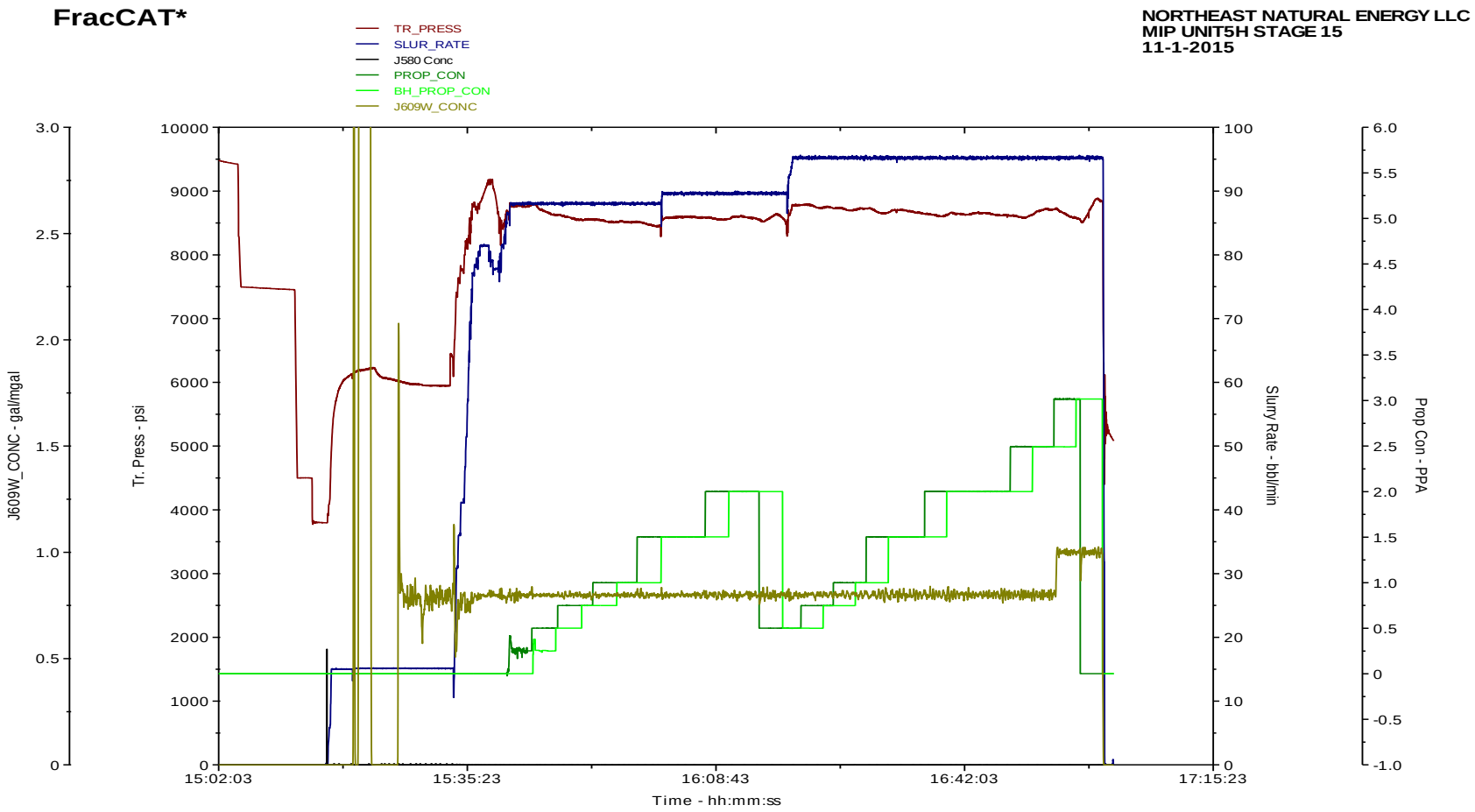
Section 5: NNE 5H Stage 15 Post Job Plot



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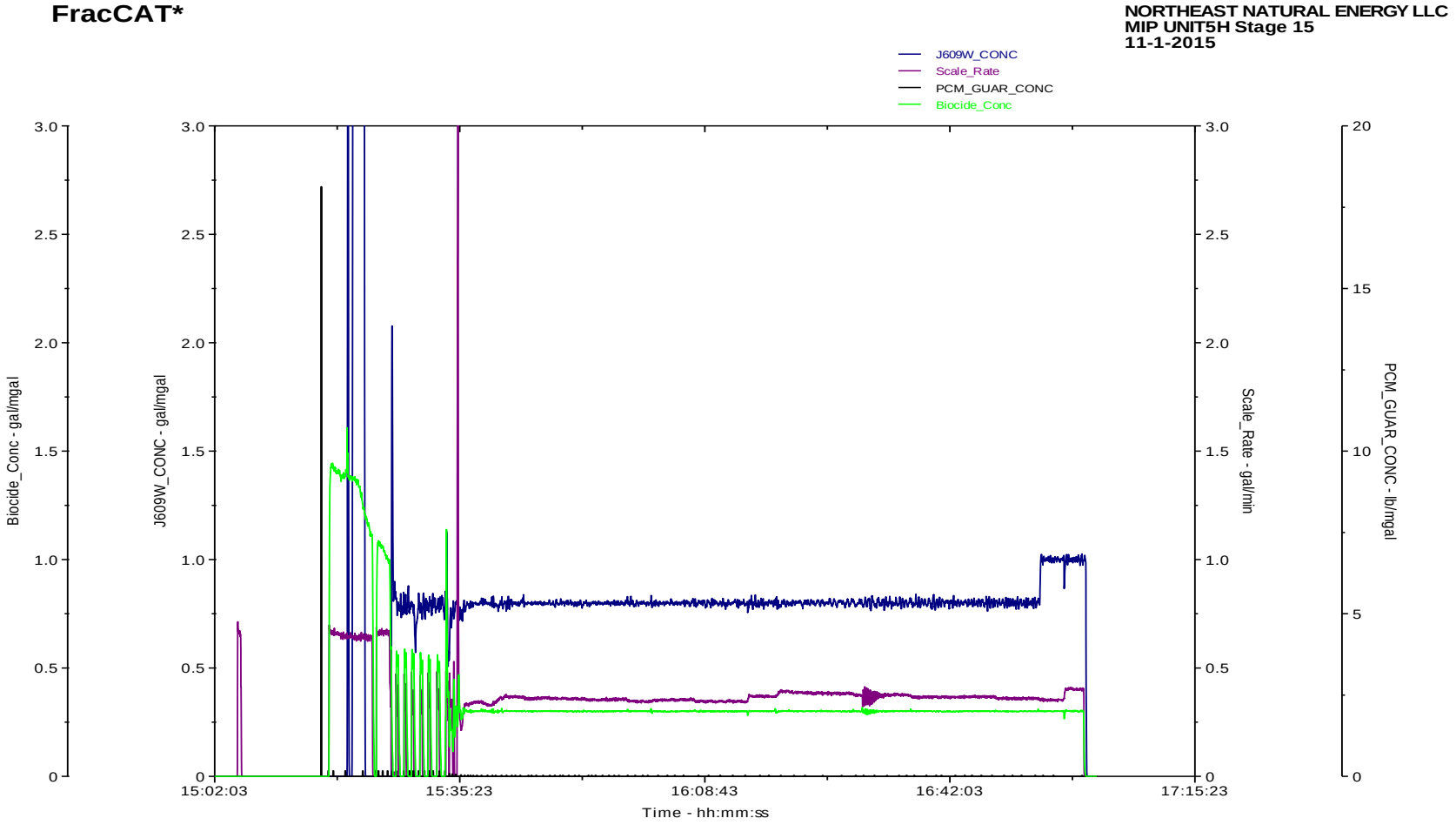
Section 6: NNE 5H Stage 15 Additive Plot



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