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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 : Mike Inman
Proposal No : 1
Date Prepared : 10-31-15

Prepared by
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Division : Schlumberger
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Service Point : Weston
Fax Number :

Comments : Stage 12

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Client: NORTHEAST NATURAL ENERGY LLC
Well: MIP UNIT5H
Formation: Marcellus
District: Weston
Country: United States
Loadcase: Stage 12

Section 1: Stage 12, 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	1.5 PPA	814.9	80.0	10.2	Slickwater	32046	100 Mesh Sand	1.5	48069
11	2.0 PPA	637.0	80.0	8.0	Slickwater	24528	100 Mesh Sand	2.0	49056
12	.5 PPA	511.4	80.0	6.4	Slickwater	21000	40/70 White	0.5	10500
13	.75 PPA	413.7	80.0	5.2	Slickwater	16800	40/70 White	0.8	12600
14	1.0 PPA	418.2	80.0	5.2	Slickwater	16800	40/70 White	1.0	16800
15	1.5 PPA	747.8	80.0	9.3	Slickwater	29400	40/70 White	1.5	44100
16	2.0 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	274.0	80.0	3.4	Slickwater	11508		0.0	0

Designed Ramp Totals			
Slurry (bbl)	Pump Time (min)	Clean Fluid (gal)	Proppant (lb)
8084.5	108.6	321426	398317

Section 2: Stage 12, 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	20.0	14.1	1.6	Slickwater	829		0.0	0.0	0
2	Acid 7.5% HC	36.0	15.1	2.4	HCl 07.5	1512		0.0	0.0	0
3	spacer	60.0	15.2	4.0	Slickwater	2520		0.0	0.0	0
4	Acid 7.5% HC	36.0	15.1	2.4	HCl 07.5	1512		0.0	0.0	0
5	PAD	595.0	53.0	13.8	Slickwater	24949		0.0	0.0	0

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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)
6	0.25 PPA	288.2	85.8	3.4	Slickwater	11960	100 Mesh Sand	0.3	0.2	2918
7	0.5 PPA	306.8	91.3	3.4	Slickwater	12603	100 Mesh Sand	0.5	0.1	6212
8	0.75 PPA	413.6	91.3	4.5	Slickwater	16803	100 Mesh Sand	0.8	0.2	12507
9	1.00 PPA	522.7	91.3	5.7	Slickwater	21004	100 Mesh Sand	1.0	0.7	20908
10	1.5 PPA	814.9	91.3	8.9	Slickwater	32051	100 Mesh Sand	1.5	0.0	47925
11	2.0 PPA	801.5	91.2	8.8	Slickwater	30869	100 Mesh Sand	2.0	0.0	61572
12	.5 PPA	511.4	91.3	5.6	Slickwater	20977	40/70 White	2.0	0.5	11084
13	.75 PPA	413.7	91.3	4.5	Slickwater	16802	40/70 White	0.8	0.7	12543
14	1.0 PPA	418.2	91.3	4.6	Slickwater	16802	40/70 White	1.0	0.0	16742
15	1.5 PPA	747.8	91.3	8.2	Slickwater	29405	40/70 White	1.5	0.6	43975
16	2.0 PPA	1091.1	90.6	12.0	Slickwater	42009	40/70 White	2.0	0.9	83816
17	2.5 PPA	950.7	88.3	10.8	Slickwater	35850	40/70 White	2.5	0.0	89508
18	3.0 PPA	77.8	86.6	0.9	Slickwater	3002	40/70 White	3.0	0.0	6030
19	Flush	260.7	70.9	6.9	Slickwater	11010		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	14.1	15.2	5978	6409	3887
2	Acid 7.5% HC	15.1	15.2	6370	6420	6267
3	spacer	15.2	15.2	6053	6261	5981
4	Acid 7.5% HC	15.1	15.2	5977	5985	5969
5	PAD	53.0	71.3	8351	9213	5980
6	0.25 PPA	85.8	91.3	8849	9079	8636
7	0.5 PPA	91.3	91.4	8942	9088	8871
8	0.75 PPA	91.3	91.4	8838	8883	8812
9	1.00 PPA	91.3	91.4	8776	8818	8749
10	1.5 PPA	91.3	91.4	8776	8819	8740
11	2.0 PPA	91.2	91.4	8827	8876	8773
12	.5 PPA	91.3	91.4	8869	8969	8794
13	.75 PPA	91.3	91.4	8768	8795	8751
14	1.0 PPA	91.3	91.4	8754	8770	8737
15	1.5 PPA	91.3	91.4	8797	8847	8741
16	2.0 PPA	90.6	91.4	8822	9037	8687
17	2.5 PPA	88.3	88.8	8878	9028	8730
18	3.0 PPA	86.6	86.8	9051	9088	9028
19	Flush	70.9	85.8	8985	9285	7163

As Measured Totals

Slurry (bbl)	Pump Time (min)	Clean Fluid (gal)	Proppant (lb)
8366.3	112.4	332469	403380

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Loadcase: Stage 12

Average Treating Pressure:	8747 psi
Maximum Treating Pressure:	9285 psi
Minimum Treating Pressure:	3887 psi
Average Injection Rate:	85.9 bbl/min
Maximum Injection Rate:	91.4 bbl/min
Average Horsepower:	18549.8 hhp
Maximum Horsepower:	20324.4 hhp
Maximum Prop Concentration:	3.0 PPA
Open psi	3890
Ball vol	268 bbl
Break psi	6253
Break rate	15bpm

Section 3: Stage 12, 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	23:23:33	Remark	9702	6	0.0	0.7	0.0
4	23:26:39	Remark	9535	5	0.0	0.0	0.0
5	23:31:44	Start Rate Automatically	3887	6	0.0	0.0	0.0
6	23:31:44	Start Propped Frac Automatically	3887	6	0.0	0.0	0.0
7	23:31:44	Start Stage 12 Automatically	3887	6	0.0	0.0	0.0
8	23:31:44	Started Pumping	3887	6	0.0	0.0	0.0
9	23:33:29	Start Acid 7.5% HC Automatically	6422	5	20.1	15.2	0.0
10	23:35:52	Start spacer Automatically	6261	5	56.2	15.2	0.0
11	23:39:49	Start Acid 7.5% HC Automatically	5983	5	116.1	15.1	0.0
12	23:42:12	Start PAD Automatically	5978	5	152.2	15.2	0.0
13	23:48:45	Stage at Perfs: Rate	8473	5	297.3	41.0	0.0
14	23:49:12	Stage at Perfs: Acid 7.5% HC	9014	5	317.1	48.1	0.0
15	23:49:57	Stage at Perfs: spacer	8214	4	353.4	48.3	0.0
16	23:51:00	Stage at Perfs: Acid 7.5% HC	8858	5	413.4	59.4	0.0
17	23:51:36	Stage at Perfs: PAD	9104	5	450.1	63.5	0.0
18	23:56:02	Start 0.25 PPA Automatically	8747	5	747.9	74.2	0.0
19	23:56:02	Started Pumping Prop	8747	5	747.9	74.2	0.0
20	23:59:24	Start 0.5 PPA Automatically	9070	5	1036.6	91.4	0.3
21	23:59:30	Stage at Perfs: 0.25 PPA	9086	5	1045.8	91.5	0.5
22	0:02:40	Stage at Perfs: 0.5 PPA	8879	5	1334.8	91.3	0.5
23	0:02:45	Start 0.75 PPA Automatically	8874	5	1342.4	91.5	0.5
24	0:06:01	Stage at Perfs: 0.75 PPA	8825	5	1640.5	91.3	0.7
25	0:07:17	Start 1.00 PPA Automatically	8811	5	1756.1	91.4	0.7
26	0:10:33	Stage at Perfs: 1.00 PPA	8770	4	2054.3	91.1	1.0
27	0:13:01	Start 1.5 PPA Automatically	8778	4	2279.5	91.1	1.0
28	0:16:17	Stage at Perfs: 1.5 PPA	8781	5	2577.6	91.3	1.5
29	0:21:56	Start 2.0 PPA Automatically	8777	5	3093.3	91.1	1.5
30	0:22:00	Activated Extend Stage	8790	5	3099.4	91.2	1.7
31	0:25:12	Stage at Perfs: 2.0 PPA	8818	6	3391.4	91.4	2.0
32	0:30:43	Deactivated Extend Stage	8880	6	3894.9	91.1	2.0
33	0:30:43	Start .5 PPA Manually	8880	6	3894.9	91.1	2.0
34	0:33:59	Stage at Perfs: .5 PPA	8897	5	4193.0	91.4	0.5

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Message Log							
#	Time	Message	Treating Pressure (psi)	Annulus Pressure (psi)	Total Slurry (bbl)	Slurry Rate (bbl/min)	Prop. Conc. (PPA)
35	0:36:20	Start .75 PPA Automatically	8790	5	4407.6	91.3	0.5
36	0:39:36	Stage at Perfs: .75 PPA	8761	5	4705.7	91.4	0.8
37	0:40:52	Start 1.0 PPA Automatically	8756	5	4821.3	91.2	0.8
38	0:44:08	Stage at Perfs: 1.0 PPA	8741	5	5119.5	91.3	1.0
39	0:45:26	Start 1.5 PPA Automatically	8752	5	5238.1	91.3	1.0
40	0:48:42	Stage at Perfs: 1.5 PPA	8772	5	5536.3	91.2	1.5
41	0:53:38	Start 2.0 PPA Automatically	8818	5	5986.5	91.3	1.5
42	0:53:44	Activated Extend Stage	8826	5	5995.7	91.5	2.0
43	0:56:54	Stage at Perfs: 2.0 PPA	8700	4	6284.7	91.3	2.0
44	1:05:16	Deactivated Extend Stage	8799	3	7040.8	88.7	2.0
45	1:05:41	Start 2.5 PPA Automatically	8788	5	7077.7	88.7	2.0
46	1:05:46	Activated Extend Stage	8798	4	7085.1	88.6	2.5
47	1:09:02	Stage at Perfs: 2.5 PPA	8806	4	7374.9	88.7	2.5
48	1:16:27	Deactivated Extend Stage	9042	4	8027.8	86.6	2.5
49	1:16:27	Start 3.0 PPA Manually	9042	4	8027.8	86.6	2.5
50	1:17:00	Cut Prop	9046	4	8075.5	86.4	3.0
51	1:17:21	Start Flush Manually	9116	4	8105.6	85.7	0.0
52	1:17:23	Stopped Pumping Prop	9113	5	8108.5	85.7	0.0
53	1:20:09	Stage at Perfs: 3.0 PPA	8283	3	8324.8	56.4	0.0

Section 4: Stage 12, Propped Frac: Material Balance

Material Balance	
Material Name	Quantity Pumped
Slickwater	329445 gal
HCl 07.5	3000 gal
100 Mesh Sand	145260 lb
40/70 White	258120 lb
B385	90 gal
B317, Scale	35 gal
J609, Water Friction-Reducing Agent	220 gal
A264, Corros	3 gal
L058, Iron C	15 lb

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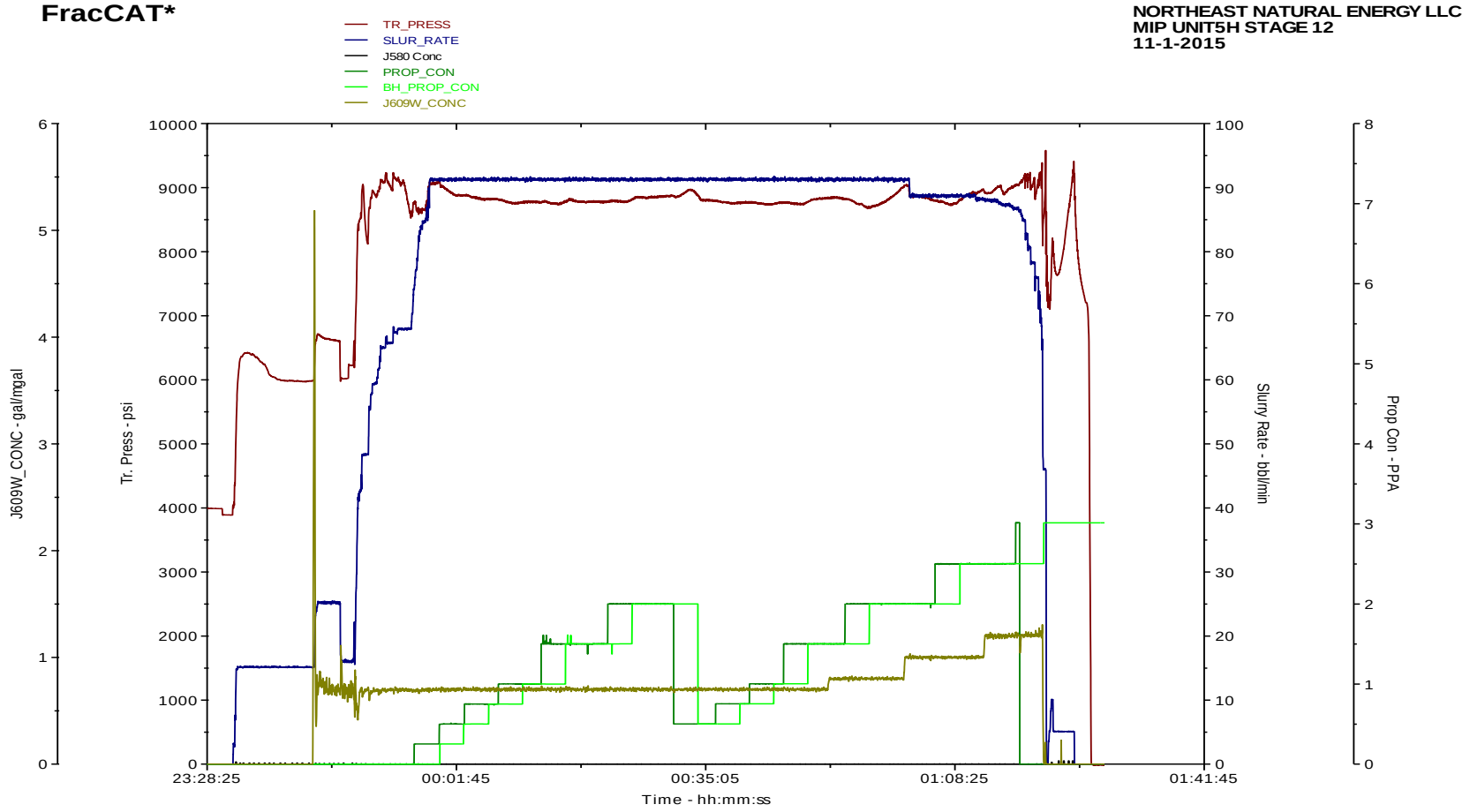
Section 5: Stage 12, Propped Frac: Post Job PRC Monitoring Panel



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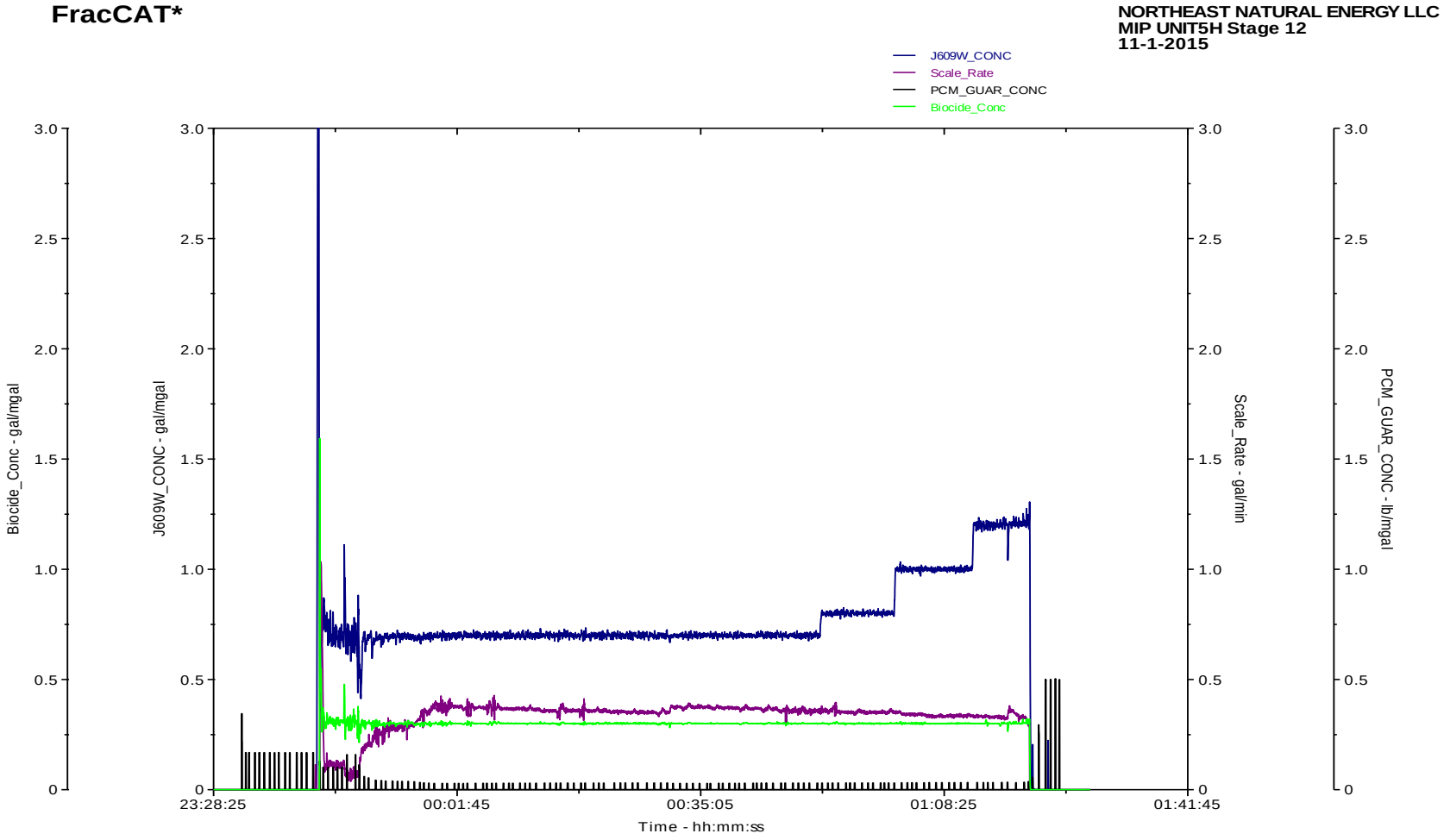
Section 6: Stage 12, Propped Frac: Post Job Chem Plot



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