

Sequence V Surveillance Panel Meeting November 23rd, 2022 11 AM EST, via Webex

Roll Call:

Afton: B. Maddock, A. Stone
 General Motors: K. Zreik
 Haltermann: E. Hennessy, W. Hairston
 Infineum: T. Dvorak, C. Laufer, A. Ritchie (Chair)
 Intertek: J. Franklin, A. Lopez
 Lubrizol: T. Catanese, G. Szappanos
 OHT: J. Bowden
 Oronite: R. Affinito, J. Martinez, R. Stockwell
 PSL Services: C. Taylor
 Shell: J. Hsu
 SwRI: D. Engstrom, T. Kostan, M. Lochte
 TEI: D. Lanctot
 TMC: R. Grundza
 Valvoline: A. Savant

Meeting Summary:

After review of the data to date (two 931s and one 1011-1), options for Row 2 were discussed. The group agreed (via motion) to the following updated matrix composition:

Row	SwRI1	SwRI2	IAR1	IAR2	Afton
1	931	1011-1	931	1011-1	1011-1
2	1011-1	940	940	931	931
3	Tbd	tbd	tbd	tbd	tbd

Meeting Details:

The Chair announced that Todd Dvorak (Infineum) will be representing Infineum. Doyle Boese (Infineum) has retired will no longer be representing Infineum externally and we thank him hugely for his contributions and wish him well for his next endeavors.

The group met to review the 3 test results that have been reported (shaded green in summary table below) and finalize the composition of row 2 (shaded blue). 2 tests are still in progress (shaded yellow).

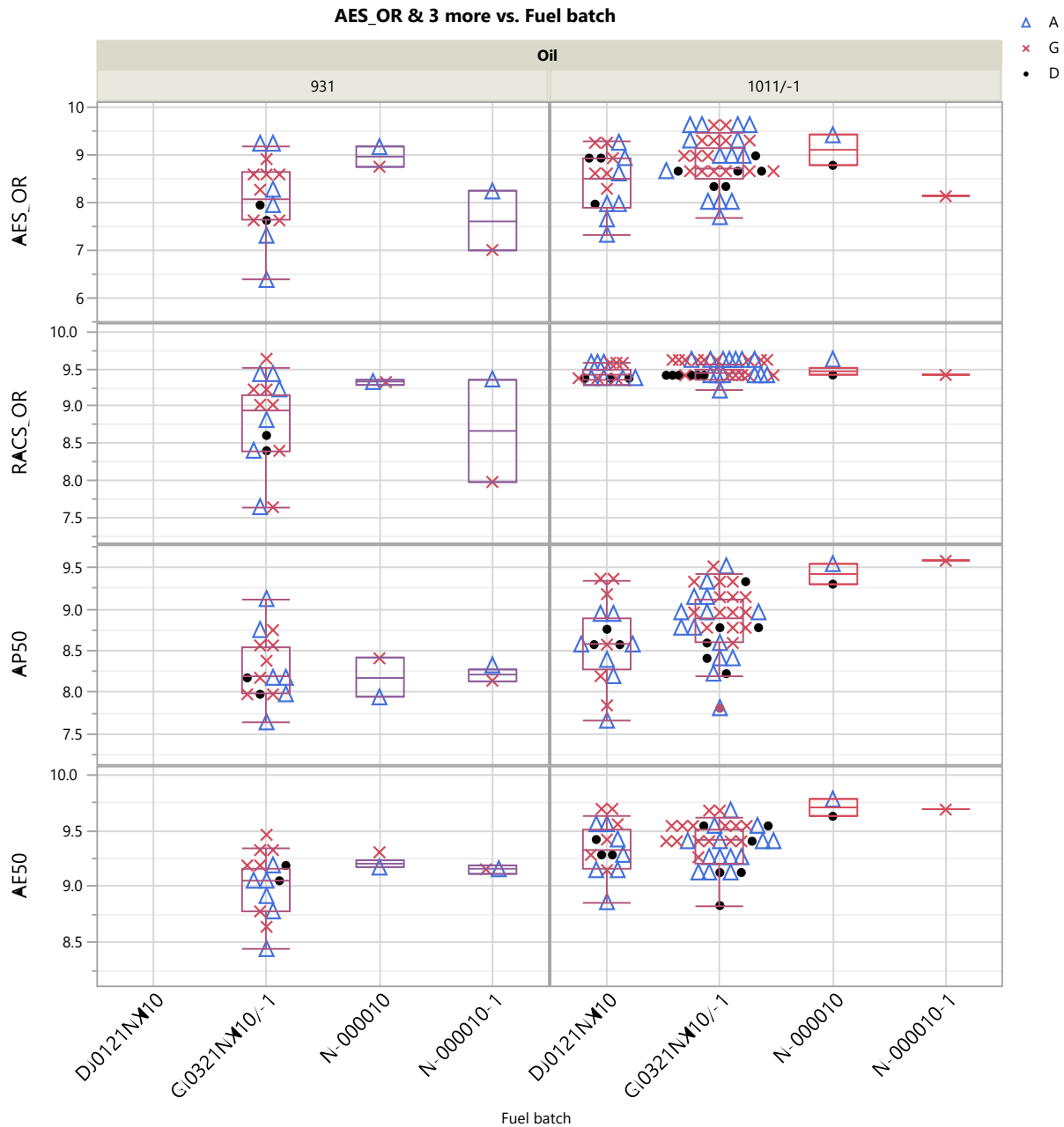
Row	SwRI1	SwRI2	IAR1	IAR2	Afton
1	931	1011-1	931	1011-1	1011-1
2					
3					

Caroline Laufer (Infineum) summarized the results to date in the attached plot. It shows 931, 1011, and 1011-1 data points with validity codes: AC, AF, AO, OC, and PF. Key takeaways on the assessment of the new fuel batch, N-000010-1:

- Compared to the performance with the rejected fuel batch N-000010, AES appears to have shifted down with the new fuel batch N-000010-1 for both 931 and 1011-1. This

was anticipated based on the adjustments that Haltermann made (see page 2 of [Nov 7th minutes](#))

- Compared to N-000010, RO 931 shifted down for RAC with the new fuel batch but note there are only 2 data points so far, one of which was quite low. RO 1011-1 did not show significant difference compared to all 3 fuel batches preceding it. RAC performance level for 1011-1 appears to have hit a ceiling at around 9.5 merits.
- For 931, both AP50 and AE50 performance levels were very similar to N-000010. For 1011-1, both AP50 and AE50 performance levels were similar or better for the latest N-000010-1 batch. Caroline highlighted that if DJ represents the ideal batch, it appears that performance of 1011/1011-1 has only grown milder and milder with each fuel batch since DJ batch.



The Chair shared his thoughts that the latest batch of fuel (N-000010-1) appears more severe than the previous batch (N-000010) that the SP rejected. The latest batch shows signs of being more severe than the GI batch. He agreed that the varnish does not show much difference compared to the previous, rejected batch. The Chair collected the viewpoints of the panel:

- Rich Grundza (TMC) agreed that the latest batch is closer to the DJ batch for sludge. It was encouraging to see RAC move on 931 compared to the previous batch N-000010. Jo Martinez (Oronite) noted that for RAC, one lab appears unchanged.
- Al Lopez (Intertek) said that the newest fuel batch appears to be more severe as expected but we need more data. Varnish was mild on 1011-1, but within bands of having acceptable results. The group should determine how we want to observe 940, expecting it to be much dirtier than 7 AES merits, or whether if it's more important to observe 931. He commented that 940 is just as important to see separation from 931 to make a good correction for all 3 oils.
- Dan Engstrom (SwRI) agreed with all the comments so far. He is curious to see the 1011-1 result come in and doesn't see any issues to move forward. He noted we need to generate more 931 data to see if it will tend to be more severe or more on target.
- Amol Savant (Valvoline) observed that we didn't have 931 data on the DJ batch and asked about the test stands*.
- Ben Maddock (Afton) agreed it was good to see more sludge but concerning to see varnish on the mild side.

The Chair summarized that the group needs to decide on the composition of row 2, and the overall matrix design: 5 tests, v5 tests 5 tests, 336, or 456 combinations. At the face-to-face meeting in San Antonio on Nov 16th, the group proposed the following and agreed to discuss it further once the first set of results are reviewed:

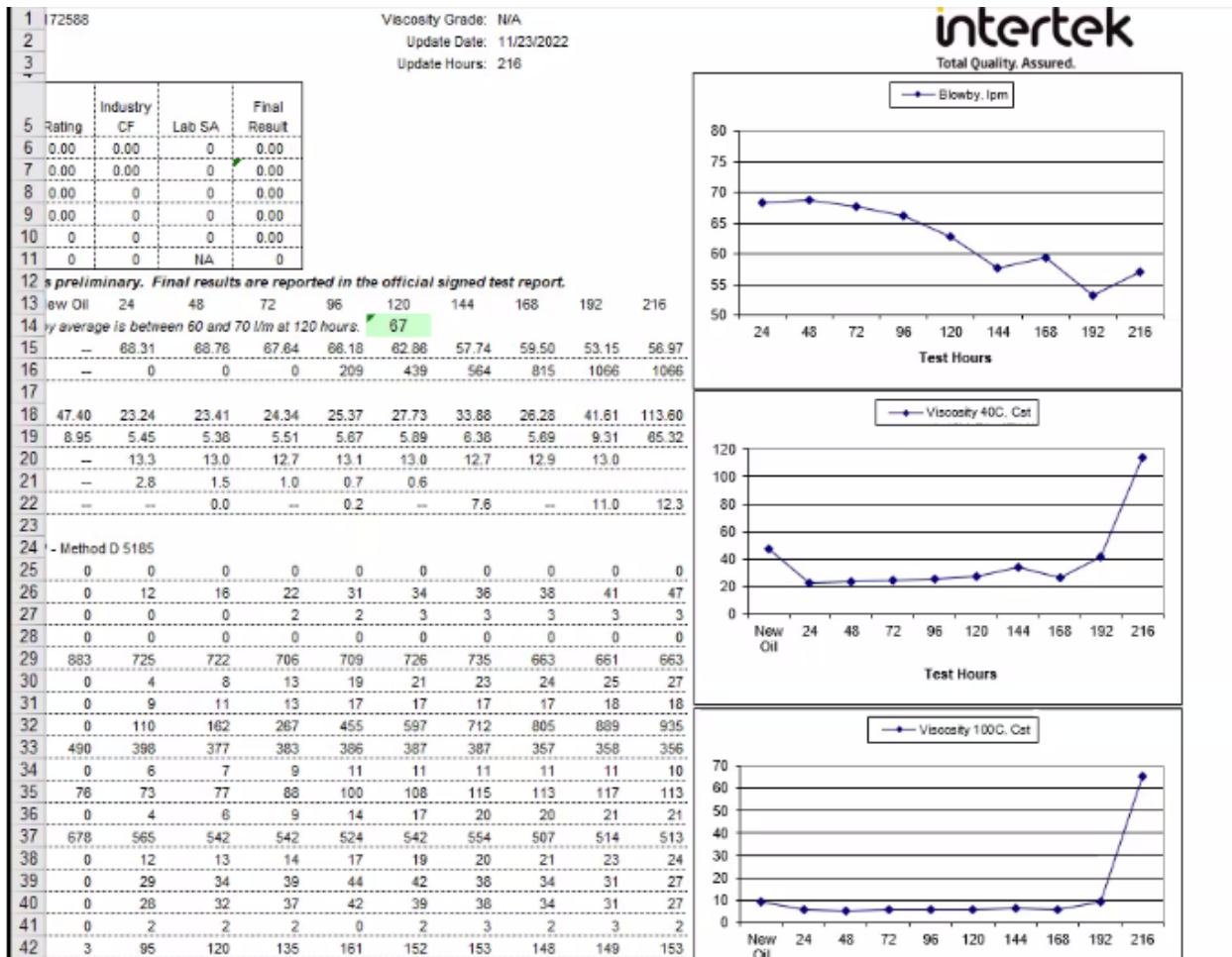
Row	SwRI1	SwRI2	IAR1	IAR2	Afton
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3	tbd	tbd	tbd	Tbd	tbd

- Travis Kostan (SwRI) is still good with row 2 as discussed the previous week. He noted that all 3 options can still be on the table after the completion of row 2.
- Jo Martinez (Oronite) is good with row 2 as shown.
- Al Lopez (Intertek) agreed with two 940s but expressed concern about the separation between 931 and 940. He therefore proposed the following where 940 becomes SwRI's first row 2 test and 931 is their 2nd test:

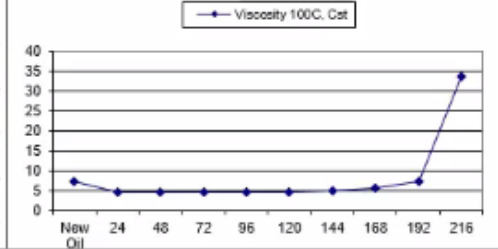
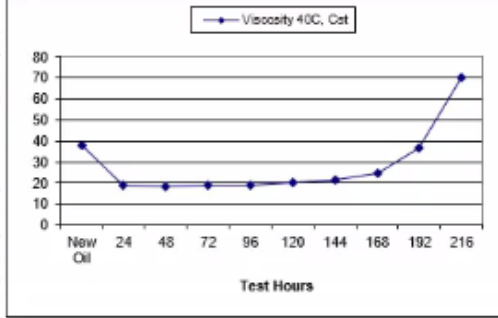
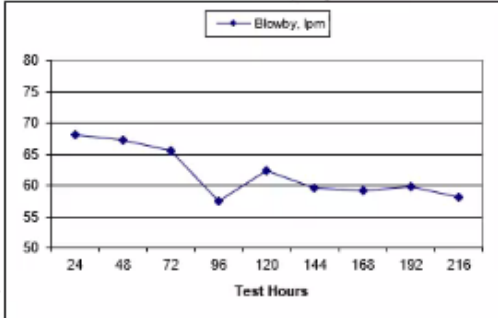
Row	SwRI1	SwRI2	IAR1	IAR2	Afton
1	931	1011-1	931	1011-1	1011-1
2	940	931	940	931	931
3	tbd	Tbd	tbd	tbd	tbd

- *Rich Grundza (TMC) noted the above would address Amol's comment about running 940 on the stand that ran 931.
- Jo Martinez (Oronite) liked the idea of 931 coming out of SwRI because their RAC did not move. She commented on the sequence not being ideal, ie: five 931s would be run by the end of row 2. Amol Savant (Valvoline) asked if 366 would be ok with the statisticians. It was agreed that this would be discussed when the data from row 2 comes in.

- Ricardo Affinito (Oronite) is ok with either table above. However, he expressed concern about the contingency on 1011-1 because we don't know how the data will land yet. We have enough information on 931 and we're proposing to obtain 2 more 931s. Does this propose any risk? An argument for the first option.
- Todd Dvorak (Infineum) agreed with Jo and Travis. He commented that we like to randomize the sequence. He relayed Doyle's concern about having enough data for the "good" and "bad" oils to get a possible correction factor. This would be a push to getting more 940 test results. But there's always trade-offs.
- Rich Grundza (TMC) concurs with the stats group. He understood AI's concern but would like to minimize the potential for surprises.
- Ben Maddock (Afton) reminded the group that the last time we ran 940, two of the results were in the 6s and we'll likely see it go more severe. He stated that he's not concerned about 940 and 931 not separating and therefore, supported the option discussed the previous week.
- AI Lopez (Intertek) was ok to concede. He commented that 940 will be very severe based on his 931 result alone. He shared that there was a huge hook with this new fuel. Chem was unremarkable until the end, flat until the last 48 hours. We'll need to keep an eye on when 940 runs.



1	IR-169622	Viscosity Grade: N/A									
2	27	Update Date: 11/23/2022									
3		Update Hours: 216									
5		Rating	Industry	Lab SA	Final Result						
6		0.00	0.00	0	0.00						
7		0.00	0.00	0	0.00						
8		0.00	0	0	0.00						
9		0.00	0	0	0.00						
10		0	0	0	0.00						
11		0	0	NA	0						
12	to is preliminary. Final results are reported in the official signed test report.										
13	4	New Oil	24	48	72	96	120	144	168	192	216
14	lowby average is between 60 and 70 l/m at 120 hours. 64										
15		--	88.20	67.31	65.62	57.49	62.40	59.64	59.09	59.75	58.19
16		--	0	0	20	250	417	584	814	1002	1002
17											
18		37.70	18.72	18.68	18.71	18.96	19.96	21.23	24.60	36.37	70.40
19		7.36	4.51	4.49	4.49	4.52	4.74	4.99	5.58	7.34	33.76
20		--	13.4	13.0	13.0	12.8	13.2	13.1	13.0	13.2	
21		--	3.5	1.4	0.9	0.5	0.5	0.4			
22		--	--	0.4	--	0.2	--	8.4	--	13.4	13.5
23											
24	ICP - Method D 5185										
25		0	0	0	0	0	0	0	0	0	0
26		0	10	14	19	27	31	36	39	41	44
27		231	140	72	34	26	28	28	31	34	34
28		0	140	0	0	0	0	0	0	0	0
29		2100	1746	1720	1718	1700	1743	1739	1774	1780	1777
30		0	2	5	10	16	19	23	25	27	28
31		0	9	12	15	19	21	23	24	24	25
32		0	77	142	324	657	946	1183	1379	1505	1545
33		8	9	10	13	16	16	16	17	17	16
34		0	3	4	6	9	10	11	11	11	12
35		76	72	78	88	99	107	116	122	128	122
36		0	4	6	11	24	37	45	49	50	49
37		726	597	590	589	557	576	584	593	602	590
38		0	21	26	38	47	57	73	79	82	82
39		0	32	40	48	54	51	49	47	44	40
40		0	30	38	45	56	56	59	62	61	62
41		0	3	4	5	5	6	7	8	9	9
42		2	99	133	149	180	174	188	185	182	182



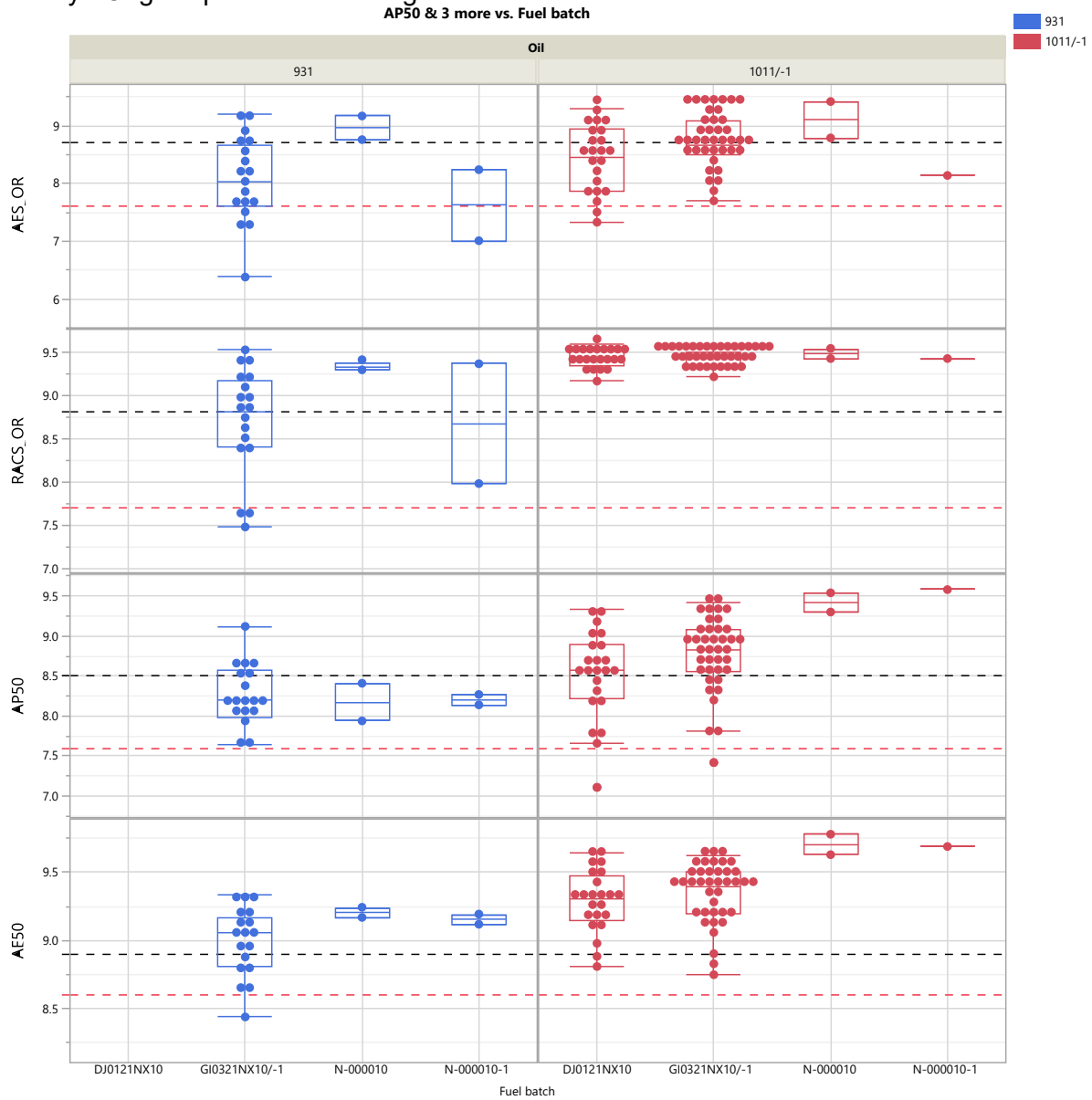
Motion was made by Amol Savant (Valvoline), seconded by Ben Maddock (Afton) to run row 2 as shown in this table:

Row	SwRI1	SwRI2	IAR1	IAR2	Afton
1	931	1011-1	931	1011-1	1011-1
2	1011-1	940	940	931	931
3	tbd	tbd	Tbd	tbd	tbd

Motion passed. Results of the vote: 8 approve, 3 waive, 0 negative. (Approves from SwRI, Afton, Lubrizol, TMC, Haltermann, Oronite, Infineum. Waives from Shell (joined late), TEI, and OHT)

Meeting adjourned at 11:59 AM EST.

Appendix: Plot in minutes above were edited after the meeting to reflect the lab label more clearly. Original plot shared during the SP call is shown below.



Black dashed lines represent the dexos1 Gen 3 limits and dashed red lines represent GF-6 limits.