

Sequence V Surveillance Panel Meeting March 26th, 2021 1 PM EST

Roll Call:

Afton: B. Maddock, B. Campbell
BP: J. Agudelo
Ford: M. Deegan
General Motors: B. Cosgrove, T. Cushing, M. Hopp, N. Siebert
Haltermann: P. Tumati
HCS Group: I. Gabrel
Infineum: D. Boese, C. Laufer, A. Ritchie (Chair)
Intertek: A. Lopez
Lubrizol: J. Brys, J. Gleason, P. Scinto
OHT: J. Bowden
Oronite: R. Stockwell
SwRI: A. Chaudhry, D. Engstrom, T. Kostan, P. Lang, M. Lochte
TEI: D. Lanctot
TMC: F. Farber, R. Grundza
Valvoline: A. Savant

Meeting Summary:

The panel reconvened to listen to the presentation supporting the case for TSA by Robert Stockwell (Oronite). After much discussion and learning that the OEM sponsor would not sign the information letter and that GM would not accept any TSA / adjustments to the AES results, the motion to apply TSA to both candidates and references was withdrawn. It was confirmed that an information letter re: AES ICF was signed and issued, and an information letter re: TSA would be neither signed nor issued. Lab engineers agreed to meet to investigate the severity shifts.

Actions:

1. **Lab engineers** to meet to investigate severity shifts (share operational data, build data, ratings, etc). **Rich Grundza (TMC)** to schedule meetings and to include Ford and the Chair.
2. **Amol Savant (Valvoline)** to discuss with **TMC** re: the overall correction with and without the ICF.
3. Open action from [Feb 25th meeting](#): **Robert Stockwell (Oronite)** to lead task force on obtaining clarity around test validity, QIs, 2 hours of no data, etc.
4. Open action from [June 24th meeting](#): **Haltermann** to look at fuel data from Sec 8.2.6 requirement and report back to panel.

Next call: Monday, June 14th, 2021 @ 10 AM

Meeting Details:

Minutes from the [March 11th & 15th](#) and [March 19th](#) SP calls were unanimously approved (motion by Al Lopez – Intertek, second by Robert Stockwell - Oronite).

Frank Farber (TMC) issued and distributed the [information letter re: AES ICF](#) from the March 16th SP call. The Chair announced that Ford will not be signing the 2nd letter re: TSA and therefore, it will not become an information letter. Referring to slide 11 of the presentation from Robert Stockwell (Oronite), the Chair noted that we seem to be mixing issues as we have an OEM spec brought into the domain of an ASTM panel. Nathan Siebert (GM) announced that GM would not accept TSA / adjusted data.

Robert Stockwell (Oronite) guided the panel through his presentation (“VH Top of Scale Factor (TSF) for 2021 Revised.pdf” appended at the end of this document).

- Robert recognized that there were a lot of questions about the TSA idea. He likes the idea because there’s compression at the top of the scale and TSA could be one of many ways to address it. Slide 2 summarizes the reasons for TSA opposition that Robert took away from the March 19th meeting.
- He explained that Slide 3 was worth discussing because it can affect other items in the future as we have labs with different results, a mild fuel batch, and possibly other contributing factors. Robert agreed with Bob Campbell (Afton) that we need to treat references and candidates the same, which is now reflected in Slide 14. But if it can’t be used for its intended purpose, Robert explained, then there’s no impact on ILSAC GF-6.
- Data from the current fuel batch is shown on Slide 12. Robert described Lab G to be the most mild, with the table on the slide summarizing how far on average each lab is away from target. Depending on how one looks at the data, there can be different opinions. He added that if a fuel batch is mild by 0.32, then the data on Slide 12 is accurate. If it changed over time, then other ways of looking at the data would be more appropriate.
- Bob Campbell (Afton) pointed out that the 2nd plot on Slide 13 should be shifted by 0.32 and then re-centered. Travis Kostan (SwRI) did not agree with shifting the data and explained that the plot is showing that batch GI is hitting an upper limit with 1011 and that if it’s shifted, then the upper limit is in a different location. Travis believed it would not make sense to adjust with ICF.
- Robert stated that if GM is not accepting the TSA motion (Slide 14), then he will change his negative vote from the previous meeting. But added that he still likes the idea since there’s compression at the higher end and that TSA is a good way to look at that mathematically. A better way to solve the problem would be to understand why the labs are different and to get a fuel batch that’s on target. Nathan Siebert (GM) agreed and would like the group to do the maintenance and fix the problems rather than apply correction factors.

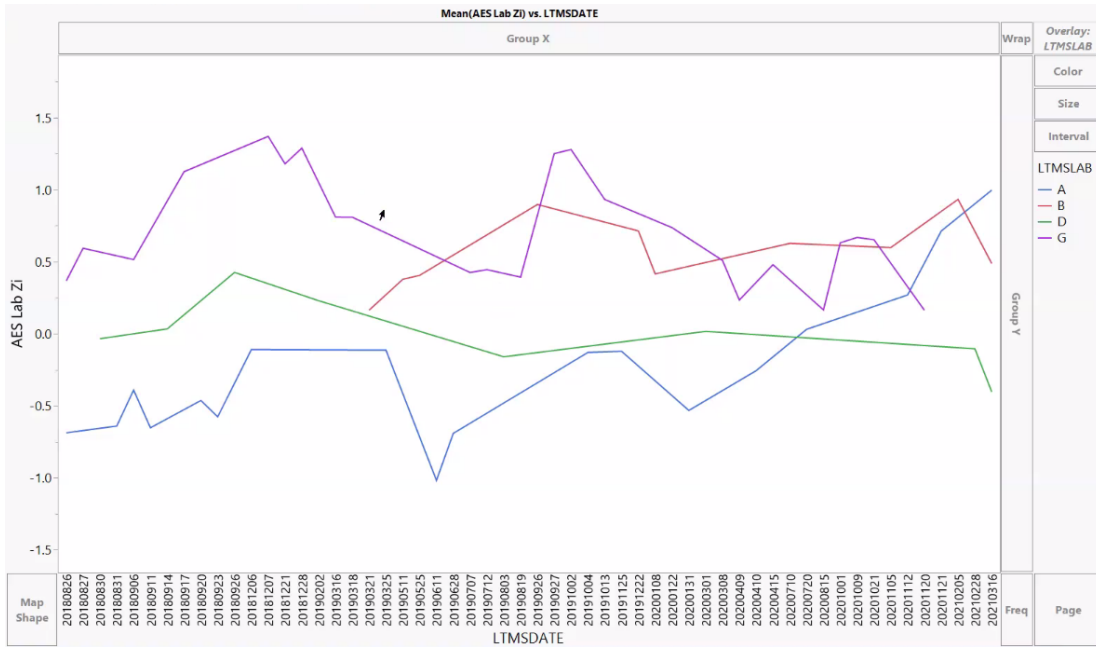
Travis Kostan (SwRI) added that there is a realization here that if you have an oil that is truly a 9.1 or 9.2 AES oil and you run when it’s a half merit mild, this test cannot yield a 9.7. The math was intended to slowly recognize that you can’t run a 9.2 oil at a lab that is a half merit mild and get 9.7. Travis explained that we cannot adjust the results because the system was not designed that way. Phil Scinto (Lubrizol) furthered that this works the other way too in that you cannot take a 9.2 at a lab that has a positive adjustment and get a 10.2. He said if we believe the compression is happening, we need to do something. He explained that everyone who analyzed the data believe the compression is there and tried to deal with it in the best possible way. Bob Campbell (Afton) commented that there’s some homework the labs need to do first, to which Phil agreed.

Phil Scinto (Lubrizol) asked why RAC does not see a significant difference in fuel batch. The Chair offered that since sludge is more biased to the bottom of the engine, perhaps rocker cover at the top is less susceptible to fuel batch. Travis Kostan (SwRI) added that RAC is a transformed calculation, to which Phil commented that RAC has its own top of the scale as well. The Chair pointed out that some may think a transformation is needed on AES but we do not due to the impact on AES at the GF-6 limits.

Al Lopez (Intertek) inquired if the compression would get worse without the fuel correction / ICF. Rich Grundza (TMC) replied that we make the same adjustments as if we didn't have the ICF. He explained that when you add both, you're still in the compression zone; we recalculate SA based on the application of ICF and that we'll still subtract that from the candidates in the compression zone. Al stated that for milder labs, ICF will affect their SA so it won't be as big. Phil Scinto (Lubrizol) agreed that the SA will be changed. He clarified that if one didn't do this, there's no difference, but if you do this and you're mild, the SA will be bigger and more negative. Mike Deegan (Ford) reminded the panel that these are the reasons why Bob Campbell (Afton) was asking for all 3 charts to make it clear. Bob remarked that no one can argue that there's compression at the top, purely because we're bound at 10. He followed that the question to answer is where it begins. Phil answered that the statisticians looked at it and they came up with 8.8 and 8.6. He explained that the group split the difference and that's how we ended up with 8.7. Al commented that we've seen this happen before and gave the example of putting a cap at 10 on VG's RAC parameter, as sometimes the parameter went above 10 after adjustment. Jerry Brys (Lubrizol) added that the reason why over 10 was possible was because of the transformation. Other examples were offered by the group: oxidation cap at 0.1, negative bearing weight losses, etc.

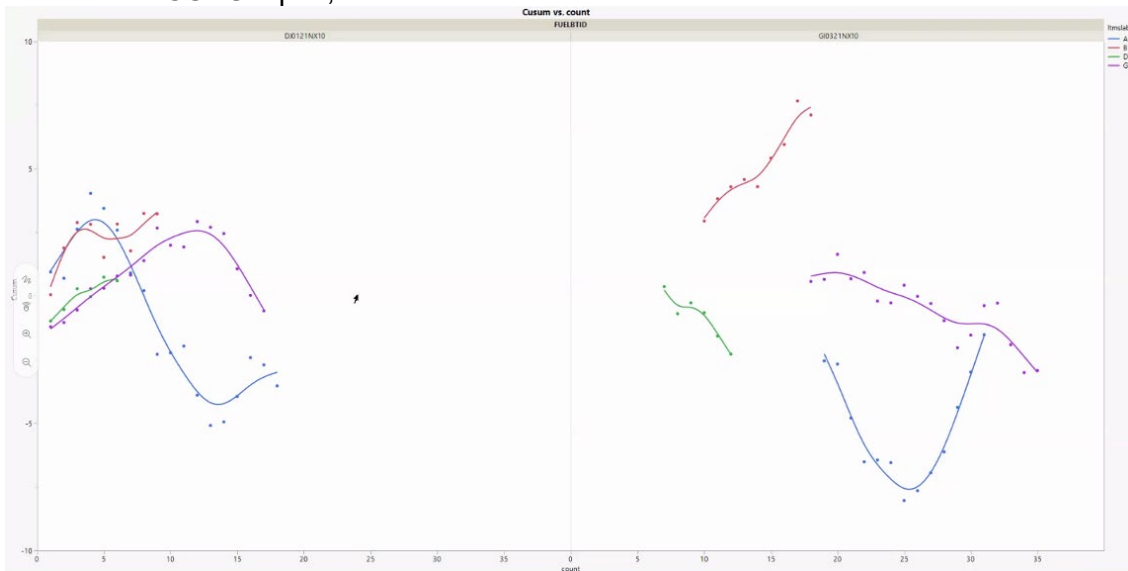
Travis Kostan (SwRI) noted that if everyone is willing to agree that there is compression, then typically we can address that via a transformation. Since adding a transformation at this point would upset the system, he explained that the statisticians group proposed to do what a transformation would do at the top of the scale. He pointed out that if the group does not accept the TSA because it's different, then the group should not have accepted the RACS transformation.

Amol Savant (Valvoline) asked if we could see chronological data as he wasn't fully convinced there's a shift. Bob Campbell (Afton) requested to line up the data with calendar time, put a line in where the fuel batch changed. He commented that this could be lab driven, in which case, application of the TSA would be the wrong thing to do. Travis Kostan (SwRI) shared the following plot in response:



Bob asked if this included ICF, to which Travis confirmed yes, it already has 0.32. Rich Grundza (TMC) noted that the labs are slightly severe. Travis commented that he believed the top of the scale issue is not as much related to lab differences and that it's acknowledging what happens to candidates at the top of the scale, regardless of where it's run. Doyle Boese (Infineum) said this plot shows that about 1/3 way in, maybe a lab has become a bit mild.

Rich then shared a CUSUM plot, for the 2 fuel batches:

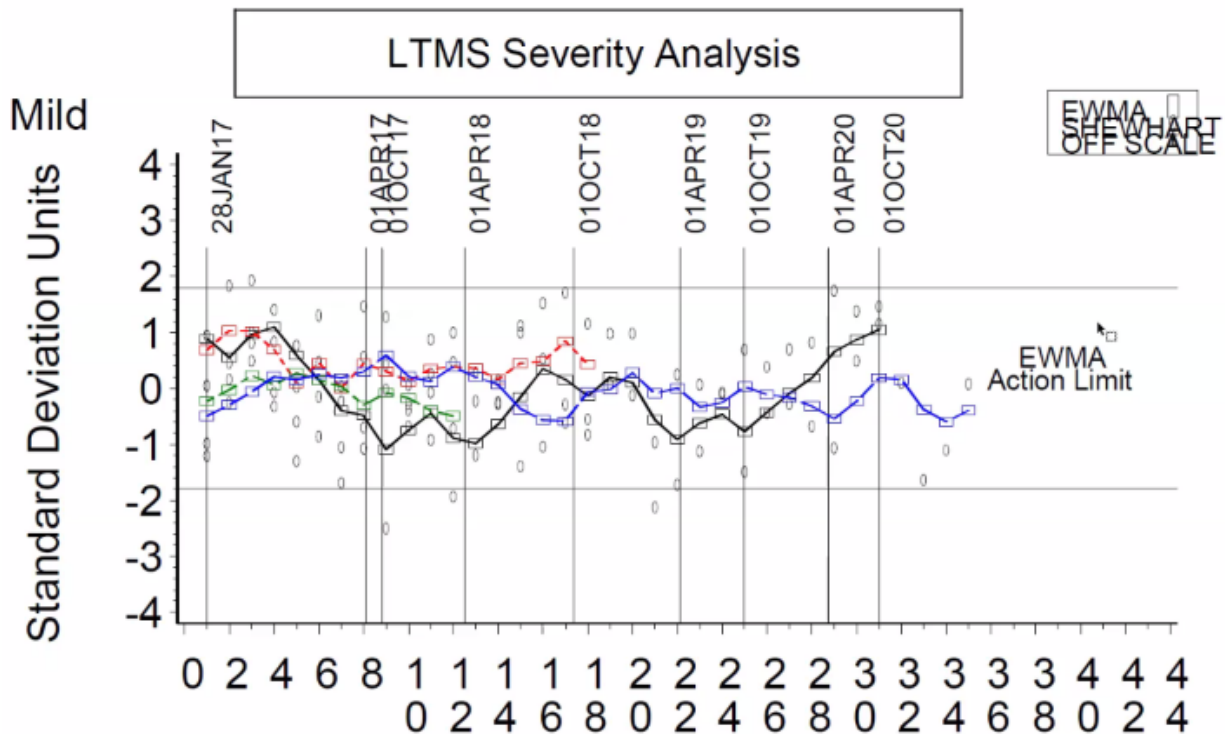


Rich pointed out how the blue lab was going severe, then all of a sudden, went mild. Travis commented that he didn't like CUSUM plots because he believes that's not the conclusion that should be made and explained that when the slope is low, that does not mean things are getting worse. Ben Maddock (Afton) added that if the slope does not change, then nothing is changing. Bob highlighted the inflection point. He said when there's in inflection, then there's something that's an assignable cause that should be

investigated. Rich observed that this inflection happens with more than 1 lab. Bob stated that he would support the lab engineers to get together to start sharing data (operational data, build data, etc.) to help resolve some of these differences. The Chair asked the lab engineers to form a group to do this investigation and the following agreed to participate:

- Al Lopez (Intertek)
 - Ankit Chaudhry (SwRI)
 - Ben Maddock (Afton)
 - Jerry Brys (Lubrizol) – noted that it will be someone else from his lab
 - Amol Savant (Valvoline) – requested that the labs that are mild to do a self-audit - data acquisitions, ratings, operational data, etc.
 - Rich Grundza (TMC)
 - Mike Deegan (Ford)
- And the Chair will join for at least the first session

Rich Grundza (TMC) shared the following plot as one of the plots requested by Bob Campbell (see note *):



Amol Savant (Valvoline) asked how we can say we're seeing a shift across the industry when only the black line is mild. Bob said this plot was helpful because it's not lined up by calendar date. Rich said the point is that the slopes aren't going the same way with Labs B and G being similar and Lab A being mild half-way through the mild batch. Amol noted that the different slopes of the individual plots suggest that the same thing is not happening at each lab / stand. He asked if applying the ICF could be adversely impacting labs running more or less on target. Rich stated that if we add ICF, then the labs apply that to all data, then calculated a new SA with ICF, and the overall correction is essentially equal to what the SA was without the ICF. Amol did not agree with this assessment. Doyle Boese (Infineum) added that 3-4 people have done this calculation

independently and got the same result. Amol said he had done this calculation and believes this is not true for labs running on target or slightly severe. The Chair asked Amol to take this offline with TMC and to report back.

The Chair asked TMC to provide an update on any housekeeping items. Frank Farber (TMC) stated his position is to not release the information letter re: TSA. He could send it through subcommittee B if that's what the SP wants, but given the lack of consensus, it does not make sense to move forward. Al Lopez (Intertek) confirmed if all candidate now will not have the TSA applied? Rich confirmed that that was correct. He commented that he was ready to issue the form today but held off until this call. Al asked if the motion on the table by Pat Lange is withdrawn? Robert Stockwell (Oronite) confirmed that the motion is withdrawn.

Amol Savant (Valvoline) commented that he did not understand how the OEM can sign only one letter and not the other because to him, the two are intertwined. The Chair explained that the ICF letter was signed to provide relief to the calibration process. Amol described that this impacts the candidates. The Chair clarified that the impact to the candidates is negligible. Amol requested that whoever agrees with this to re-run their numbers with references and candidates. Bob Campbell (Afton) said he didn't believe it either but as Doyle said, we went through the numbers and the statement is correct. Bob commented that it might have something to do with the amount of data in your set. Jerry Brys (Lubrizol) said he too ran through his number and it was different by only 0.1.

Frank asked the panel to confirm if the information letter should be released or not. The Chair answered that it will not be released and added that we will do better next time. Bob Campbell (Afton) motioned to adjourn.

Meeting was adjourned at 2:26 PM EST.

Note:

* = prior to the meeting, upon review of the presentation from Robert Stockwell, Bob Campbell emailed the panel:

Thanks Robert—I know we're close to meeting time, but several comments and perhaps clarifications.

While slide 12 is interesting, I believe it is misleading and doesn't reflect the current state of the test at the lab level, which I believe is important. Could I ask that you provide 3 sets of graphs with Yi and Zi's on a lab basis as indicated below. In most other test areas where we've discussed ICF's, SA modifications, Stand vs. Lab LTMS changes or transforms, the panel receives and reviews this information so there's full transparency and understanding of the practical impacts across the industry.

1 – lab charts if we did nothing

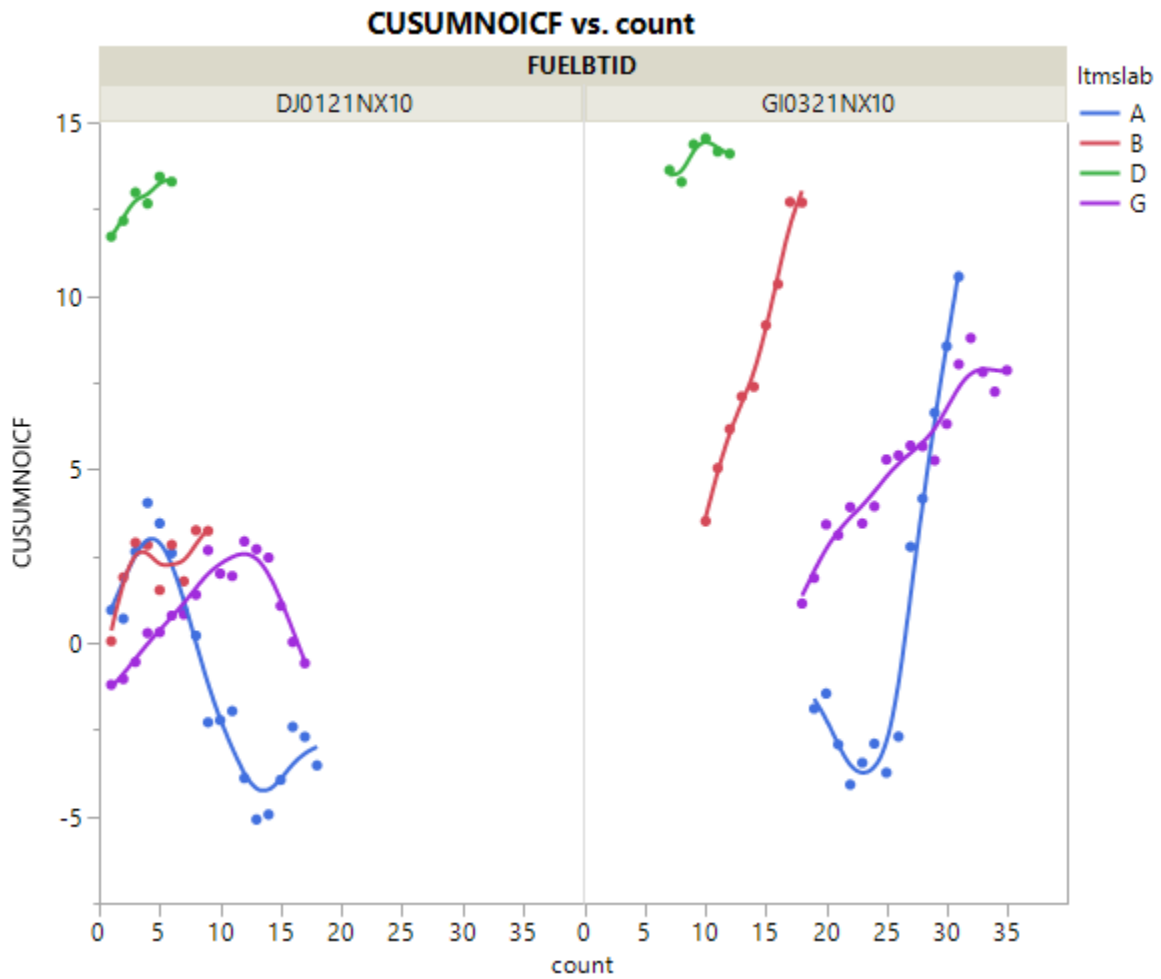
2 – lab charts if we add the ICF

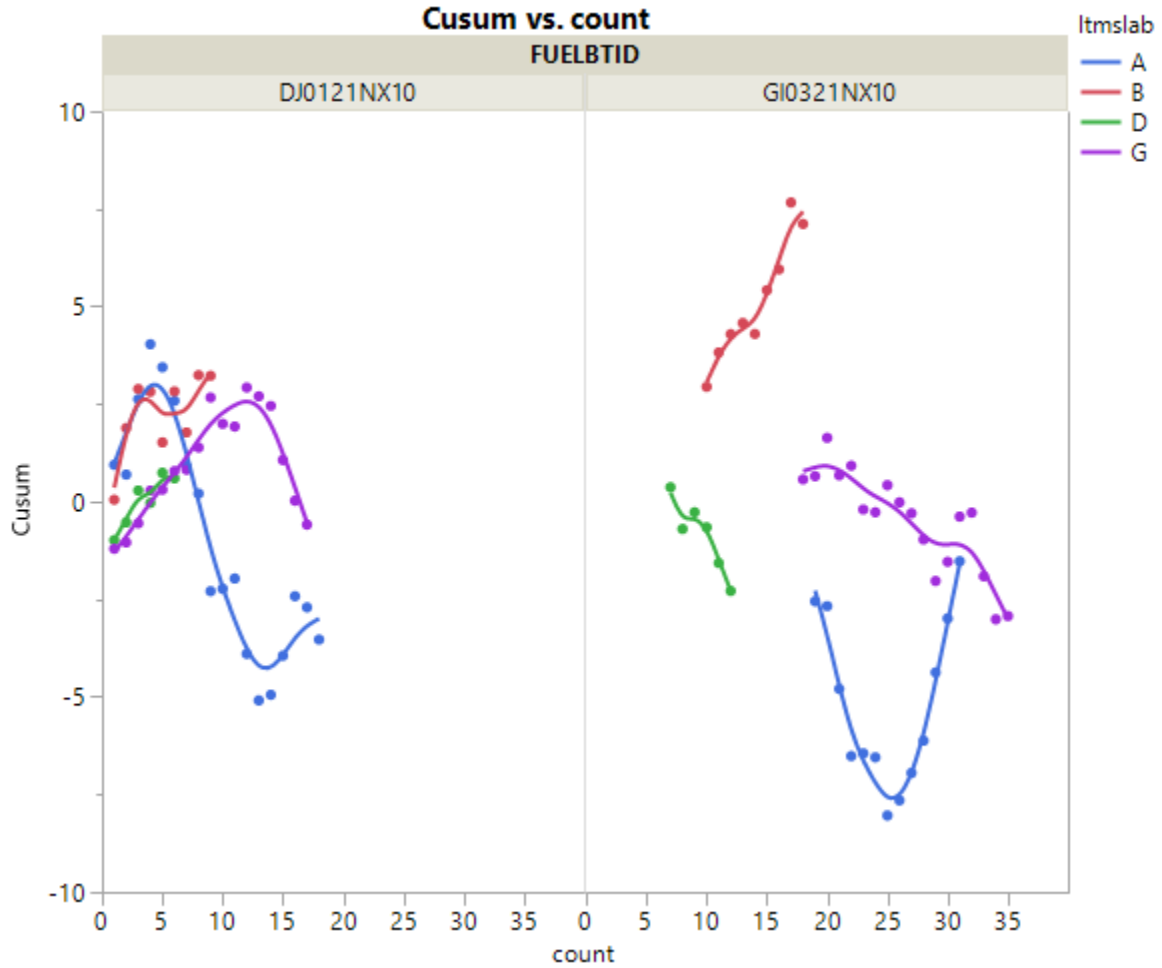
3 – lab charts if we add the ICF with the new proposal

Slide 13-could you modify the new fuel batch analysis (the bottom table) to include the newly approved ICF of -0.32? Since we've all agreed that this is the magnitude of the fuel bias, it would seem appropriate to correct the data in chart. I realize it won't impact the std. dev, however it then centers over the target.

Rich Grundza replied with the following:

Here are cusums with and without ICF I maybe able to do cusum with Top scale ICF for the meeting but time is short. 1st plot is with out ICF applied, second is with the ICF






Appended: "VH Top of Scale Factor (TSF) for 2021 Revised.pdf", copied below, and can also be found attached in the meeting request.



VH Top of Scale
Factor (TSF) for 2021

Slide 1:




VH Top of Scale Factor (TSF)
Revision includes some changes – thanks to all that provided feedback

Robert Stockwell
Jo Martinez

March 26, 2021

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Slide 2:

**Key Points from the March 19, 2021
Presentation opposing TSA**

- 1) Top of Scale Adjustment Factor (TSA) must be applied to both reference and candidate results
- 2) Pivot of 8.7 looks like the dexos1™ Gen3 limit
- 3) Cusum plots show the labs are much different
- 4) Reference oil 1011 does not show top scale compression

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Slide 3:

Executive Summary




- 1) Top of Scale Factor (TSF) must be applied to both reference and candidate results
 - Reference and candidate oils must be treated the same. Pat Lang made this motion at the end of the March 19th meeting and Robert Stockwell seconded. This motion will be made again to correct this minor error in the original TSF motion.
 - Let's use TSF, TSA makes me think of air travel
- 2) Pivot of 8.7 in the TSF is a result of many iterations and vetting by the industry Statisticians Group and 8.7 is the dexos1™ Gen3 AES limit
- 3) The cusum plot is available from the TMC and shows divergence between pairs of labs. Raw plotted data may be more appropriate.
- 4) Reference oil 1011 plot does show compression, but this was not clear in the plot with data combined from multiple fuel batches.

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Slide 4:

1) Top Scale Factor (TSF)

Let's use TSF, TSA makes me think of air travel



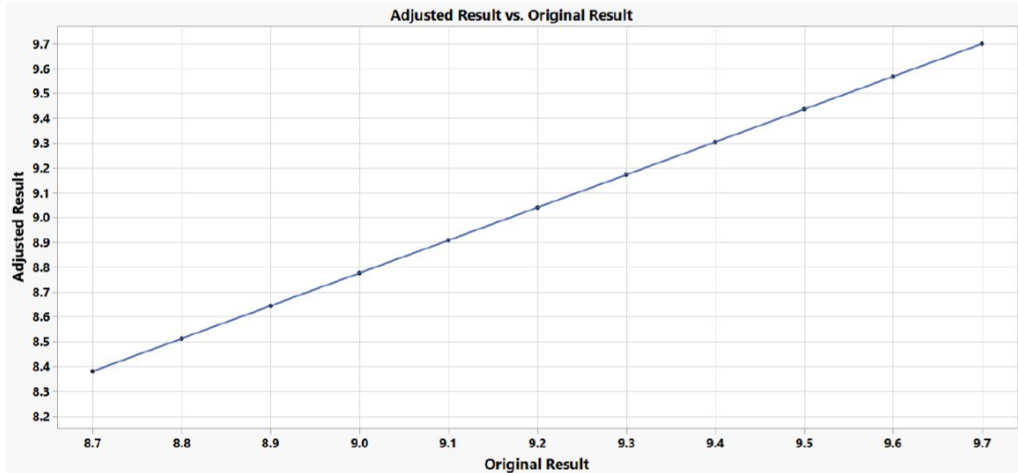
- Apply Factor to both reference and candidate test result
 - Factor = $1 - (\text{Original Result} - 8.7)$, $0 \leq \text{Factor} \leq 1$
 - New ICF = Factor x ICF
 - New SA = Factor x SA (*candidates only*)
 - Adjusted Result = Original Result + New ICF + New SA
- Reference results and candidate results are treated the same way
- I will ask Pat to repeat his motion at the end of my presentation.

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Slide 5:

Effect of TSF on ICF=-0.32

ICF – Industry Correction Factor



Slide 6:

Top of Scale Issue



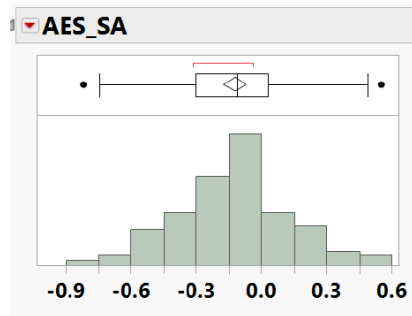
- The VH was intended for GF-6 oils. With the mild trend of the new fuel batch and the influx of high-tier oils because of the higher dexos1™ Gen3 limit, there's a problem that the system can't handle.
- With the mild fuel batch, Reference Oil 1011 is not normally or uniformly distributed (slide 13).
- The Statistics Group acknowledged this top of scale issue.

Slide 7:

2) How the Pivot of 8.7 came about



- A series of conference calls was held to brainstorm solutions and spent a lot of time testing different options. Solutions ranging from a constant correction to a more complicated non-linear equation were carefully thought of and discussed.
- Using different scenarios of typical SAs ranging from +0.35 to -0.35 (and not go too far from the ICF to be conservative), and different levels of oil performance from 8.6 to 9.6, several mathematical solutions were considered.



Slide 8:

Factor Derivation

Stats group slide – just to show some of the effort that went into this



- Apply severity adjustment to the transformed data and the untransformed data for different levels of SA, e.g., -0.1 to -0.7 standard deviations

SA_StdDev_Units	SA AES s = 0.5	TAESs = 0.68	Test Result	TAES	Corrected AES	T Corrected AES	SA untransformed	SA transformed	Multiplier= SA transformed/ SA untransformed	Average
-0.1	-0.05	-0.068	8.8	1.356441	8.75	8.7531	-0.05	-0.0469	0.93768919	0.99244756
-0.3	-0.15	-0.204	8.8	1.356441	8.65	8.6538	-0.15	-0.1462	0.97453502	
-0.5	-0.25	-0.34	8.8	1.356441	8.55	8.5473	-0.25	-0.2527	1.01097113	
-0.7	-0.35	-0.476	8.8	1.356441	8.45	8.4337	-0.35	-0.3663	1.04659492	
									
-0.1	-0.05	-0.068	9.6	4.406719	9.55	9.5965	-0.05	-0.0035	0.069458648	0.07720439
-0.3	-0.15	-0.204	9.6	4.406719	9.45	9.5889	-0.15	-0.0111	0.074321254	
-0.5	-0.25	-0.34	9.6	4.406719	9.35	9.5801	-0.25	-0.0199	0.079625258	
-0.7	-0.35	-0.476	9.6	4.406719	9.25	9.5701	-0.35	-0.0299	0.085412395	

Test Result	Avg Multiplier	Overall Average
8.8	0.992447564	
8.9	0.908978654	
9	0.817098291	
9.1	0.716603966	0.577104786
9.2	0.607284586	
9.3	0.488919964	
9.4	0.361280263	
9.5	0.224125398	
9.6	0.077204389	

Slide 9:

Factor Derivation

Stats group slide – just to show some of the effort that went into this



- Apply severity adjustment to the transformed data and the untransformed data for different levels of SA, e.g., 0.1 to 0.7 standard deviations

SA_StdDev_Units	SA AES s = 0.5	TAES s = 0.68	Test Result	TAES	Corrected AES	T Corrected AES	SA untransformed	SA transformed	Multiplier= SA transformed/ SA untransformed	Average	
0.1	0.05	0.068	8.6	1.082612	8.65	8.6524	0.05	0.0524	1.048681932	0.99374169	
0.3	0.15	0.204	8.6	1.082612	8.75	8.7518	0.15	0.1518	1.012191149		
0.5	0.25	0.34	8.6	1.082612	8.85	8.8439	0.25	0.2439	0.975409509		
0.7	0.35	0.476	8.6	1.082612	8.95	8.9285	0.35	0.3285	0.938684165		
...											
0.1	0.05	0.068	9.6	4.406719	9.65	9.6032	0.05	0.0032	0.064998966		0.059188514
0.3	0.15	0.204	9.6	4.406719	9.75	9.6091	0.15	0.0091	0.060906845		
0.5	0.25	0.34	9.6	4.406719	9.85	9.6143	0.25	0.0143	0.057149867		
0.7	0.35	0.476	9.6	4.406719	9.95	9.6188	0.35	0.0188	0.053698377		

Test Result	Avg Multiplier	Overall Average
8.6	0.993741689	
8.7	0.922728227	
8.8	0.846513346	
8.9	0.765181404	
9.0	0.678814378	0.563087568
9.1	0.587491953	
9.2	0.491291614	
9.3	0.390288733	
9.4	0.284556649	
9.5	0.174166742	
9.6	0.059188514	

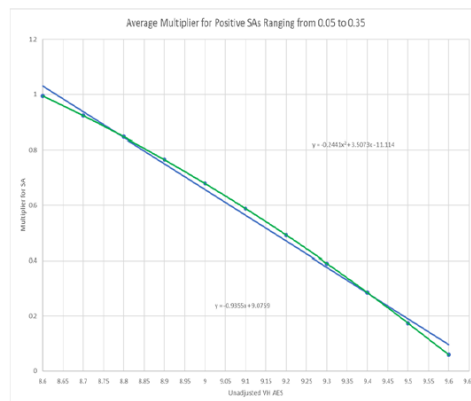
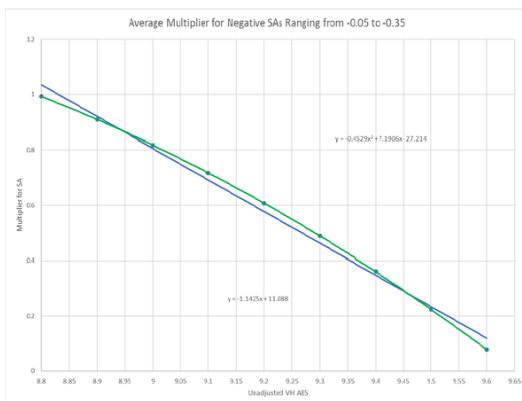
Slide 10:

Factor Derivation

Stats group slide



- A constant multiplier was an option but seems over-simplified
- A non-linear equation was an option but seems over-complicated
- A linear equation might be more palatable



Slide 11:

Factor Derivation

Stats group slide, except the last bullet which I added



- As can be seen in the slopes of the linear equations, the rate of change of the multiplier is about 0.10
- The **Factor = 10-Test Result** was suggested
- But it is believed that the VH test can only rate as good as a 9.65
- The resulting Factor converges to two equations as:

Factor = 1 – (Test Result – 8.8) for Negative Adjustments

Cannot be less than 0

Factor = 1 – (Test Result – 8.6) for Positive Adjustments

Cannot be less than 0

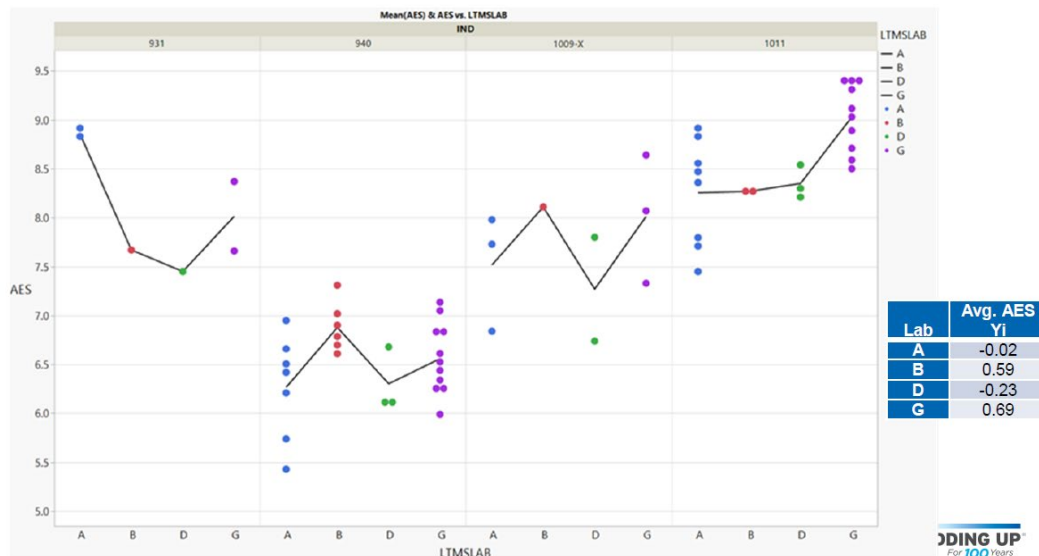
- Or split the difference for 1 equation
Factor = 1 – (Test Result – 8.7) Cannot be less than 0
- This is where the 8.7 came from, and yes this is the same as the dexos1™ Gen3 limit. Without dexos none of this work would have happened.

Slide 12:

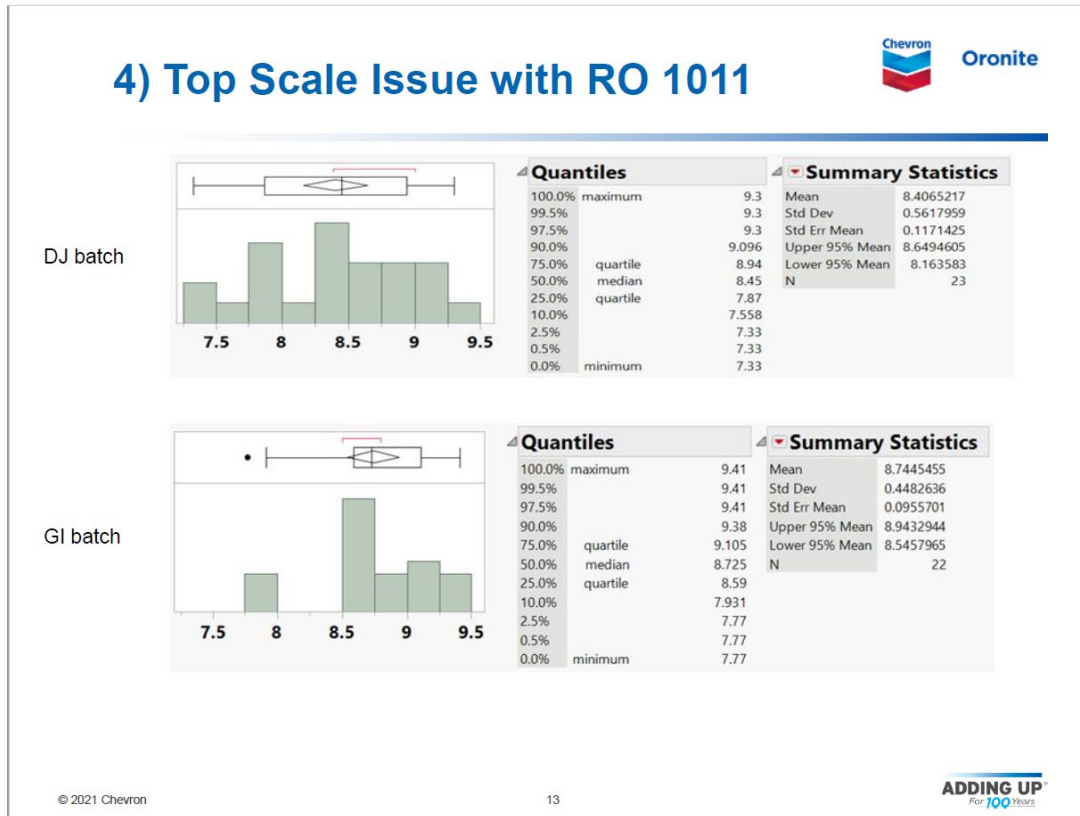
3) Fuel Batch GI AES raw data



- TMC can show the updated cusum plot if someone wants to see it
- Below is the plot with the new fuel batch by oil and lab




Slide 13:



Slide 14:

Motion

 **Oronite**

At the end of the meeting on March 19th Pat Lang made a motion seconded by Robert Stockwell to correct the original TSA error and treat reference oils and candidate oils the same. The motion was withdrawn so that the meeting could adjourn. I am asking Pat to make the motion again.

Motion: Modify the Top Scale Adjustment Factor from Monday March 15th to treat reference oils and candidate oils the same.

- Apply Factor to both reference and candidate test result
 - Factor = 1 - (Original Result – 8.7), 0 ≤ Factor ≤ 1
 - New ICF = Factor x ICF
 - New SA = Factor x SA (*candidates only*)
 - Adjusted Result = Original Result + New ICF + New SA

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