Sequence V Surveillance Panel Meeting
February 15th, 2021 10 AM EST

Roll Call:

Afton:	T. Dvorak, B. Maddock
BP:	J. Agudelo
ExxonMobil:	A. Montufar
Ford:	M. Deegan
Gage Products:	J. Carter
General Motors:	B. Cosgrove, M. Hopp
Haltermann:	E. Hennessy, P. Tumati
HCS Group:	I. Gabrel, T. King
Infineum:	D. Boese, C. Laufer, C. Leverett, A. Ritchie (Chair)
Intertek:	A. Lopez
Lubrizol:	J. Brys, J. Gingerich,J. Gleason
OHT:	Matt Bowden
Oronite:	J. Martinez, R. Stockwell
SwRI:	A. Chaudhry, D. Engstrom, T. Kostan
TMC:	R. Grundza
Willis Advanced Consulting:	A. Willis

Meeting Summary:

The Surveillance Panel met to review the statisticians report on possible causes of the VH severity shift and the proposed targets for the formal introduction of 931. The recommendation from the Statisticians Group was to "make no changes – allow the severity adjustment process to adjust for severity differences (apparently) between fuel batches". After review of the 931 data, the panel learned that one lab would fail calibration and the option of applying a correction factor was proposed. Upon looking closer at the reference data, it was observed that only 3 out of 14 stands were different, and therefore, it was highlighted that a one-size-fits-all approach might not be best. Subsequently, the idea of moving to a stand-based system was proposed. The panel will reconvene on 2/25 to discuss the options of a correction factor and a stand-based system, and to make a decision on 931 targets and introduction.

Actions:

1. **Rich Grundza (TMC)** and **Doyle Boese (Infineum)** to take action to look through the correction factor approach and discuss with the **Statisticians Group**.
2. **Jo Martinez (Oronite)** to assess a stand-based system.
3. Open action from June 24th meeting: **Haltermann** to look at fuel data from Sec 8.2.6 requirement and report back to panel.

Next meeting: Thursday, February 25th, 2021 @ 10 AM EST

Meeting Details:

Minutes from the Jan 11th SP call and minutes from the Jan 25th SP call were unanimously approved (motion by Angela Willis - Willis Advanced Consulting, second by Al Lopez - Intertek).

Prasad Tumati (Haltermann) updated that the fuel inventory has not changed in the last 3 weeks. Roughly 255,000 – 260,000 gal remain (including the heel). Wondering if the depletion we encountered in December is continuing, Chair Ritchie asked the labs to share their respective lab's activity level:

- Al Lopez (Intertek) stated they have 4 stands and expecting more testing. Intertek will be ordering more fuel soon, this week.
- Dan Engstrom (SwRI) reported that they have moderate levels of VH runs. They have 2 calibrated stands, pending a 3rd depending on 931 targets.
- Jerry Brys (Lubrizol) informed the group they have 2 calibrated stands and will be ordering a truck load next week or following week.
- Ben Maddock (Afton) stated they have 1 calibrated stand with a steady flow of work.

Chair Ritchie thanked the labs for sharing this information and summarized that we have enough fuel to last until the end of the year. He continued that the group will stick with the plan. For this meeting, Chair Ritchie highlighted 3 documents (appended) to review:

1) The statisticians report on possible causes of the VH severity shift
2) The proposed targets for the formal introduction of 931
3) The draft February VH report for PCEOCP

On behalf of the Statisticians Group, Doyle Boese (Infineum) shared the report on VH sludge severity shift analysis (see Appendix 1 for report). He opened by stating that the analysis showed the mild shift to be universal (ie: not heavily influenced by 1 lab for example) and guided the group through each point from the executive summary (copied below):

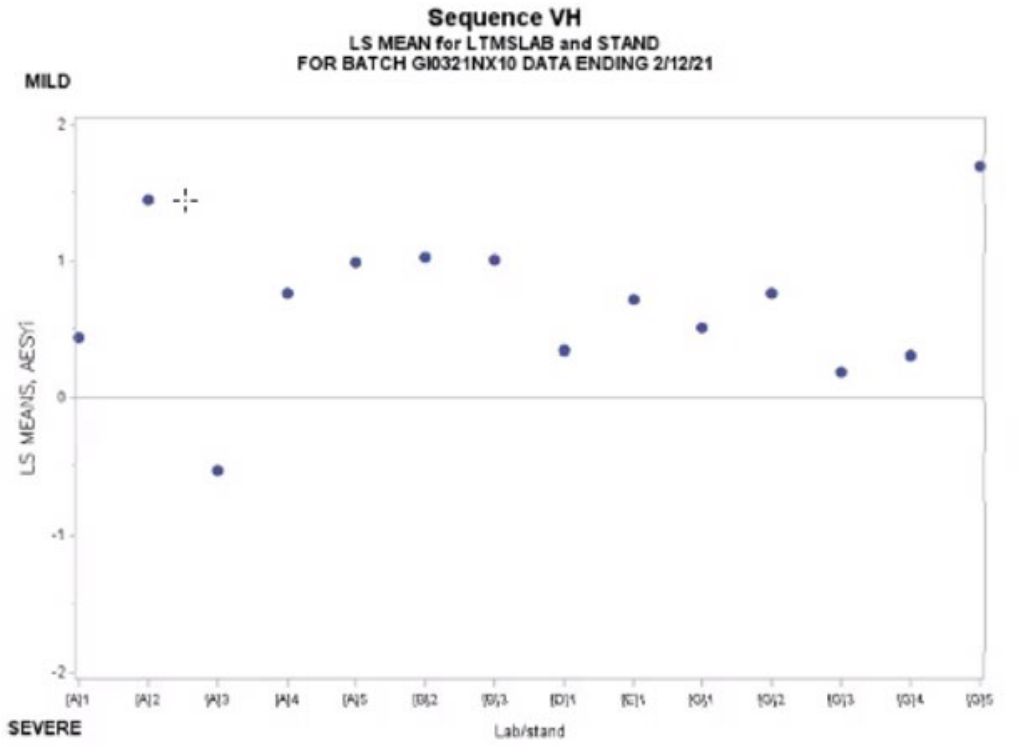
- Partition analysis indicates that a mild shift occurred for both AES and RAC in the timeframe of the Fuel Batch change.
- The three labs running the majority of the tests each experience a shift of AES and RAC in the timeframe when the current Fuel Batch (GI0321NX10) was introduced.
- AES and RAC are mild for both ROs 940 and 1011 for the current fuel batch (GI0321NX10) relative to the original Fuel Batch (DJ0121NX10). The apparent Fuel Batch effect is statistically significant for AES and borderline statistically significant for RAC.
- The current Fuel Batch (GI0321NX10) is estimated to be 0.64 and 0.35 standard deviations (0.32 and 0.18 merits) mild for AES and RAC, respectively, relative to the original Fuel Batch (DJ0121NX10).
- The C of As indicate that each batch is/was in spec other than the current pre-adjusted batch Research Octane Number being slightly above the maximum (98.5 versus 98.0).
- Recommendation: Make no changes – allow severity adjustment process to adjust for severity differences (apparently) between fuel batches.

The questions and discussion that ensued from the analysis are listed:

- Angela Willis (Willis Advanced Consulting) asked: Did you do a comparison between the previous batch to the latest batch to see if there's any differences? Even though both fuels are in spec, are there any clues that could be the reason for the mild shift? Doyle Boese (Infineum) replied since we have only 2 batches, any differences would correlate. Angela suggested that when it comes down to the next batch, that's something we could pay attention to.
- Chair Ritchie asked if anything has changed by doing this detailed study. Doyle answered that the analysis confirmed that it wasn't 1 reference oil or 1 lab influencing the mild shift and that the mild shift happened to occur around the time of the fuel batch change. This does not mean that it certain the fuel batch caused the shift but the analysis showed it to be "the smoking gun". Chair Ritchie asked if this was the consensus of the Statisticians Group, to which Doyle verified he did not hear anything to the contrary.
- Dan Engstrom (SwRI) asked if the group could consider the idea of correction factors for the fuel batch. Although it's understood that we have less than a year remaining with the current batch of fuel, the labs may have concerns at the end of the road to calibrate stands.
    - Rich Grundza (TMC) added that the only reason to apply a correction factor now is if we're getting to the point that we can no longer calibrate.
    - Doyle Boese (Infineum) furthered that while the severity adjustment system works for candidate tests, the system would not work for calibration because we do not apply the system to the calibration tests. With that said, he noted calibration appears to be happening smoothly.
    - Prompted by Chair Ritchie, Rich Grundza (TMC) confirmed that in the last 15 calibration tests, we have not encountered any failures to meet target requirements.
    - Al Lopez (Intertek) agreed with Dan/SwRI. Al cited that Intertek's calibration tests are always on the edge and therefore, he would be in favor of applying a correction factor.
    - Jerry Brys (Lubrizol) concurred with both labs re: the need to apply a correction factor. He wasn't sure if it's a number to add or a sliding scale and suggested that since sludge is not linear, to perhaps apply a correction factor based on the actual sludge result itself.
    - Ben Maddock (Afton) noted that this discussion sounds like a severity adjustment and asked: why do we need a correction factor if we're passing calibration?
    - Travis Kostan (SwRI) can go either way but noted that the data seems ripe for a correction favor. It's a question of whether it's worth doing given the time we have remaining with the current batch.

Al Lopez (Intertek) announced he had to drop off the call and gave his proxy vote to Mike Deegan (Ford).

Rich Grundza (TMC) shared a plot that illustrates some of the problems with applying a correction. He commented that what we have are estimates, not absolute. He explained that there is variability (one lab slightly severe, some stands tend to be mild, etc) and applying a one-size-fits-all correction factor will not be perfect. There would be potential to shut down a lab because the lab is beyond the Zi limit.

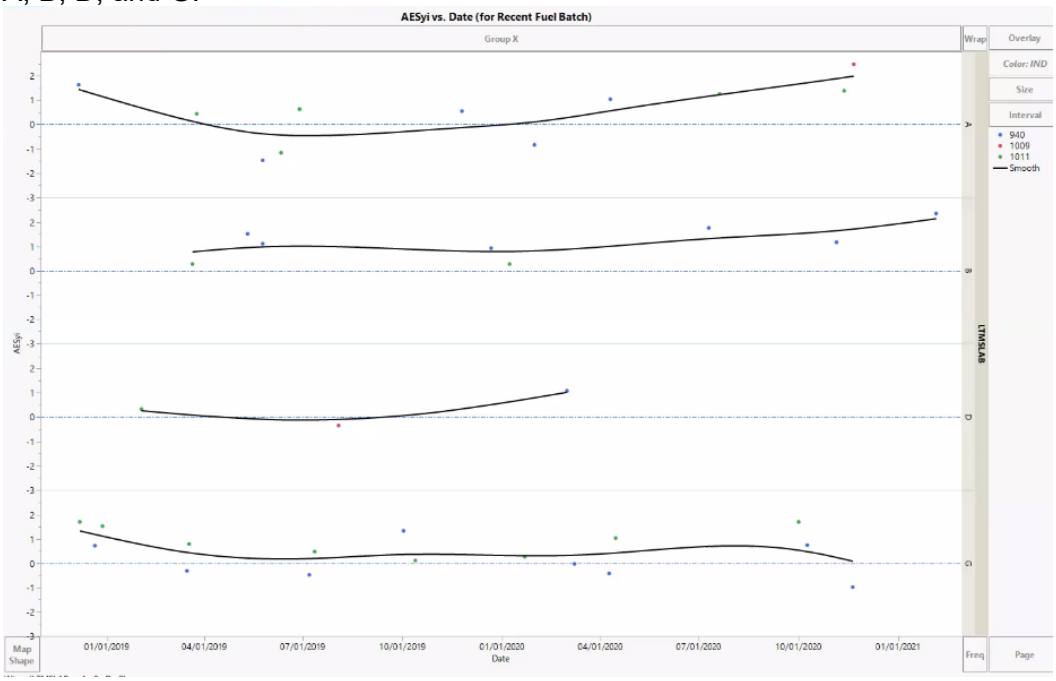


- Based on the plot that Rich shared, Jo Martinez (Oronite) proposed the idea of moving to a stand-based system.
    - Angela Willis (Willis Advanced Consulting) supported this idea and asked the group if we should be focused on understanding the extensive stand to stand variation. Is it more hardware or more operational? Are we following the test procedure consistently? This could lead into control issues or operator issues. She also noted that there could be more chronic problems that could be causing the stand to stand variation that we could dive into in the future.
    - Chair Ritchie suggested that we put this topic on hold, explaining that this is a big step and we can address it in due course when the group is ready. The introduction of 931 and setting targets for 931 could have some influence on the discussion and asked to move on to the 931 part of the agenda and revert back to this topic of a stand-based system. Group agreed to shift to the 931 topic and if we run out of time, we will discuss at the next meeting.

Rich Grundza (TMC) guided us through the 931 slidedeck (Appendix 2). He summarized that we have 6 results from 4 labs and the means for AES, RAC, and AEV compared reasonably well with 1009. APV appeared to be milder. All the results shown in the presentation have severity adjustments applied to the results. Discussion points and questions are captured as follows:

- Slide 3 shows the table with adjusted results based on the candidate model.
- Chair Ritchie asked how many data points are represented in Slide 5 (titled Comparison of Reference oil Standard Deviations). Rich confirmed that there are 8 datapoints for 1009, 6 datapoints for 931.

- With the summary table shown on Slide 6, the Chair asked what the recommendation is. Rich replied that the recommendation is to use 931.
- Chair Ritchie asked what the intention is with assigning 931. Rich Grundza (TMC) described that he would issue it normally, approximately a third of the time. Labs would receive the oil under normal rotation. The Chair asked about the inventory of 1011. Rich stated that there is a test or two worth in inventory at some labs. There is no inventory of 1011 left at TMC so whatever is at the labs is what remains.
- Rich explained that we'll put all 6 data points into the charts. Since they're judged on their own targets, they're going to tend to bring us down with respect to Zi. He explained that we would know down the road if we have the right targets. We may see more severe results, we may we higher variability because it's a borderline oil… but we won't know this today. The Chair commented that although the results are not as severe as we want them to be, we hope to capture it with the SA. 931 has shown itself to be appropriate to perform the task but we would not know for a while.
- Rich furthered that we would need to select a date, put these in the lab charts for that date, and then determine the calibration status / adjustments on calibration periods. Unfortunately, one of these results, due to RACS, makes it severe for 1 lab which would render them out of calibration. The Chair clarified his understanding that if we were to introduce those targets, that one of the stands would have a failed result? Rich confirmed yes; they would fail on Ei and would not calibrate.
    - Doyle Boese (Infineum) commented that if we apply a correction factor, we would apply that here as well. Rich explained that we would have to go back, redo all the labs' SAs with a correction factor applied, determine the SA, then apply the SAs. Todd Dvorak (Afton) stated he's not convinced we need an industry-wide correction factor. Todd shared a Yi plot for AES for the chartable data from labs A, B, D, and G:



Todd noted that Lab G seems to be on target while labs A, B, D are overall trending up. He asked the panel to think about this before we apply a one-size-fits-all correction factor. He commented that it doesn't seem equitable to apply a one-size-fits-all in this case.

- Travis Kostan (SwRI) highlighted that aside form the last result from Lab G, the trend looks similar. Todd responded that historically, Lab G has been on target and that historically, Lab B has been above target. He noted that Lab A only recently started trending up. He commented that Doyle did a good job of even looking at fuel age and it was not a factor. Looking at this plot above, Todd said he's not convinced a one-size-fits-all approach is the right thing to do but the decision is up to the panel.
- Jo Martinez (Oronite) stated that it would be idea to separate unknown part differences and correct that, and then let the SA deal with the differences at the labs. With respect to fuel, she noted that all the labs saw the same difference. Todd clarified that the plot is just AES Yi for all the chartable data generated in 2018/2019 with that fuel batch. He reiterated that it's up to the panel to decide on the right approach.

Chair Ritchie summarized the positions on whether a correction factor is appropriate:

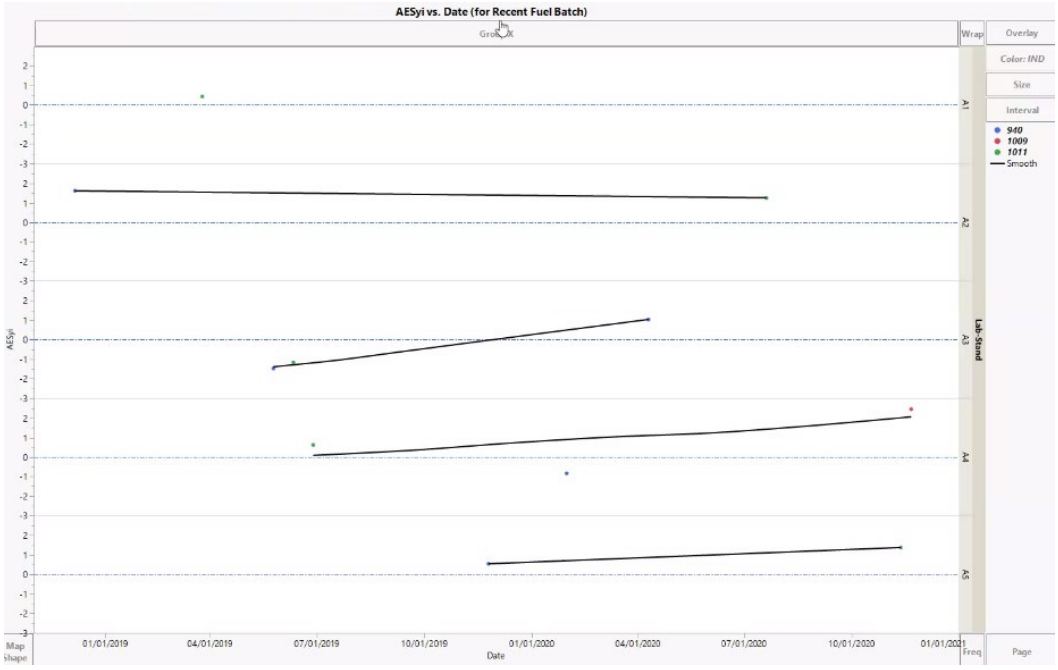
Yes: 3 labs (Intertek, SwRI, Lubrizol), 1 statistician (Jo Martinez)
No: 1 lab (Afton), 2 statisticians (Doyle Boese, Todd Dvorak)
Can see both sides: TMC

Jo Martinez (Oronite) called for another review of the severity system. She suggested it would help if we look at it by stand, instead of by lab. She acknowledged it's a significant amount of work but it might be necessary.

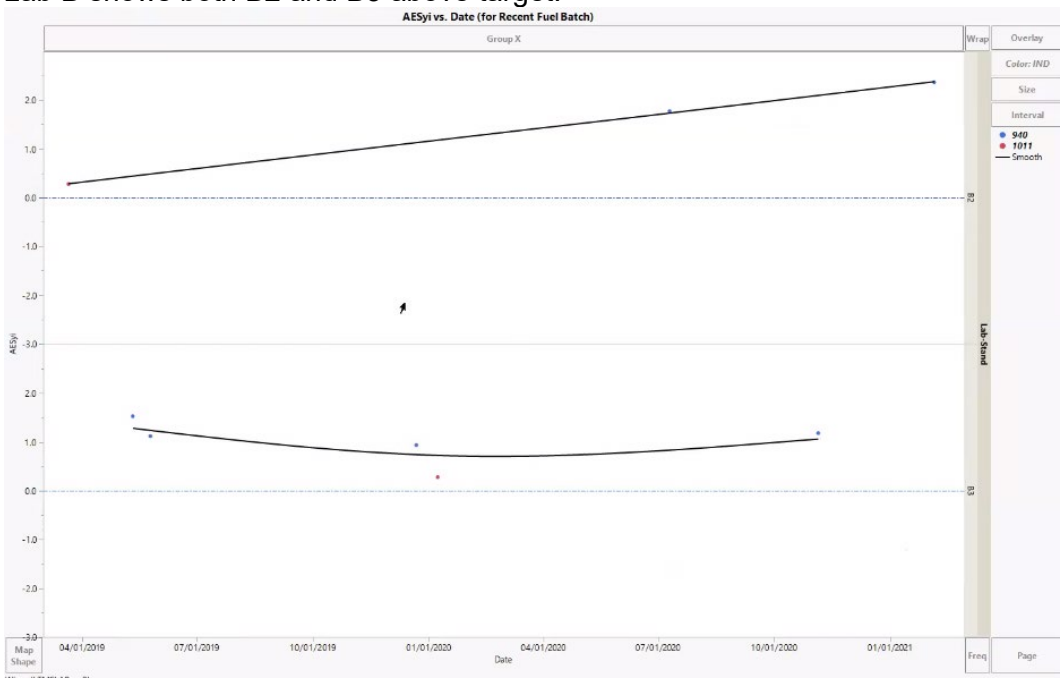
- Ben Maddock (Afton) agreed that this is worth looking into.
- Chair Ritchie asked if the group endorsed a stand-based LTMC, how would this be implemented. Rich Grundza explained that we would start over and it's a matter of applying the LTMS model for the stand-based system. One thing to consider is what lambda to apply to a stand.
- Angela Willis (Willis Advanced Consulting) asked if we could see this before we do all this work. Rich replied that it will require some program changes but that he can do this in an excel file. He commented that it may alter some decision on calibration status on an individual stand basis.

Chair Ritchie solicited for thoughts on whether a stand-based system is appropriate:

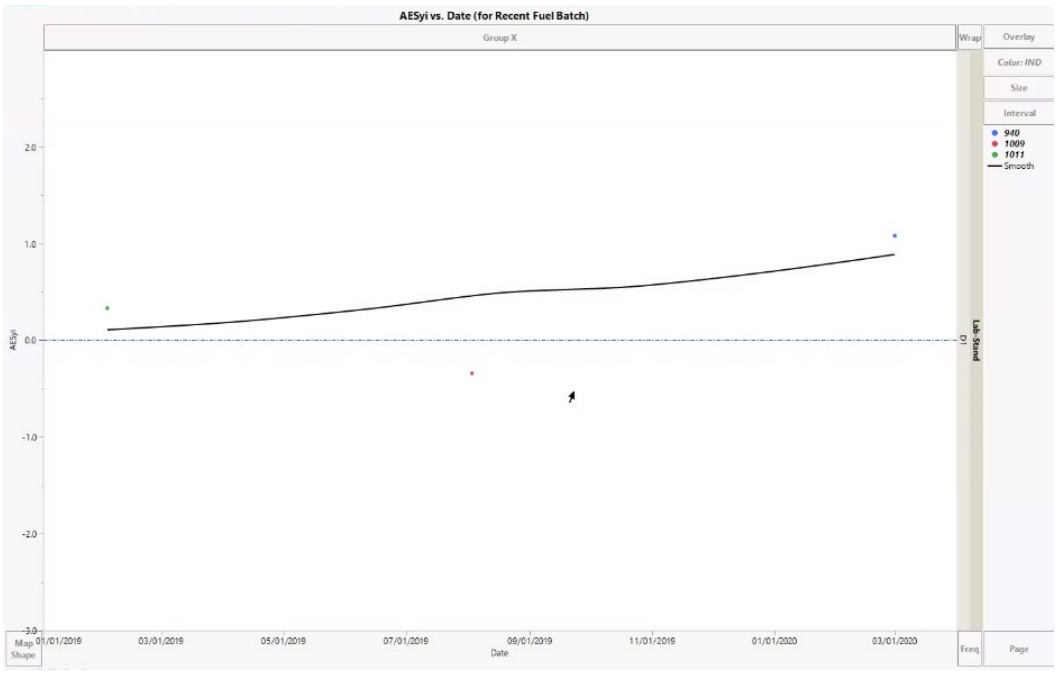
- Travis Kostan (SwRI) said a stand-based system would help if there is a high prevalence of cases where stands are different. However, he agreed with Doyle that a lot of the stands look similar; Only a couple are different. Travis suggest that perhaps those stands could be investigated and a big change could be avoided.
- Todd Dvorak (Afton) said it's worth doing a check but from a quick look (plots below), he does not see differences in stand by lab.
    - Lab A does not show a huge bias between stands as all perform similarly:



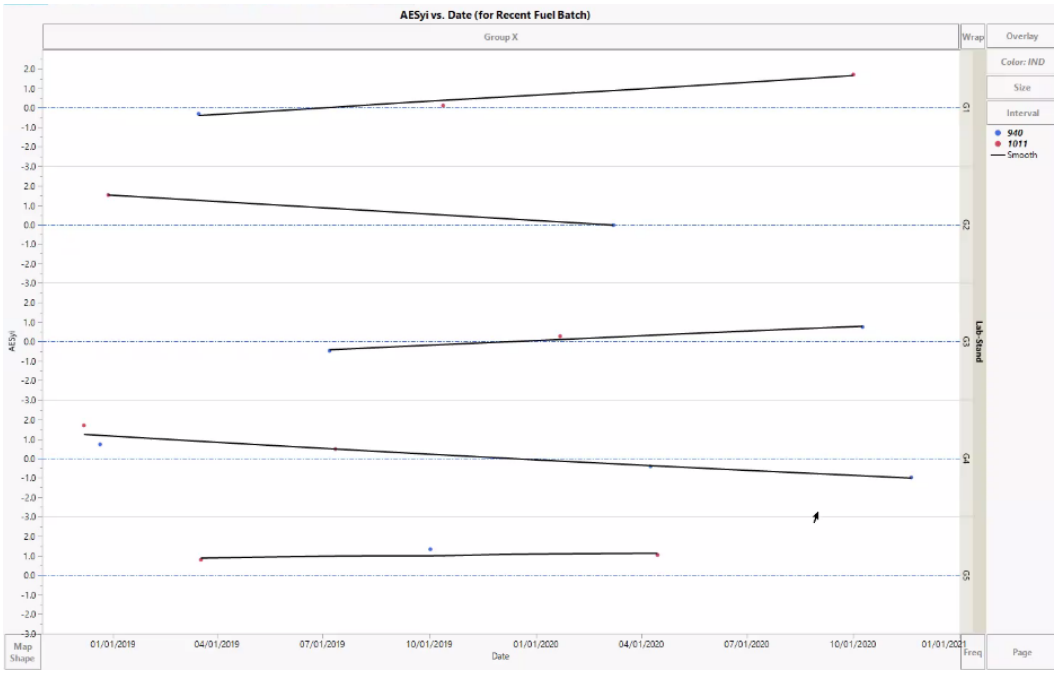
- Lab B shows both B2 and B3 above target:



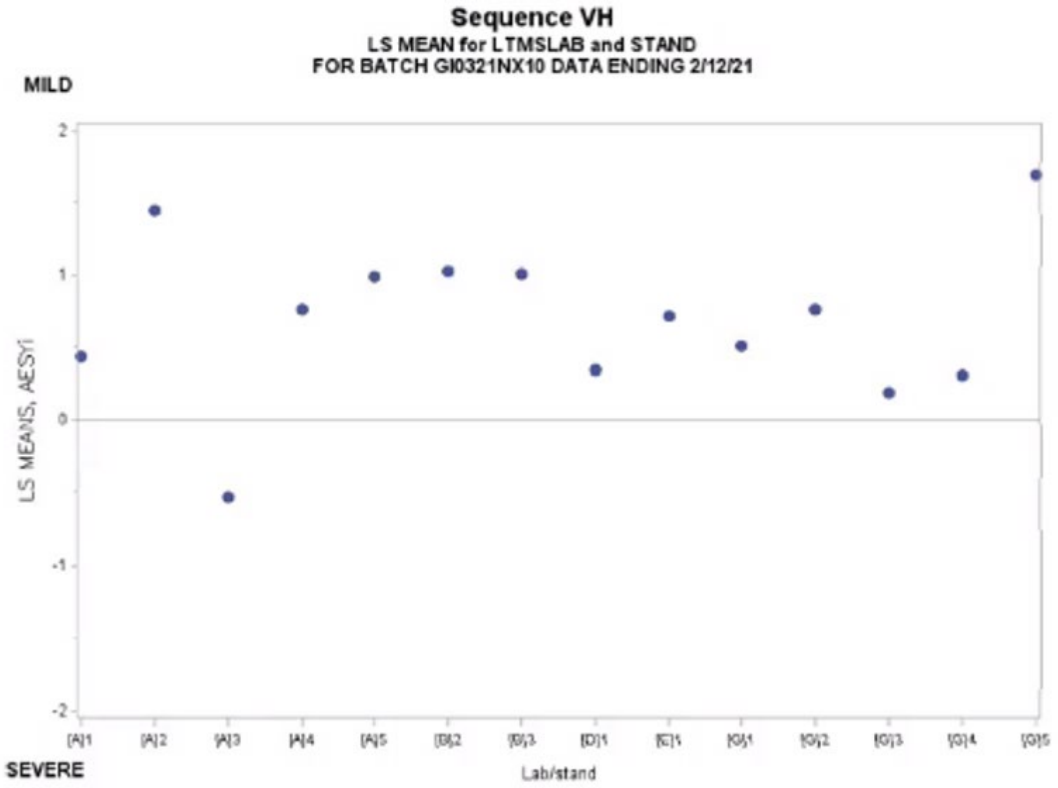
- Lab D:



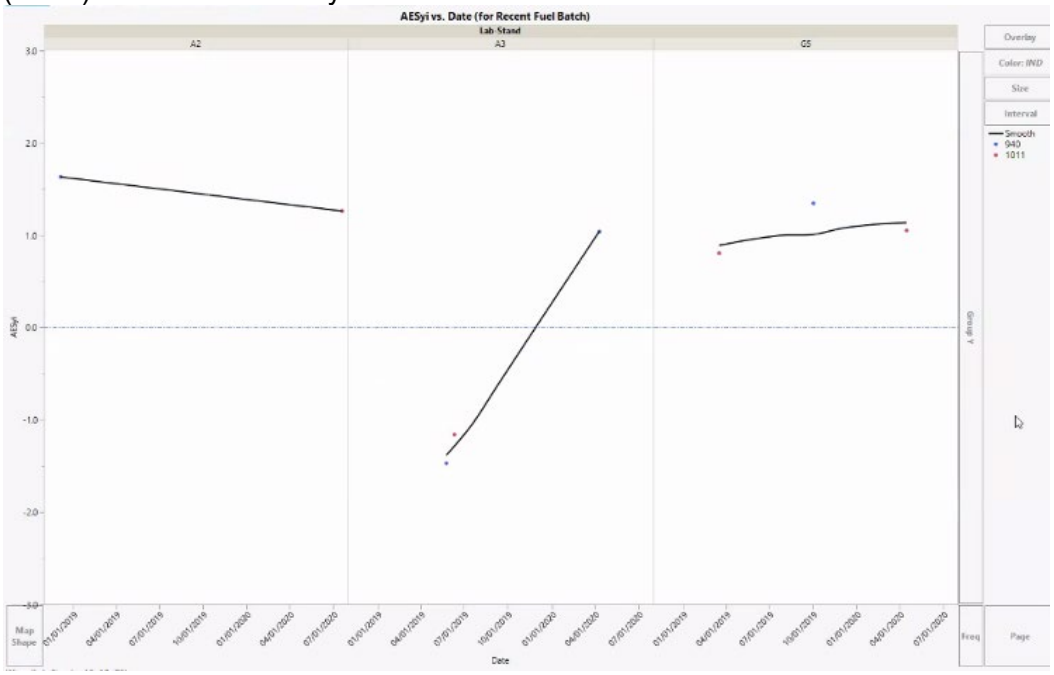
- Lab G:



- Travis Kostan (SwRI) asked which stands were used in the target setting data. He explained if one of these stands is different and used for target setting, it will have neg impact. Rich Grundza (TMC) circled back to the plot he generated earlier to help answer the question:



- Jo Martinez (Oronite) highlighted A2 and A3 being very different. Rich noted that G5 is also another stand to look at which is consistently mild. Todd Dvorak (Afton) shared a summary for these 3 stands:



With only a few minutes remaining on the call, Chair Ritchie asked what the time pressures are to get 931 introduced. Rich Grundza (TMC) replied that we have a potentially failing stand still running candidates. One lab has extended their stand at end of calibration period, coming up on having to run a reference. Rich expressed some concern as the data cannot be charted until they have targets.

Dan Engstrom (SwRI) motioned to apply a correction factor on the current fuel batch. Mike Deegan (Ford) seconded. Jerry Brys (Lubrizol) said we need a discussion to figure out what we do. He suggested we at least get the 931 data in place and delay the correction factor discussion until next meeting.

The Chair reminded the panel that the Statisticians Group did not make a recommendation to do a correction factor and were ok to do 931 targets. But since having learned one lab would fail, we're now in a situation to try to apply a correction factor. The Chair asked for guidance from the group:

- Jerry Brys (Lubrizol) suggested to get 931 introduced, then if we decide to do correction factors, then we re-do it.
- Travis Kostan (SwRI) reiterated the potential for stand differences that needs more attention.
- The Chair asked what the consequences are to managing the calibration periods. Rich Grundza (TMC) confirmed not a lot but we will need to do something in the next 2 weeks. The Chair announced we will reconvene next week to get closure on 931. All in agreement.

Closing out the meeting, actions have been assigned:

- Rich Grundza (TMC) and Doyle Boese (Infineum) to take action to look through the correction factor. Rich will assess impact of applying correction factor to 931 data. He explained he has most of the work done on AES already and he can calculate SAs based on the correction data without having the labs to upload their data again. He will discuss with the Statisticians Group by the end of the week.
- Jo Martinez (Oronite) to assess a stand-based system.

Meeting adjourned at 11:37 AM EST.

Appendix 1 – "VH Sludge Severity Shift Analysis - SG.pdf"
(Statisticians report on VH Sludge Severity Shift Analysis)

VH Sludge Severity Shift Analysis - SG.p

Appendix 2 – "931 targets.pptx" (931 proposed targets)

931 targets.pptx

Appendix 3 – “Sequence V SP February 2021 Update Report to B Draft.ppt”
(Draft February VH report to PCEOCP)

Sequence V SP
February 2021 Upda