Sequence V Surveillance Panel Meeting
June 14th, 2021 10 AM EST

Roll Call:

Afton:	B. Maddock
BP:	J. Agudelo
General Motors:	B. Cosgrove, T. Cushing, N. Siebert
Haltermann:	Q. Dunford, P. Tumati
Infineum:	D. Boese, C. Laufer, A. Ritchie (Chair)
Intertek:	M. Chadwick, A. Lopez
Lubrizol:	J. Gingerich, J. Gleason
OHT:	J. Bowden
Oronite:	J. Martinez, R. Stockwell
Shell:	J. Hsu
SwRI:	A. Chaudhry, D. Engstrom, T. Kostan, P. Lang, M. Lochte
TEI:	D. Lanctot
TMC:	J. Clark, R. Grundza
Valvoline:	A. Savant

Meeting Summary:
The Sequence VH Surveillance Panel met to resolve 2 issues: 1) size of the new fuel batch, and 2) negative received for Information Letter 21-04. After hearing the SwRI presentation outlining a historical perspective on fuel demand and after much discussion, the panel provided guidance to the fuel contract team that a smaller batch of approximately 400,000 gallons would be an appropriate size. It was agreed that the group would reconvene on June 16th to vote on a panel position re: the negative vote on Information Letter 21-04.

Actions:

1. Open action from March 26th meeting: **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. Open action from March 26th meeting: **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, 2020 meeting: **Haltermann** to look at fuel data from Sec 8.2.6 requirement and report back to panel.

Next call: Wednesday, June 16th, 2021 @ 1:30 PM EST

Meeting Details:

Approval of the minutes from the March 26th call was put on hold to allow members enough time to read them. The Chair outlined that there are 2 critical issues the Surveillance Panel needs to resolve: 1) Size of the new fuel batch and 2) Negative received for Information letter 21-04. Since the OEM sponsor was unable to attend this meeting, the Chair requested Nathan Siebert (GM) to represent their interests as a fellow OEM and if there's a key item, the Chair would call another meeting.

Chair Ritchie asked Haltermann to provide an update on fuel inventory. Prasad Tumati (Haltermann) reported that there is 80,000 gal above the heel, for a total of about 205,000 gal of fuel remaining. He projects that the heel would be reached around September, which will trigger Haltermann to transfer the remaining fuel in ISO containers. The original size of the blend was 660,000 gal. The Chair summarized that about 30% of the blend is left so it's an appropriate time to discuss the reblend, the details of which is handled by the fuel contract team. He reminded the group that the panel does not get involved in this process to ensure any potential anti-trust issues were respected. However, he relayed that the contract team has asked the panel to provide guidance on the size the batch. The panel was asked to not discuss pricing and if anyone hears anything that concerns them, to raise it so it can be handled appropriately.

Prasad Tumati (Haltermann) confirmed the Chair's historical account of how the panel has handled fuel over the years: starting with 280,000 gal, needing to reblend every ~18 months, and finally deciding to get invest in a bigger tank to avoid constant uncertainty. The Chair then explained that the fuel contract team members have different viewpoints on how big the next batch of fuel should be. He invited Mike Lochte to present his viewpoint.

Mike Lochte (SwRI) guided the panel through his presentation (appended "VH fuel demand history VH panel June 2021 SwRI.pdf") describing the fuel demand history, test activity, and his perspective on a smaller fuel batch. He asked the panel to consider the following:

- The AES recent correction factor was attributed to a change in performance of the fuel after an adjustment by the supplier. Longer storage life could lead to more adjustments
- Demand could be much lower in 2022 onward as GF-6 and dexos GEN3 will be mature, and GF-7 has not been defined. Lower demand could result in fuel being in storage for many years.
- SwRI proposes a 400,000 gallon batch which could give us same or longer life that the last 660,000 gallon batch, which is expected to last over 4 years.

- Al Lopez (Intertek) asked Haltermann to confirm the consumption rate. Prasad Tumati (Haltermann) answered that the numbers that Mike shared are historically accurate but that lately, the consumption rate has varied. He reported that last month, we had 3 truck loads, which was about 22,000 gal. Mike Lochte (SwRI) shared that if were to assume a 20,000 gal/month consumption rate, then the batch depletion would be April 2022. He pointed out that he's not advocating delaying but would like the group to decide how much to make to begin the process.
- Chair Ritchie challenged that he did not recollect that the fuel batch was said to have deteriorated, but rather, we concluded that we incorrectly assigned the severity when the

fuel batch was introduced. He asked Haltermann if this fuel batch changed over the last 2.5-3 years by any parameter that is monitored. Prasad confirmed that this is the same fuel since 2018.

- Al Lopez (Intertek) recalled that with the original large batch at 660,000 gal, we projected a life of 7 years. Whether there's data or not, there's some concern that the fuel can deteriorate. The fuel contract team would like input from all the stakeholders on consumption so they can make the better decision on how much of the fuel batch to build. The Chair added that there was a lot of work that went in to get the bigger tank and agreed with Al's recollection that the fuel was projected to last 7 years. He also recalled we went with the bigger tank to reduce cost and risk because each time the fuel changes, there's considerable work and cost with approval testing and risk of losing the test.
- Al asked Haltermann to share any concerns from a logistical standpoint if we decide to go with 400,000 gal. Quinntine Dunford (Haltermann) replied that it depends on timing and availability. He said that going to a smaller tank would be easier in terms of turnaround time. The only issue is to find the tank.
- The Chair noted that with the smaller batch, we are expecting that the testing would be less than they have been in the last 2-3 years. Nathan Siebert (GM) agreed that there's a lull in testing now and commented that in discussions about ILSAC GF-7 and dexos, we're pushing for 3-5 years before another generation comes out. The Chair checked for any counterviews. Nathan offered that if ACEA introduces anything, that could potentially drive up usage. Al added that JASO GLV1 added VH but not at high limits.
- Ben Maddock (Afton) thought our best option might be to pick a date and have every lab submit a blind consumption rate to get an accurate assessment of consumption rate until that date. The Chair pointed out that the fuel contract team needs an answer soon. There was overall agreement that the consumption rate for the next 3 years would be lower compared to the past 3 years.
- Amol Savant (Valvoline)'s concern was about our ability to consume all the fuel and asked if there could be any extrapolation that can be done from VG end of life to gain any insight. Martin Chadwick (Intertek) added that the VH replacement would consume some of that fuel as switching batches in the middle of development is not ideal. The Chair shared that he understood from Mike Deegan (Ford) that the VH lifetime was not projected to go beyond GF-7 and the intention is to develop a replacement with a smaller engine. Nathan Siebert (GM) confirmed the Chair's understanding but there's no specifics yet on the smaller engine that might use less fuel. Al Lopez (Intertek) cautioned that we shouldn't make an assumption that a smaller engine would require less fuel as the consumption would depend on the operating conditions.
- Nathan Siebert (GM) asked about an alternative approved fuel supplier. The Chair asked Mike Lochte what the fuel contract team needs from the panel to address this. This would be considered in the fuel contract team.
- Amol Savant (Valvoline) asked Haltermann how much smaller the tank would be for a 400,000 gal batch. Quinntine Dunford (Haltermann) answered that we would be looking at a 500,000 gal tank at minimum. Amol followed with if there's a buffer. Quinntine affirmed and said we lose about 10% capacity so for a 500,000 gal tank, 450,000 would be the max.
- Robert Stockwell (Oronite) asked how much fuel we would need to consume all the remaining hardware. He commented that if we only have enough hardware for 300,000 gal, it would not be a good idea to build more. Al Lopez (Intertek) said that Ron Romano and Mike Deegan (Ford) were prepared to make more pistons and we can get blocks refurbished like we did for the VG and extend the life.

After above discussion, the Chair concluded the guidance of the panel was agreement on a smaller batch of approximately 400,000 gal. Mike Lochte (SwRI) thanked the panel.

Moving to the 2nd agenda item, the Chair invited Amol Savant (Valvoline) to share his thoughts behind the negative vote. Amol opened with that he believes there needs to be a wait time before implementation. For the ICF topic, he felt that there was not enough time to go back and do the analysis before it was implemented. He guided the panel through his points (please see appended full document “VH21-4 Negative.pdf” for further detail and plots):

Letter Ballot: D02 (21-04) Closing Date: Jun 07, 2021

Item No.: 6 (sub .B001)

Committee D02 and sub-committee D02.B0.01 Concurrent ballot

Item description: Approval of Industry correction factor for VH-AES – Apply an AES industry correction factor of -0.32 merits to all reference oil tests conducted on fuel batches GI0321NX10 and GI0321NX10-1, irrespective of completion date. Apply an AES industry correction factor of -0.32 to all non-reference oil tests completing on or after March 16, 2021 and using fuel batches GI0321NX10 and GI0321NX10-1.

VOTE on this ballot item: **NEGATIVE**

Statement in support of the Negative vote

Valvoline votes negative to the above-mentioned ballot item (21-04, item 6: VH-AES Industry correction factor) on the basis of following reasoning :

1) Not all the stands are showing the same general (mild) shift for ICF to apply:

An Industry Correction Factor (ICF) provides industrywide shift-correction for a said result parameter considering (assuming) that same/similar shift is observed throughout all the stands and labs across the industry. However, for the parameter in question, VH-AES (Avg. Engine Sludge), a closer inspection of the data reveals that not all the stands in the industry are exhibiting the same general shift. It appears, only few stands or one/two labs are mainly contributing to the mild shift in VH-AES. As an exercise, if the stands were to be plotted on individual stand basis (not lab basis), many stands show acceptable level of performance for the VH-AES parameter (for the mentioned fuel batches) and few of them can be argued to be on-target [data from few of such stands is provided in exhibit 1]. For such near-target/acceptably performing stands, proposed ICF would not be appropriate.

It is understood that the current VH-LTMS is a 'lab-based' system, but plotting it on stand-basis shows dilution of contribution to the observed severity shift. Previously presented analyses by the industry statisticians group clearly show stand differences (across different labs, as well as within a lab) [exhibit 2]. There may be a merit in exploring stand-based LTMS system for VH. Understandably, it may be problematic to change from lab-based to stand-based system this late, but without that we need to be mindful, a 'lab-based' system may provide undue bias suggesting lab-wide or industry-wide shift while not all individual stands may be exhibiting the same.

Suggestion: • Lab-based LTMS system would be better for VH, looking at within lab(s) stand difference.
• A Lab-based correction factor instead of Industry-wide correction factor may provide more balanced approach.

2) Assumption of new fuel batch(es) causing shift:

Industry statistical analysis shows the new fuel batch/es being significantly different, however arguably, only few stands or one/two labs could be contributing more to that level of significance (statisticians analysis shows one lab and few stands as significantly different). It would be pertinent to see the data reanalyzed for fuel-batch significance removing the stands and lab showing significant difference.

Another fuel related issue, data analysis of various fuel parameters between old/original batch vs new batch/es did not yield any statistically significant differences, despite fuel batch showing up as significant.

It is possible that this shift/change may be coming from actual stand operation or setup, as the stands age or have had multiple runs, which chronologically may coincide with newer fuel batches (misidentifying fuel batch as the cause); this would be more applicable in case of higher activity stands/labs.

Suggestion: a deeper dive/ thorough check, comparison should be explored between the stands/labs showing higher shift versus near-target performance.

3) ICF was not really necessary:

Granted that the industry EWMA chart for VH-AES crossed the action alarm limit on couple of instances (roughly b/w Nov-20 to Feb-21 timeframe), but no lab was having any issue calibrating on references. And, soon after that the EWMA chart started trending downward. Which begs the question, was ICF really needed?

The sharp up and down trends in chronologically plotted EWMA chart may be due to few stands exhibiting higher shift or swing (variability), or could be unfortunate coincidental stacking due to chronological order in which they occurred. These up and down swings in EWMA chart would suggest ICF is not necessary at this point. Even the statisticians' group did not reach consensus on adoption of ICF for VH-AES (meeting minutes on record).

4) Early mismatch between old non-ICF Severity Adjustment (SA) and new total correction [ICF + SA] (for a lab with none or only one/two runs on the new fuel batch):

Calculations suggest, it requires 4 to 5 tests for the total correction from the new ICF (newSA + ICF) to catch up (match) with the older non-ICF SAs.

Most labs (especially higher activity labs) have had several reference-calibration runs on the new fuel batch before implementation of the VH-AES industry correction factor, so for such labs it is not an issue.

However, for a low activity or one stand lab which may not have had any or just one or two reference runs before the implementation of the said ICF, this mismatch b/w oldSA vs (newSA+ICF) can be significant and would not correctly reflect the stand performance and in turn candidates may be improperly adjusted/corrected.

Suggestion: Deferral of ICF implementation for such lab until total correction from ICF catch up with old SAs.

Technical contact on the matter:

AMOL SAVANT ACSavant@valvoline.com

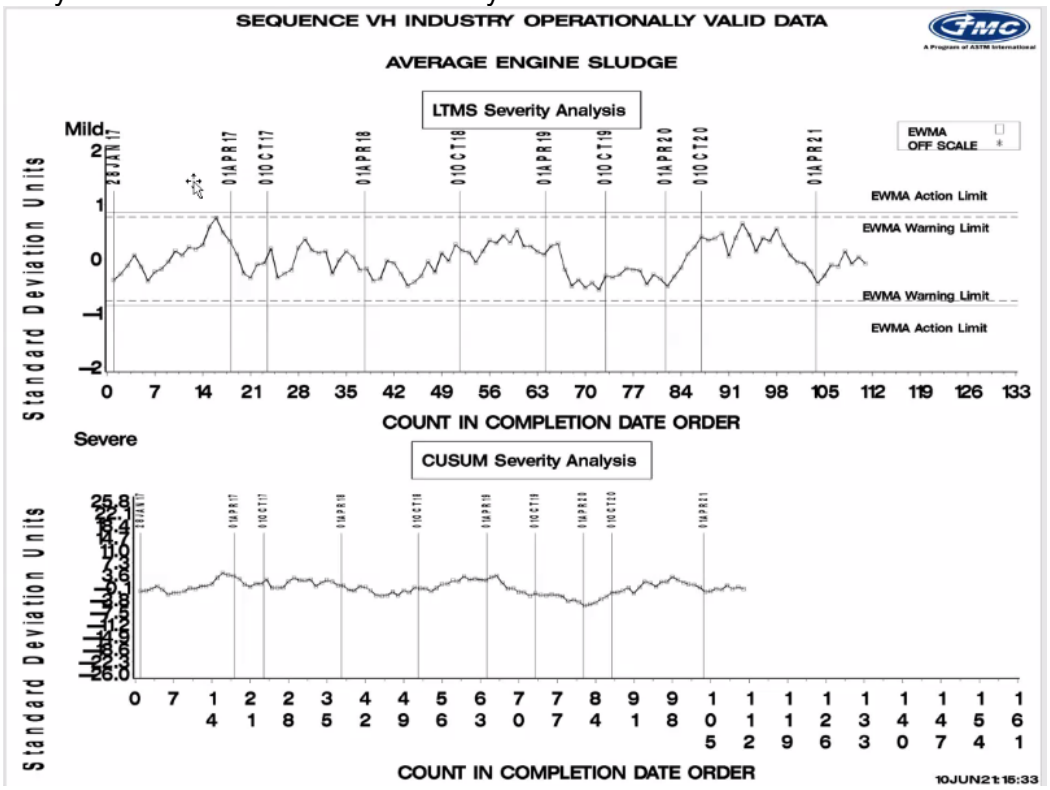
The Chair commented that many or all of these points were covered in our SP calls. Amol agreed that some of these points were discussed but the case for pushing the ICF through was still not 100% clear. Re: the 4th point, he said he was asked to calculate his numbers to see that they match, but it was not necessarily true for his case as a one-stand lab that did not have too many tests run with the new fuel batch. The Chair commented that we were in an imperfect situation which was never going to get resolution on purely technical reasons. We knew the outcome was not ideal and we knew there were technical arguments against it, but we used a pragmatic judgement targeted at the labs' distress around their ability to calibrate without action.

In the process, we noted the impact of an ICF on candidate results was insignificant. The Chair said he sees Amol's points as technically persuasive but struggled to see how we can resolve this and asked TMC for guidance. Rich Grundza (TMC) said that all the points Amol raised was discussed by the statisticians group. He explained that if the negative is upheld, we would need to issue another information letter, removing the ICF going forward, redoing the severity adjustments. Jeff Clark (TMC) clarified that we would reset things as we cannot retroactively invalidate. He added that Subcommittee B will ask what the SP's position is. The panel will need to vote on 1 of 3 positions: 1) SP agrees with the negative and finds it technically persuasive, 2) SP disagrees and finds it non-persuasive, or 3) SP discussed and cannot come to a position. Jeff said that having a position would help, especially since timing is of the essence here with candidates running right now that could be in jeopardy.

Martin Chadwick (Intertek) confirmed that the first 3 of Amol's points were brought up in the statisticians group. The intent behind the 4th point was to return the mean of the data back to target. There was some evidence that a shift took place. Multiple tests would not be required. Amol Savant (Valvoline) stated that his point is that the perceived shift is not being seen by all labs and pointed the panel to see the exhibit laid out in his document.

Rich Grundza (TMC) asked if a reference test was run on those stands and wondered about the data that Amol referred to, to suggest no shift. Amol replied that if you plot some of the stands between old and new fuel, there's no shift. B3, G4, G1, and D1 are all not showing a shift. He reiterated that applying a correction across the industry when we see several stands not showing a shift is the issue. Jeff Clark (TMC) asked if Amol is saying that ICF is acceptable if every stand shows a shift. Amol answered that it does not have to be every single stand, just a general shift. In this case, 40-50% of the stands are not showing a shift.

The industry control chart was then shared by Rich:



Rich was showing that this is part of the argument we had whether to apply ICF or not earlier this year. SA, when you have enough data or not, when you compare with and without ICF, you end up with the same correction factor. That was for the 4 labs that contributed data in this. The data was available and discussed, with annexes included in the statisticians group's presentation.

Doyle Boese (Infineum) added that one thing to consider is sample size. Splitting by stand is really getting into too small of a sample size to detect such a change. He felt it was dangerous to split into small sizes to see a uniform shift in each stand.

The Chair said he will be asked to offer his opinion on the negative at the B meeting next week. The Chair's current thought is that this is technically persuasive but we discussed this numerous times within the panel before agreeing to a correction factor (ICF). Industry control charts indicated a mild issue and when we investigated, we determined that the new batch was milder than originally determined; the statisticians group confirmed this and determined it was 0.32 AES units milder. Amol stated that the 0.32 came from the latest data, not the fuel matrix data. Rich confirmed that this was correct but going back to Doyle's point, we didn't detect it off the bat because we didn't have sufficient data to determine that. Amol believed that we didn't do sufficient analysis and objected to the "on average, it shows" statement. He said that if you look at the data chronologically, it's not "on average." He would not call it "on average" across the labs because some labs are contributing more than others.

The Chair asked if Amol agreed we the test is on target for AES with the application for ICF. Amol said if you see the EWMA plot, it's on the upswing again. He asked if it borders the upper limit again, would we just add more ICF? Rich Grundza (TMC) agreed that EWMA is bouncing around but CUSUM is level. The above plot is as of Friday and since April 21st, the CUSUM line is flat. EWMA is bouncing around zero. He asked the group to look at April 2020 when a lot of the labs were already using the new fuel batch. It was below zero and he did not see why ICF was needed. The swing could have been caused by unknown causes and believed this could be due to unfortunate chronological stacking. In a lab-based system, Amol explain that this is more prone to happen than in a stand-based system.

Nathan Siebert (GM) asked if we are cherry picking because he did not recall we needed to put in a correction factor in when it was trending low in 2019. Rich Grundza (TMC) said we weren't anywhere near the alarm for a severity issue. The Chair acknowledged that EWMA is always going up and down and sees what Nathan was saying. But the ICF made EWMA and CUSUM go right down the middle and look more regular. Amol countered that if you take out the ICF, it shifts upwards. He said that around test 93, that's when it crosses action alarm limit. Rich added that this goes back to test 50 or so. Amol stated that it might not be prominent, but it shows a downward trend without the ICF even from test 98 onwards. Rich commented that with Amol's thoughts about changing it to a stand-based system, you would still see stacking. Amol replied that there'd be a dilution effect. Jeff Clark (TMC) stated this plot is irrespective of lab identity so the plot would be the same if you switched to a lab system. Amol replied that people aren't understanding him and clarified that labs would rotate between stands. Jeff quickly corrected the statement and said this is not IIIG style. Rich furthered that the SA is made up of all the stands and is calculated each time a stand calibrates or recalibrates. Travis Kostan (SwRI) added that the statisticians group looked at this; plenty of test entities that were severe before are now mild and that there is not a stacking effect. Amol asked why the stats group was not unanimous. Travis replied that there was no conflict on ICF. Rich said that there was some discussion on a lab based system, but no consensus.

Amol asked: in a lab-based system, if 1 stand calibrates and lab is now calibrated for the next 6 months; If there's a 2nd stand within those 6 months, is the lab supposed to calibrate? Jeff Clark (TMC) said it does nothing for calibration for other stands. Rich added that if a stand fails, that failing result is not included in the lab SA until that stand is calibrated. In other words, we do not update the lab SAs until there's an acceptable calibration.

The Chair summarized that there's still a negative that is likely to hold because it's possibly technically persuasive. Jeff Clark (TMC) said the panel needs to vote one way or another: 1) SP agrees with the negative and finds it technically persuasive, 2) SP disagrees and finds it non-persuasive, or 3) SP discussed and cannot come to a position. The Chair noted that there hasn't been wide participation in this call; since we're past the meeting time, Jeff commented that we lost stakeholders. The Chair proposed to reconvene this Wednesday and review this again. He requested Amol to assist us to come to a resolution.

Meeting adjourned at 11:45 am.

Appended: "VH fuel demand history VH panel June 2021 SwRI.pdf" and "VH21-4 Negative.pdf", both copied below, and can also be found attached in the Chair's email sent on June 13th at 11:40 AM EST.


VH fuel demand history VH panel, Ju


VH21-4_Negative.pdf

“VH fuel demand history VH panel June 2021 SwRI.pdf”

Slide 1:

VH fuel demand history

Slide 2:

Dates to remember…..

	Key Demand Influencing dates	
	Jan 2018, first registered VH test	
	May 2018, fuel contract signed	
420,000+gallons consumed in 32 months (13,125 gal/month)	August 2018 first reference on our current batch of VH fuel	
	May 1, 2020 GF-6 first license date	
	April 19, 2021, 240,000 gallons remaining in tank.	
	1-Sep-21	expect Haltermann to empty tank into ISO containers
		new batch can start when tank is empty
	Sept 1, 2021 dexos GEN3 first use date	
		expected batch depletion 240,000 gallons/13,125
	1-Oct-22	gallon per month is 18 months

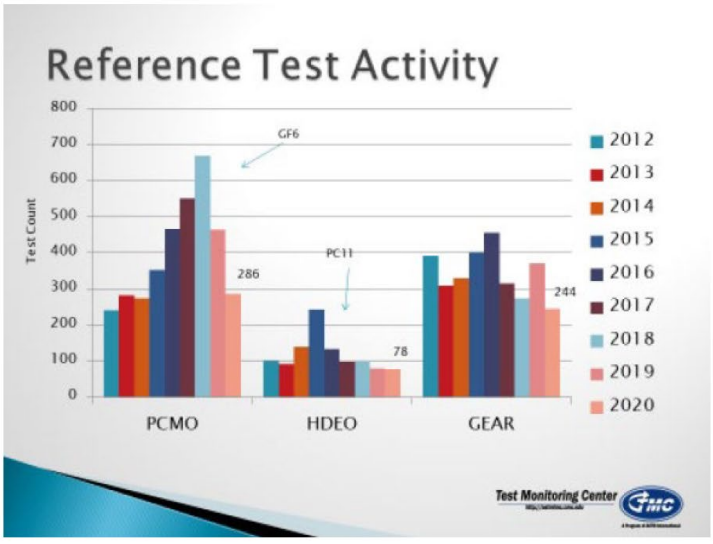
Slide 3:

History including GF-6 and dexos GEN3

VH tests on any fuel batch				
	Acc registered	references	total tests	total gallons
Jan 1 – Dec 31 2018	146	68	214	160,500
Jan 1 – Dec 31 2019	147	26	173	129,750
Jan 1 – Dec 31, 2020	148	16	164	123,000
Jan 1 –June 1, 2021	82	17	99	74,250

Slide 4:

Historical activity



Slide 5:

Historical perspective on VG test activity after GF-5 introduction in October 2010

VG tests on any fuel batch					
	ACC registered	references	total tests	total gallons	
October 1, 2008 – September 31, 2009	101	58	159	119,250	
October 1, 2009-September 31, 2010	150	21	171	128,250	
October 1, 2010 – September 31, 2011	130	58	188	141,000	peak year
October 1, 2011 – September 31, 2012	115	20	135	101,250	72%
October 1, 2012 – September 31, 2013	101	44	145	108,750	77%
October 1, 2013 – September 31, 2014	111	21	132	99,000	70%
October 1, 2014 – September 31, 2015	109	18	127	95,250	68%

Slide 6:

Historical perspective on VH test activity

VH tests on any fuel batch					
	Acc registered	references	total tests	total gallons	
Jan 1 – Dec 31 2018	146	68	214	160,500	peak year
Jan 1 – Dec 31 2019	147	26	173	129,750	81%
Jan 1 – Dec 31, 2020	148	16	164	123,000	77%
Jan 1 –June 1, 2021	82	17	99	74,250	

Slide 7:

Info to consider

- The AES recent correction factor was attributed to a change in performance of the fuel after an adjustment by the supplier. Longer storage life could lead to more adjustments
- Demand could be much lower in 2022 onward as GF-6 and dexos GEN3 will be mature, and GF-7 has not been defined. Lower demand could result in fuel being in storage for many years.
- SwRI proposes a 400,000 gallon batch which could give us same or longer life that the last 660,000 gallon batch, which is expected to last over 4 years.

"VH21-4 Negative.pdf":

Letter Ballot: D02 (21-04) Closing Date: Jun 07, 2021

Item No.: 6 (sub .B001)

Committee D02 and sub-committee D02.B0.01 Concurrent ballot

Item description: Approval of Industry correction factor for VH-AES – Apply an AES industry correction factor of -0.32 merits to all reference oil tests conducted on fuel batches GI0321NX10 and GI0321NX10-1, irrespective of completion date. Apply an AES industry correction factor of -0.32 to all non-reference oil tests completing on or after March 16, 2021 and using fuel batches GI0321NX10 and GI0321NX10-1.

VOTE on this ballot item: **NEGATIVE**

Statement in support of the Negative vote

Valvoline votes negative to the above-mentioned ballot item (21-04, item 6: VH-AES Industry correction factor) on the basis of following reasoning :

1) Not all the stands are showing the same general (mild) shift for ICF to apply:

An Industry Correction Factor (ICF) provides industrywide shift-correction for a said result parameter considering (assuming) that same/similar shift is observed throughout all the stands and labs across the industry. However, for the parameter in question, VH-AES (Avg. Engine Sludge), a closer inspection of the data reveals that not all the stands in the industry are exhibiting the same general shift. It appears, only few stands or one/two labs are mainly contributing to the mild shift in VH-AES. As an exercise, if the stands were to be plotted on individual stand basis (not lab basis), many stands show acceptable level of performance for the VH-AES parameter (for the mentioned fuel batches) and few of them can be argued to be on-target [data from few of such stands is provided in exhibit 1]. For such near-target/acceptably performing stands, proposed ICF would not be appropriate.

It is understood that the current VH-LTMS is a 'lab-based' system, but plotting it on stand-basis shows dilution of contribution to the observed severity shift. Previously presented analyses by the industry statisticians group clearly show stand differences (across different labs, as well as within a lab) [exhibit 2]. There may be a merit in exploring stand-based LTMS system for VH. Understandably, it may be problematic to change from lab-based to stand-based system this late, but without that we need to be mindful, a 'lab-based' system may provide undue bias suggesting lab-wide or industry-wide shift while not all individual stands may be exhibiting the same.

Suggestion:
- Lab-based LTMS system would be better for VH, looking at within lab(s) stand difference.
- A Lab-based correction factor instead of Industry-wide correction factor may provide more balanced approach.

2) Assumption of new fuel batch(es) causing shift:

Industry statistical analysis shows the new fuel batch/es being significantly different, however arguably, only few stands or one/two labs could be contributing more to that level of significance (statisticians analysis shows one lab and few stands as significantly different). It would be pertinent to see the data reanalyzed for fuel-batch significance removing the stands and lab showing significant difference.

Another fuel related issue, data analysis of various fuel parameters between old/original batch vs new batch/es did not yield any statistically significant differences, despite fuel batch showing up as significant.

It is possible that this shift/change may be coming from actual stand operation or setup, as the stands age or have had multiple runs, which chronologically may coincide with newer fuel batches (misidentifying fuel batch as the cause); this would be more applicable in case of higher activity stands/labs.

Suggestion: a deeper dive/ thorough check, comparison should be explored between the stands/labs showing higher shift versus near-target performance.

3) ICF was not really necessary:

Granted that the industry EWMA chart for VH-AES crossed the action alarm limit on couple of instances (roughly b/w Nov-20 to Feb-21 timeframe), but no lab was having any issue calibrating on references. And, soon after that the EWMA chart started trending downward. Which begs the question, was ICF really needed?

The sharp up and down trends in chronologically plotted EWMA chart may be due to few stands exhibiting higher shift or swing (variability), or could be unfortunate coincidental stacking due to chronological order in which they occurred. These up and down swings in EWMA chart would suggest ICF is not necessary at this point. Even the statisticians' group did not reach consensus on adoption of ICF for VH-AES (meeting minutes on record).

4) Early mismatch between old non-ICF Severity Adjustment (SA) and new total correction [ICF + SA] (for a lab with none or only one/two runs on the new fuel batch):

Calculations suggest, it requires 4 to 5 tests for the total correction from the new ICF (newSA + ICF) to catch up (match) with the older non-ICF SAs.

Most labs (especially higher activity labs) have had several reference-calibration runs on the new fuel batch before implementation of the VH-AES industry correction factor, so for such labs it is not an issue.

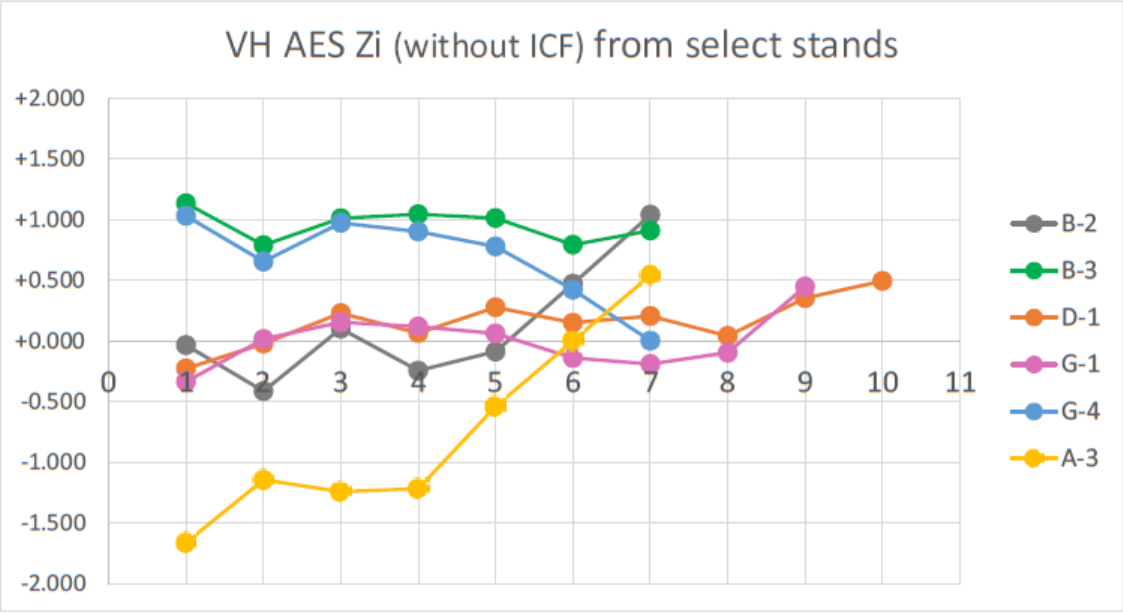
However, for a low activity or one stand lab which may not have had any or just one or two reference runs before the implementation of the said ICF, this mismatch b/w oldSA vs (newSA+ICF) can be significant and would not correctly reflect the stand performance and in turn candidates may be improperly adjusted/corrected.

Suggestion: Deferral of ICF implementation for such lab until total correction from ICF catch up with old SAs.

Technical contact on the matter:

AMOL SAVANT ACSavant@valvoline.com

Exhibit 1: Examples of industry stands VH-AES Zi's without ICF, when plotted on individual stand-basis



View Attachment: Ind stands VH AES wo ICF_examples.xlsx

(open in Excel)

Exhibit 2: Analysis from Statistician's group

Summary of Fit

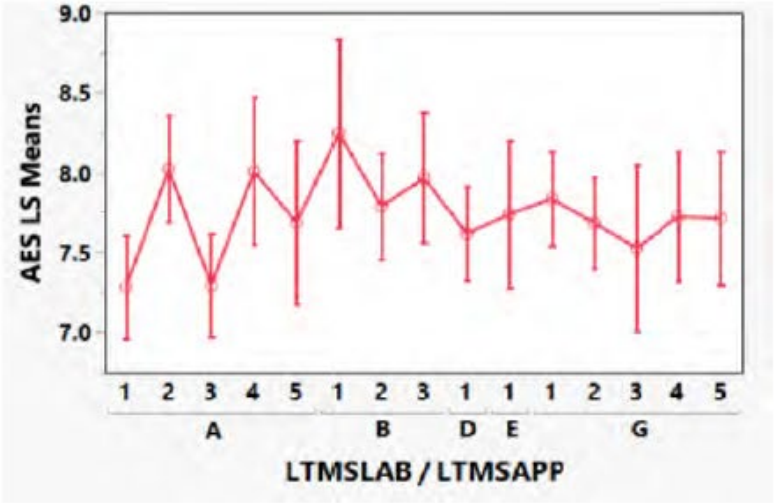
RSquare	0.809986
RSquare Adj	0.773519
Root Mean Square Error	0.493889
Mean of Response	7.582605
Observations (or Sum Wgts)	119

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	7.7432189	0.085812	90.23	<.0001*
IND[940]	-1.119497	0.091933	-12.18	<.0001*
IND[931]	0.493534	0.178145	2.77	0.0067*
IND[1009]	-0.301793	0.127622	-2.36	0.0200*
IND[1009-1]	0.0589726	0.189186	0.31	0.7559
LTMSLAB[A]	-0.083682	0.09145	-0.92	0.3624
LTMSLAB[B]	0.2572468	0.117018	2.20	0.0303*
LTMSLAB[D]	-0.124695	0.124617	-1.00	0.3194
LTMSLAB[E]	-0.003509	0.184053	-0.02	0.9848
LTMSLAB[A]:LTMSAPP[1]	-0.376329	0.146048	-2.58	0.0114*
LTMSLAB[A]:LTMSAPP[2]	0.3634119	0.155863	2.33	0.0217*
LTMSLAB[A]:LTMSAPP[3]	-0.363488	0.15013	-2.42	0.0173*
LTMSLAB[A]:LTMSAPP[4]	0.3480853	0.192346	1.81	0.0734
LTMSLAB[B]:LTMSAPP[1]	0.2452884	0.212374	1.15	0.2509
LTMSLAB[B]:LTMSAPP[2]	-0.209764	0.160655	-1.31	0.1947
LTMSLAB[G]:LTMSAPP[1]	0.138532	0.13666	1.01	0.3132
LTMSLAB[G]:LTMSAPP[2]	-0.014141	0.136865	-0.10	0.9179
LTMSLAB[G]:LTMSAPP[3]	-0.170056	0.209813	-0.81	0.4196
LTMSLAB[G]:LTMSAPP[4]	0.0273287	0.168074	0.16	0.8712
FUELBTID[DJ0121NX10]	-0.17511	0.049637	-3.53	0.0006*

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
IND	4	4	92.641414	94.9483	<.0001*
LTMSLAB	4	4	1.442837	1.4788	0.2144
LTMSAPP[LTMSLAB]	10	10	5.277192	2.1634	0.0262*
FUELBTID	1	1	3.035744	12.4453	0.0006*



Negative

Ballot Number: D02 (21-04) Close Date: JUNE 7, 2021

Item Number: 006 Revision Of D8256-2021 Test Method for Evaluation of Automotive Engine Oils for Inhibition of Deposit Formation in the Sequence VH Spark-Ignition Engine Fueled with Gasoline and Operated Under Low-Temperature, Light-Duty Conditions WK76491
Sequence VH Info Letter 21-1, Seq No. 3(SEE VOLUME 05.05)(CONCURRENT WITH .B001)
TECHNICAL CONTACT: Frank M Farber
fmf@astmtmc.cmu.edu
(412) 365-1030

Member's Name: AMOL SAVANT

Address: Valvoline, LLC
121 22nd St
WESTWOOD KY 41101

Phone Nr: 6065858982 Fax Nr:

Email Address: acsavant@valvoline.com

File Attachment: 2315980_D020421_6.pdf

Statement:

Section **Statement**

VOTE on this ballot item: **NEGATIVE**

Member #: 2315980 AMOL SAVANT
ACSavant@valvoline.com

Statement in support of the Negative vote

I vote negative to the above-mentioned ballot item (21-04, item 6: VH-AES Industry correction factor) on the basis of following reasoning :

1) Not all the stands showing the same general (mild) shift to warrant industry-wide correction factor:

An Industry Correction Factor (ICF) provides industrywide shift-correction for a said result parameter considering (assuming) that same/similar shift is observed throughout all the stands and labs across the industry. However, for the parameter in question, VH-AES (Avg. Engine Sludge), a closer inspection of the data reveals that not all the stands in the industry are exhibiting the same general shift. It appears, only few stands

or one/two labs are mainly contributing to the mild shift in VH-AES. As an exercise, if the stands were to be plotted on individual stand basis (not lab basis), many stands show acceptable level of performance for the VH-AES parameter (for the mentioned fuel batches) and few of them can be argued to be on-target [data from few of such stands is provided in exhibit 1]. For such near-target/acceptably performing stands, proposed ICF would not be appropriate.

It is understood that the current VH-LTMS is a 'lab-based' system, but plotting it on stand-basis shows dilution of contribution to the observed severity shift. Previously presented analyses by the industry statisticians group clearly show stand differences (across different labs, as well as within a lab) [exhibit 2]. There may be a merit in exploring stand-based LTMS system for VH. Understandably, it may be problematic to change from lab-based to stand-based system this late, but without that we need to be mindful, a 'lab-based' system may provide undue bias suggesting lab-wide or industry-wide shift while not all individual stands may be exhibiting the same.

Suggestion: ● Lab-based LTMS system would be better for VH, looking at within lab(s) stand difference.

- A Lab-based correction factor instead of Industry-wide correction factor may provide more balanced approach.

2) Assumption of new fuel batch(es) causing shift:

Industry statistical analysis shows the new fuel batch/es being significantly different, however arguably, only few stands or one/two labs could be contributing more to that level of significance (statisticians analysis shows one lab and few stands as significantly different). It would be pertinent to see the data reanalyzed for fuel-batch significance removing the stands and lab showing significant difference.

Another fuel related issue, data analysis of various fuel parameters between old/original batch vs new batch/es did not yield any statistically significant differences, despite fuel batch showing up as significant.

It is possible that this shift/change may be coming from actual stand operation or setup, as the stands age or have had multiple runs, which chronologically may coincide with newer fuel batches (misidentifying fuel batch as the cause); this would be more applicable in case of higher activity stands/labs.

Suggestion: a deeper dive/ thorough check, comparison should be explored between the stands/labs showing higher shift versus near-target performance.

3) ICF was not truly necessary:

Granted that the industry EWMA chart for VH-AES crossed the action alarm limit on couple of instances (roughly b/w Nov-20 to Feb-21 timeframe), but no lab was having any issue calibrating on references. And, soon after that the EWMA chart started trending downward. Which begs the question, was ICF really needed?

The sharp up and down trends in chronologically plotted EWMA chart may be due to few stands exhibiting higher shift or swing (variability), or could be unfortunate coincidental stacking due to chronological order in which they occurred. These up and down swings in EWMA chart would suggest ICF is not necessary at this point. Even the statisticians' group did not reach consensus on adoption of ICF for VH-AES (meeting minutes on record).

4) Early mismatch between old non-ICF Severity Adjustment (SA) and new total correction [ICF + SA] (for a lab with none or only one/two runs on the new fuel batch):

Calculations suggest, it requires 4 to 5 tests for the total correction from the new ICF (newSA + ICF) to catch up (match) with the older non-ICF SAs.

Most labs (especially higher activity labs) have had several reference-calibration runs on the new fuel batch before implementation of the VH-AES industry correction factor, so for such labs it is not an issue.

However, for a low activity or one stand lab which may not have had any or just one or two reference runs before the implementation of the said ICF, this mismatch b/w oldSA vs (newSA+ICF) can be significant and would not correctly reflect the stand performance and in turn candidates may be improperly adjusted/corrected.

Suggestion: Deferral of ICF implementation for such lab until total correction from ICF catch up with old SAs.

Letter Ballot: D02 (21-04) Closing Date: Jun 07, 2021

Item No.: 6 (sub .B001)

Committee D02 and sub-committee D02.B0.01 Concurrent ballot

Item description: Approval of Industry correction factor for VH-AES – Apply an AES industry correction factor of -0.32 merits to all reference oil tests conducted on fuel batches GI0321NX10 and GI0321NX10-1, irrespective of completion date. Apply an AES industry correction factor of -0.32 to all non-reference oil tests completing on or after March 16, 2021 and using fuel batches GI0321NX10 and GI0321NX10-1.

VOTE on this ballot item: **NEGATIVE**

Member #: 2315980 AMOL SAVANT ACSavant@valvoline.com

Statement in support of the Negative vote

I vote negative to the above-mentioned ballot item (21-04, item 6: VH-AES Industry correction factor) on the basis of following reasoning :

1) Not all the stands showing the same general (mild) shift to warrant industry-wide correction factor:

An Industry Correction Factor (ICF) provides industrywide shift-correction for a said result parameter considering (assuming) that same/similar shift is observed throughout all the stands and labs across the industry. However, for the parameter in question, VH-AES (Avg. Engine Sludge), a closer inspection of the data reveals that not all the stands in the industry are exhibiting the same general shift. It appears, only few stands or one/two labs are mainly contributing to the mild shift in VH-AES. As an exercise, if the stands were to be plotted on individual stand basis (not lab basis), many stands show acceptable level of performance for the VH-AES parameter (for the mentioned fuel batches) and few of them can be argued to be on-target [data from few of such stands is provided in exhibit 1]. For such near-target/acceptably performing stands, proposed ICF would not be appropriate.

It is understood that the current VH-LTMS is a 'lab-based' system, but plotting it on stand-basis shows dilution of contribution to the observed severity shift. Previously presented analyses by the industry statisticians group clearly show stand differences (across different labs, as well as within a lab) [exhibit 2]. There may be a merit in exploring stand-based LTMS system for VH. Understandably, it may be problematic to change from lab-based to stand-based system this late, but without that we need to be mindful, a 'lab-based' system may provide undue bias suggesting lab-wide or industry-wide shift while not all individual stands may be exhibiting the same.

Suggestion: • Lab-based LTMS system would be better for VH, looking at within lab(s) stand difference.

• A Lab-based correction factor instead of Industry-wide correction factor may provide more balanced approach.

2) Assumption of new fuel batch(es) causing shift:

Industry statistical analysis shows the new fuel batch/es being significantly different, however arguably, only few stands or one/two labs could be contributing more to that level of significance (statisticians analysis shows one lab and few stands as significantly different). It would be pertinent to see the data reanalyzed for fuel-batch significance removing the stands and lab showing significant difference.

Another fuel related issue, data analysis of various fuel parameters between old/original batch vs new batch/es did not yield any statistically significant differences, despite fuel batch showing up as significant.

It is possible that this shift/change may be coming from actual stand operation or setup, as the stands age or have had multiple runs, which chronologically may coincide with newer fuel batches (misidentifying fuel batch as the cause); this would be more applicable in case of higher activity stands/labs.

Suggestion: a deeper dive/ thorough check, comparison should be explored between the stands/labs showing higher shift versus near-target performance.

3) ICF was not truly necessary:

Granted that the industry EWMA chart for VH-AES crossed the action alarm limit on couple of instances (roughly b/w Nov-20 to Feb-21 timeframe), but no lab was having any issue calibrating on references. And, soon after that the EWMA chart started trending downward. Which begs the question, was ICF really needed?

The sharp up and down trends in chronologically plotted EWMA chart may be due to few stands exhibiting higher shift or swing (variability), or could be unfortunate coincidental stacking due to chronological order in which they occurred. These up and down swings in EWMA chart would suggest ICF is not necessary at this point. Even the statisticians' group did not reach consensus on adoption of ICF for VH-AES (meeting minutes on record).

4) Early mismatch between old non-ICF Severity Adjustment (SA) and new total correction [ICF + SA] (for a lab with none or only one/two runs on the new fuel batch):

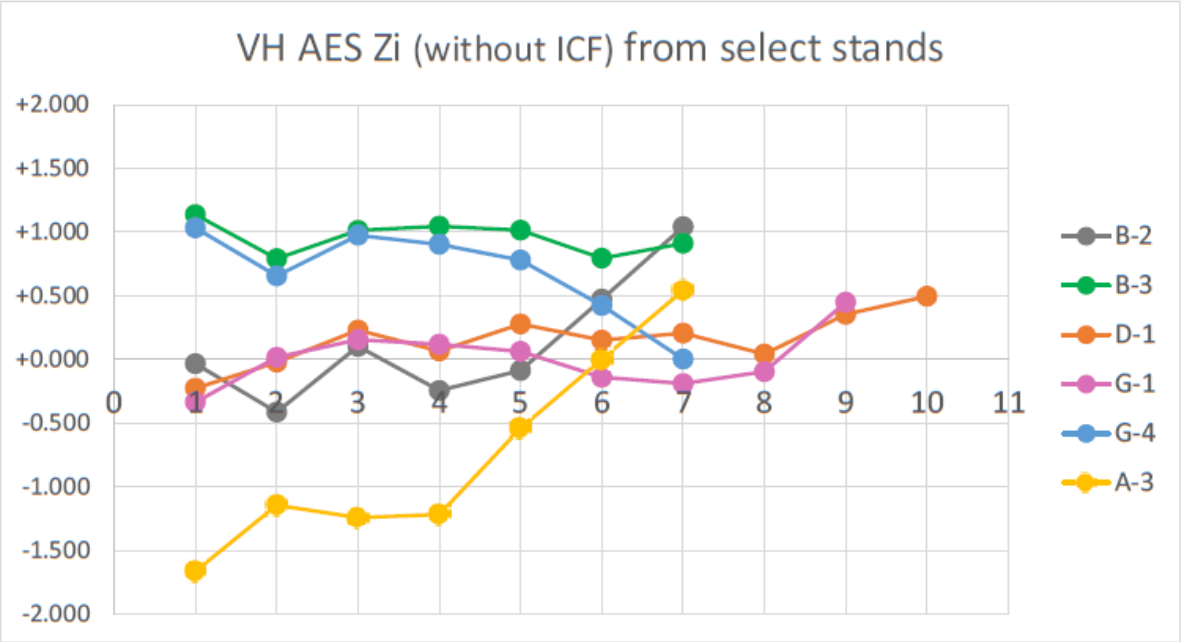
Calculations suggest, it requires 4 to 5 tests for the total correction from the new ICF (newSA + ICF) to catch up (match) with the older non-ICF SAs.

Most labs (especially higher activity labs) have had several reference-calibration runs on the new fuel batch before implementation of the VH-AES industry correction factor, so for such labs it is not an issue.

However, for a low activity or one stand lab which may not have had any or just one or two reference runs before the implementation of the said ICF, this mismatch b/w oldSA vs (newSA+ICF) can be significant and would not correctly reflect the stand performance and in turn candidates may be improperly adjusted/corrected.

Suggestion: Deferral of ICF implementation for such lab until total correction from ICF catch up with old SAs.

Exhibit 1: Examples of industry stands VH-AES Zi's without ICF, when plotted on individual stand-basis



View Attachment: Ind stands VH AES wo ICF_examples.xlsx

(open in Excel)

Exhibit 2: Analysis from Statistician's group

Summary of Fit

RSquare	0.809986
RSquare Adj	0.773519
Root Mean Square Error	0.493889
Mean of Response	7.582605
Observations (or Sum Wgts)	119

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	7.7432189	0.085812	90.23	<.0001*
IND[940]	-1.119497	0.091933	-12.18	<.0001*
IND[931]	0.493534	0.178145	2.77	0.0067*
IND[1009]	-0.301793	0.127622	-2.36	0.0200*
IND[1009-1]	0.0589726	0.189186	0.31	0.7559
LTMSLAB[A]	-0.083682	0.09145	-0.92	0.3624
LTMSLAB[B]	0.2572468	0.117018	2.20	0.0303*
LTMSLAB[D]	-0.124695	0.124617	-1.00	0.3194
LTMSLAB[E]	-0.003509	0.184053	-0.02	0.9848
LTMSLAB[A]:LTMSAPP[1]	-0.376329	0.146048	-2.58	0.0114*
LTMSLAB[A]:LTMSAPP[2]	0.3634119	0.155863	2.33	0.0217*
LTMSLAB[A]:LTMSAPP[3]	-0.363488	0.15013	-2.42	0.0173*
LTMSLAB[A]:LTMSAPP[4]	0.3480853	0.192346	1.81	0.0734
LTMSLAB[B]:LTMSAPP[1]	0.2452884	0.212374	1.15	0.2509
LTMSLAB[B]:LTMSAPP[2]	-0.209764	0.160655	-1.31	0.1947
LTMSLAB[G]:LTMSAPP[1]	0.138532	0.13666	1.01	0.3132
LTMSLAB[G]:LTMSAPP[2]	-0.014141	0.136865	-0.10	0.9179
LTMSLAB[G]:LTMSAPP[3]	-0.170056	0.209813	-0.81	0.4196
LTMSLAB[G]:LTMSAPP[4]	0.0273287	0.168074	0.16	0.8712
FUELBTID[DJ0121NX10]	-0.17511	0.049637	-3.53	0.0006*

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
IND	4	4	92.641414	94.9483	<.0001*
LTMSLAB	4	4	1.442837	1.4788	0.2144
LTMSAPP[LTMSLAB]	10	10	5.277192	2.1634	0.0262*
FUELBTID	1	1	3.035744	12.4453	0.0006*