

# Sequence V Surveillance Panel | MINUTES

Revision Date 06-05-2016 | Revision 1.0

<b>Relevant Test:</b>	Sequence VG and VH
<b>Note Taker:</b>	Chris Mileti, Kevin O'Malley
<b>Meeting Date:</b>	06-01-2016
<b>Lubrizol Attendees:</b>	
<b>Comments:</b>	Sequence V Surveillance Panel conference call to discuss approving the "DJ" fuel batch for the Sequence VG test.

## "SEQUENCE VG NEW FUEL BATCH ADJUSTMENTS" PRESENTATION:

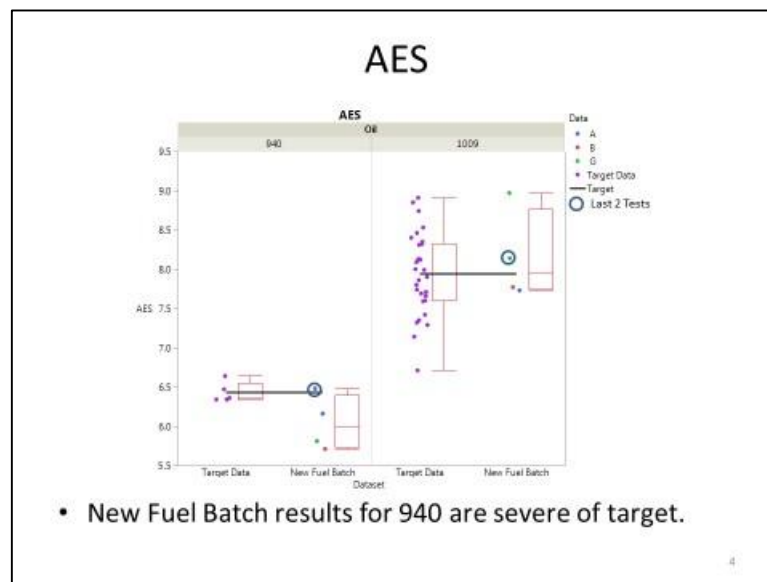
### 1. Background:

- Boese discussed the "Sequence VG New Fuel Batch Adjustments" presentation that was submitted by the Statistical Team on June 1<sup>st</sup>.
- The Statistical Team compiled the presentation a day earlier, so the turnaround time was extremely short.
  - The statisticians were unable to come to a broad agreement on the content of this presentation.
- The statisticians are not recommending any adjustments for the "DJ" fuel batch.

### 2. Shewhart Severity Limits:

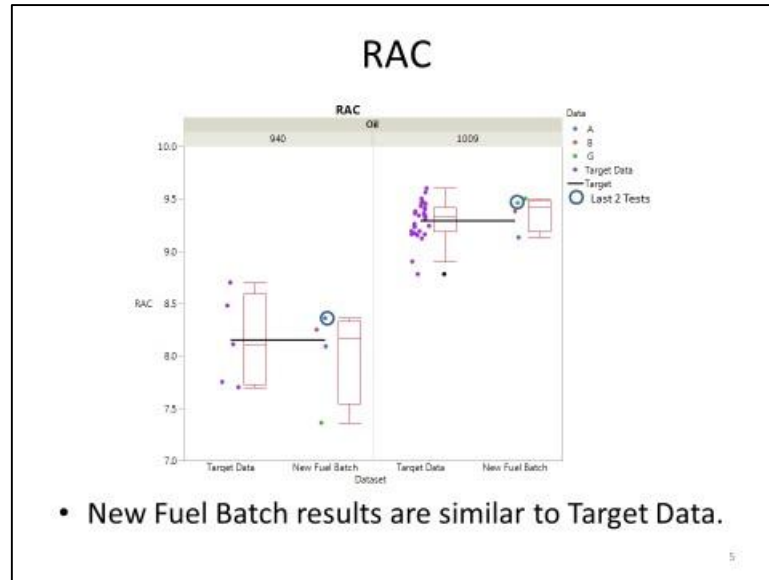
- Of the four recent tests, two passed the Shewhart severity limits.
- The last two tests were for calibration purposes and did not pass the Shewhart limits (but were close).

### 3. Slide #4:



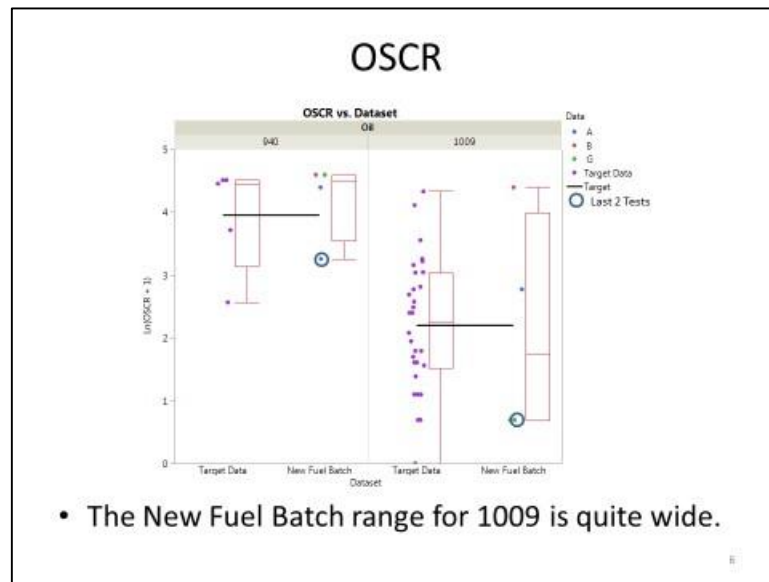
- The REO940 Average Engine Sludge results with the "DJ" fuel batch are severe of target.

**4. Slide #5:**



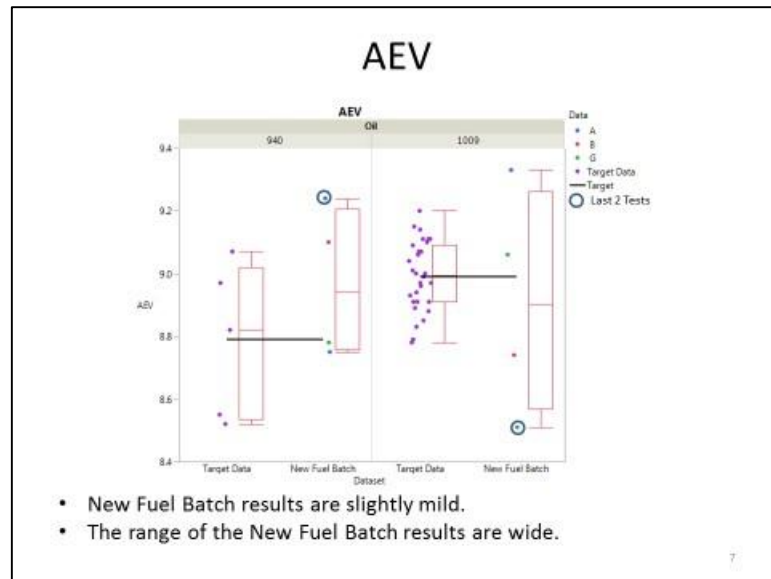
a. The Rocker Arm Cover Sludge results with the “DJ” fuel batch are close to the targets.

**5. Slide #6:**



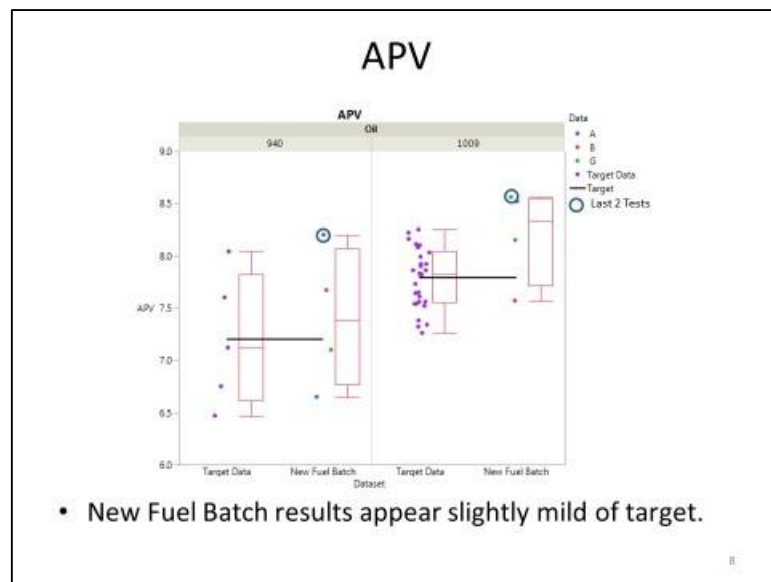
- a. Overall, there is a large amount of variability in the Oil Screen Clogging results with the “DJ” fuel batch.
- b. The variability with REO1009 is higher than with REO940.

**6. Slide #7:**



a. The Average Engine Varnish for REO940 is slightly mild of target with the “DJ” fuel batch.

**7. Slide #8:**



a. The Average Piston Varnish is mild of target for both reference oils with the “DJ” fuel batch.

**8. Slides 10 Through 16:**

- a. The subsequent statistical analysis provides no evidence that adjustments are needed.
- b. Of the eight tests with the “DJ” fuel batch, two of the tests had parameters that exceeded the Shewhart limit ( $Y_i=1.8$ ).
- c. Of the eight tests with the “DJ” fuel batch, two of the tests had parameters that were very close to the Shewhart limits.
- d. **Comments from O’Malley:**
  - i. Four of the tests in the matrix are hovering around the control limits.
    1. Is this pass/fail rate normal for Sequence V reference tests?
  - ii. TMC Response:

1. The frequency of tests that are close to the limit may actually be low compared to previous batches.
  2. But overall they do not know what to make of this data.
- e. **Comments from Martinez:**
- i. The AEV parameter is definitely more variable with the "DJ" batch of fuel.
  - ii. *Intertek Comment:*
    1. Each of the labs is using a different batch of VG pistons.
    2. This could be impacting APV, which in turn will impact AEV.
      - a. APV is used along with the left-side and right-side camshaft baffle varnish in the calculation of AEV.
  - iii. *Ford Comment:*
    1. Romano is not sure that the APV parameter is contributing to the AEV variability.
    2. He believes that the camshaft baffle varnish is the bigger contributor to AEV variability.
  - iv. *Afton Comment:*
    1. The variability in camshaft baffle varnish is concerning.
    2. It is possible that the baffles are getting covered in sludge sooner than with previous fuel batches?
  - v. *Lubrizol Comment:*
    1. Lubrizol has collected evidence suggesting that scratches in the baffle surface (resulting from aggressive cleaning) can increase oil retention time and thus varnish formation.
    2. Test precision (in terms of AEV) could be improved by modifying the procedure so that the baffles can be cleaned in the ultrasonic cleaner.

## 9. Intertek's Concerns Regarding $Y_i$ :

- a. The fuel matrix dataset is limited.
- b. The labs risk failing reference tests for APV and OSC if there are no correction factors and the  $Y_i$  remains unchanged.
- c. The Surveillance Panel should consider widening the  $Y_i$  limits.
  - i. This has been done in the past.
  - ii. The current "AK" fuel batch uses exotic correction factors for many of the parameters.
  - iii. The  $Y_i$  could be increased from 1.8 to 2.5 for the secondary parameters.
- d. **Ford Comment:**
  - i. Romano is willing to increase the  $Y_i$  for OSC but not for APV.
    1. He does not want to see APV become any more variable.
- e. **Afton Comment:**
  - i. The  $Y_i$  could be increased to 2.0 instead of all the way to 2.5.
  - ii. This could put the pass/fail rate close to where it is now.
- f. **TMC Comment:**
  - i. Any changes to LTMS require a 2-week waiting period.
  - ii. Retroactive changes to LTMS are very taboo, so this change could only be applied to future tests.

## 10. Lubrizol's Concerns about Fuel Matrix Data:

- a. The data on Slide #16 indicates that something is not right [with the test and fuel combination].

## New Fuel Batch Matrix Test Y<sub>i</sub>s

New Fuel Batch Matrix Y<sub>i</sub>s (No Fuel Batch Adjustments)

Test Key	Lab	Oil	AES	AEV	RAC	APV	OSCR
107179-VG	G	940	-1.2157	0.7600	-0.8587	0.2222	0.7668
110579-VG	A	940	-0.5294	-0.1600	-0.0652	-0.8730	0.5279
113363-VG	B	940	-0.7843	0.5600	0.1087	0.1429	0.7668
107183-VG	B	1009	0.2885	-1.9094	0.3333	-1.3953	2.1147
105817-VG	A	1009	-0.4038	1.5455	-0.5926	1.6977	0.5516
107180-VG	G	1009	1.9808	1.2273	0.7778	1.3953	-1.4517
114532-VG	A	940	0.0980	1.8000	0.2283	1.5873	-0.8249
104341-VG	G	1009	0.9808	-1.3182	0.6296	1.7907	-1.4517

Within (but below) 0.01 of Shewhart severity limit.

Exceeds Shewhart severity limit.

- Of the 8 New Fuel Batch tests, 2 had parameters which exceeded Shewhart limit ( $K = 1.8$ ).

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- Is the Surveillance Panel ignoring something that is going on with test?
- Should more data be collected?
- Intertek Comment:**
  - Additional data may be needed.
  - They are worried that the current situation could lead to an increase in the number of failed reference tests.
- TMC Comment:**
  - If the labs are worried about failing reference tests, then the group should definitely be worried about candidate tests as well.
  - OSC is obviously not well behaved.
  - Perhaps more data is needed to better understand the varnish parameters.
- SWRI Comment:**
  - They are going to run out of the ""AK"" fuel batch within the next few weeks.
- Ritchie Comment:**
  - This is obviously not an ideal situation, but the group needs to make choices that everyone can live with.
  - Additional data will give us a better handle on the Y<sub>i</sub> situation, but it will also use up critical hardware that is already in short supply.
  - The ""DJ"" fuel batch should be approved so that the labs can focus on the development of the VH test.

## SURVEILLANCE PANEL MOTIONS:

### 1. Southwest Motion to Approve ""DJ"" Fuel Batch:

- SWRI Motion:** The ""DJ"" fuel batch should be approved for the Sequence VG test, based on the available data, and with no correction factors. The Y<sub>i</sub> should also be increased from 1.8 to 2.0 for the APV and OSC parameters.
- Ford accepted the motion, and it was seconded by Intertek.
- The motion passed with (8) ""approve"" votes and (5) ""waive"" votes.

### 2. Amendment to Original Southwest Motion [\*\*\*UPDATE\*\*\*]:

- After the 06-01-2016 meeting, there was some confusion regarding the appropriate wording for the original SWRI motion.
- Andy Ritchie issued a revised E-ballot via email on 06-03-2016 at 12:50PM EST.

- c. **Ritchie Revision to SWRI Motion:** Approve the DJ batch of Haltermann fuel for the Sequence VG test based on the available fuel release matrix data, with no correction factors, and an increase in the OSC, AEV and APV  $Y_i$  from 1.8 to 2.0.

**3. Ford Motion to Stop Further Extensions on References:**

- a. **Ford Motion:** Effective immediately, no further extensions will be granted. Current extensions will still expire on the originally acknowledged date.
- b. This motion was seconded by the TMC.
- c. The motion passed with (10) "approve" votes and (2) "waive" votes.

**SOUTHWEST UPDATE ON VG-B TEST DEVELOPMENT:**

**1. Background:**

- a. SWRI began to internally develop the VG-B test in response to their severe results with the VG-A test.
- b. **VG-B Summary:**
  - i. *VH Parts:* Engine block, cylinder heads, pistons, intake manifold and throttle body
  - ii. *VG Parts:* EEC-IV ECM, test stand and piston rings
  - iii. *VG-A Features Carried Over to VG-B:* Fuel pressure is controlled, Stage 2 and Stage 3 coolant flow rate is controlled
- c. The VG-B test configuration has delivered more manageable severity levels with the "DJ" fuel batch.

**2. Intertek VG-B Preparations:**

- a. IAR has built a VG-B engine.
- b. Once IAR and SWRI complete their second operational data review, IAR will attempt to replicate the original SWRI VG-B test using REO1009.
  - i. IAR and SWRI have identified significant oil and coolant temperature differential differences between the labs.
- c. Ritchie requested that all Surveillance Panel members resume using "Sequence VH" to describe future test development.

Action Items	Person responsible	Completion Date

Follow-up Notes/Updates:	Initials	Date Added