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**COMMITTEE D02 ON PETROLEUM PRODUCTS, LIQUID FUELS, AND LUBRICANTS**

**CHAIRMAN:** RANDY F JENNINGS, TENNESSEE DEPT OF AGRIC, P O Box 40627, NASHVILLE, TN 37204, UNITED STATES (615) 837-5327, FAX: (615) 837-5335, E-MAIL: RANDY.JENNINGS@TN.GOV  
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Originally Issued: August XX , 2024

Reply to: Richard Grundza  
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Unapproved Minutes of the July 17, 2024  
Sequence IV Surveillance Panel Conference Call.

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The meeting was called to order by Chairman Buscher at 10:00 AM Central Time.

A copy of the agenda is included as attachment 1.

A list of attendees is included as attachment 2. Bill introduced the new Toyota representative, Venkat Deshpande.

Minutes from the 11/14/23 meeting were approved by voice vote.

The panel discussed status of the Sequence IVA test. Approximately 55 builds are left and sufficient quantities of reference oil are available to allow for calibration. Test activity is about one test per month. Once there is approximately 12 tests left, CLOG will contact interested users of the test to see if some variant of the IVB or other test can be used to replace the IVA. A Haltermann representative was not available. C of A for the current fuel batch was reviewed and the chair indicated that the Action Item to confirm D2622 is being used for sulfur has been completed as past C of A's showed this method for sulfur measurement. The panel also reviewed the CPD report. Currently, Batch G cams are being used for intake and Batch H cams will be available shortly. All the hardware supplier updates are included as attachment 3.

The panel heard from TMC regarding oil availability. Current oils are at least at a 5 year supply. Bill Buscher indicated the supplier of reference oil 1012 informed him that this oil could not be reblended. Bill asked if the TMC could see if both reference oils 1011-1 and 300-1 could be reblended. The TMC agreed to follow up on that request. The panel reviewed current industry control charts and discussed lab and stand influence on the charts. The Bill and the TMC agreed to investigate cam batches and lifter grades for potential impact on severity. Industry control charts as well as plots by oil and stand are included in attachment 4.

The group discussed single lobe failure and reviewed current rates. There appears to have been an uptick late last year, but rates have been below 10 % or so for some time. The panel discussed the need to continue to segregate engines which ran oils less than 0W-16 for use only with less than 0W-16 oils and agreed to remove the requirement. Since the vote was 6 for and 5 waives, the panel agreed to a 7/31/24 effective date to allow any members or users not present to express concerns before issuing an information letter. The panel reviewed a set of motions to report negative wear values as 0. This was approved with one member waiving,

The panel reviewed the action items from the previous meeting (see attachment 5). It was agreed to put off holding a metrology workshop until early 2025, when test activity may be lower. The group followed up on an action item regarding adding an engine coolant temperature circuit to facilitate cold starts after long down times, but no progress had been made on that item. The group also heard from one panel member that the Keyence VR-3000 is being phased out and all required support may not be available for it. (attachment 6).

Attachment 7 includes the motion and action items recorded during this meeting.

The next meeting will be at the call of the chair.

**MEMBERSHIP  
SEQUENCE IV SURVEILLANCE PANEL**

July 17, 2024

NAME	COMPANY-ADDRESS-PHONE-FAX-EMAIL	SIGNATURE
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**MEMBERSHIP  
SEQUENCE IV SURVEILLANCE PANEL**

July 17, 2024

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**NON-MEMBER MAILING LIST  
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July 17, 2024

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July 17, 2024

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**NON-MEMBER MAILING LIST  
SEQUENCE IV SURVEILLANCE PANEL**

July 17, 2024

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	Company: Phone No.: Cell No.: Email:	
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	Company: Phone No.: Cell No.: Email:	
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## **Sequence IV Surveillance Panel**

Microsoft Teams Meeting

July 17, 2024

10:00 a.m. - 12:00 p.m. Central Time

### A G E N D A

1. Chairman comments.
2. Attendance.
3. Membership changes.
4. Approval of minutes for November 14, 2023.
5. Introduction of the replacement contact for Toyota.
6. Sequence IVA status report.
7. Fuel supplier status report.
8. CPD inventory status report.
9. Reference oil status report.
10. Sequence IVB discussion on industry severity trends.
11. Sequence IVB discussion and motion on *The Special Case of Wear Results Being Negative*.
12. Scheduling the Sequence IVB metrology workshop.
13. Old business.
14. New business.
15. Next meeting.
16. Adjourn.



## Seq. IVB Inventory Status Report As of May 31, 2024

**For presentation to:**

**PCEOCP (June 18, 2024)**

**&**

**Seq. IV Surveillance Panel (July 17, 2024)**

### 1. Seq. IVB Engine Inventory Life Estimates (Based on Industry Wide Consumption Rates)

<b>Remaining Engine Inventory Life (Based on 5 Year Industry Wide Consumption Rate)</b>	
OHTIVB-16000-2 Engine Assembly	8.36 Years
Including Engine Component Build-Out	12.56 Years

\*Includes highest yearly consumption rate (2018-2019)

<b>Remaining Engine Inventory Life (Based on 2 Year Average Industry Wide Consumption Rate)</b>	
Current OHTIVB-16000-2 Engine Assembly	9.95 Years
Including Engine Component Build-Out	14.95 Years

<b>Remaining Engine Inventory Life (Based on 1 Year Industry Wide Consumption Rate)</b>	
OHTIVB-16000-2 Engine Assembly	9.95 Years
Including Engine Component Build-Out	14.95 Years

**Comments:**

- At the time of this estimate, the supplier anticipates engine consumption rates to remain the same.
- The supplier has also acquired enough ancillary engine kit materials (OHTIVB-103-1) to match our engine inventory.

## 2. Seq. IVB Intake and Exhaust Camshaft Inventory Life Estimates (Based on Industry Wide Consumption Rates)

<b>Remaining Camshaft Inventory Life (Based on 5 Year Average Industry Wide Consumption Rate)</b>	
Seq. IVB Intake Camshaft	14.50 Years
Seq. IVB Exhaust Camshaft	16.66 Years

\*Includes highest yearly consumption rate (2018-2019)

<b>Remaining Camshaft Inventory Life (Based on 2 Year Average Industry Wide Consumption Rate)</b>	
Seq. IVB Intake Camshaft	17.89 Years
Seq. IVB Exhaust Camshaft	21.82 Years

<b>Remaining Camshaft Inventory Life (Based on 1 Year Industry Wide Consumption Rate)</b>	
Seq. IVB Intake Camshaft	17.74 Years
Seq. IVB Exhaust Camshaft	20.61 Years

### Comments:

- At the time of this estimate, the supplier anticipates camshaft consumption rates to remain the same.
- The supplier has also acquired enough camshaft test kit (OHTIVB-102-1) materials to match our camshaft inventory.

## 3. Seq. IVB Test Lifters Inventory Life Estimates (Based on Industry Wide Consumption Rates)

<b>Remaining Lifter Inventory Life (Based on Average Industry Wide Consumption Rate)</b>	
Minimum Inventory Life of any Given Lifter Size (5 Year Consumption Rate)	>22 Years
Minimum Inventory Life of any Given Lifter Size (2 Year Consumption Rate)	>23 Years
Minimum Inventory Life of any Given Lifter Size (1 Year Consumption Rate)	>22 Years

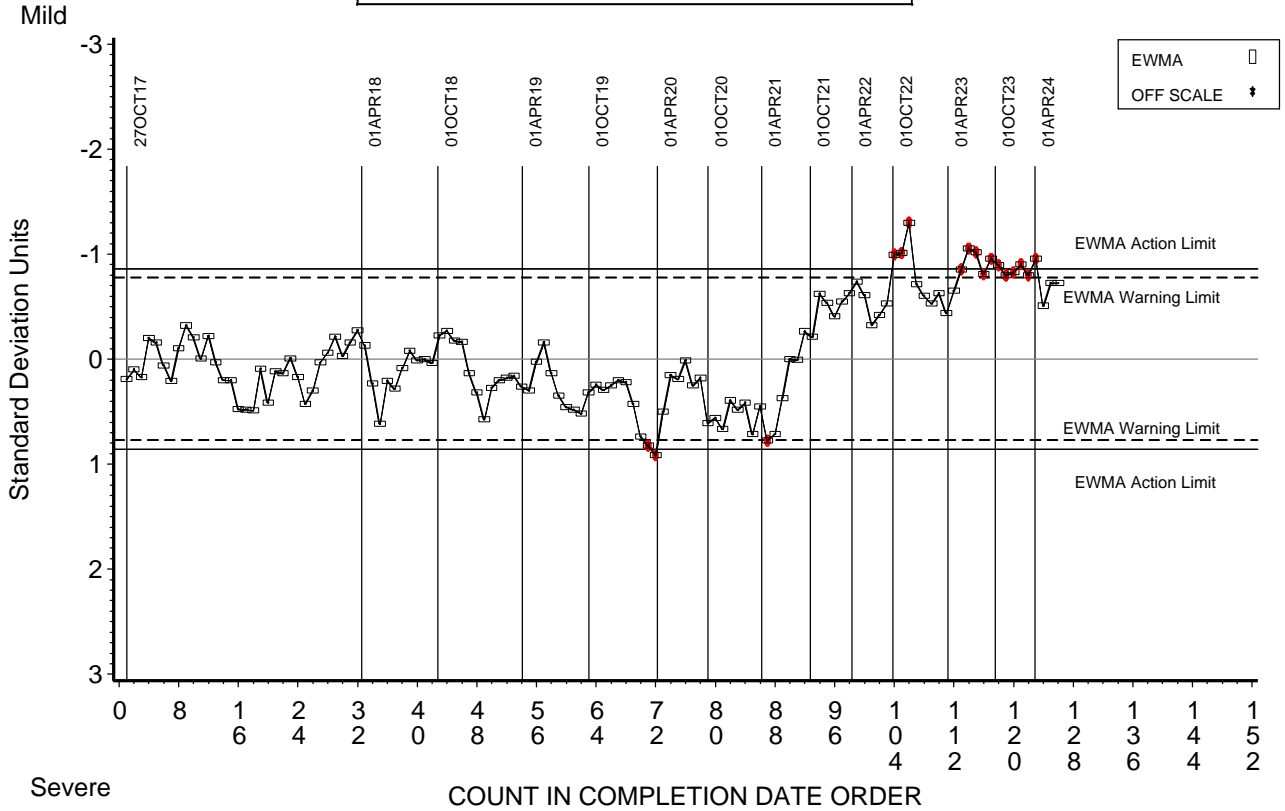
- There are 25 individual lifter grades (sizes). The remaining lifter inventory life estimate indicates the earliest depletion of any given lifter grade.
- At the time of this estimate, the supplier anticipates lifter consumption rates to remain the same.

# SEQUENCE IVB INDUSTRY OPERATIONALLY VALID DATA

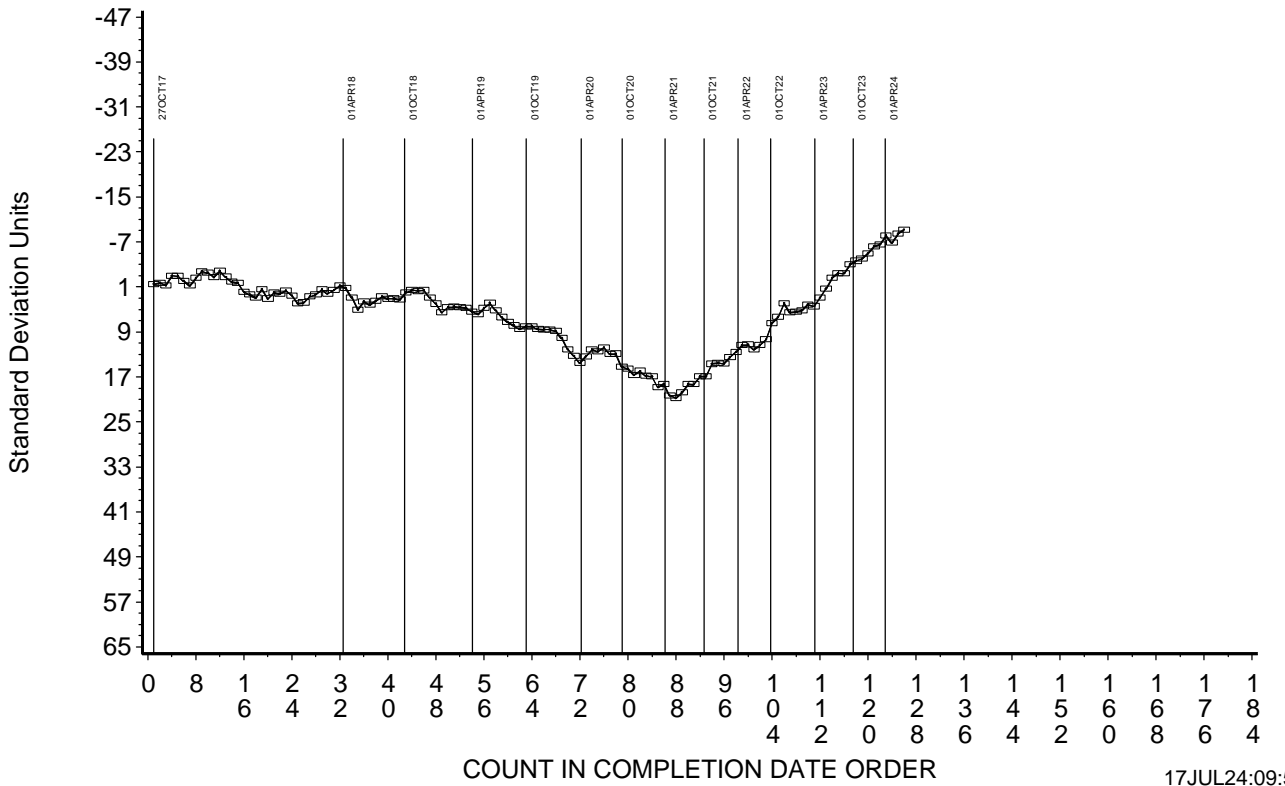
## AVERAGE VOLUME LOSS BY KEYENCE INTAKE Final



LTMS Severity Analysis

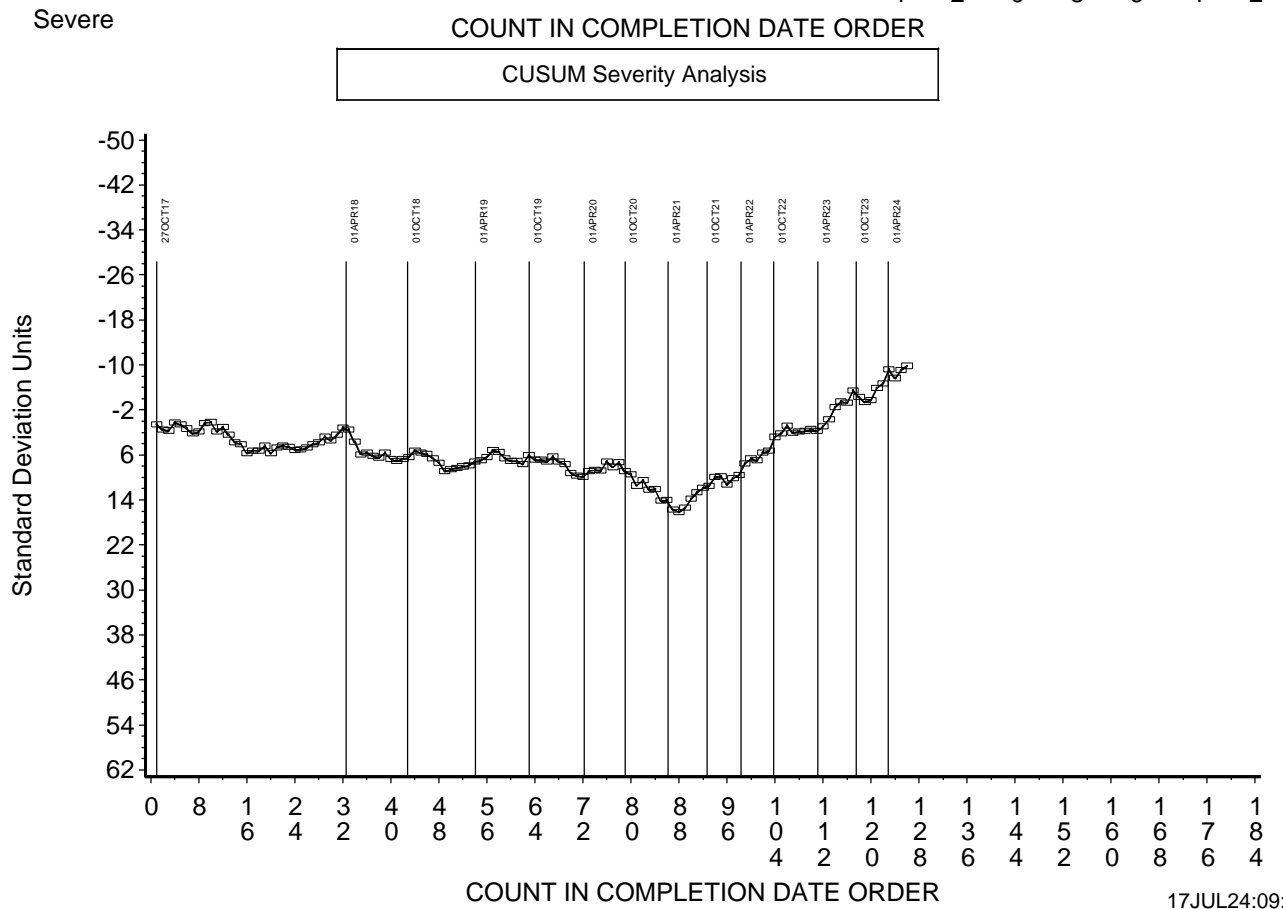
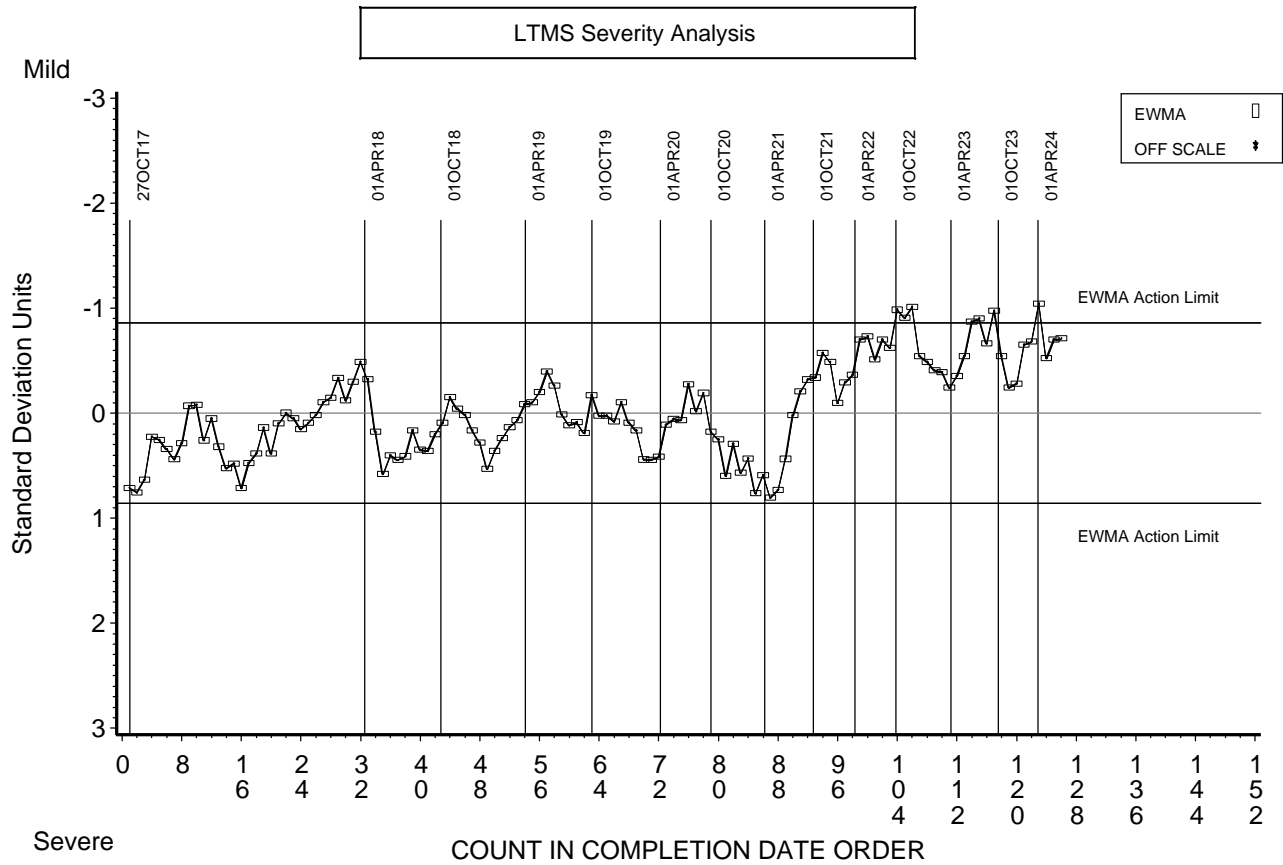


CUSUM Severity Analysis

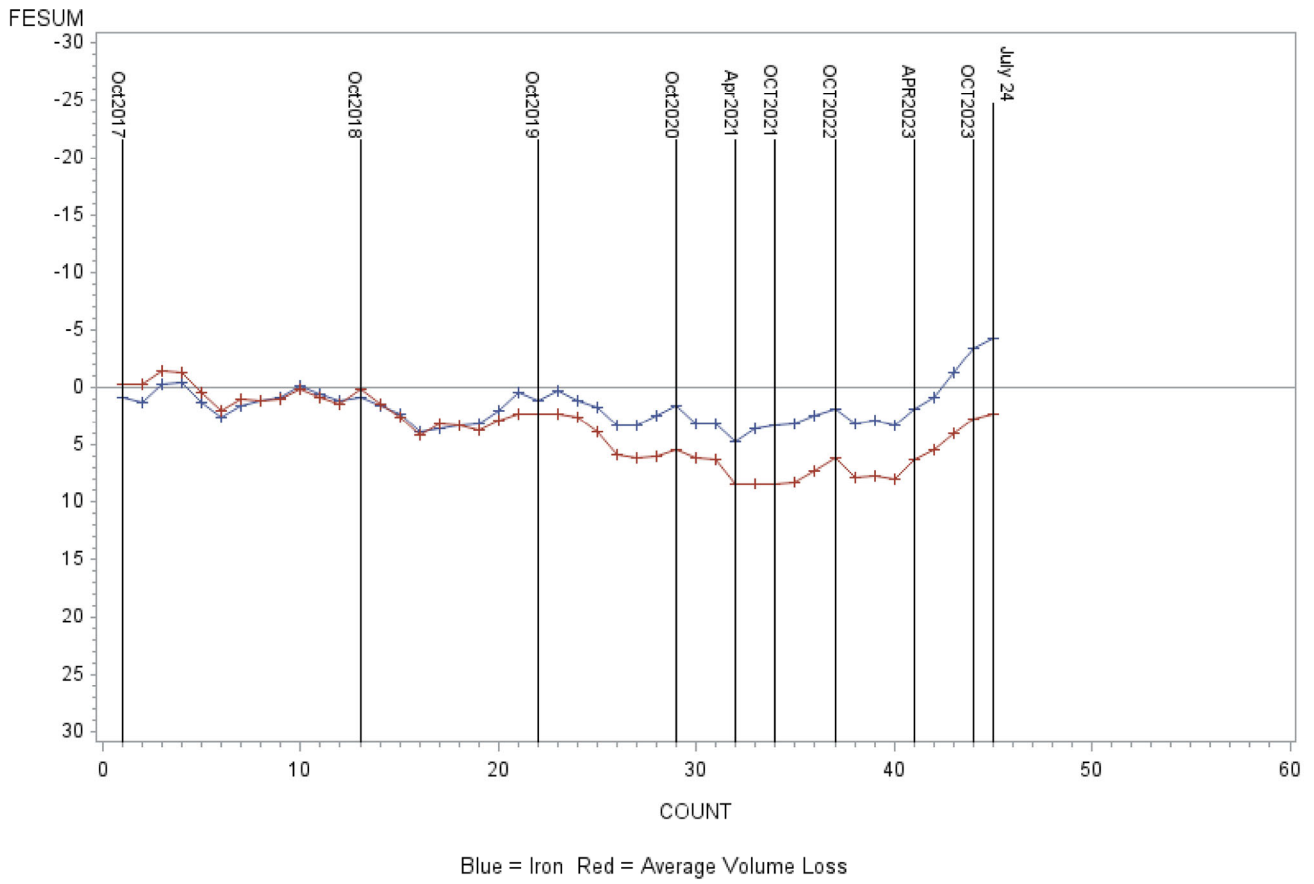


# SEQUENCE IVB INDUSTRY OPERATIONALLY VALID DATA

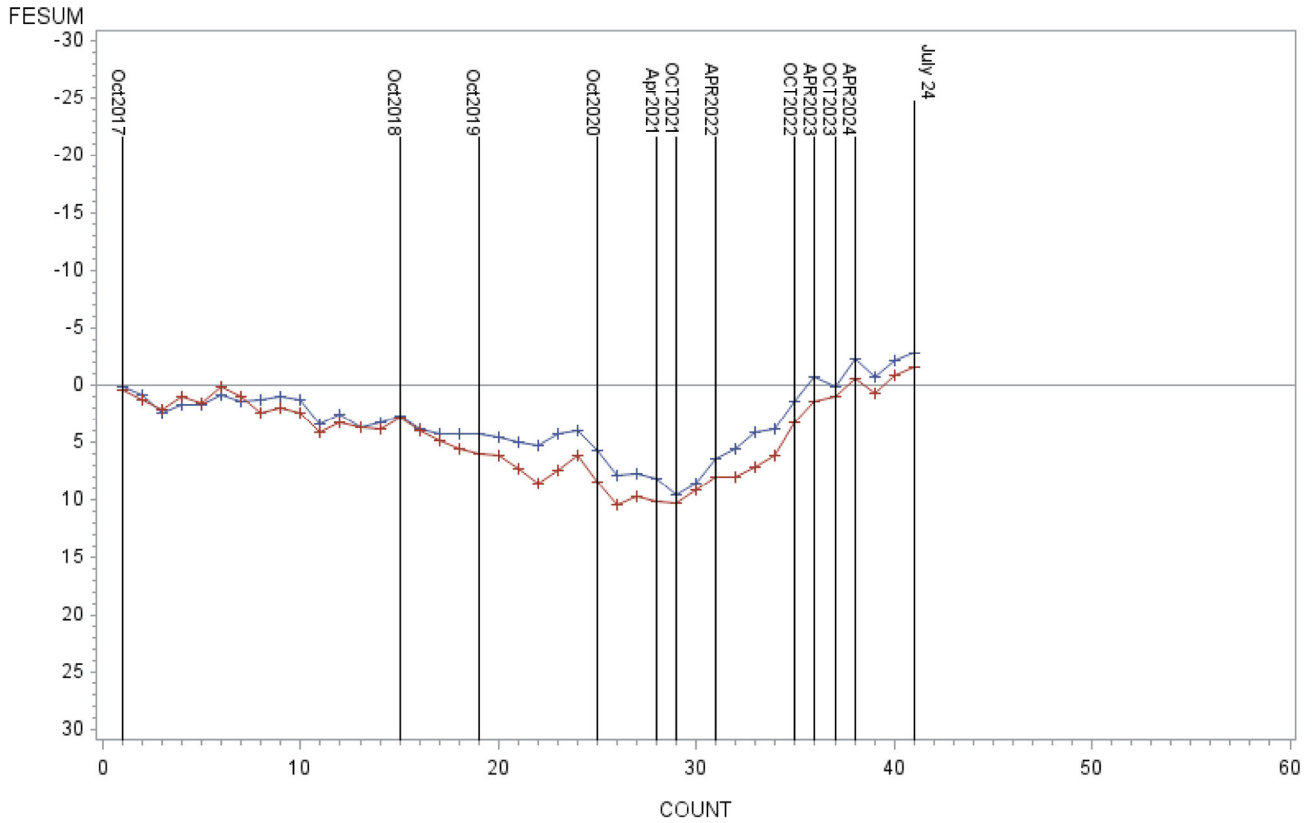
## END OF TEST FE FINAL Severity Adjusted RESULT



### Sequence IVB Iron and Average volume loss Cusums Reference oil 300 Blends

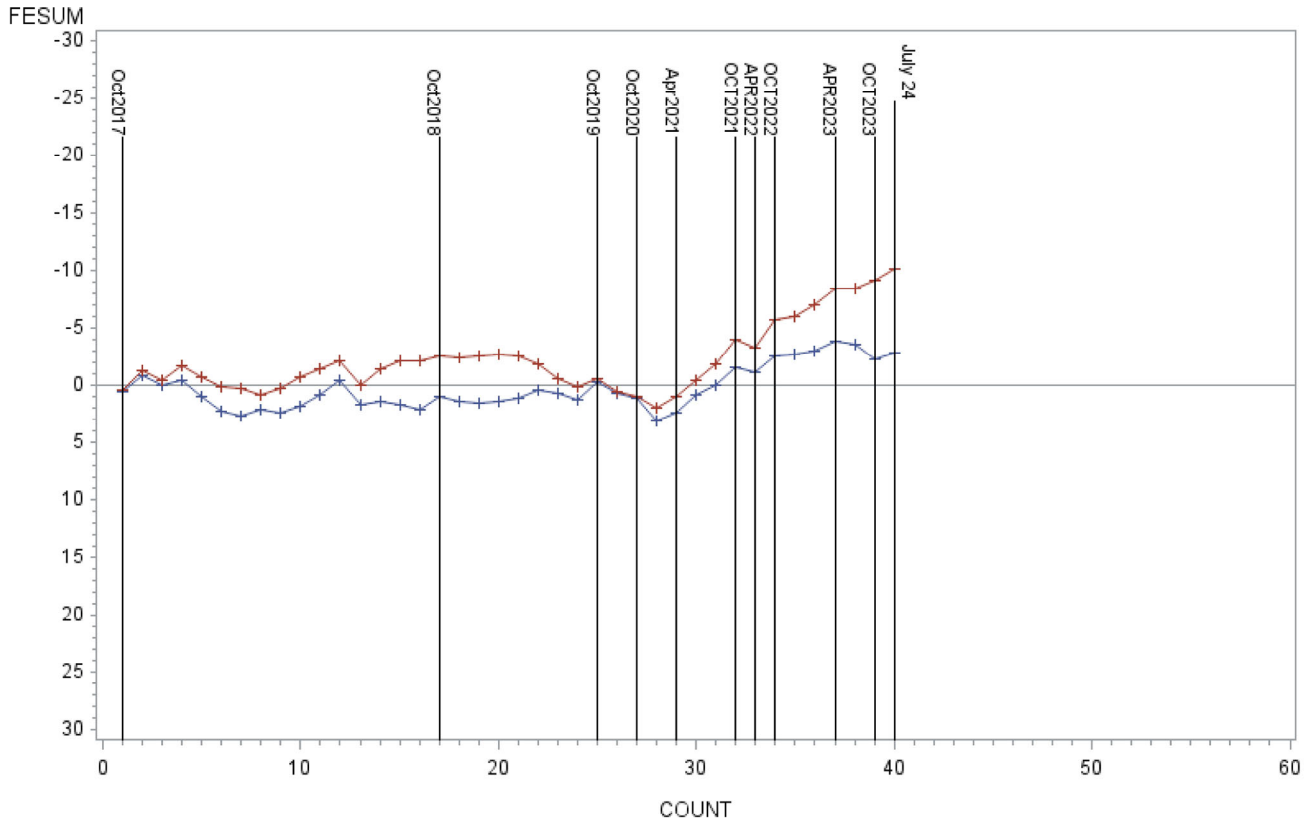


### Sequence IVB Iron and Average volume loss Cusums Reference oil 1011 Blends



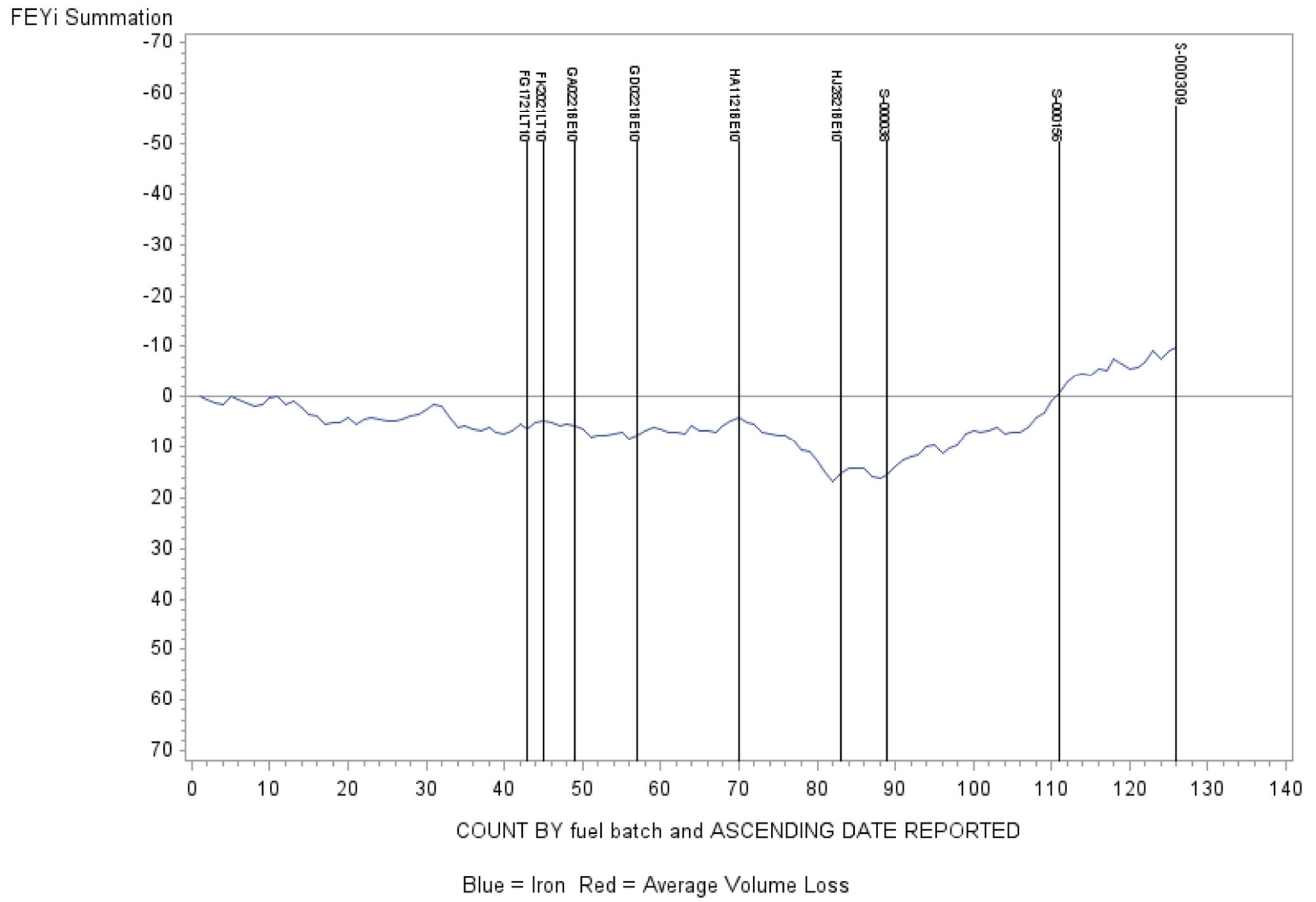
Blue = Iron Red = Average Volume Loss

### Sequence IVB Iron and Average volume loss Cusums Reference oil 1012



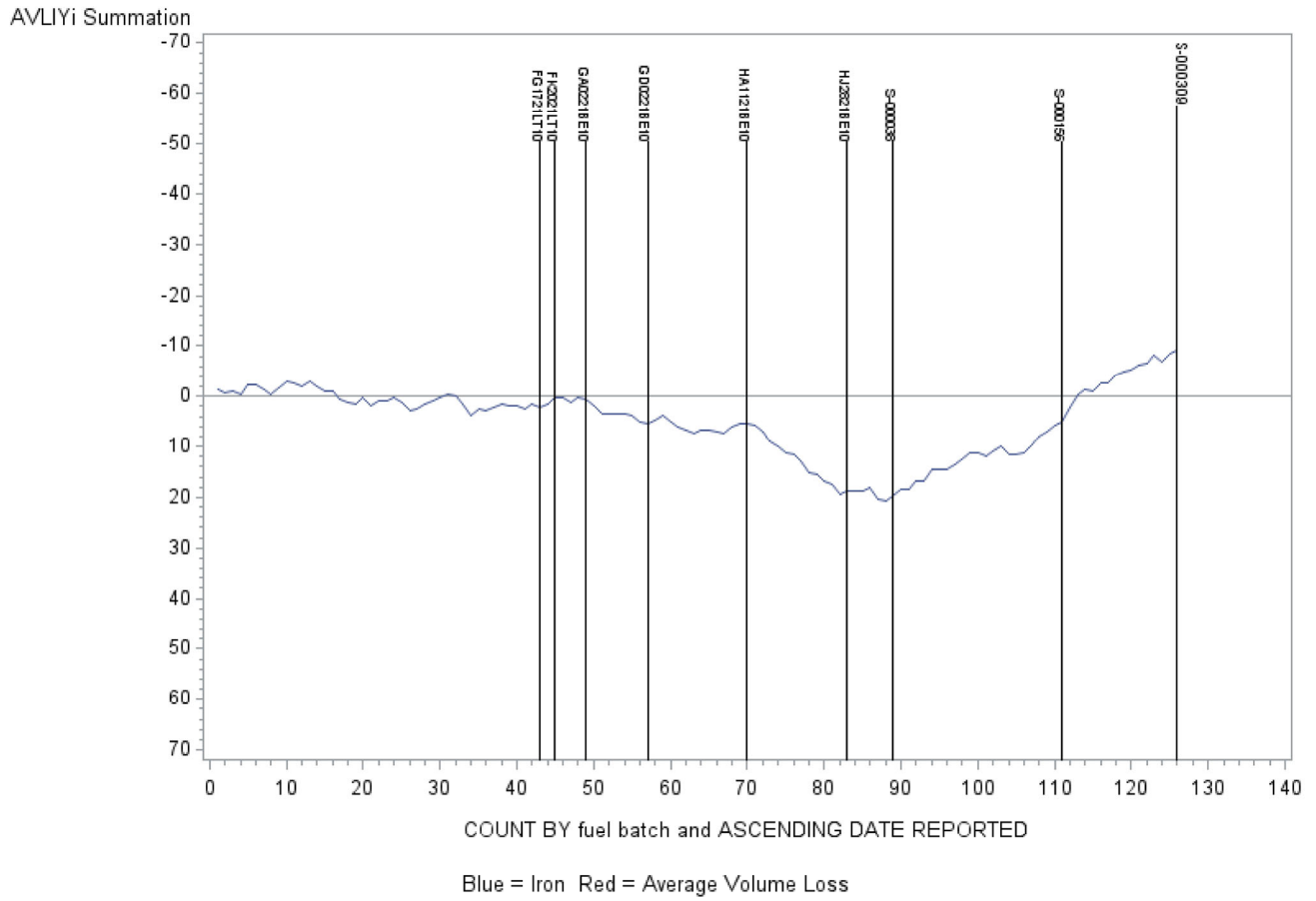
Blue = Iron Red = Average Volume Loss

### Sequence IVB Summation Delta/s by Fuel Batch





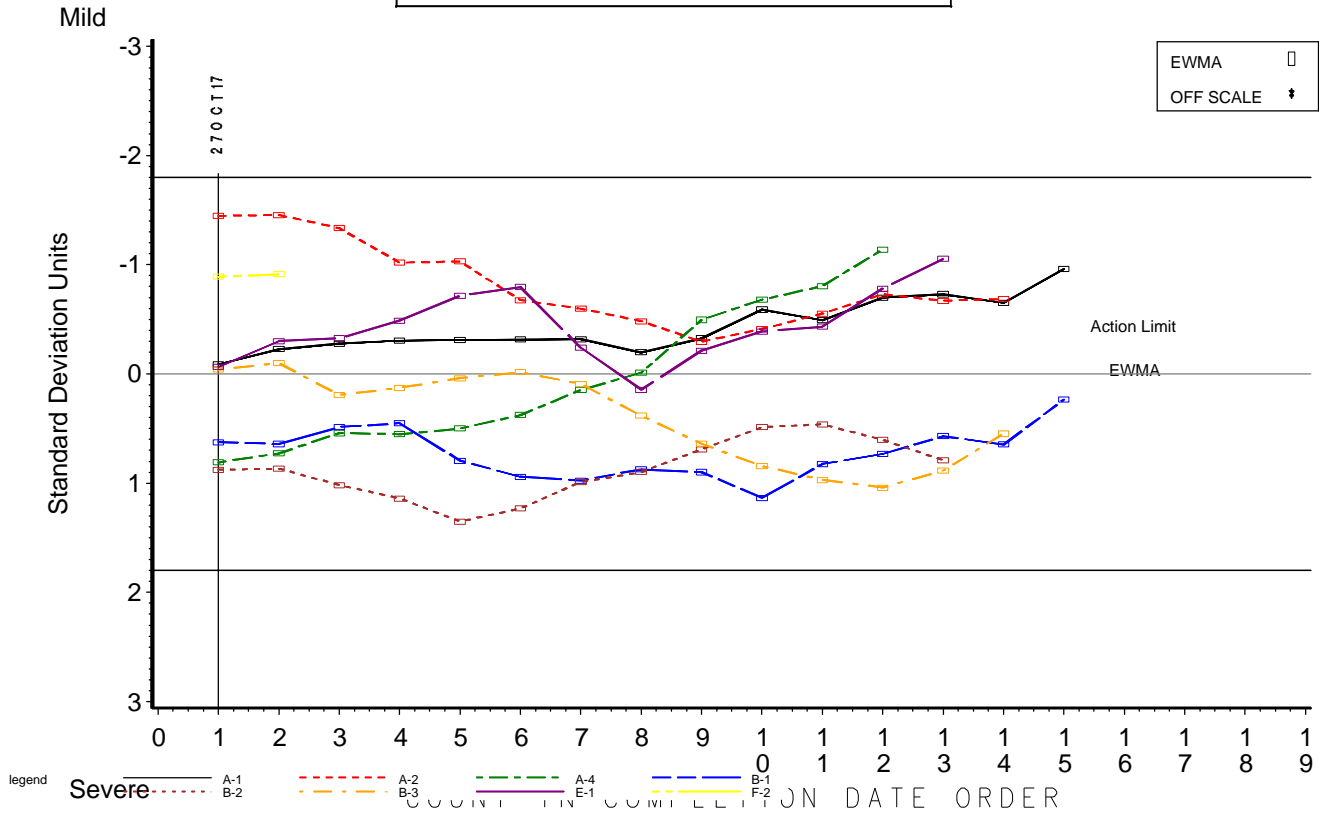
### Sequence IVB Summation Delta/s by Fuel Batch



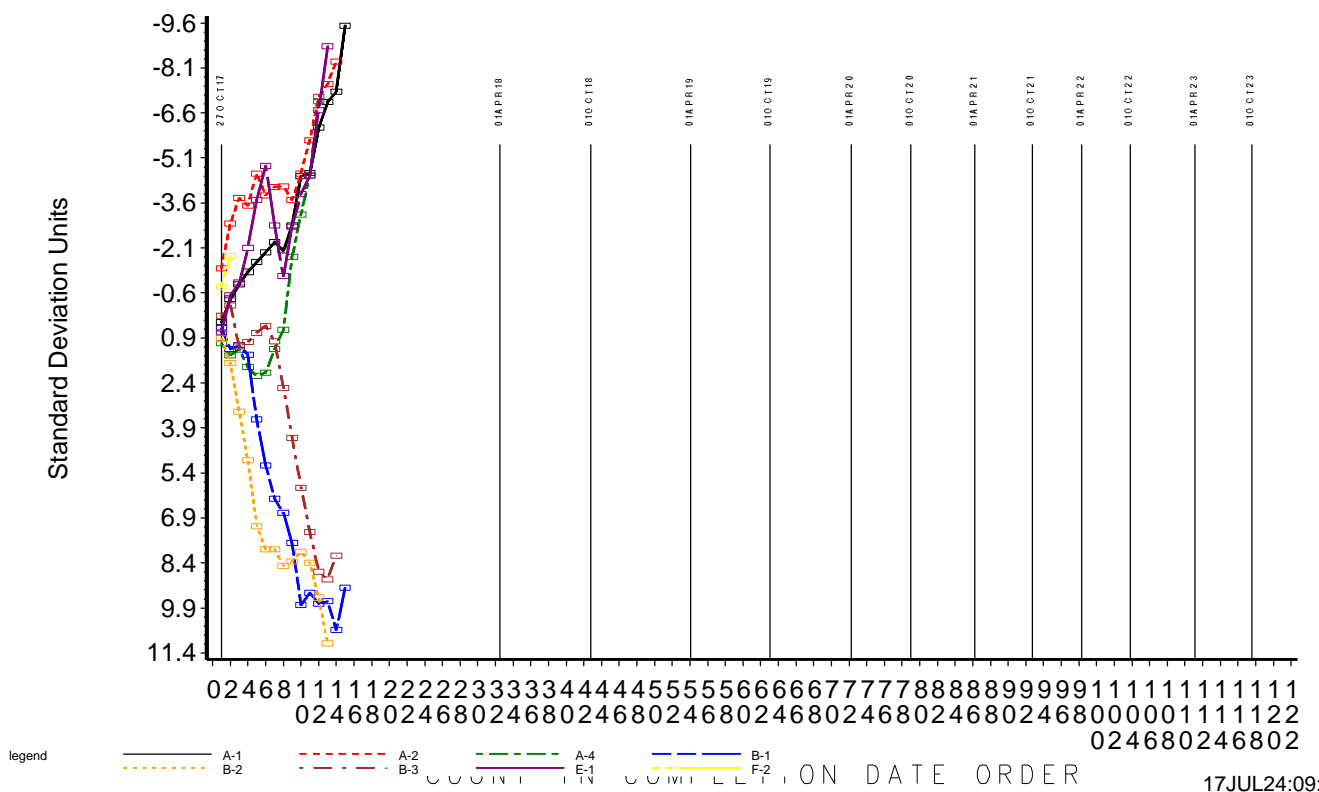
SEQUENCE IVB APPARATUS OPERATIONALLY VALID DATA  
 All Stands reporting data in the past year  
 END OF TEST FE FINAL Severity Adjusted RESULT



LTMS Severity Analysis



CUSUM Severity Analysis





Sequence IV Surveillance Panel  
November 14, 2023  
1:00 p.m. - 3:00 p.m. Central Time  
Microsoft Teams Meeting

Motions and Action Items

As Recorded at the Meeting by Bill Buscher

1. Motion – The Sequence IV Surveillance Panel approves revision to the Sequence IVB test procedure (D8350) to allow any electric pump motor that meets the designated Golden Stand electric pump motor specifications (details to be included in the information letter), as a replacement electric pump motor to accommodate Class 1, Div 2 by OSHA requirements.  
Ben Maddock / Rich Grundza / Passed Unanimously 14 – 0 – 0
2. Motion – The Sequence IV Surveillance Panel approves revision to the Sequence IVB test procedure (D8350) section 7.2.2.1 to replace ASTM D5453 with ASTM D2622 as the required test for sulfur content analysis of the test fuel.  
George Szappanos / Bill Buscher / Passed Unanimously 14 – 0 – 0
3. Action Item – Confirm that the fuel specification for Haltermann HF-0008 also includes ASTM D2622 as the required test for sulfur content analysis of the test fuel.
4. Action Item – Lubrizol to develop a system to bypass the ECT resistor at engine start to richen the AFR and eliminate cold start issues.
5. Action Item – SP chair to coordinate a metrology workshop in early 2024. An invite will be distributed in January 2024.



KEYENCE CORPORATION OF AMERICA  
MEMORANDUM OF UNDERSTANDING  
FINAL SERVICE INSPECTION

SUBJECT: Keyence VR-3000 Final Inspection

1. Serviceability on the VR-3000 series microscope has ended as of 3/31/24.
2. Keyence has performed the following tests in order to check performance of the VR-3000
  - a. Verification tests using calibration block
  - b. Motorized Stage functionality check (if applicable)
  - c. White Balance lighting test
  - d. Temperature adjustment check
  - e. Scan time check
3. The following services will still be included as part of the product support:
  - Application assistance
  - User training/support
  - Technical support to include questions related to calibration/verification, Windows compatibility, diagnosis of errors, etc.
4. The following services will NOT be guaranteed:
  - Hardware repairs
  - Sending unit in for evaluation
  - Replacement parts
5. Any diagnosis that results in reduced functionality will be provided in writing with a copy of this signed memorandum.

Signed by: \_\_\_\_\_

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Sequence IV Surveillance Panel  
July 17, 2024  
10:00 a.m. - 12:00 p.m. Central Time  
Microsoft Teams Meeting

Motions and Action Items  
As Recorded at the Meeting by Bill Buscher

1. Action Item – TMC to verify with the reference oil 300 and 1011 suppliers, that these oils can be re-blended in the future.
2. Motion – The Sequence IV Surveillance Panel approves revision to the Sequence IVB test procedure (D8350) to eliminate the requirement to segregate test engines for high viscosity ( $\geq 0W-16$ ) and low viscosity ( $< 0W-16$ ) test oils. Effective 7/31/2024.  
Andrew Rohlfing / Robert Stockwell / Passed 6 – 0 – 5
3. Motion – The Sequence IV Surveillance Panel approves revision to the Sequence IVB test procedure (D8350) annex **A5. Camshaft and Lifter Measurements** to add the following wording:  
*A.5.4.4 The special case of the intake/exhaust lifter average mass loss being negative* – In this case, record 0.0 mg as the average mass loss result on Form 4 and Form 9.  
NOTE X – The minimum intake/exhaust lifter average mass loss result that will be considered for this method is 0.0 mg so this value replaces any value that is  $< 0$  mg.  
A.5.4.4.1 Comment on Form 13 (Test Comments) that the original result has been replaced by 0.0 mg because the mass loss result was negative.  
*A.5.10.4 The special case of the intake/exhaust camshaft average heel to toe wear being negative* – In this case, record 0.0  $\mu\text{m}$  as the average wear result on Form 4 and Form 9.  
NOTE X – The minimum intake/exhaust camshaft average heel to toe wear result that will be considered for this method is 0.0  $\mu\text{m}$  so this value replaces any value that is  $< 0$   $\mu\text{m}$ .  
A.5.10.4.1 Comment on Form 13 (Test Comments) that the original result has been replaced by 0.0 micrometer because the wear result was negative.  
Bill Buscher / Rich Grundza / Passed 10 – 0 – 1

4. Motion – The Sequence IV Surveillance Panel approves revision to the Sequence IVB test procedure (D8350) annex **A6. Keyence VR-3000 Setup and Measurement Procedure** to add the following wording:

*A.6.8.5 The special case of the intake/exhaust lifter average Keyence volume loss being negative* – In this case, record 0.00 mm<sup>3</sup> as the average volume loss result on Form 4 and Form 9.

NOTE X – The minimum intake/exhaust lifter average Keyence volume loss result that will be considered for this method is 0.00 mm<sup>3</sup> so this value replaces any value that is < 0 mm<sup>3</sup>.

A.6.8.5.1 Comment on Form 13 (Test Comments) that the original result has been replaced by 0.00 mm<sup>3</sup> because the volume loss result was negative.

Bill Buscher / Rich Grundza / Passed 10 – 0 – 1

5. Action Item – Lubrizol to develop a system to bypass the ECT resistor at engine start to richen the AFR and eliminate cold start issues.





**ASTM Sequence IV Surveillance Panel****Scope and Objectives****Scope**

The Sequence IV Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence IVA test documented in Test Method D 6891 and the Sequence IVB test documented in Test Method D 8350, both as updated by the Information Letter system. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least every six months. Improvements in wear measurement technique, test operation, test monitoring and test validation will be accomplished through continual communication with the Test Sponsors and Parts Distributors, ASTM Test Monitoring Center, ASTM Committee D02.B0.01 and the ASTM Passenger Car Engine Oil Classification Panel. Actions to improve the process will be recommended when deemed appropriate based on input from the proceeding. The Panel will review development and correlation of updated test procedures with previous test procedures. This process will provide a suitable test procedure for evaluating an automotive lubricant's effect on controlling valve train wear and overall engine wear for overhead valve train equipped engines with sliding followers or lifters.

<b><u>Objectives</u></b>	<b><u>Target Date</u></b>
1. Preserve Sequence IVA test hardware to maintain test availability for legacy specifications.	<i>On-going</i>
2. Maintain acceptable test hardware for the life of the Sequence IVB test.	<i>On-going</i>
3. Maintain acceptable test fuel for the life of both the Sequence IVA and Sequence IVB tests.	<i>On-going</i>
4. Maintain reference oil supply for the life of both the Sequence IVA and Sequence IVB tests.	<i>On-going</i>
5. Continue active monitoring of test severity and precision for both the Sequence IVA and Sequence IVB tests.	<i>On-going</i>
6. Maintain an on-going timeline / events list for the Sequence IVB test.	<i>On-going</i>

Sequence IV Surveillance Panel  
May 4, 2023  
8:00AM – 10:30AM  
Southwest Research Institute – Building 209  
San Antonio, TX

Motions and Action Items

As Recorded at the Meeting by Bill Buscher

1. Action Item – Haltermann to solicit Sequence IV test laboratories to divide remaining KA24E Green fuel batch S-000309 inventory.
2. Action Item – Haltermann to research/investigate differences between the last five (5) KA24E Green fuel batches.
3. Motion – Modify Sequence IVB test procedure to allow for the addition of a fuel shutoff valve and pressure relief between the fuel pressure gauge and fuel rail.  
George Szappanos / Rich Grundza / Passed Unanimously 14 – 0 – 0