HEAVY-DUTY ENGINE OIL CLASSIFICATION PANEL

OF

ASTM D02.B0.02

June 18, 2024

JW Marriott – Austin, TX

ACTION ITEMS

MINUTES

1.0 Call to order

1.1 The Heavy Duty Engine Oil Classification Panel (HDEOCP) was called to order by Chairman Shawn Whitacre at 1:36 p.m on Tuesday, June 18, 2024, in the Lonestar Ballroom of the JW Marriott in Austin, TX.

1.2 There were 14 members present and 59 guests present. The attendance list is included as Attachment **2.**

2.0 Agenda

2.1 The agenda circulated prior (included as Attachment **1**) was not changed.

3.0 Minutes

3.1 The December 5, 2023 minutes were approved as written.

4.0 Membership

4.1 Ashu Gupta – John Deere replaces Barb Goodrich.

4.2 Castrol - TBD

5.0 Mack / Volvo Surveillance Panel Update – David Brass (Attachment 3)

5.1 6 Total meetings this semester, February through May

5.2 2 ballots this period from January 19, 2024 (24-01)

5.2.1 Item 2: Mack T-11 Coolant Addition (Passed)

5.2.2 Item 4: ICF for Volvo T-13 KV40 Increase (Passed)

5.3 Volvo T-13

5.3.1 Higher than normal Oil consumption across all labs with a step change from 20-30 g/hr to 30-40 g/hr currently.

5.3.1.1 All completed reference tests were acceptable calibrations.

5.3.2 TMC 823-1 was accepted with targets set for performance after the first 5 data points. There are now 11 tests ran on TMC 823-1, and the stats group is re-evaluating the data.

5.3.3 New reference oil TMC 824 with expected targets near PC-12 limits has been supplied and is awaiting testing. Current discussion is around when to start the matrix with the current OC status.

5.4 Mack T-11 / T12

5.4.1 Pencool coolant additives are no longer available.

5.4.2 Mack T-11 procedure was editorially updated from ASTM Ballot Feb 19, 2024 regarding the use of Chevron Delo Extended Life Coolant 50/50.

5.4.3 The Surveillance Panel motioned that the next T-12 reference tests are to be ran on Chevron Delo Extended Life Coolant 50/50 to allow for the use of this coolant in the T-12.

5.5 Volvo T-13 High Oil Consumption Investigation

5.5.1 The Surveillance Panel used TMC 823-1 oil to understand the effect of the parts on oil consumption.

5.5.2 Oil consumption is believed to be elevated due to the available pistons and piston rings that are in the supply network.

5.5.3 The test does not use batched parts so it took time to pinpoint which parts were causing the high oil consumption.

5.5.4 Pistons from 9/2022 – 4/2023 when tested with rings produced in the same time range (1017729 inclusive) have contributed to the higher oil consumption.

5.5.5 Using pistons and/or rings earlier than this date range has shown reduced oil consumption.

5.5.6 The current accessible parts supply is coming from the higher oil consumption date code range.

5.6 Reference oils

5.6.1 TMC 823-1 introduced in May 2023 with LTMS targets of FTIR Peak Height Oxidation at 109.3 and % increase in KV40 from 300 – 360 hours at 8.139 sqrt%. Limits to be re-evaluated now that 11 tests have been completed on TMC 823-1.

5.6.2 TMC 824 chosen by the surveillance panel and made available to the TMC. NCDT and engine labs will cover testing of this new reference oil for target setting.

5.7 Hardware Update

5.7.1 Volvo T-13

5.7.1.1 Liner batch D about 6 months of supply left.

5.7.1.2 TEI to purchase 3 year supply of liners.

5.7.1.3 Surveillance Panel to investigate batching pistons and rings due to current oil consumption issue.

5.7.2 Mack T-8, T-11, T-12

5.7.2.1 Less hardware being utilized due to these tests not being in the new category.

5.7.2.2 7-9 years worth of hardware remaining at the current usage rates for T-11/T-12.

5.7.2.3 T-8 has 7 years of expected hardware availability.

5.8 Questions / Discussion

5.8.1 Question: Has increasing oil charge on T-13 been investigated, or what could be done because this is a big problem for the test.

5.8.1.1 This would be a procedure change, and so far no results changes have been notated with the higher oil consumption.

5.8.1.2 Biggest risk is the engine running dry and ending the test early, and the tests seeing the highest OC were making it to the last oil charge before running dry.

6.0 Caterpillar Surveillance Panel Update - Jacob Goodale (Attachment 4)

6.1 1 meeting in April during this period.

6.2 2 Editorial ballots this period.

6.2.1 Revision of C13 ring weight loss addition (passed)

6.2.2 C13 Deposit test procedural edits (passed)

6.3 COAT

6.3.1 New reference oil testing and scoping of blends 833-2 and 832-2.

6.3.1.1 Initial results did not show discrimination at both labs.

6.3.1.2 Shift in performance on 833-2 between the labs with one on target, one mild.

6.3.1.3 SP recommended moving forward with just 833-2 to eliminate convolution.

6.4 EOAT Matrix

6.4.1 SP paused testing until operational data review is conducted of new reference oil tests and the recent 1005-6 run.

6.4.2 The latest 1005-6 run in line with mild new reference oil test.

6.4.3 Operational review to be conducted at next panel meeting.

6.4.4 The panel will endorse continuation of EOAT matrix after the data review.

6.4.5 Severity of reference oil 833-1 as expected at both labs.

6.5 C13 Deposit test

6.5.1 Prove out of low viscosity capability.

6.5.1.1 Instead of changing engine calibration there is an investigation into modifying the engine oil pressure measurement, with SwRI taking the lead on this.

6.5.1.2 This action should be completed by July 1st, and rolled out to all labs once validated.

6.5.2 Report forms and data dictionary were updated with Ring Weight Loss addition.

6.6 Reference Oils

6.6.1 TMC 832-1 and 832-2 suspended due to lack of discrimination.

6.7 COAT Hardware

6.7.1 2 year supply of B filters at current run rates.

6.7.2 Discussions have begun on starting to get another batch of filters made.

7.0 Cummins Surveillance Panel Update - Andrew Smith (Attachment 5)

7.1 2 Surveillance Panel meetings this period.

7.1.1 1st meeting introduced the new ISB block and hardware batches to be introduced this year.

7.1.2 ISB Viscosity test reference oil precision targets were set.

7.1.3 PC9HS Fuel batch was discussed. The fuel turned black after die was added due to the fuel appearing “more yellow” than normal according to supplier. As of now, no noticeable test effects have been noted.

7.1.4 2nd meeting involved discussion on when/ how to introduce the new hardware batch. This is planned to be done after the new reference oil matrix has been completed.

7.1.5 No net gain/ loss of reference time was motioned and approved by the panel due to the number of references the labs will be expected to run in the coming few months.

7.1.6 ISB Test Status

7.1.6.1 Current batch kits have all been allocated by TEI.

7.1.6.2 New Hardware batch expected to be available by August 2024.

7.1.6.3 TMC 831-4 has approximately 200 gallons remaining.

7.1.6.4 TMC 831-5 re-blend has arrived to TMC.

7.1.6.5 New reference oil TMC 835 has arrived to TMC and all the labs for the matrix.

7.1.6.6 Action Items for Panel: When can the new reference oil matrix start, and creation of a Calterm screen file parameter list.

7.1.7 ISM Test Status

7.1.7.1 17 full kits remaining at TEI.

7.1.7.2 A new hardware batch is being worked on, a plan for introduction is needed.
7.1.7.3 New crossheads have arrived, waiting on valves.
7.1.7.4 IAS will be the next lowest item with approximately 80 kits remaining.
7.1.7.5 7 new ISM blocks have arrived to TEI and are currently being machined.
7.1.7.6 Action Item: Still looking for a volunteer to run the selected ISB new oil in the ISM for possible use as a new reference oil for the ISM. Discussion has been started for allowing the "prove-out" run to be the first test of the matrix if the panel votes to use the oil for the matrix.

8.0 DD13 Surveillance Panel Update - Rob Slocum (Attachment 6)
8.1 Panel proposed a date of March 1st 2016 for ACC retroactive registration which was when the precision matrix concluded.
8.1.1 No objection through the surveillance panel communication.
8.2 Bearing part numbers and suppliers reviewed for best practices to ensure the correct bearings were ordered and consistent.
8.3 No reference activity this period.
8.4 Hardware Update
8.4.1 Exhaust Rocker Arms currently unavailable but 120 on their way to TEI with estimated delivery at the end of June 2024.
8.4.2 Next batch of liners needs to be planned and discussed due to new liner screening process.
8.5 Reference oil life is good, with an estimated 5+ years of life.
9.0 D4485 Surveillance Panel Update - Laura Birnbaumer (Attachment 7)
9.1 Information Letter 24-1 for updating D4485 Annex A5 for SL107 issued on March 26 and the ballot 24-03 to approve the IL closed June 4 with no negatives and one comment.
9.2 Impact of the ballot shown in Attachment 7.
9.3 D4485 Questions
9.3.1 Foam by D892 is required for all active C and F categories.
9.3.2 Tables 2 (API CH-4) and 3 (API CI-4) do NOT allow Option A.
9.3.3 Tables 4, 5, and 6 (API CJ-4, CK-4 and FA-4) do not have this restriction on Option A.
9.3.4 If D892 WITH option A is indeed the intended for API CJ-4 and CK-4 and FA-4, a footnote should be added to Tables 4, 5, 6 denoting this is an intended change and not a copy/paste error.
9.3.5 MOTION: Laura Birnbaumer (No second)
9.3.5.1 Add a footnote to Tables 4, 5, and 6 denoting it was an intended change to not include a restriction on Option A.
9.3.5.2 Discussion:
9.3.5.2.1 Jeff Clark looked at the original 2009 document and the footnote is not there from the beginning. Indicating it may be likely this means it was left off on purpose.
9.3.5.2.2 It was asked to table this discussion for a future meeting so the archives can be reviewed by each respective member.
9.3.5.2.3 Action ITEM: members can review their archives to confirm, will be reviewed at the next meeting.
9.3.6 T8E
9.3.6.1 Bob Warden, SwRI, MOTION: Add the % Loss for the T-8E Relative Viscosity at 4.8% Soot.
- CH-4 – 50% shear loss
- CI-4 -100% shear loss

9.3.6.2 Joe Franklin, Intertek, Seconds the motion
9.3.6.3 Vote 13 for, no opposed, 1 waive by Mike Deegan, Ford.
9.3.6.4 The motion passes.
9.4 Future

9.4.1 The surveillance panel will hold a meeting Wednesday 6/19 after the Sub B group.

10.0 EMA Update – Roger Gault
- 10.1 EMA focused on PC12.
- 10.2 CLOG activities have been discussed but haven't started yet due to the focus on PC12.

11.0 New Business
- 11.1 Section 7 Update from Elastomer group
  - 11.1.1 Round robin for new HD elastomer is coming to a close, looking to set up a surveillance panel meeting to set targets.
  - 11.1.2 Class panel should ask the statisticians to look at the data as well.
  - 11.1.3 Only a year left of fluroelastomer FKM, asking the EMA to review for a new elastomer.

12.0 Next meeting
- 12.1 December 10th, 2024 at the Anaheim Marriott in Anaheim, California or at the call of the chairman.

13.0 The meeting was adjourned at 2:45 pm.

AGENDA
D02.B0.02.1
Heavy-Duty Engine Oil Classification Panel
Tuesday, June 18, 2024 1:30pm CDT
JW Marriott – Lonestar Ballroom Salon B/C
Austin, TX USA

1) **Call to Order/Anti-trust statement**

2) **Minutes** – Approval of Minutes from December 5, 2023 Meeting in New Orleans, LA USA

3) **Membership**

   a) Review and update current panel membership

4) **Surveillance Panel/Task Force Reports**

   a) Volvo/Mack SP Report (David Brass, Infineum)
   b) CAT SP Report (Jacob Goodale, Infineum)
   c) Cummins SP Report (Andrew Smith, Intertek)
   d) DD13 SP Report (Robert Slocum, Lubrizol)
   e) D4485 SP Update (Laura Birnbaumer, Chevron Oronite)

5) **Old Business**
   a) EOEC Fixed Limits Information Letter Update (Laura Birnbaumer, Chevron Oronite)

6) **New Business**
   a) None

7) **HDEOCP Adjournment**

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Mack/Volvo Surveillance Panel Update

David Brass, Mack/Volvo Surveillance Panel Chair

HDEOCP

June 18, 2024

Meetings

- Surveillance Panel held 6 meetings in the last period
  - February 8
  - March 5
  - March 19
  - April 8
  - April 22
  - May 22

Ballots

January 19, 2024 (24-01)		
Item 2	Mack T-11 Coolant Addition	Passed
Item 4	ICF for Volvo T-13 KV40 Increase	Passed

Key Updates

Volvo T-13

- Volvo T-13 has been experiencing higher than normal oil consumption at all labs with a step change from 20-30 g/hr to 30-40 g/hr.
  - All completed reference tests during this period have been Acceptable Calibrations
- Reference Oil Blend TMC 823-1 was accepted with targets set for its performance in the Volvo T-13 on 5 data points. This target will be re-evaluated after at least 10 runs on TMC 823-1. (Being evaluated now that 11 data points have been generated)
- A new reference oil TMC 824 (expected targets near PC-12 limits) has been supplied and is awaiting testing that has been funded through NCDT/Labs

Key Updates

Mack T-11 / T-12

- The Pencool coolant additives that were used for both the Mack T-11 and Mack T-12 are no longer commercially available.
- Mack T-11 procedure editorially updated from ASTM ballot (Passed, Feb 19, 2024) to:
  - “Use either Pencool 3000 coolant additive or Chevron Delo Extended Life Coolant 50/50. Use Pencool 3000 coolant additive at the manufacturer’s recommended rate in demineralized water with less than 0.03 g/L of salts or distilled water. Chevron Delo Extended Life Coolant 50/50 is purchased premixed and should not be diluted. Pencool 3000 may be obtained from the supplier shown in A2.7, Annex A2, and Chevron Delo Extended Life Coolant 50/50 is available from local automotive distributors.”
- Surveillance Panel motioned to have next round of Mack T-12 reference tests run on Chevron Delo Extended Life Coolant 50/50 to allow its use in this test too. Lab calibration periods to end May – July.

Volvo T-13 High Oil Consumption Investigation

- Surveillance Panel utilized testing of TMC 823-1 to help understand the effect of the parts on oil consumption
- Oil consumption has been elevated due to the available pistons and piston rings that are in the supply network. This test does not use batched parts so it took some time to pinpoint which parts were causing the high oil consumption.
  - Pistons from 9/2022 – 4/2023 when tested with Rings produced in the same time range (1017729 inclusive) have contributed to higher oil consumption
  - Using pistons and/or rings earlier than this range of date codes has shown reduced oil consumption.
  - Unfortunately, the current accessible parts supply is coming from this date range.

Pistons	Rings	OC (48-96 hr)	Test Site
New (2023) New (2023)	New (1017729) New (1017729)	44.4 44.4	Lab D Lab G
Old (2019)	New (1017729)	29.3	Lab B
New (2023)	Old (903045 – 934730)	26.9	Lab G
Old (2021)	Old (< 808k)	23.1	Lab B

Reference Oils

Test	Reference Oil	Supply
Mack T-8	TMC 1005-5	2 year supply
Mack T-11	TMC 822-2	5+ year supply
Mack T-12	TMC 821-4	5+ year supply
Volvo T-13	TMC 823 TMC 823-1 TMC 824	2 drums remaining 5+ year supply 3+ year supply

Updates:
TMC 823-1 introduced in May 2023
LTMS targets set:

- FTIR Peak Height Oxidation = 109.3
- % Increase in KV40 from 300 – 360 hrs = Sqrt (%) = 8.139

Targets to be re-evaluated now that 11 tests have been completed on this reference oil

New T-13 Reference Oil requested by Surveillance Panel with PC-12 targets (FTIR Oxidation ≤ 80, KV40 % change ≤ 50).
TMC 824 chosen by surveillance panel and made available to TMC. NCDT/Labs to cover testing of this new reference oil for target setting.

Volvo T-13 Hardware

- Liner Batch D has about 6 months of supply left
- TEI will begin procurement of 3 years worth of liners (Batch E)
- Surveillance Panel is investigating the ability to batch the pistons and rings

Mack T-8/T-11/T-12 Hardware

Final Parts Batch

	Mack T-11/T-12	Mack T-8	Total Available Kits	Expected Available Kits (After Avg. Rejection Rates)
Top Rings	**Y**	**Y**	319	303
2nd Rings	**Y**	**Y**	299	278
Oil Rings	**Y**	**Y**	299	287
Piston Crowns	**F (Random Subgroup, Excluding sub A)**		239 (w/o sub A)	**234 (w/o sub A) (Limiting Part for T-11/T-12)**
Rod Bearings	**Z**		305	299
Main Bearings	**Q**		367	293
Liner	**W**		330	297
Piston Skirts	**B**		304	288

- Current Purchase Rate for T-11/T-12 kits is 25-30/year (7 – 9 years of parts remaining).
  - Previous purchase rate was 45/year (5 years of parts remaining)
- Current Purchase Rate for T-8 kits is 4-6/year (7 years of parts remaining)

Caterpillar Surveillance Panel Update

Jacob Goodale, Caterpillar Surveillance Panel Chair

HDEOCP

June 18, 2024

Meetings

- Surveillance Panel held 1 meetings in the last period
  - April 22nd

Ballots

April 22, 2024		
Item 2	Revision of C13 Ring Weight Loss addition	Passed
Item 3	C13 Deposit Test procedural corrections	Passed

Key Updates

COAT

- New reference oil testing, scoping of new blends 833-2 and 832-2
  - No discrimination observed between 833-2 and 832-2 at both labs
  - Shift in performance on 833-2 observed, with one lab on target and one mild
  - SP recommended moving forward with just 833-2 to eliminate convolution
- EOAT Matrix
  - SP has paused running additional tests until operational review of new reference oil tests and recent 1005-6 run
  - Latest 1005-6 run in line with mild new reference oil test
- Operational review to be conducted at next SP meeting
  - SP will endorse continuation of EOAT matrix, pending on data review
  - Review will cover new reference oils and recent 833-1 testing
  - Severity on 833-1 as expected at both labs

Key Updates

C13 Deposit Test

- Low Viscosity Prove out
  - Caterpillar recommended that the labs modify the engine oil pressure measurement hardware instead of changing the engine calibration. SwRI taking the lead on this action
  - Prove out should be completed by July 1st , modifications will be rolled out to all labs once validated
- Ring Weight Loss Addition
  - Report forms and data dictionary to be updated

Reference Oils

Test	Reference Oil	Supply
1K, 1N	TMC 809-1 TMC 811-2	5+ year supply 5+ year supply
1R	TMC 822-2 TMC 1005-5	5+ year supply 2 year supply
1P	TMC 1005-5	2 year supply
COAT	TMC 832-1 TMC 832-2 TMC 833-1 TMC 833-2 TMC 1005-6	5+ year supply 5+ year supply 1 year supply 5+ year supply 2 year supply
C13	TMC 831-4 TMC 831-5	2.5 year supply 5+ year supply

Updates:
TMC 832-1 and 832-2 suspended by SP due to lack of discrimination

COAT Hardware

- 184 Batch B filters remaining, approximately 2 year supply based upon current run rates
- SP in discussions on getting another batch of filters made

Cummins

ISB (ASTM D7484) ISM (ASTM D7468)

Surveillance Panel Update

June 2024

Prepared by: Andrew Smith, S.P. Chairman

Cummins SP Report

- 2 Surveillance Panel Meetings this period
- 1st Meeting
  - Discussion on new ISB block and hardware batches
    - Presentation by Cummins
  - ISB Viscosity Test reference oil precision targets set
  - PC9HS Fuel Discussion
- 2nd Meeting
  - ISB Hardware Update
    - Discussion on how/when to introduce the new hardware
    - No net gain/loss of reference time motion and approval
  - ISB Reference Oil Update
    - 831-4 running low
    - New Reference Oil (835) available for matrix
    - SP intention is to only use the new reference oil after matrix

Cummins SP Report

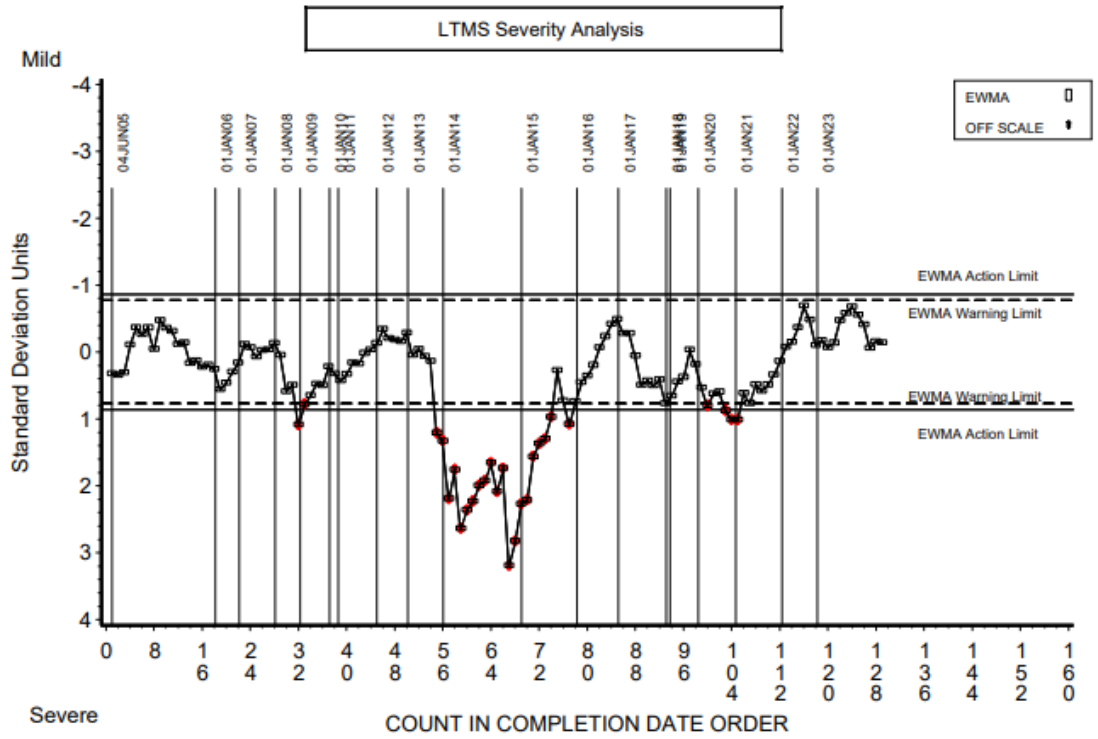
ISB Test Status

- 2 labs, 6 tests stands are currently calibrated
  - Critical Parts Inventory: Current batch kits have been allocated to labs by TEI
  - New Hardware Batch
    - Expected arrival August 2024
- Reference Oil Status
  - Approx. 200 gallons of 831-4 remaining
  - 831-5 has arrived to TMC
  - New Reference oil (835) has arrived to TMC and all the labs for the matrix

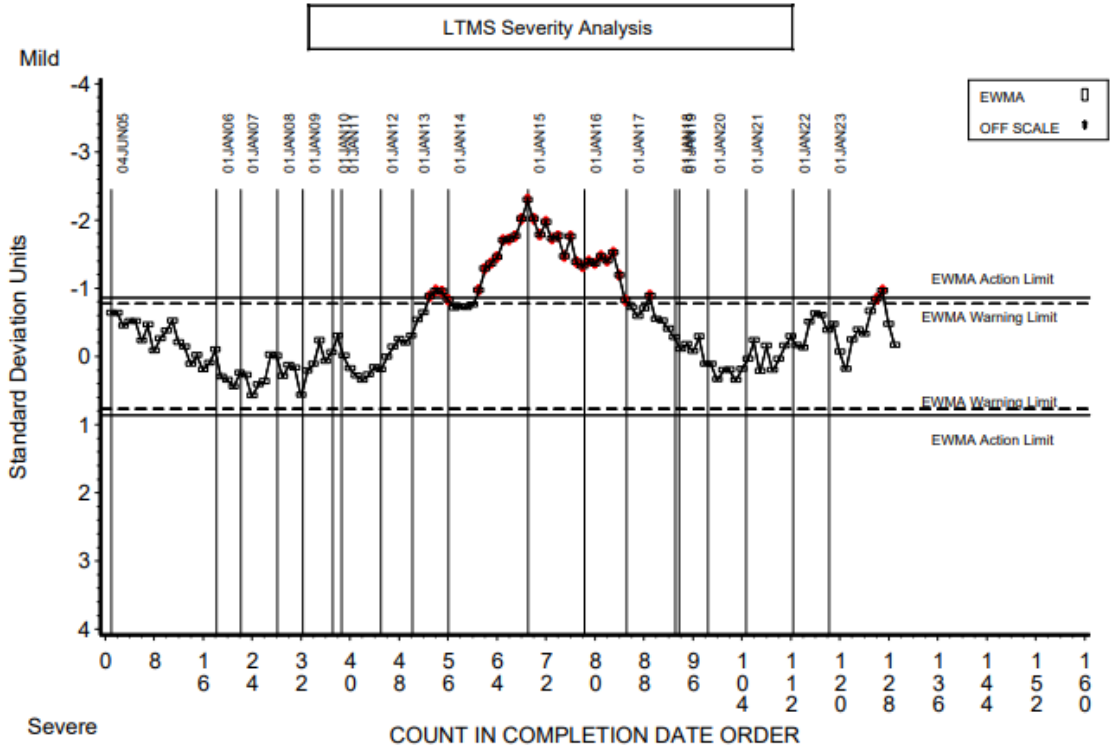
Cummins SP Report

ISB Test Status

ACSW



ATWL



Cummins SP Report

ISB Test Status

- Action Items
  - Low viscosity reference oil introduction
    - When can this start?
    - Labs to let me know when they are available to begin
  - Calterm screen file parameter list creation

Cummins SP Report

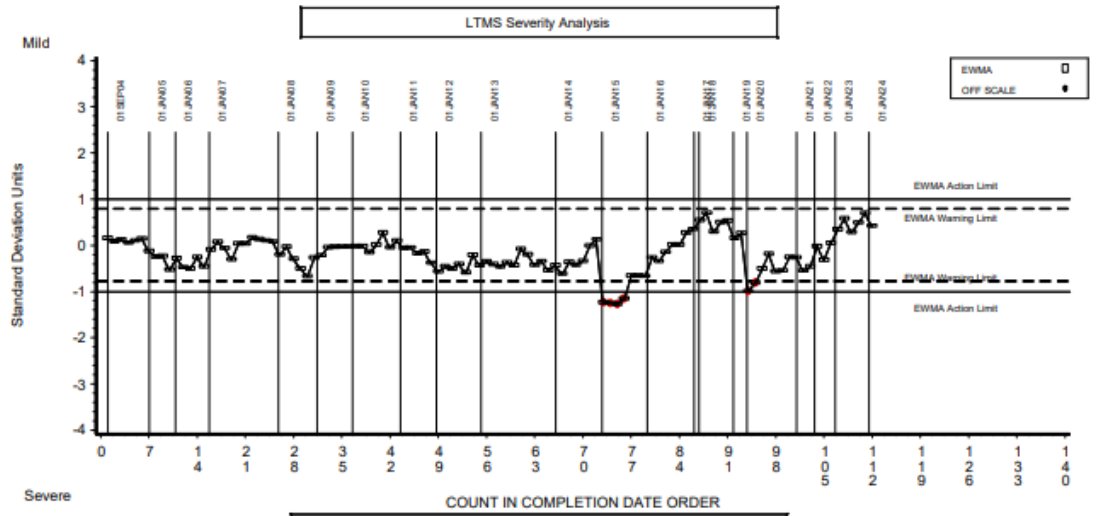
ISM Test Status

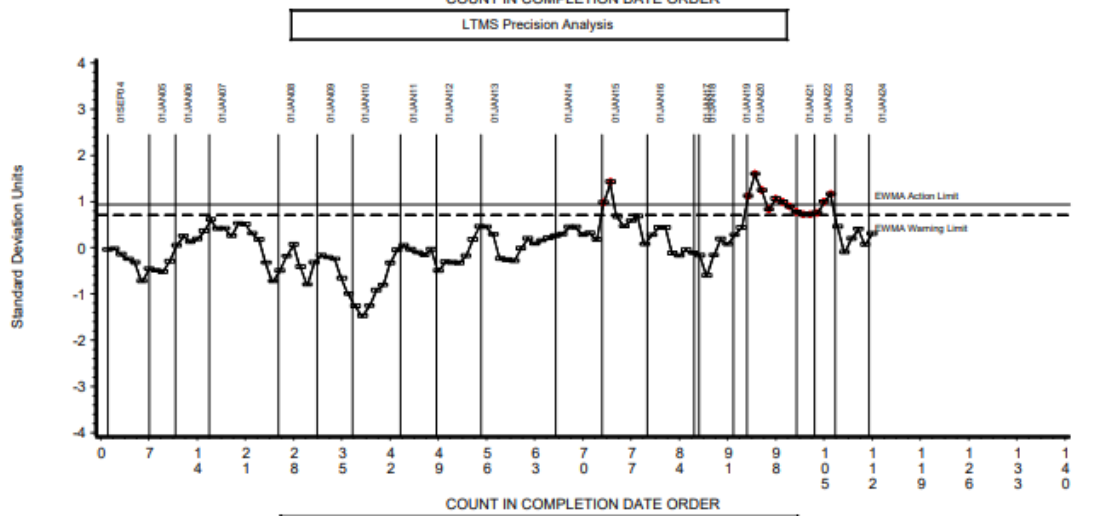
- 3 labs, 4 tests stands are currently calibrated
  - Critical Parts Inventory
    - 17 Full Kits remaining at TEI
    - Working on new hardware batch and how to introduce
    - New crossheads have arrived to TEI, valves are on order
    - IAS will be next lowest (approximately 80 kits remaining)
    - 7 ISM blocks have arrived to TEI and are currently being machined
- Reference Oil Update:
  - Approximately 5 Year Supply of 830-3 at current usage rate
  - Need volunteer for ISB oil prove-out run

Cummins SP Report

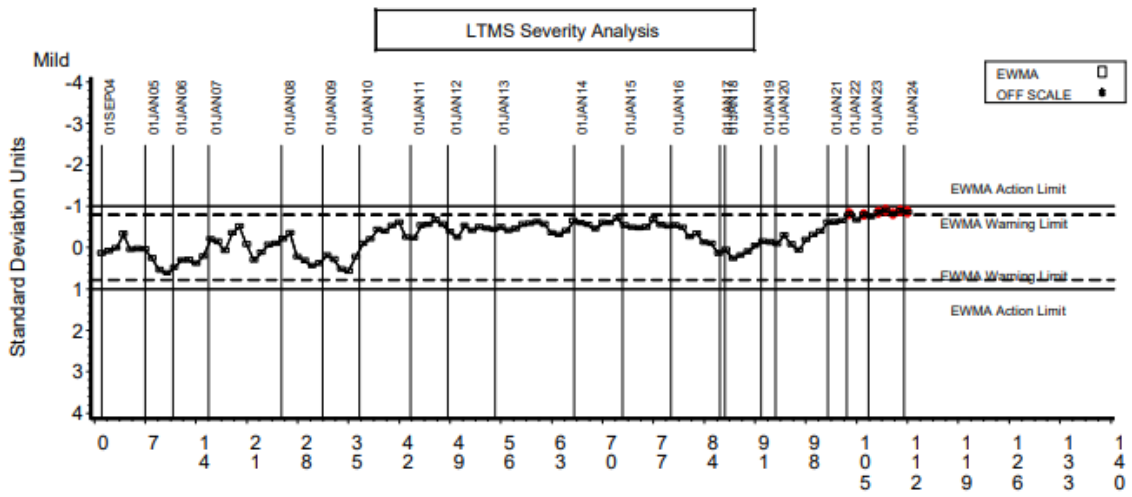
ISM Test Status

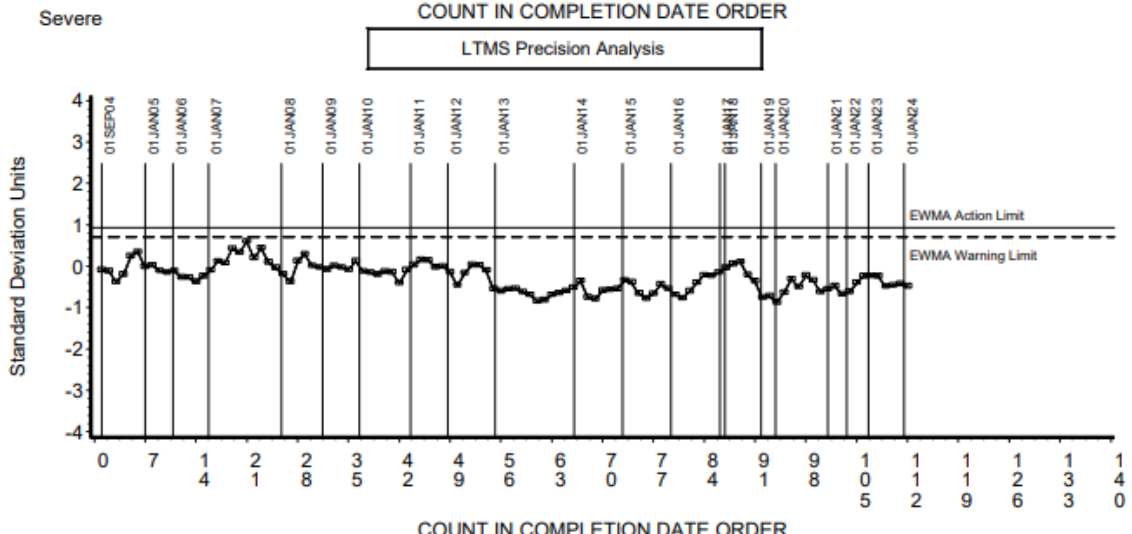
ASR





CWL

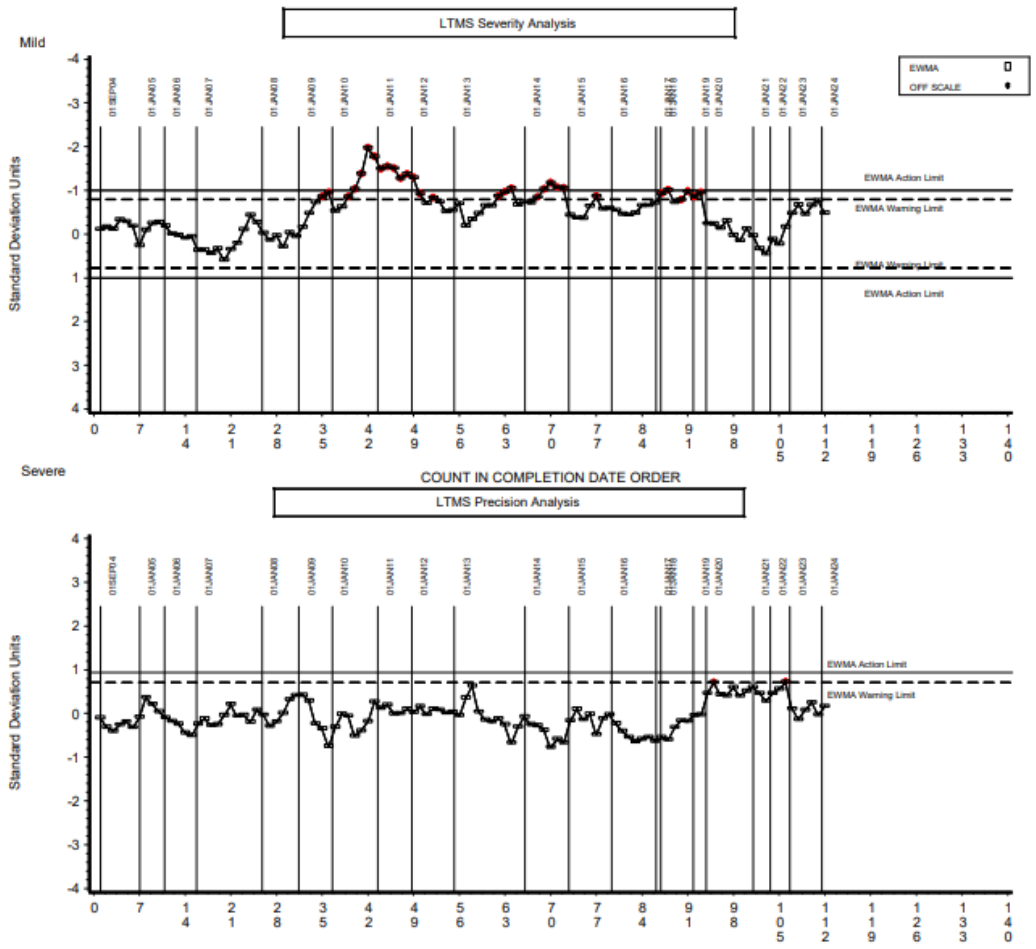




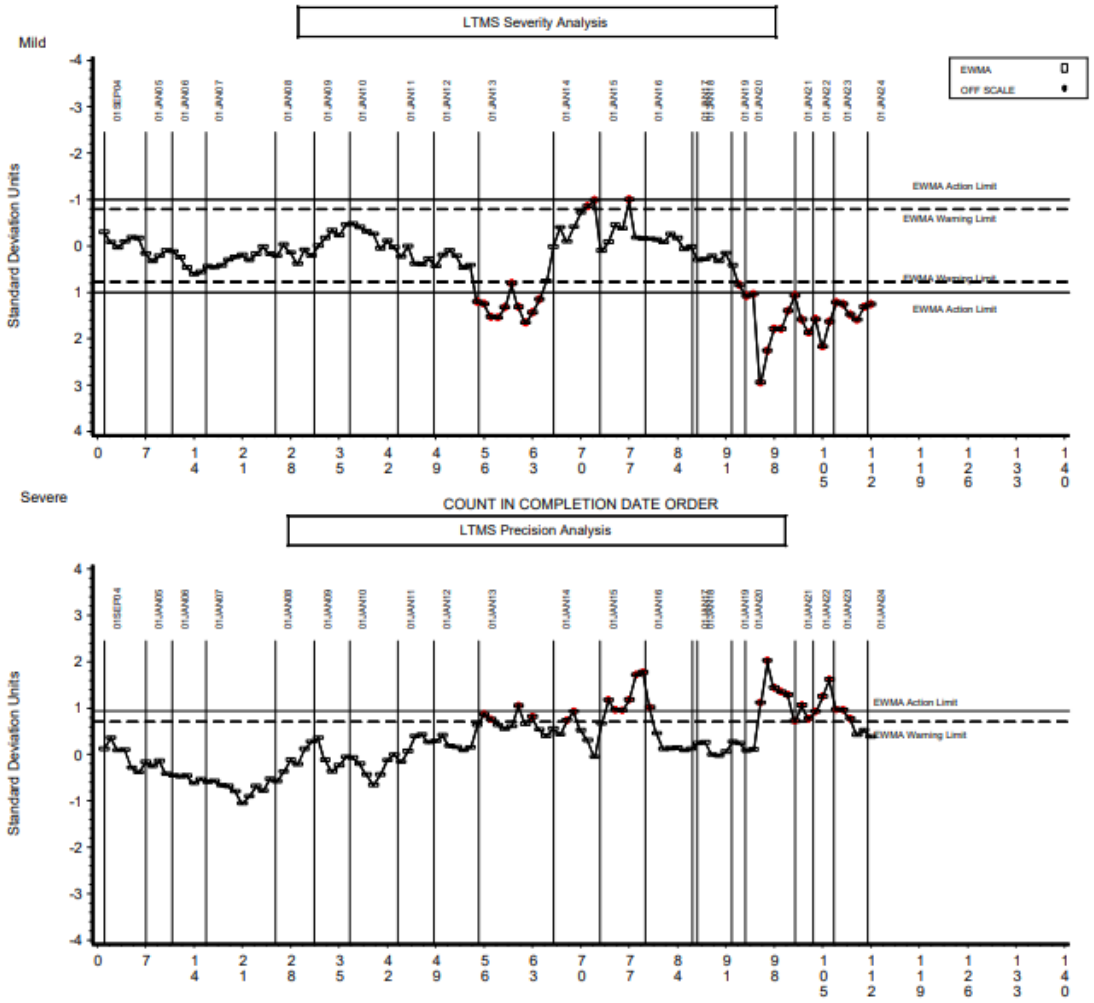
Cummins SP Report

ISM Test Status

FDP



IAS



Cummins SP Report

ISM Test Status

- Action Items
  - Low viscosity reference oil introduction
    - Need volunteer for prove-out run on ISB RO 835
  - CF change was previously made to IAS, needs to be re-investigated now with more data available and coming up to new references
  - New crosshead, intake and exhaust valve batch introduction

Cummins SP Report

- Questions?

DD13 S.P.
Annual Report, June 2024
Presentation to Subcommittee D02.B0

Prepared By: Robert Slocum, S.P. Chair June 2024

DD13 S.P. Report
Panel Activity

- Provided to ACC a proposed date of March 1st 2016 for retroactive test registration.
  - No objection through Surveillance Panel communication

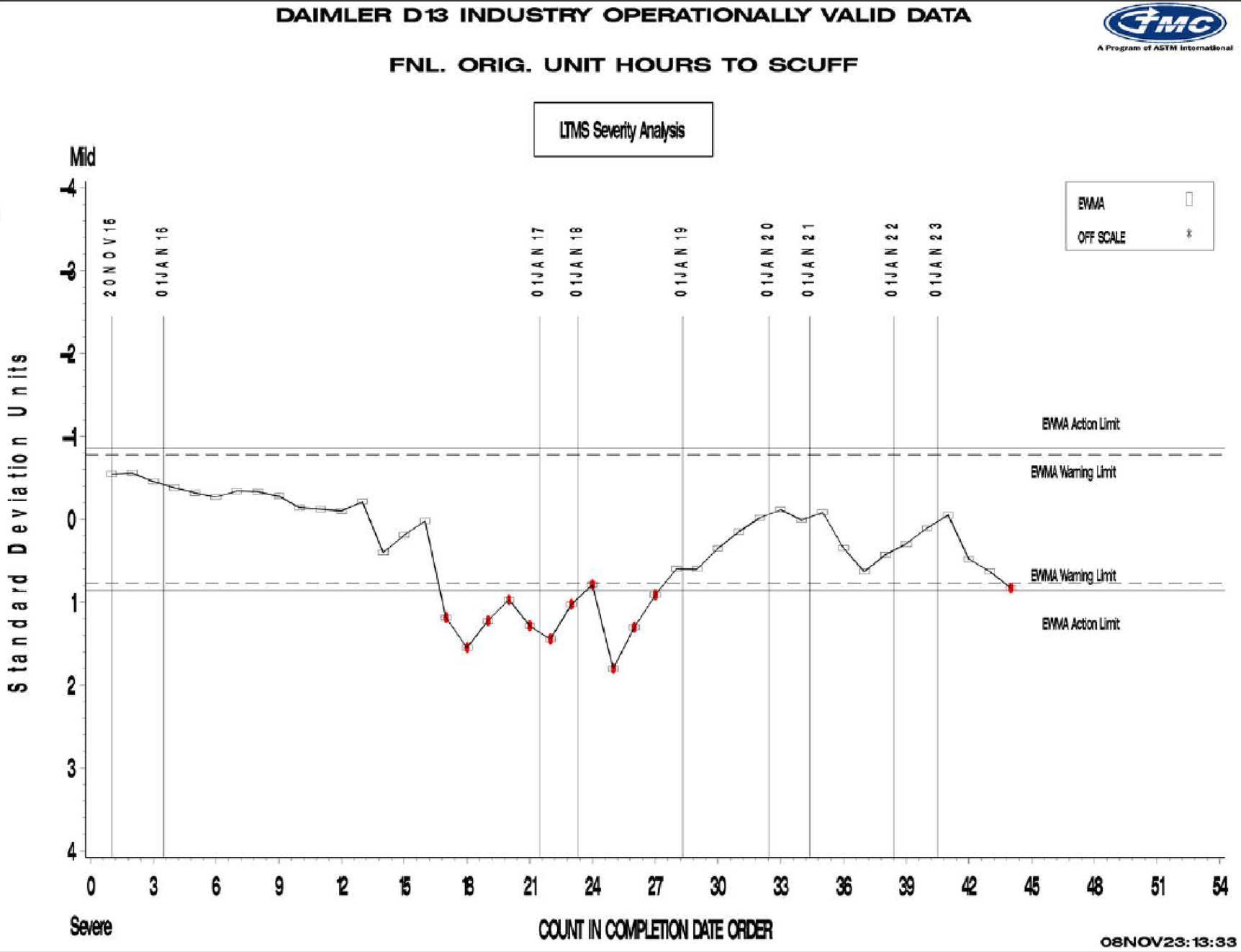
- Bearing Part Numbers/Suppliers Reviewed for Best Practices
- - Ensure the correct bearings were ordered (coatings, primary supplier vs. secondary supplier, etc.)

DD13 S.P. Report
Reference Test Activity

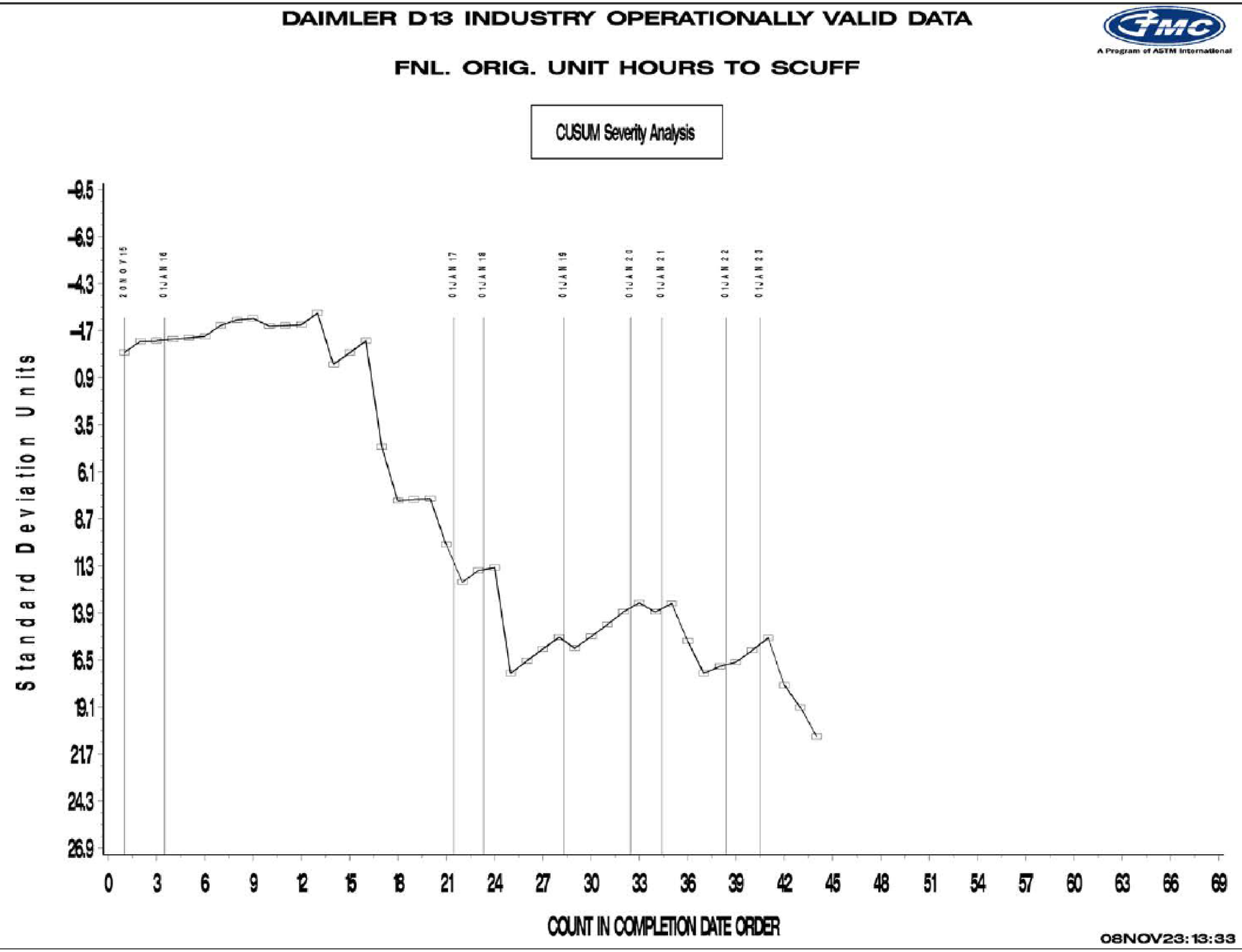
Acceptable Calibration Test	AC	0
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		**0**

Control Charting

Level 1 Alarm in Severe Direction



Control Charting



DD 13 S.P. Report
Hardware

- A4710500834 (exhaust rocker) arms currently unavailable but 120 on the way to TEI. Estimated delivery end of June 2024
- Due to new liner screening process next batch of liners need to be planned and discussed
- Batched parts below

Part	Batch	Quantity	Kits Remaining	Years Remaining*
Top Ring	C	1830	305	7.4
Second Ring	B	1567	261	6.4
Oil Ring	B	1007	168	4.1
Piston	B	1578	263	6.4
Liner	D	1056	176	4.3
				*Based on Last 12 months of sales

DD 13 S.P. Report

Reference Oil Inventory Estimated Life

Oil	Tests	Year	Blend Quantity	TMC Inventory	Estimated Life
864-1	DD13	2016	1576	440	3
864-2	DD13	2023	1475	1475	>5

DD 13 S.P. Report
Next S.P. Meeting

- Tentatively plan to target July/August
  - Topics
    - New liner screening process next batch of liners need to be planned and discussed
    - Other?

ASTM D4485 Surveillance Panel

Heavy Duty Class Panel

June 18, 2024

Austin, TX

Activity

- Information Letter 24-1 for updating D4485 Annex A5 for SL107 was issued on March 26 and the ballot, 24-03 to approve the IL closed June 4 – no negatives; one comment.

Item	Sub	Action		Committee	AFF	NEG	ABST	PCNT
002	B0	REVISION D4485-2022E1 Specification for Performance of Active API Service Category Engine Oils		D02	132.00	0.00	548.00	100.00
		TECHNICAL CONTACT: Joseph M Franklin		D02.B0	31.00	0.00	42.00	100.00
		WORK ITEM: WK90072						
		Information Letter 24-1, Sequence Number 16						

Comments:
(Main/Sub) Dr. Kalyan Kumar Chakraborty

Affirmative with comment

Ballot Number:	D02 (24-03)	Close Date: JUNE 3, 2024
Item Number:	002	Revision Of D4485-2022E1 Specification for Performance of Active API Service Category Engine Oils WK90072 Information Letter 24-1, Sequence Number 16(SEE VOLUME 05.02)(CONCURRENT WITH .B000) TECHNICAL CONTACT: Joseph M Franklin joe.franklin@intertek.com (523) -46-71
Member's Name:	Dr. Kalyan Kumar Chakraborty	
Address:	364/22 Netaji Subhash Chandra Bose Rd	
Phone Nr:	9432 32 7984	Fax Nr:
Email Address:	kkc.iitkgp@yahoo.co.in	
File Attachment:		
Statement:		

Section	**Statement**
	To achieve the adequate functional characteristics, a compromising consideration of the fitting level of essential properties is to be selectively chosen.

Cla

Impact

A5.4.1 Table A5.2 shows the initial TMC SL107 standard deviation estimates of the four reference elastomers and the four performance parameters, as reported by the TMC. The standard deviation estimates, applicable at the time a test oil is evaluated, are obtained from the TMC website (https://www.astmtmc.org/ftp/docs/d4485/D7216_Adjusted_Specification_Limit_Data/). With the introduction of SL107 Adjusted Specification Limits in 2023, the standard deviation took into account the data to date. Starting in 2025, the standard deviation will take into account a rolling 24 months of data and will be updated annually in February.

Help from the Class Panel with a D4485 question

- Foam by D892 is required for all active C and F Categories.
- Tables 2 (API CH-4) and 3 (API CI-4) do NOT allow Option A.

CH-4 Bench Tests		Measured Parameter	Primary Performance Criteria
HTCBT, 135 °C (D6594)	D6594	Used Oil Elemental Concentration	
		Copper, mg/kg increase, max	20
		Lead, mg/kg increase, max	120
		Tin, mg/kg increase	report
		Copper strip rating,[K] max	3
D892 (Option A not allowed)	D892 (Option A not allowed)	Foaming/Settling,[L] mL, max	
		Sequence I	10/0
		Sequence II	20/0
		Sequence III	10/0

Help from the Class Panel with a D4485 question

- While Tables 4, 5 and 6 (API CJ-4, CK-4 and FA-4) do not have this restriction on Option A.

CK-4 Category Bench Tests

Test Method	Measured Parameter		Primary Performance Criteria	
	SAE J300 Viscosity Grade		SAE xW-30	SAE xW-40
D4683 or D4741 or D5481	High temperature/high shear viscosity at 150 °C, mPa·s	min	3.5	Meets SAE J300
		max	N/A	
HTCBT, 135 °C (D6594)	Copper, mg/kg increase, max		20	20
	Lead, mg/kg increase, max		120	120
	Copper strip rating,[B] max		3	3
Noack (D5800)	Evaporative loss at 250 °C, %, max		13	13
Foam (D892)	Foaming/settling,[C] Sequence I, mL, max		10/0	10/0
	Foaming/settling,[C] Sequence II, mL, max		20/0	20/0
	Foaming/settling,[C] Sequence III, mL, max		10/0	10/0

Help from the Class Panel with a D4485 question

- If D892 WITH Option A is indeed the intended for API CJ-4, CK-4 and FA-4, a footnote will be added to Tables 4, 5 and 6 denoting this is an intended change and not a copy/paste error.
- Discussion

Help from the Class Panel with a D4485 question

- The T8E is a requirement for both API CH-4 and CI-4.

D4485 – 22[ε1]

TABLE 2 Diesel Engine Oil Category CH-4

Required Test Method	Test Method	Rated or Measured Parameter		Primary Performance Criteria		
				One-test	Two-test[A]	Three-test[A]
1P (D6681[B])	D6681	Weighted demerits (WDP), max		350	378	390
		Top groove carbon (TGC), demerits, max		36	39	41
		Top land carbon (TLC), demerits, max		40	46	49
		Average Oil Consumption, g/h (0 h – 360 h), max		12.4	12.4	12.4
		Final Oil Consumption, g/h (312 h – 360 h), max		14.6	14.6	14.6
		Piston, ring, and liner scuffing		none	none	none[C]
1K (D6750[D])	D6750	Weighted demerits (WDK), %, max		332	347	353
		Top groove fill (TGF), %, max		24	27	29
		Top land heavy carbon (TLHC), %, max		4	5	5
		Average Oil Consumption	g/kWh (0 h – 252 h), max	0.54	0.54	0.54
			g/MJ (0 h – 252 h), max	0.15	0.15	0.15
		Piston, ring, and liner scuffing		none	none	none[C]
T-9 (D6483) or T-10 (D6987/D6987M) or T-12 (D7422)	D6483	Average Liner Wear, normalized to 1.75 % soot, µm max		25.4	26.6	27.1
		Average Top Ring Mass Loss, mg max[E]		120	136	144
		EOT Used Oil Lead Content less New Oil Lead Content, mg/kg, max		25	32	36
	D6987/D6987M	Liner wear, µm, max		32	34	35
		Ring wear, mg, max		150	159	163
		Lead content at EOT, mg/kg, max		50	56	59
	D7422	Liner wear, µm, max		30.0	30.8	31.1
		Top Ring Mass Loss, mg, max		120	132	137
		Lead content at EOT, mg/kg, max		65	75	79
RFWT (D5966)	D5966	Average Pin Wear	mils, max	0.30	0.33	0.36
			(µm) max	(7.6)	(8.4)	(9.1)
M11 (D6838[F]) or ISM (D7468)	D6838	Rocker Pad Average Mass Loss, normalized to 4.5 % soot, mg max		6.5	7.5	8.0
		Oil Filter Differential Pressure at EOT, kPa max		79	93	100
		Average Engine Sludge, CRC Merits at EOT, min		8.7	8.6	8.5
	D7468	Crosshead wear, mg, max		7.5	7.8	7.9
		Oil filter delta pressure, at 150 h, kPa, max		79	95	103
		Sludge rating, CRC merits, min		8.1	8.0	8.0
Ext. T-8E (D5967[G])	D5967	Relative Viscosity at 4.8 % Soot by TGA, max		2.1	2.2	2.3
		Viscosity increase at 3.8 % Soot by TGA, mm^2/s, max		11.5	12.5	13.0
Sequence IIIF (D6984) or	D6984	60 h Viscosity at 40 °C, increase from 10 min sample, % max			295	

Help from the Class Panel with a D4485 question

Ext. T-8E (D5967[G])	D5967	Relative Viscosity at 4.8 % Soot by TGA, max	2
		Viscosity increase at 3.8 % Soot by TGA, mm^2/s, max	11

Footnote refers to T-11 as an alternative

- Clarify and add back the % loss for the T-8E Relative Viscosity at 4.8% Soot – 50% shear loss

acea

2022 ACEA Oil Sequences for Heavy-Duty E

REQUIREMENT	TEST METHOD	PROPERTIES	UNIT	E4-22
2. ENGINE TESTS				
2.1 Wear	CEC L-99-08 (OM646LA)	Cam wear outlet (avg max wear 8 cams)	µm	≤140
2.2 * Soot in oil	ASTM D5967 (Mack T-8E)	Test duration 300h relative viscosity at 4.8% soot and 50% shear loss		≤2.1

Help from the Class Panel with a D4485 question

- The T8E is a requirement for both API CH-4 and CI-4.

D4485 – 22$^{\varepsilon 1}$

TABLE 3 Diesel Engine Oil Category CI-4

Required Test Method	Engine Test Method	Rated or Measured Parameter	Primary Performance Criteria		
			One-test	Two-test[A]	Three-test[A]
1R (D6923) or 1P (D6681)	D6923	Weighted demerits (WDR), max	382	396	402
		Top groove carbon (TGC), demerits, max	52	57	59
		Top land carbon (TLC), demerits, max	31	35	36
		Initial oil consumption (IOC), (0 h – 252 h), g/h, average	13.1	13.1	13.1
		Final oil consumption,(432 h – 504 h), g/h, average, max	IOC + 1.8	IOC + 1.8	IOC + 1.8
		Piston, ring, and liner distress	none	none	none
		Ring sticking	none	none	none
	D6681	Weighted demerits (WDP), max	350	378	390
		Top groove carbon (TGC), demerits, max	36	39	41
		Top land carbon (TLC), demerits, max	40	46	49
		Average oil consumption, g/h (0 h – 360 h), max	12.4	12.4	12.4
		Final oil consumption, g/h (312 h – 360 h), max	14.6	14.6	14.6
		Piston, ring, and liner scuffing	none	none	none
T-10 (D6987/D6987M) or T-12 (D7422)	D6987/D6987M	Merit rating,[A] min	1000	1000	1000
	D7422	Merit rating,[A] min	1000	1000	1000
M11 EGR (D6975) or ISM (D7468)	D6975	Average crosshead mass. loss, mg, max	20.0	21.8	22.6
		Average top ring mass loss, mg	report	report	report
		Oil filter differential pressure at 250 h, kPa, max	275	320	341
		Average engine sludge, CRC merits at EOT, min	7.8	7.6	7.5
	D7468	Crosshead wear, mg, max	7.5	7.8	7.9
		Oil filter Δ pressure at 150 h, kPa, max	55	67	74
		Sludge rating, CRC Merits, min	8.1	8.0	8.0
Ext. T-8E (D5967)[B]	D5967	Relative viscosity at 4.8 % soot[C]	1.8	1.9	2.0
Sequence IIIF	D6984	Kinematic viscosity (at 40 °C), percent increase, max	275	275 (MTAC)	275 (MTAC)

Help from the Class Panel with a D4485 question

Ext. T-8E (D5967)[B]	D5967	Relative viscosity at 4.8 % soot[C]	1.8	1.9	

[C] Relative Viscosity (RV) = viscosity at 4.8 % soot/viscosity of new oil sheared in Test Method D6278.

- Clarify and add back the % loss for the T-8E Relative Viscosity at 4.8% Soot – 100% shear loss

Digging back through meeting notes from the Mack SP, I did find a note from '01 that clearly states which was being used where.

- Issues regarding T-8E relative viscosity: The CI-4 category uses 100% DIN shear as the initial viscosity, while CH-4 uses 50%, and the results differ. 100% DIN shear is not currently monitored for calibration or severity adjusted. **Proposal** – Add 100% DIN shear calculation to T-8E as 3rd parameter for severity adjustment only…not critical for stand calibration.
  Jeff noted he can back calculate targets from the existing data base.
  Greg Shank noted that he would prefer to calibrate stands using the 100% DIN shear targets and use 50% for SA's. **Action** – Jeff Clark will draft a proposal and lab charts for the above data and we will discuss during a teleconference in January.
  Bob Campbell questioned if we need to monitor DIN shear, and Joe Franklin suggested we look at the status of the data and discuss during the above teleconference.

Help from the Class Panel with a D4485 question

- Motion to add the % loss for the T-8E Relative Viscosity at 4.8% Soot
  - CH-4 – 50% shear loss
  - CI-4 – 100% shear loss

Future

- The Surveillance Panel will hold a meeting June 19 after Sub B to address
  - Correcting type-os
  - Adding alternative methods for shear stability
  - Clarifying intent
  - Another other new business