HEAVY-DUTY ENGINE OIL CLASSIFICATION PANEL

OF

ASTM D02.B0.02

December 10, 2024

Anaheim Marriott – Anaheim, CA

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 1:30 p.m. on Tuesday, December 10, 2024, in the Platinum Ballroom 7&8 of the Anaheim Marriott in Anaheim, CA.

1.2 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 minutes from June 18, 2024 were approved as written.

4.0 Membership Changes

4.1 Michael Madalian – Infineum (replacing David Brass)

4.2 Mark Petraoia – TOTAL (Replacing Angela Willis)

4.3 Mike Cabaj – Daimler Truck (Replacing Suzanne Neal)

4.4 Michael Mclaughlin - BP

5.0 Surveillance Panel Reports

5.1 DD13 Surveillance Panel, Robert Slocum – Lubrizol (**Attachment 3**)

5.1.1 BOI/VGRA in progress

5.1.2 3 acceptable references prior to BOI/VGRA

5.1.3 Reference Oil inventory is in good standing

5.1.4 Exhaust rocker arm supply issue has been resolved

5.1.5 Connecting rods have been received by TEI and another batch is on order, so no current supply issues

5.1.6 Kits are available for several years, and will re-evaluate as PC12 progresses

5.1.7 BOI/VGRA expected to be completed mid-January

5.2 Cummins Surveillance Panel, Joshua Ward – Intertek (**Attachment 4**)

5.2.1 ISB Update

5.2.1.1 Limited current hardware availability, 4 stands currently calibrated on old batch hardware
5.2.1.2 New batch has 237 kits worth of camshafts which are the limiting factor, other hardware has larger numbers (>500 kits)
5.2.1.3 New RO835 prove-out testing expected to be completed by year end
5.2.1.4 Current Action Items
5.2.1.4.1 Low viscosity reference oil introduction is in progress
5.2.1.4.2 2 of 4 remaining tests are underway, targeting to finish the other 2 by end of the year.
5.2.1.4.3 After the reference oil matrix is completed, the new hardware testing should begin immediately following targets being set by the panel
5.2.1.4.4 ISB turbocharger supply is low and the panel is currently working to solve supply issue, which is the issue that delayed matrix testing

5.2.2 ISM Update
5.2.2.1 RO835 was rejected by the panel for use in the ISM
5.2.2.1.1 Panel interested in other suppliers for new reference oil
5.2.2.2 New hardware introduction tests expected to start in January, and control charts will be evaluated after the hardware is introduced
5.2.2.2.1 The new hardware batch consists of only 85 kits worth of adjusting screws which are the limiting factor
5.2.2.3 Another batch of injector adjusting screws have been ordered
5.2.2.4 Current Action Items
5.2.2.4.1 Low viscosity reference oil
5.2.2.4.2 New Hardware introduction (85 kits)
5.2.2.4.3 Continue to monitor ISM control charts as reference data becomes available
5.2.2.4.4 Purchase future batch of adjusting screws to align with remaining hardware quantities

5.3 Mack/Volvo Surveillance Panel, Andrew Smith on behalf of David Brass – Infineum (**Attachment 5**)
5.3.1 T13
5.3.1.1 Higher than normal Oil Consumption was found to be attributed to the rings and pistons
5.3.1.2 The manufacturing site of the rings was changed (same part number) and the new supply of rings produced normal oil consumption
5.3.1.3 A new reference oil TMC824 with expected targets near PC12 limits to begin in December. The matrix is funded through NCDT and Test Labs.
5.3.1.4 T13 power cylinder components will be batched, with the new batch expected to be delivered by March 2025

5.3.2 T11/T12
5.3.2.1 Pencool coolant no longer available to labs, and an alternative coolant (Chevron Delo Extended Life) was added to the Mack T11 and is under evaluation in the Mack T12
5.3.2.2 Panel reviewing lead parameters ICF based on new batch of hardware and new coolant

5.3.3 T8/T11/T12 Hardware
5.3.3.1 Low hardware sales this year have extended the EOL of T8/T11/T12 testing. Estimated EOL are shown in the attachments.

5.3.4 Reference Oil Supply
5.3.4.1 TMC 1005-5 is low, and a re-blend request has been made to the supplier by TMC

5.4 Caterpillar Surveillance Panel, Andrew Smith on behalf of Jacob Goodale – Infineum (**Attachment 6**)

5.4.1 Surveillance Panel Update: Josh Ward has stepped down as secretary as he has taken the Cummins SP Chair role, and the panel is looking for a replacement
5.4.2 COAT
5.4.2.1 Reference oil 832-2 not approved for introduction, 833-2 introduction has started
5.4.2.2 EOAT/COAT equivalency matrix was completed
5.4.3 C13
5.4.3.1 Low viscosity test prove out has been completed
5.4.3.2 Top Ring Mass Loss added to the procedure from Information Letter 24-1
5.4.3.3 831-5 introduction plan agreed upon
5.4.4 COAT / EOAT Matrix
5.4.4.1 5 tests completed and analyzed by industry statisticians
5.4.4.2 The passing rate of oil 1005 in EOAT was used to find an equivalent passing rate in COAT, which takes into account the test variability
5.4.4.3 An equivalent limit in COAT was determined to be 12.2
5.4.4.4 Andrew Smith **MOTION**, Joe Franklin Second: Accept the presented equivalency limit of 12.2 for oils run in the COAT providing equivalency to the EOAT.
5.4.4.4.1 12 Approve
5.4.4.4.2 1 Waive, Mike Cabaj, Daimler Truck
5.4.4.4.3 Motion Carries

5.5 D4485 Surveillance Panel, Laura Birnbaumer – Chevron Oronite (**Attachment 7**)
5.5.1 D4485-24 was issued in July 2024
5.5.1.1 Main change was update to A5 for the new elastomer reference oil
5.5.2 SP met in Austin at the previous ASTM, and agreed on 7 updates/corrections for the next edition
5.5.3 SP will meet Wednesday after sub B for new business and these updates
5.5.4 D4485 question to Class Panel: Was option A intentionally left off Tables 4, 5, and 6.
5.5.4.1 In 2006 it was found that this was intentionally removed from the tables via motion, second, and unanimous vote.
5.5.4.2 Laura Birnbaumer **MOTION**, Joe Franklin Second: Add a footnote by the D892 test method to Tables 4, 5, and 6 stating that the removal of “Option A is Not Allowed” is an intended change from the previous service categories.
5.5.4.2.1 This will be word smithed after the vote, to allow for moving forward.
5.5.4.2.2 Motion Carries Unanimously

6.0 CLOG, Brent Calcut – Afton (**Attachment 8**)

6.1 T11 Equivalency Plan was agreed upon, and have asked the industry statisticians to analyze results from ISB Viscosity precision matrix to establish equivalency
6.1.1 PM is complete; results have been posted
6.2 T8 Equivalency Plan
6.2.1 CLOG recommended to review 1005 data ran on the ISB Viscosity, and if more data is needed, run more RO1005 tests in ISB Viscosity
6.3 MRV is straightforward, as the ISB Viscosity evaluates sooted oil MRV at around the same soot percentage of 5%
6.4 T12 Wear Status
6.4.1 4 options were reviewed in CLOG
6.4.1.1 Option 1: ISB Camshaft Wear
6.4.1.1.1 Redundancy with T12 Ring and Liner wear

6.4.1.1.2 Will the ISB run to completion with CH-4 and CI-4 oils? CLOG members were asked to investigate these oils in the ISB Wear test

6.4.1.2 Option 2: SwRI Bench Development

6.4.1.2.1 SwRI to advise if they are willing to revisit this effort

6.4.1.3 Option 3: OM471 400 hr test procedure development

6.4.1.3.1 600 hr version currently runs in Europe, and the test has the potential to measure liner wear and oxidation, but test development would be necessary for a 400 hr version in the US with a different fuel

6.4.1.4 Option 4: Development on Daimler SRV converting to ASTM test

6.4.1.4.1 Potential to correlate wear

6.4.2 Timeline based upon current low usage rates allows for time to find the best solution, and the group does not need to be rushed to a decision

6.5 T12 Lead Status

6.5.1 A shortened T13 oxidation test could be developed to replace the lead parameters

6.5.2 CLOG requested ACC to review T12 lead data with gasoline oxidation tests, and will wait for a final response from the ACC

7.0 Old Business

7.1 Elastomer Testing Section 7 Update – Not reviewed during this meeting

8.0 New Business

8.1 EMA Update/ Introduction – Chad Grugel

8.1.1 Will soon take over as lead EMA staff for Roger Gault

8.1.2 EMA is closely monitoring PC12, with first licensing date of January 1, 2027, as timing is most critical to EMA.

8.1.3 EMA is following the CLOG updates

8.1.4 Elastomer and material change has been provided, and are following progress

9.0 Next meetings

9.1 Tuesday June 24, 2025 in Kansas City or at call of Chairman.

10.0 The meeting was adjourned at 2:33 pm.

AGENDA
D02.B0.02.1
Heavy-Duty Engine Oil Classification Panel

Tuesday, December 10, 2024 1:30pm PST
Anaheim Marriott – Platinum Ballroom Salon 7/8
Anaheim, CA USA

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

2) **Minutes** – Approval of Minutes from June 18, 2024 Meeting in Austin, TX USA

3) **Membership**

   a) Review and update current panel membership

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

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

5) **Category Life Oversight Group (CLOG) Update**
   a) Support for legacy HD Categories (Brent Calcut, Afton Chemical)

6) **Old Business**
   a) Elastomer Testing (Section 7) Update - TBD

7) **New Business**
   a) EMA Update – Introduction (Chad Grugel, EMA)

8) **HDEOCP Adjournment**

LastName	FirstName	Company	E-mail Address
Alessi	Michael	ExxonMobil F&L	michael.l.alessi@exxonmobil.com
Andersen	Jason	PACCAR Technical Center	jason.andersen@paccar.com
Birnbaumer	Laura	Chevron Oronite	labi@chevron.com
Bowden	Matthew	OH Technologies	mjbowden@ohtech.com
Bowden	Jason	OH Technologies, Inc.	jhbowden@ohtech.com
Calcut	Brent	Afton Chemical Corporation	brent.calcut@aftonchemical.com
Campbell	Bob	Afton Chemical Corporation	bob.campbell@aftonchemical.com
Castanien	Chris	Chevron	christiancastanien@chevron.com
Clark	Jeff	TMC	jac@astmtmc.org
DeBaun	Heather	Navistar, Inc.	heather.debaun@navistar.com
Deegan	Michael	Ford Motor Co.	mdeegan@ford.com
Delp	Lynsie	Caterpillar Inc.	delpr@cat.com
Duho	Kwame	Valvoline Global Operations	jkduho@valvoline.com
Franklin	Joe	Intertek Automotive Research	joe.franklin@intertek.com
Gibbons	Greer	Lubrizol	greer.gibbons@lubrizol.com
Girard	Luc	Sanjuro Consulting	lgirard@sanjuroconsulting.com
Goble	Wesley	Valvoline Global	wesley.goble@valvolineglobal.com
Haffner	Steve	SGH Consulting / NOVVI	sghaffner2013@gmail.com
Haumann	Karin	Shell	karin.haumann@shell.com
Hosseini	S.	Chevron Oronite	Mahboob.Hosseini@Chevron.com
Jetter	Steven	ExxonMobil	steven.m.jetter@exxonmobil.com
Ketcham	Stephen	Chevron	Stephen.ketchan@chevron.com
Koglin	Cory	Afton Chemical Corporation	cory.koglin@aftonchemical.com
Lanctot	Dan	TEI	dlanctot@tei-net.com
Lang	Patrick	Southwest Research Institute	plang@swri.org
Lee	David	Chevron Oronite	david.lee@chevron.com
Moyer	Sean	Test Monitoring Center	sam@astmtmc.org
Neal	Suzanne	Daimler Truck NA	suzanne.neal@daimlertruck.com
O'Ryan	Bill	API	oryanw@api.org
Qin	Wei	Cummins Inc.	
Scinto	Philip	Lubrizol	phil.scinto@lubrizol.com
Slocum	Robert	The Lubrizol Corporation	robert.slocum@lubrizol.com
Smith	Andrew	Infineum	andrew.smith@infineum.com
Stockwell	Robert	Chevron Oronite	robert.stockwell@chevron.com
Tonkel	Bruce	Valvoline	bruce.tonkel@valvoline.com
Ward	Josh	Intertek Automotive Research	joshua.ward@intertek.com
Warden	Robert	Southwest Research Institute	robert.warden@swri.org
Whitacre	Shawn	Chevron Lubricants	shawnwhitacre@chevron.com
Duncan	Dave	Richful	david.duncan@richful.com
Maddock	Ben	Afton Chemical Corporation	ben.maddock@aftonchemical.com

Petraroia	Mark	Total Energies	mark.petraroia@totalenergies.com
Madalian	Michael	Infineum	michael.madalian@infineum.com
Schweitzer	Addison	Shell	addison.schweitzer@shell.com
Goodrich	Barb	B.E. Goodrich Consulting	BEGoodrich@aol.com
McCollum	Clarence	Richful	clarence.mccollum@richful.com
Huang	Chung-Hsuan	CNH	chung-hsuan.huang@cnh.com
Sobecki	Brandyn	Daimler Truck NA	brandyn.sobecki@daimlertruck.com
Cabaj	Mike	Daimler Truck NA	michael.cabaj@daimlertruck.com
Freeman	Traci	Afton Chemical Corporation	traci.freeman@aftonchemical.com

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

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

DD13 S.P. Report
Panel Activity

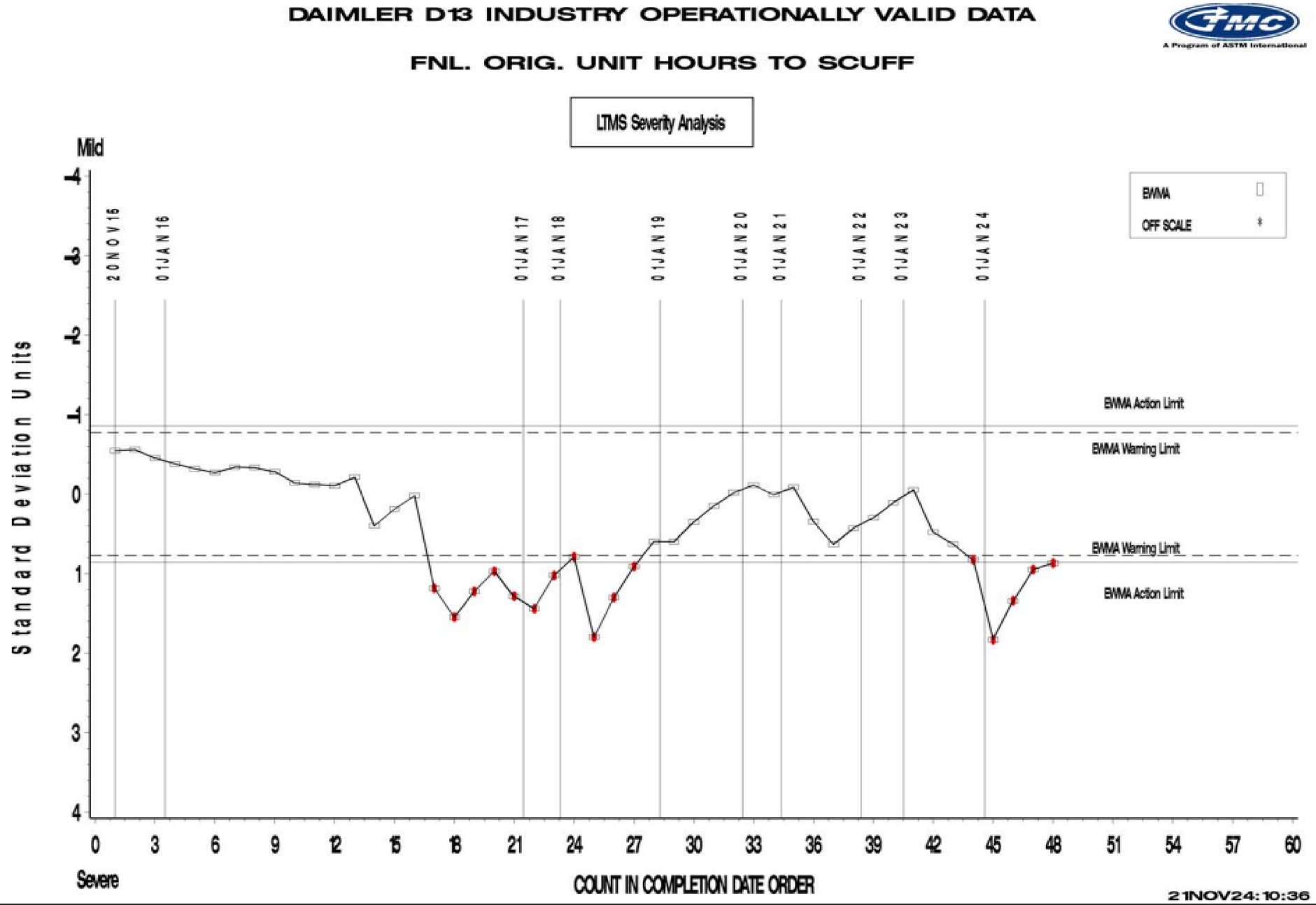
- BOI/VGRA in progress

DD13 S.P. Report
Reference Test Activity

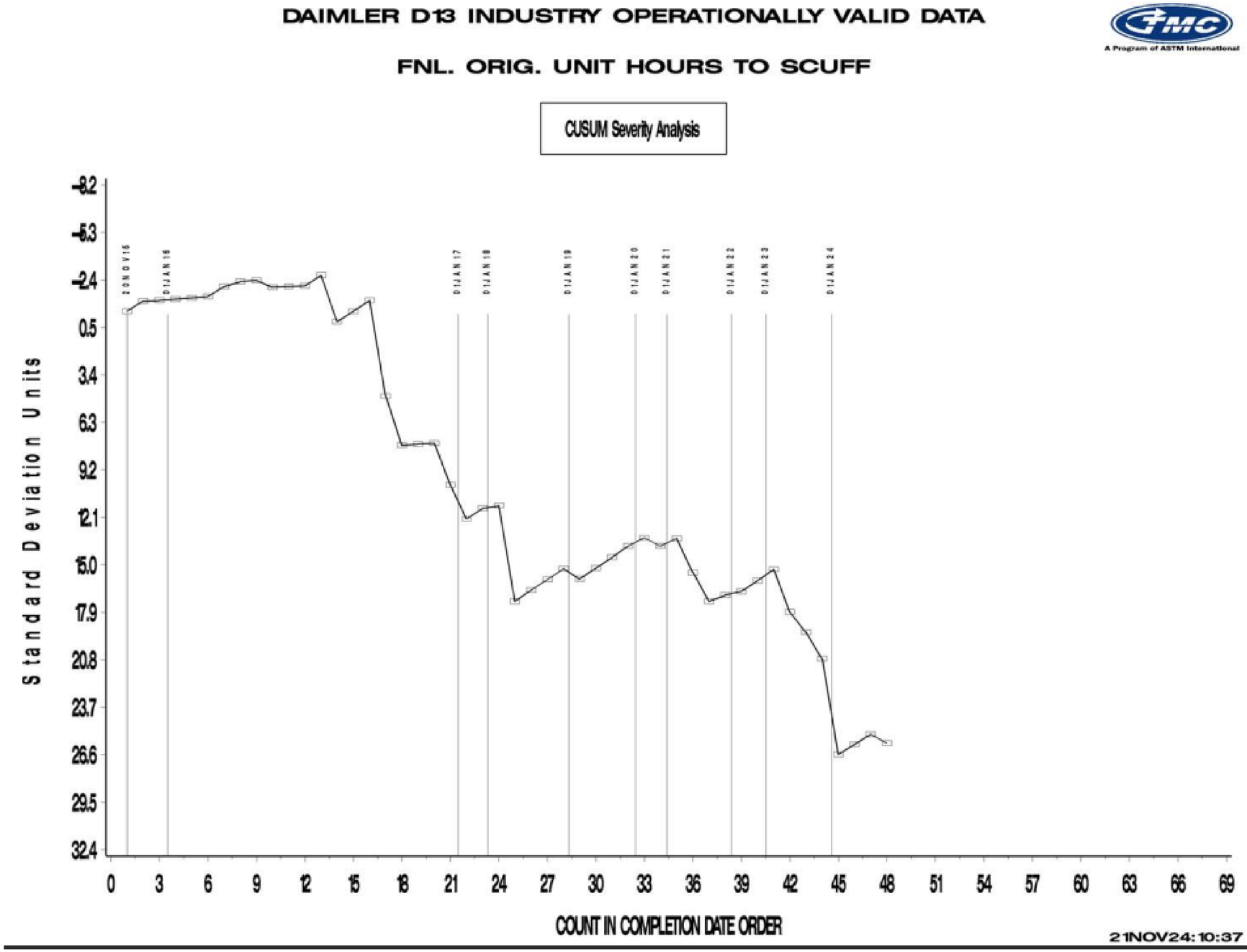
As of 10/2024

Acceptable Calibration Test	AC	3
Failed Calibration Test	OC	1
Operationally Invalid	LC	1
Aborted	XC	0
Valid Matrix Test	AM	7
Aborted Matrix Test	XM	1
Total		13

Control Charting



Control Charting



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
Hardware

- A4710500834 (exhaust rocker) arms inventory seem to be ok at the moment.
- Connecting rods have been a challenge but recently received an order and have already placed another
- Batched parts below

Part	Batch	Quantity	Kits Remaining	Years Remaining*
Top Ring	C	1740	305	7.4
Second Ring	B	1477	261	6.4
Oil Ring	B	917	168	4.1
Piston	B	1488	263	6.4
Liner	D	966	176	4.3

*Based on Last 12 months of sales

DD13 BOI/VGRA Update

LAB B				LAB G				LAB A			
IND	Testkey	Status	HRSSCF	IND	Testkey	Status	HRSSCF	IND	Testkey	Status	HRSSCF
DD1	190568	Reported	102	DD1	190580	Terminated		DD12	190595	Reported	31
DD17	190574	Reported	62	DD1	191447	Reported	31	DD3	190591	Reported	142
DD7	190571	Reported	200	DD9	190583	Reported	4	DD11	190594	Reported	82
DD15	190573	Invalid		DD5	190582	Reported	42	DD10	190593	Reported	4
DD6	190570	reported	154	DD14	190585	Reported	150	DD20	190597	assigned	
DD19	190575	assigned		DD13	190584	reported	>200	DD16	190596	assigned	
DD9	190572			DD18	190587	Assigned		DD8	190592		
DD4	190569			DD2	190581	assigned		DD21	190598		
DD15	192964			DD17	190586	Assigned					

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

- BOI/VGRA completion next steps??

Cummins

ISB (ASTM D7484) ISM (ASTM D7468)

Surveillance Panel Update

December 2024

Prepared by: Joshua Ward, S.P. Chairman

Cummins SP Report

ISB Test Status

- 4 labs, 4 test stands are currently calibrated on old hardware batch with limited hardware availability
  - Critical Parts Inventory of New Hardware
    - Camshaft Batch O: 237 Kits
    - Tappets Batch G: 500 Kits
    - Crossheads Batch H: 500 Kits
    - Push Rods Batch E: 650 Kits
- New Reference Oil Update:
  - New RO835 prove-out tests expected to complete by end of year

Cummins SP Report

ISB Test Status

- 4 Surveillance Panel Meetings this period
- 1st Meeting
  - Discussion on new ISB reference oil, hardware, and rollout plan
- 2nd Meeting
  - Discussion on ISB new hardware status and turbo availability
- 3rd Meeting
  - Discussion on ISB new hardware and turbo availability
- 4th Meeting
  - ISB new reference oil timeline

Cummins SP Report

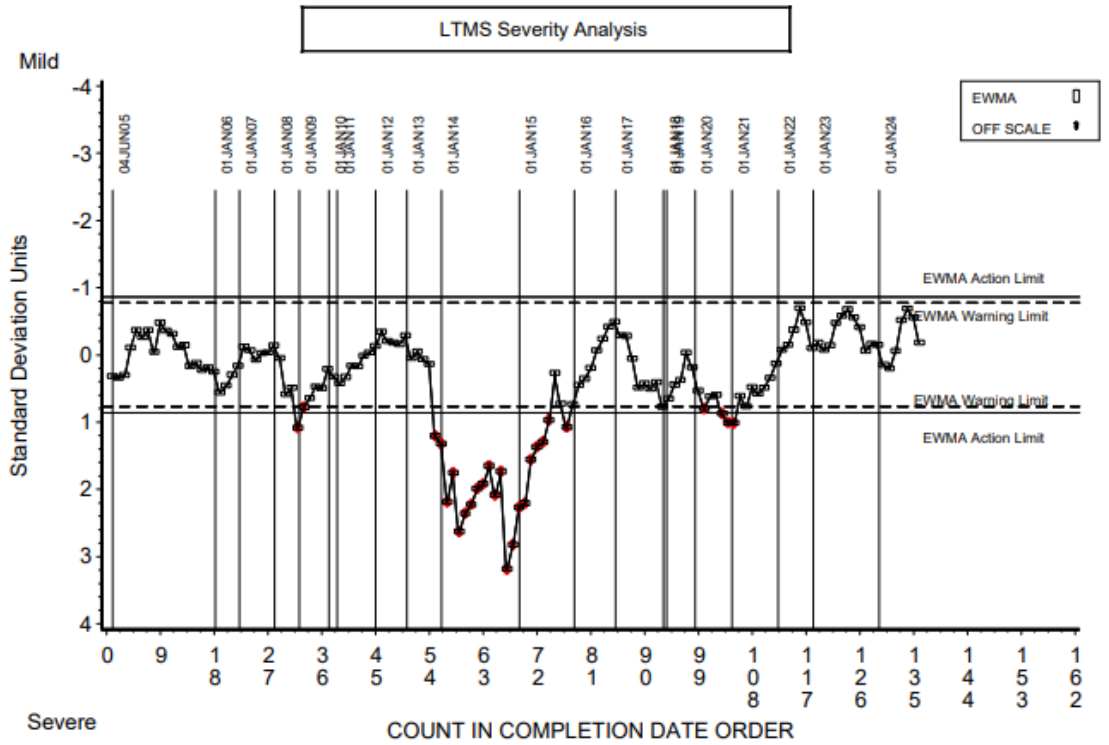
ISB Test Status

- Action Items
  - Low viscosity reference oil introduction in progress
    - Expected to complete by end of year
    - Stats group to review and propose targets upon completion
  - New hardware introduction to take place once targets are established on the new reference oil
  - Continue to monitor ISB new hardware data as reference data becomes available
  - ISB turbo supply remains an open issue

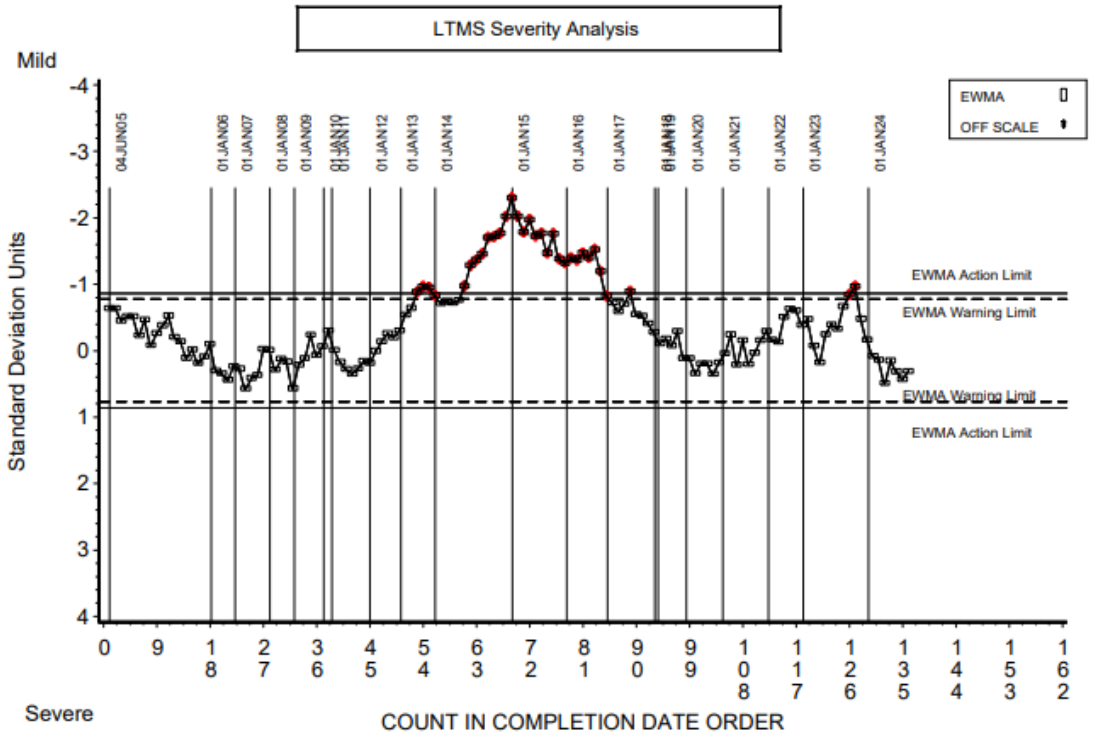
Cummins SP Report

ISB Test Status

ACSW



ATWL



Cummins SP Report

ISM Test Status

- 3 labs, 3 tests stands are currently calibrated on old hardware with limited hardware availability
- New hardware will be brought in on coordinated references
  - Critical Parts Inventory
    - Adjusting Screw Batch G: 85 Kits
    - Crossheads Batch H: 210 Kits
    - Push Rods Batch D: 284 Kits
    - Exhaust Valve Batch H: 192 Kits
    - Intake Valves Batch H: 192 Kits
- Reference Oil Update:
  - Approximately 5 Year Supply of 830-3 at current usage rate

Cummins SP Report

ISM Test Status

- 4 Surveillance Panel Meetings this period
- 1st Meeting
  - Discussion ISM new hardware status
- 2nd Meeting
  - Discussion on next batch of ISM hardware timeline and new reference oil prove-out test
- 3rd Meeting
  - Discussion and motions to release ISM hardware for coordinated referencing
  - Reviewed results from ISM new reference oil prove-out test
- 4th Meeting
  - Discussion on future batch of ISM hardware timeline and quantities
  - Reviewed results from new reference oil prove out test. Motion was made to reject RO835 for use in the ISM

Cummins SP Report

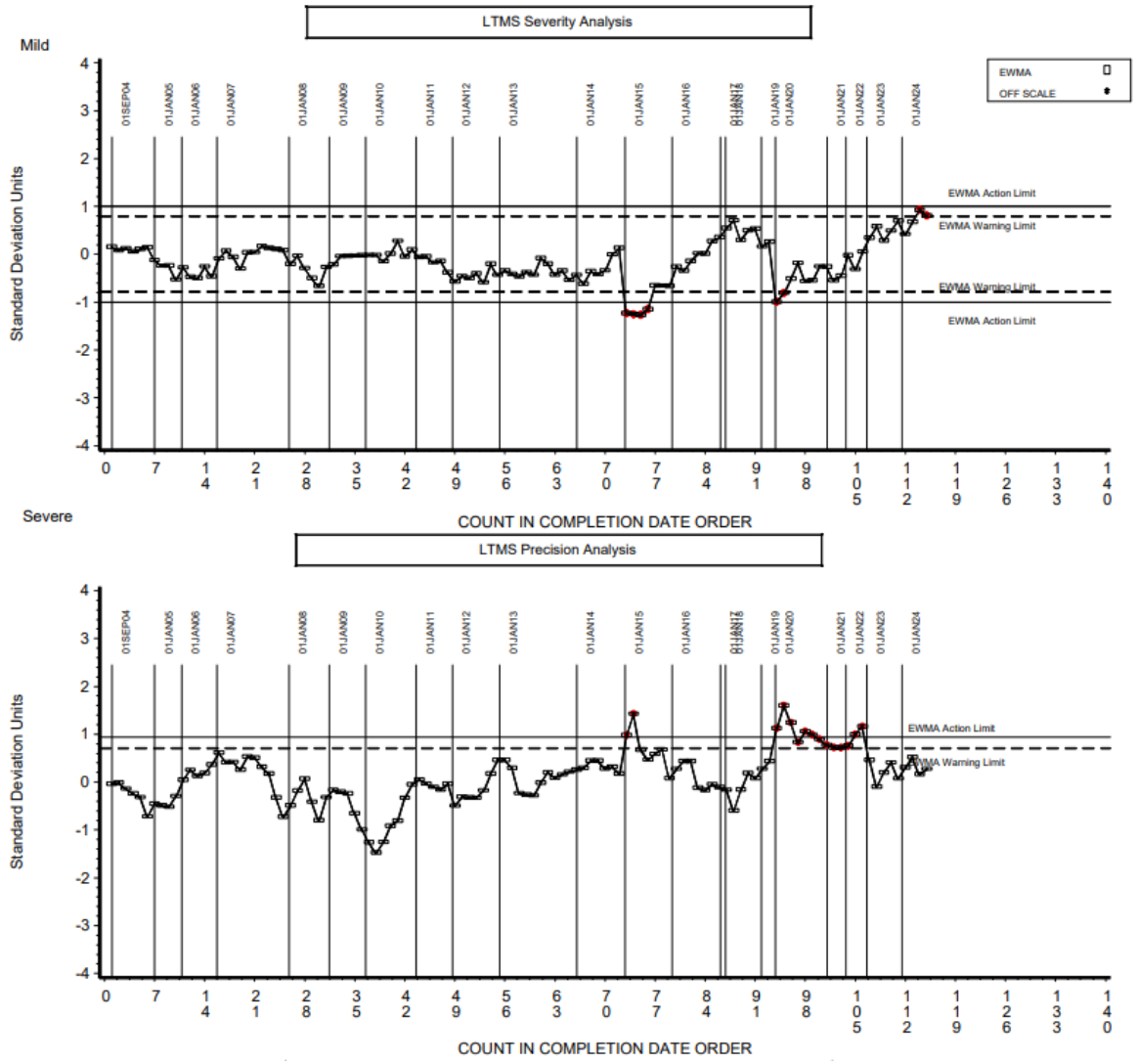
ISM Test Status

- Action Items
  - Low viscosity reference oil
    - Need suppliers to bring oils to the panel to be evaluated for use in the ISM
  - New hardware introduction tests expected to start in January (85 kits)
  - Continue to monitor ISM control charts as reference data on the new hardware becomes available
  - Purchase future batch of injector adjusting screws to align with remaining hardware quantities

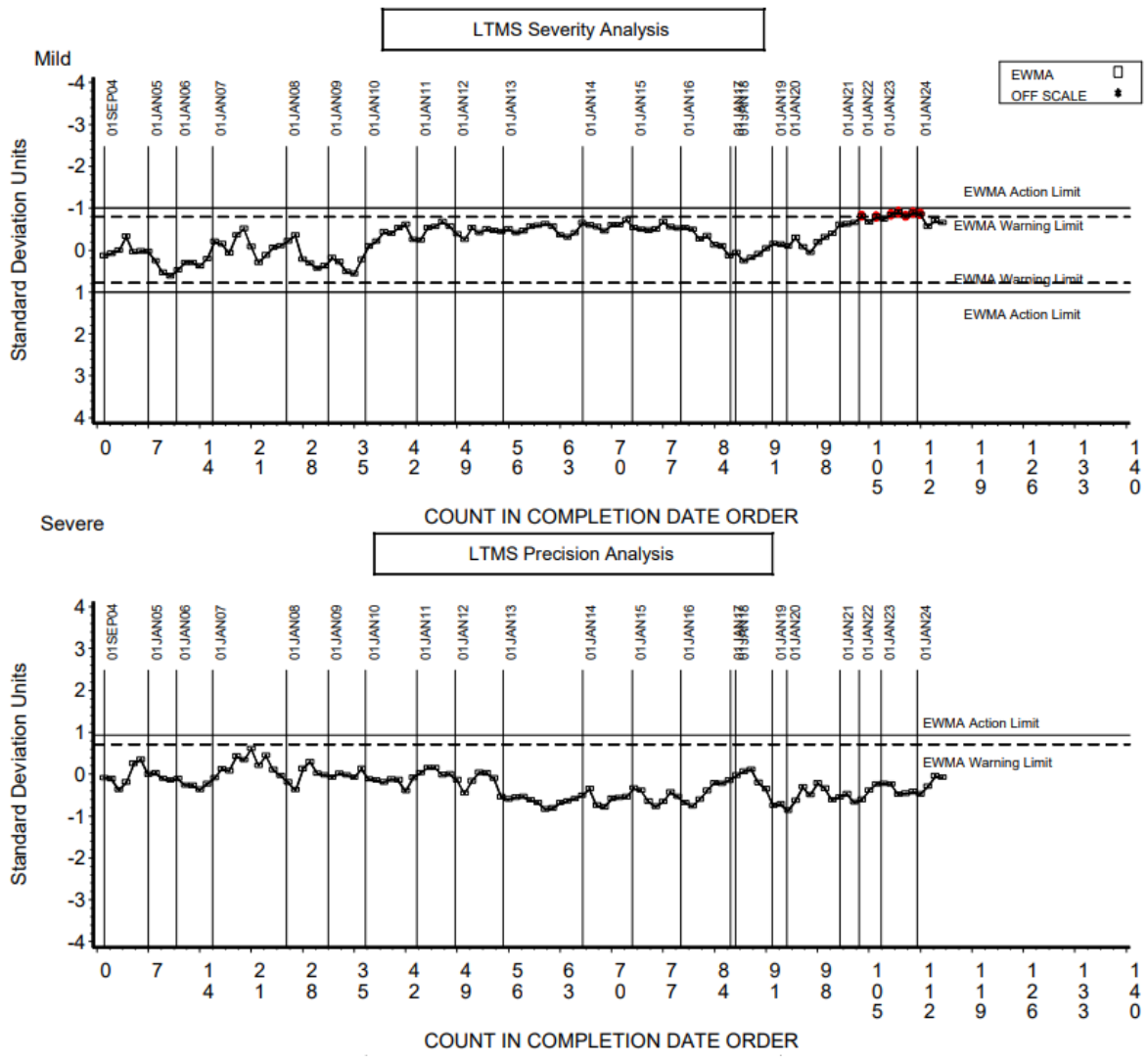
Cummins SP Report

ISM Test Status

Average Sludge Rating



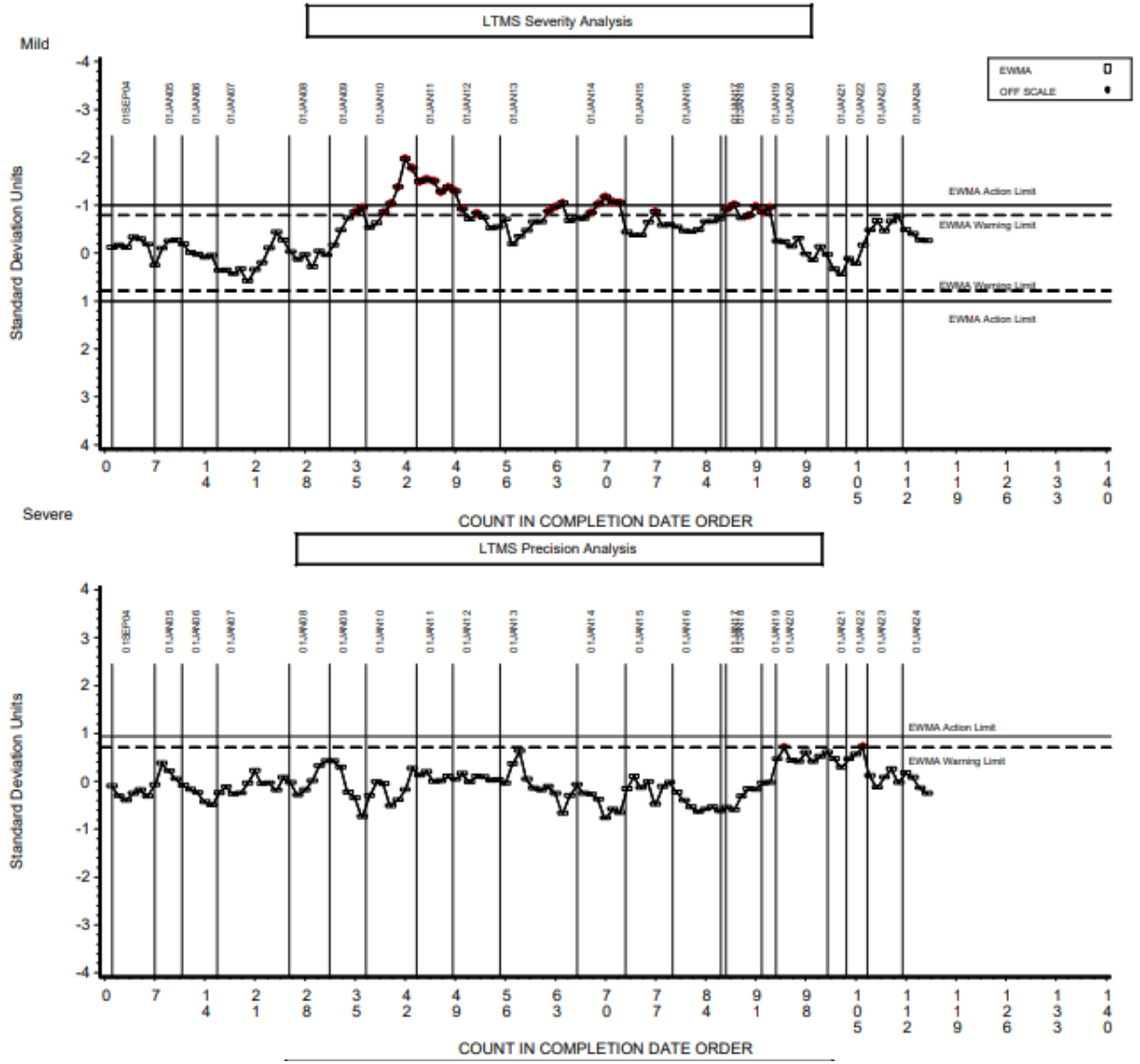
Crosshead Weight Loss



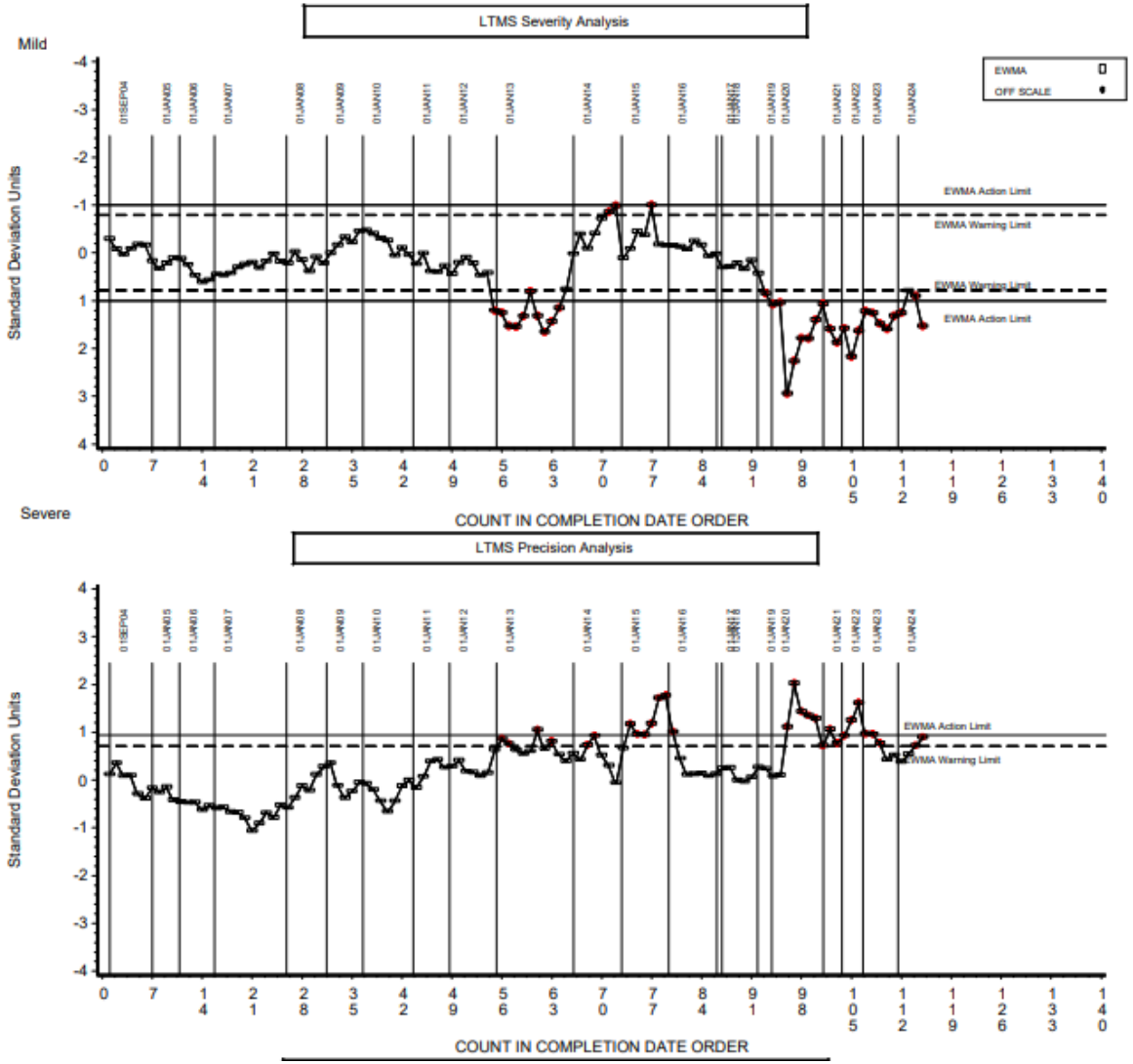
Cummins SP Report

ISM Test Status

Oil Filter Delta Pressure



Injector Screw Weight Loss



Cummins SP Report

- Questions?

Mack/Volvo Surveillance Panel Update

David Brass, Mack/Volvo Surveillance Panel Chair

HDEOCP

December 10, 2024

Meetings

- Surveillance Panel held 3 meetings in the last period
  - September 26
  - November 11
  - December 2

- Next Meeting planned for:
  - December 19

Ballots

- No Ballots this period

Key Updates

Volvo T-13

- Higher than normal oil consumption (30-40 g/hr compared to 20-30 g/hr normal range) was found to be attributed to the rings and pistons.
  - Surveillance Panel found a fix by switching manufacturing site of the rings (same part number) used in the test. Change brought oil consumption to <25 g/hr.
  - Surveillance Panel has decided to start batching all power cylinder parts going forward
- A new reference oil TMC 824 (expected targets near PC-12 limits) has been supplied to labs and is to begin target matrix testing in December. Matrix funded through NCDT and Test 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.
- Alternative coolant (Chevron Delo Extended Life Coolant) was added for Mack T-11 earlier in the year and is currently under evaluation for the Mack T-12
- Panel is evaluating new ICF for PB and PB2 parameters based on data with new batch of parts and Chevron Delo Extended Life Coolant.

Volvo T-13 High Oil Consumption Investigation

- Oil consumption had been elevated due to the available pistons and piston rings that are in the supply network. This test has not use batched parts so it took some time to pinpoint which parts were causing the high oil consumption.
  - Pistons from 8/2022 – 4/2023 when tested with Rings produced in the same time range have contributed to high oil consumption
  - Swapping to rings or pistons outside of this date range reduced the oil consumption.

Study 1

Pistons	Rings	OC (48-96 hr)	Test Site
New (2023)	New (1017729)	44.4	Lab D
New (2023)	New (1017729)	44.4	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

Study 2 – Lab A

Pistons	Rings	OC (48-96 hr)
New (5/2022)	New (934k)	39.5
New (8/2022)	New (939/959/967k)	41.0
Old (2019)	Old (500k)	24.5
New (2023)	**Alt Manufacture Site**	25.6
New (2023)	**Alt Manufacture Site**	23.2

Volvo T-13 Parts Batching

- Surveillance Panel has agreed to shift ring supply to alternative manufacturing site to improve oil consumption. Batched rings will come from this manufacturing site.
- TEI is actively trying to obtain batches of the power cylinder parts for the Volvo T-13 going forward:

Part	Batch	Part Number	Production Expectation
Liner	E	21334768	3000 received by TEI
Piston	A	21170742	January 31, 2025
Piston Pin	A	20569833	Production to Complete by Dec 16
Top Ring	A	21251596	February 28, 2025
2nd Ring	A	20590309	February 28, 2025
Oil Ring	A	20568155	To be provided after PO received

All parts batches are expected to be delivered by March 2025. Goal to reference in all new parts batches together.

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**	308	293
2nd Rings	**Y**	**Y**	288	268
Oil Rings	**Y**	**Y**	288	277
Piston Crowns	**F (Random Subgroup, Excluding sub A)**		230 (w/o sub A)	**225 (w/o sub A) (Limiting Part for T-11/T-12)**
Rod Bearings	**Z**		296	290
Main Bearings	**Q**		358	286
Liner	**W**		319	287
Piston Skirts	**B**		295	280

- Purchase Rate for T-11/T-12 kits over the last year is 17 kits/year (**13 years of parts remaining – EOL 2037**).
  - Previous purchase rate was 30-45 kits/year (**5 – 8 years of parts remaining – EOL 2030-2033**)
- Current Purchase Rate for T-8 kits is 2 kits/year (**21 years of parts remaining – EOL 2045**)
  - Previous purchase rate was 4-6 kits/year (**7 – 10 years of parts remaining – EOL 2032-2035**)

Reference Oils Inventory

Test	Reference Oil	TMC Inventory from Semi-Annual Report (Gallons)	Supply
Mack T-8	TMC 1005-5	311	1 year supply
Mack T-11	TMC 822-2	664	2 year supply
Mack T-12	TMC 821-4	1874	5+ year supply
Volvo T-13	TMC 823 TMC 823-1 TMC 824	~100 1007 724	2 drums remaining 5+ year supply 3+ year supply

New T-13 Reference Oil requested by Surveillance Panel with PC-12 targets (FTIR Oxidation ≤ 80, KV40 % change ≤ 50), **TMC 824 to begin matrix in December.** NCDT/Labs to cover testing of this new reference oil for target setting.

Mack T-8/E

Labs	Stands	Referenced Stands
2	2	2

Reference Test Activity (January - November 2024)

Test Status	Validity Code	#	Cause
Acceptable Calibration Test	AC	2	
Failed Calibration Test	OC	1	Mild All Parameters
Aborted	XC	1	High OC
TOTAL		**4**	

Test Severity

- VI38 is in level 2 Zi alarm in mild direction
- RV48 and RV2 are in control

Mack T-11

Labs	Stands	Referenced Stands
2	4	**0**

Reference Test Activity (December 2023 – November 2024)

Test Status	Validity Code	#
Acceptable Calibration Test	AC	2
TOTAL		**2**

Test Severity

- SOOT (12 cSt), SOOT5 (15 cSt) are in control
- SOOT4 is in severity action alarm in severe direction and in precision action alarm.
  - SOOT4 has been this way since introduction of 822-2 in 2014 with limited variation.
  - SOOT is critical parameter for test not SOOT4.
- MRV is in severity warning alarm in the severe direction

Mack T-12

Labs	Stands	Referenced Stands
3	3	2

Reference Test Activity (January – November 2024)

Test Status	Validity Code	#	Cause
Acceptable Calibration Test	AC	2	
Failed Calibration Test	OC	2	PB and PB2 Mild
Aborted	XC	1 1	Fuel Dilution Low Oil Volume
TOTAL		**6**	

Test Severity

- PB and PB2 are in severity action alarm in the mild direction
- All other parameters are in control

Volvo T-13

Labs	Stands	Referenced Stands
4	9	7

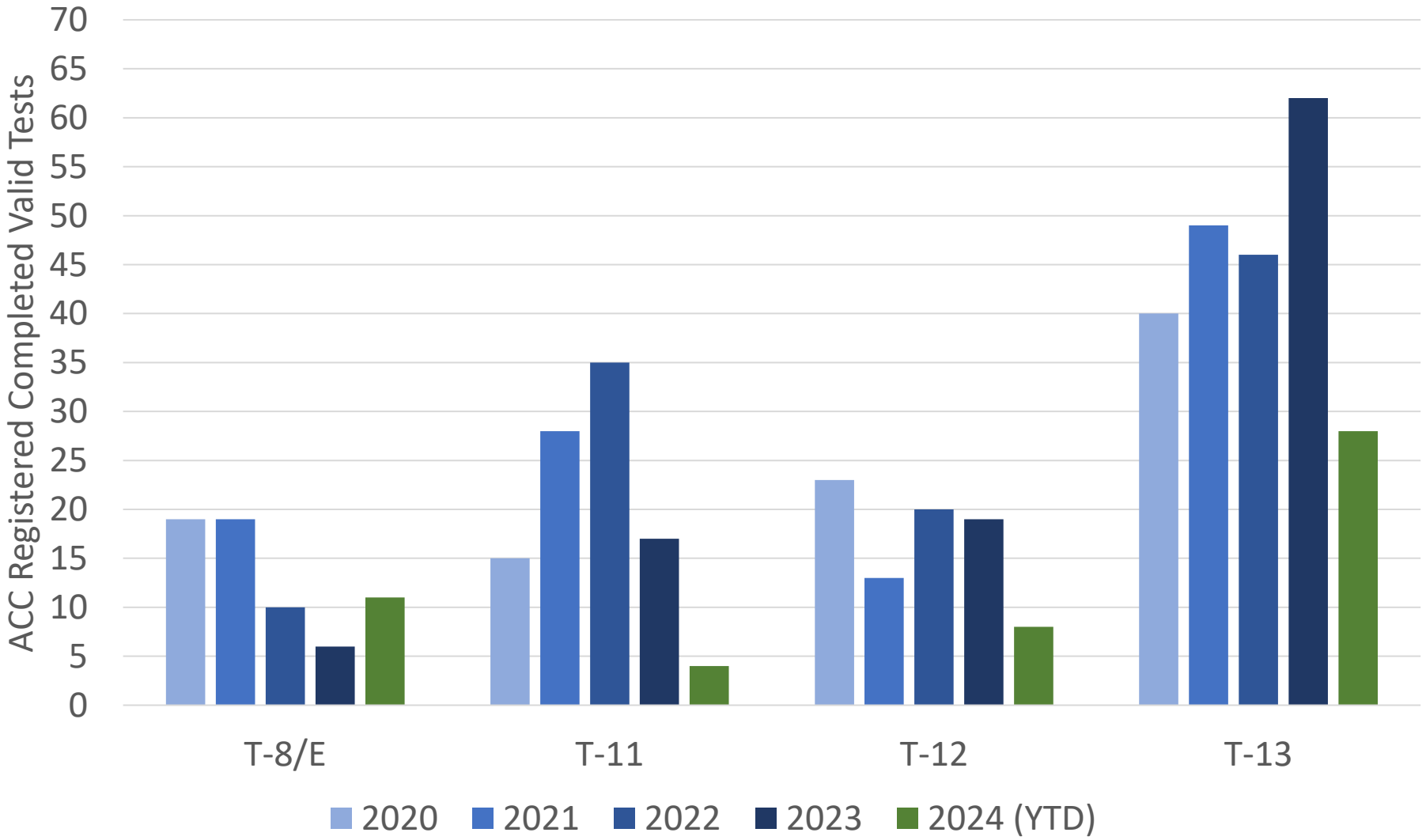
Reference Test Activity (January – November 2024)

Test Status	Validity Code	#	Cause / Failed Parameter
Acceptable Calibration Test	AC	7	
Aborted	XC	1 1 1	Fuel Contamination Oil Gallery and Oil Jet Thermocouple issues High Crankcase pressure due to build issue
Informational	NN	1	Understand Oil Consumption
TOTAL		**11**	

Test Severity

- IRPH and KV40 are in control

Candidate Activity

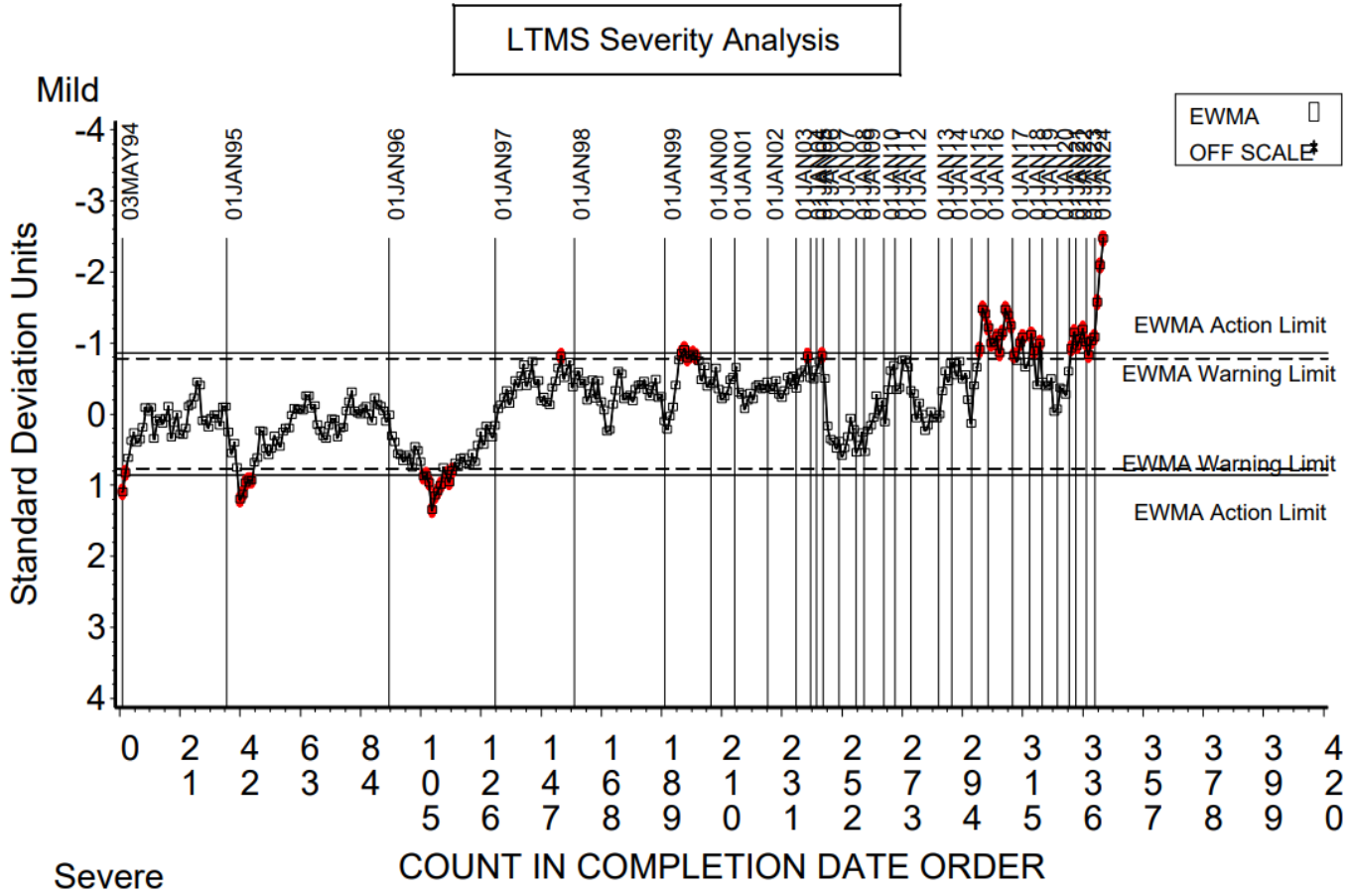


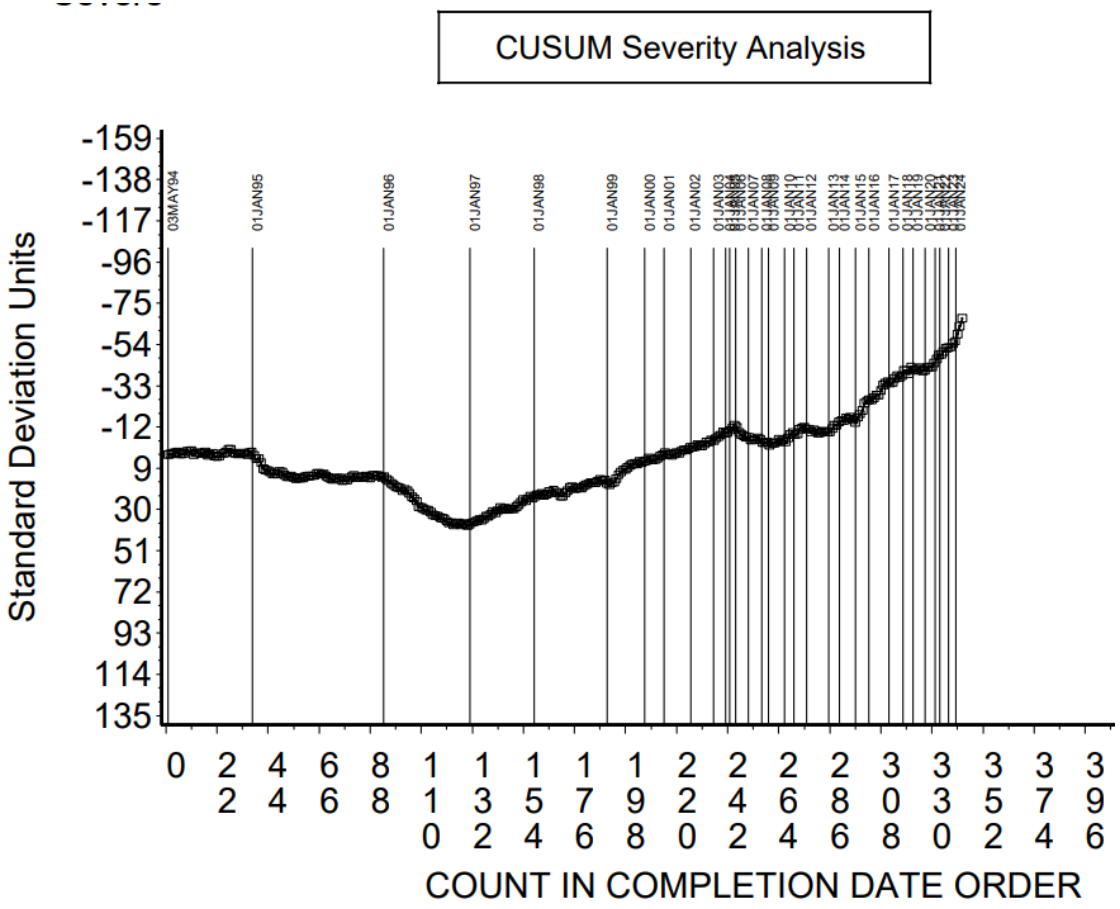
Appendix
Charts

Mack T-8

Mack T-8 Charts – VI38

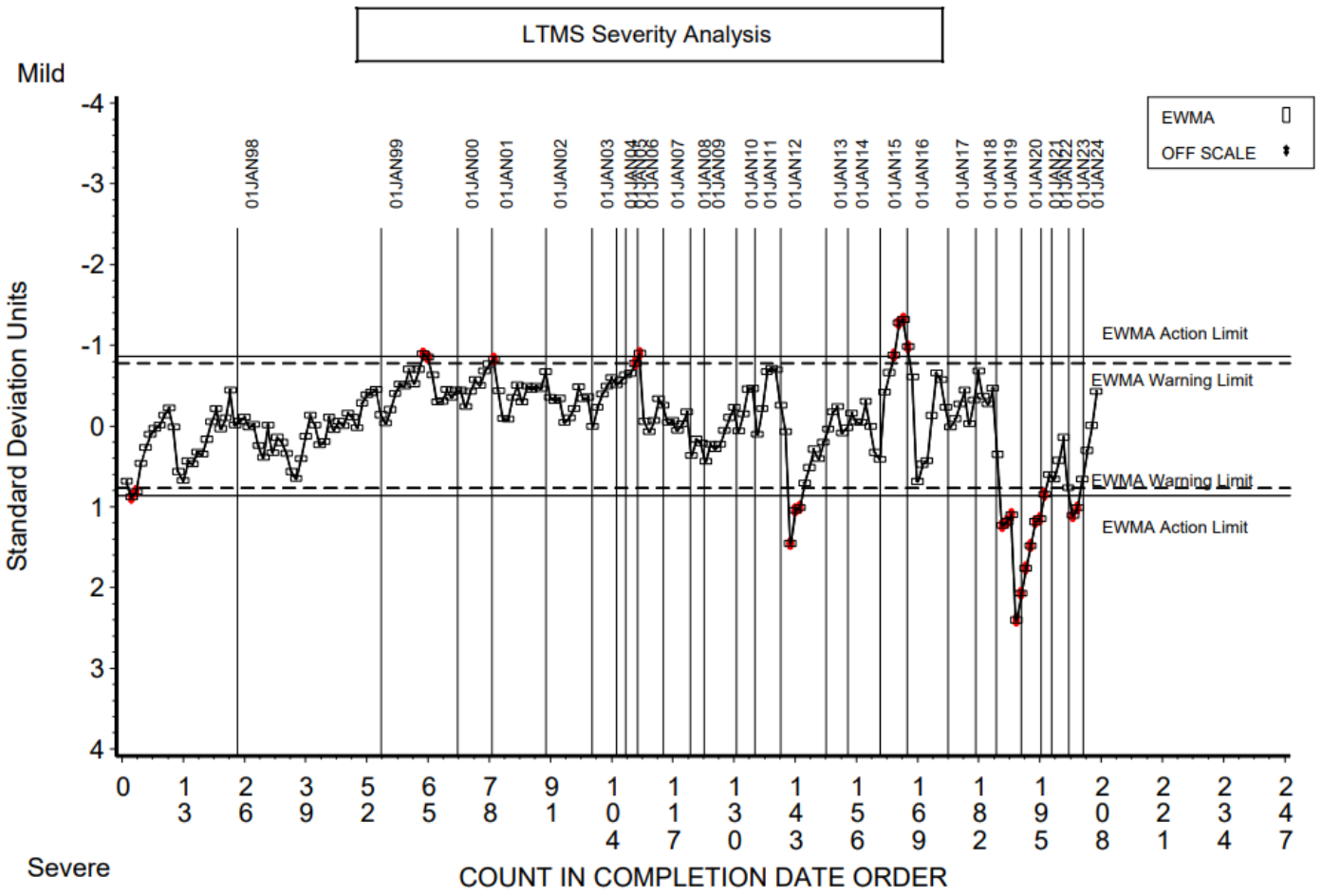
Viscosity Increase @ 3.8% Soot

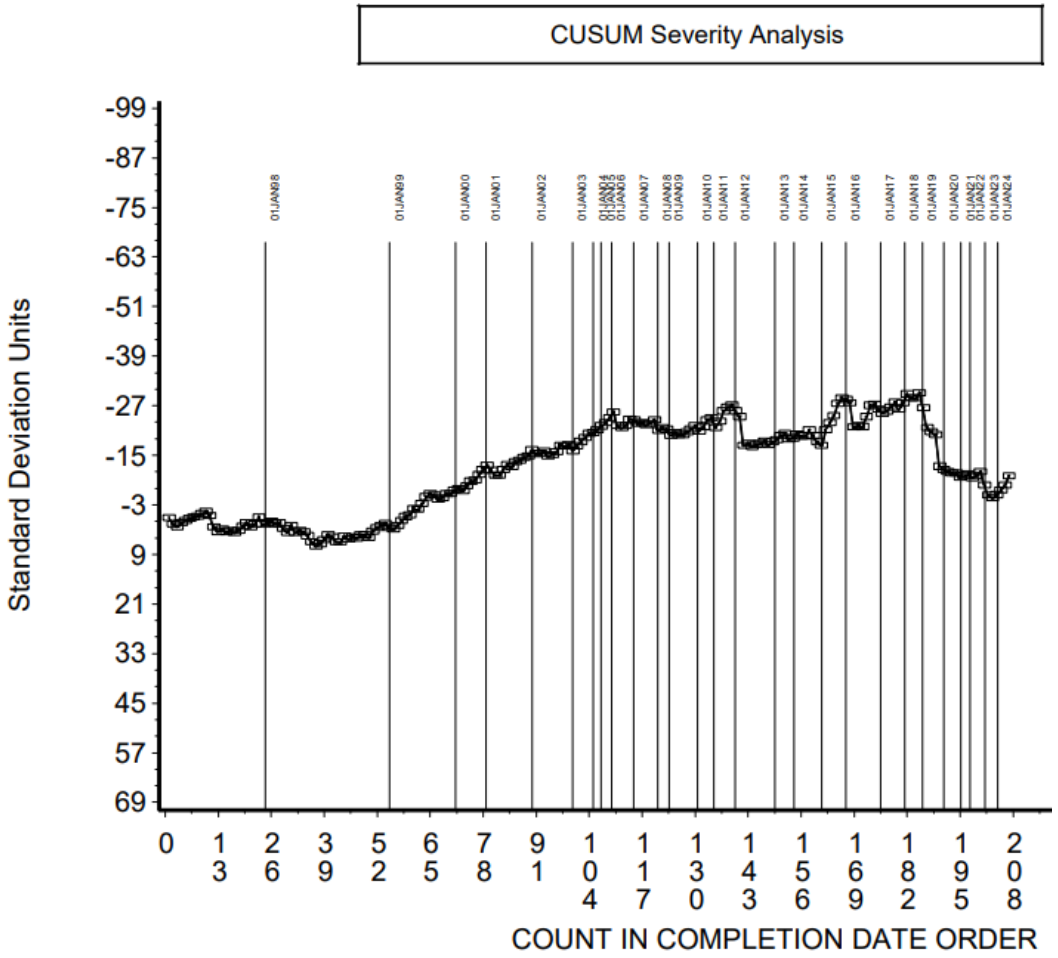




Mack T-8 Charts – RV48

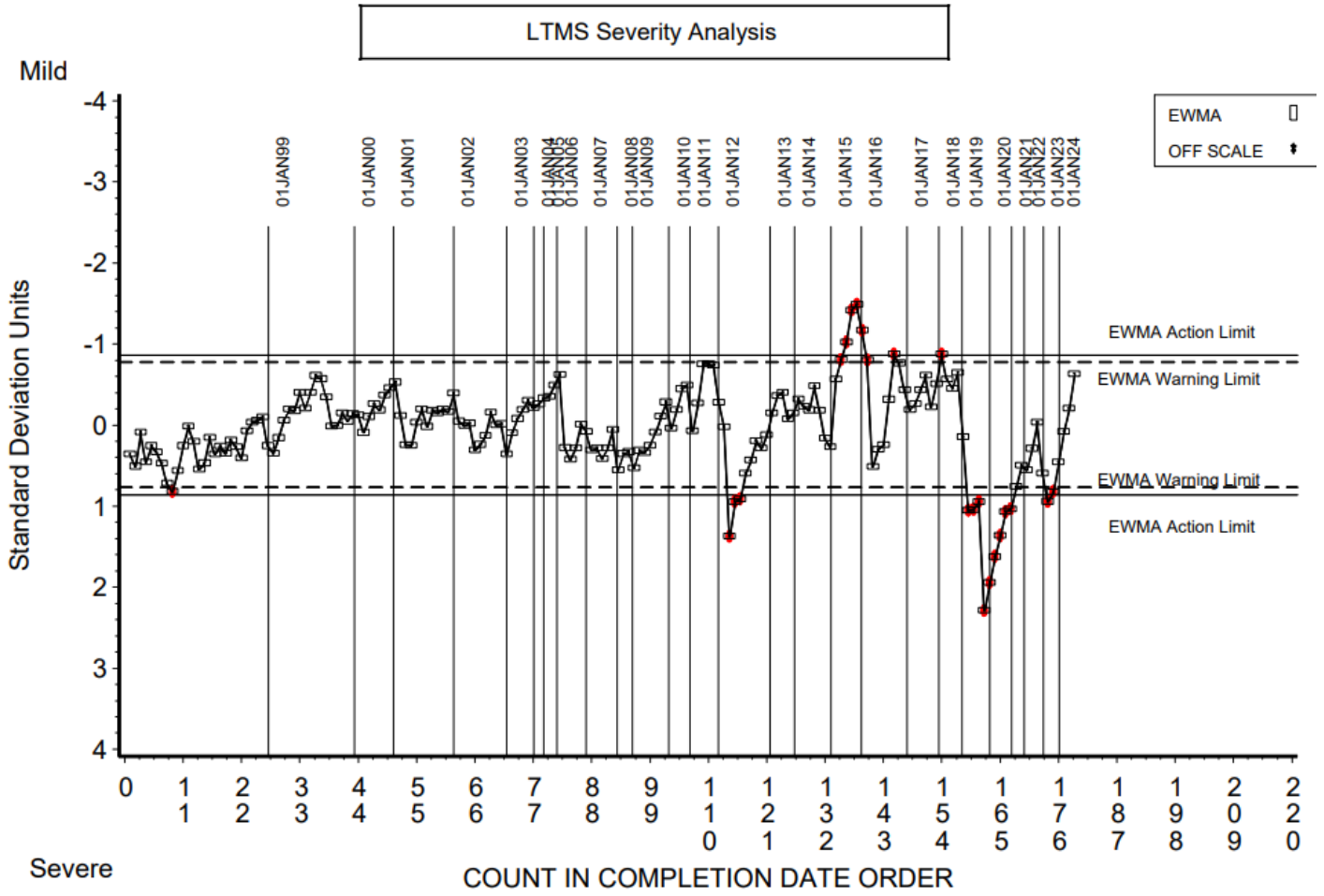
Relative Viscosity @ 4.8% Soot (50% Loss)

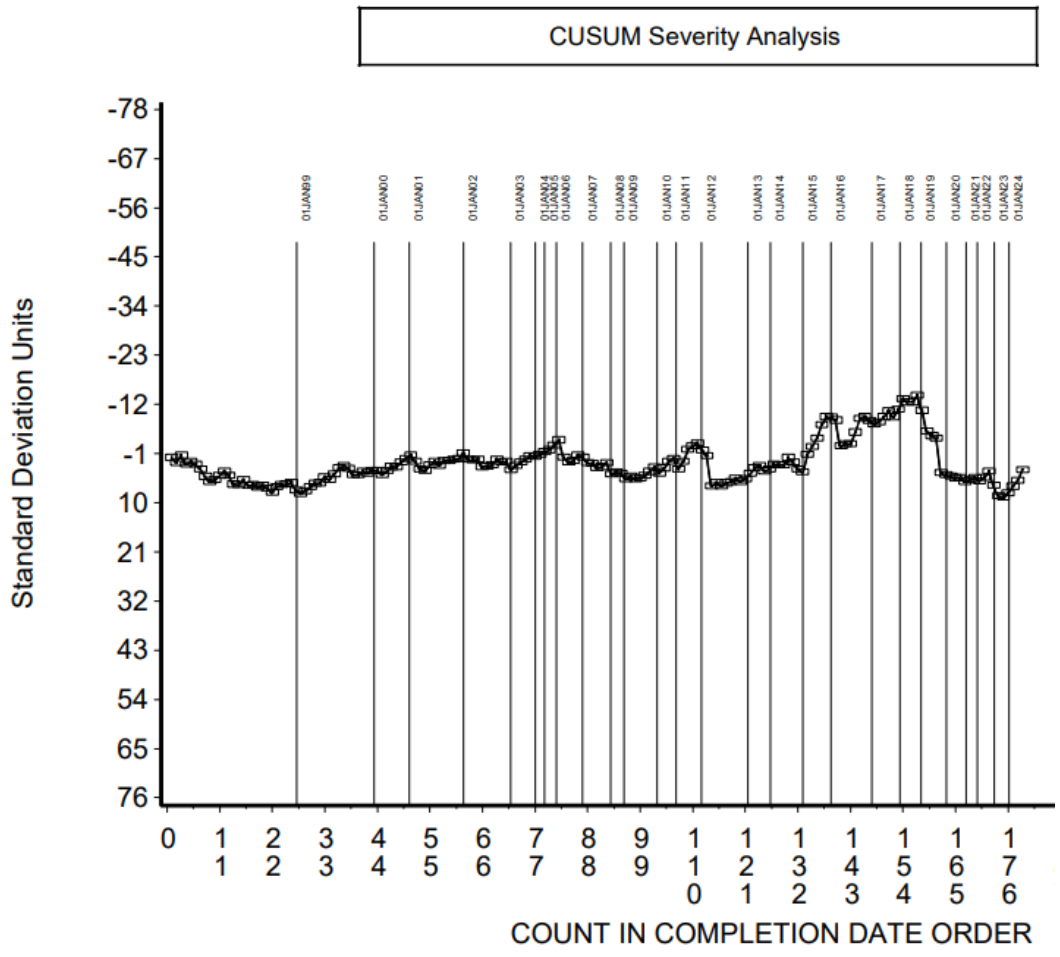




Mack T-8 Charts – RV2

Relative Viscosity @ 4.8% Soot (100% Loss)

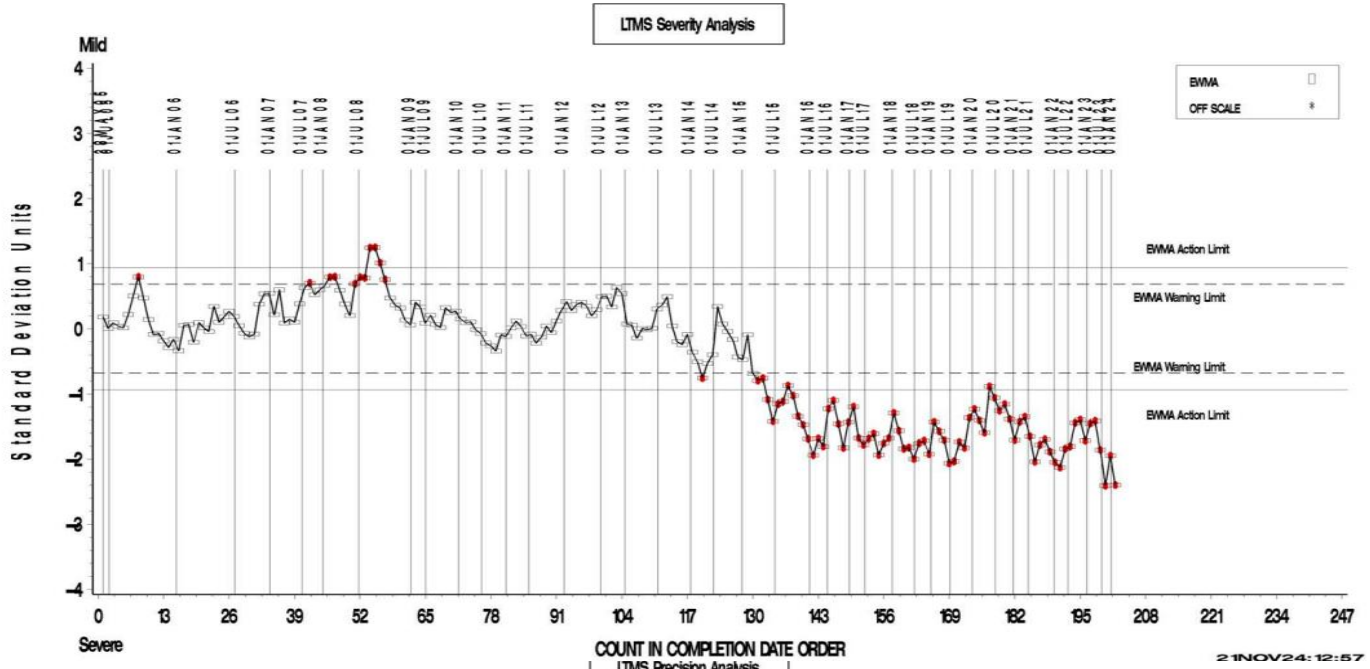


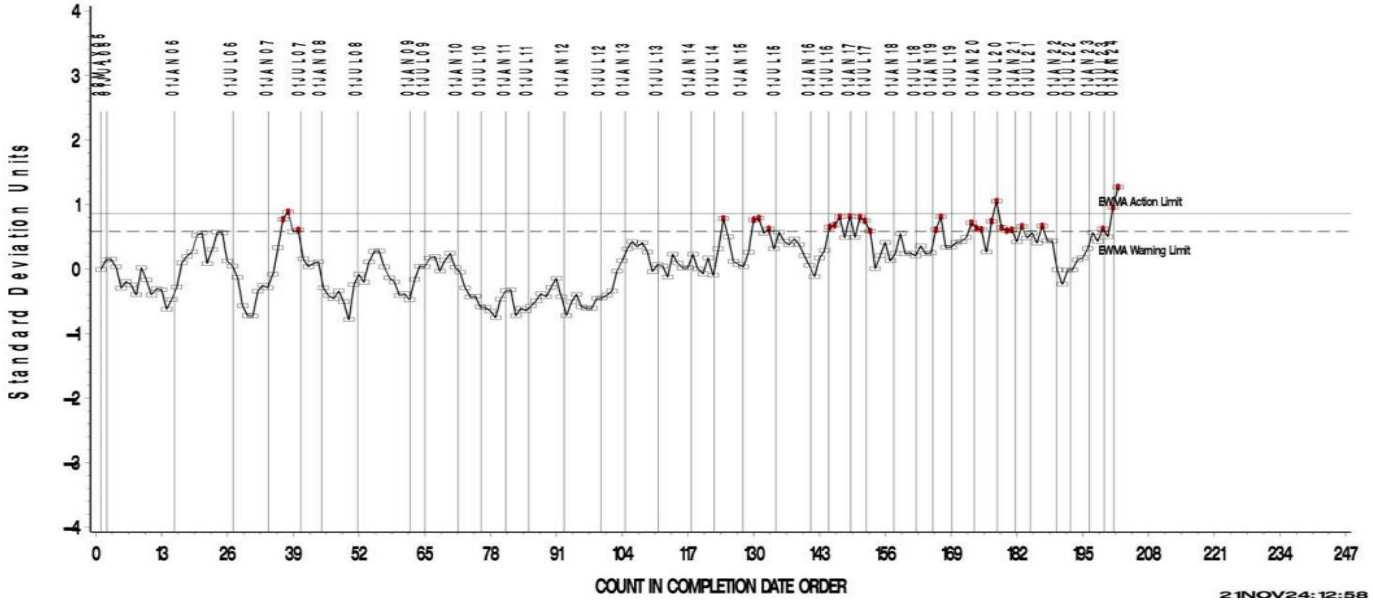


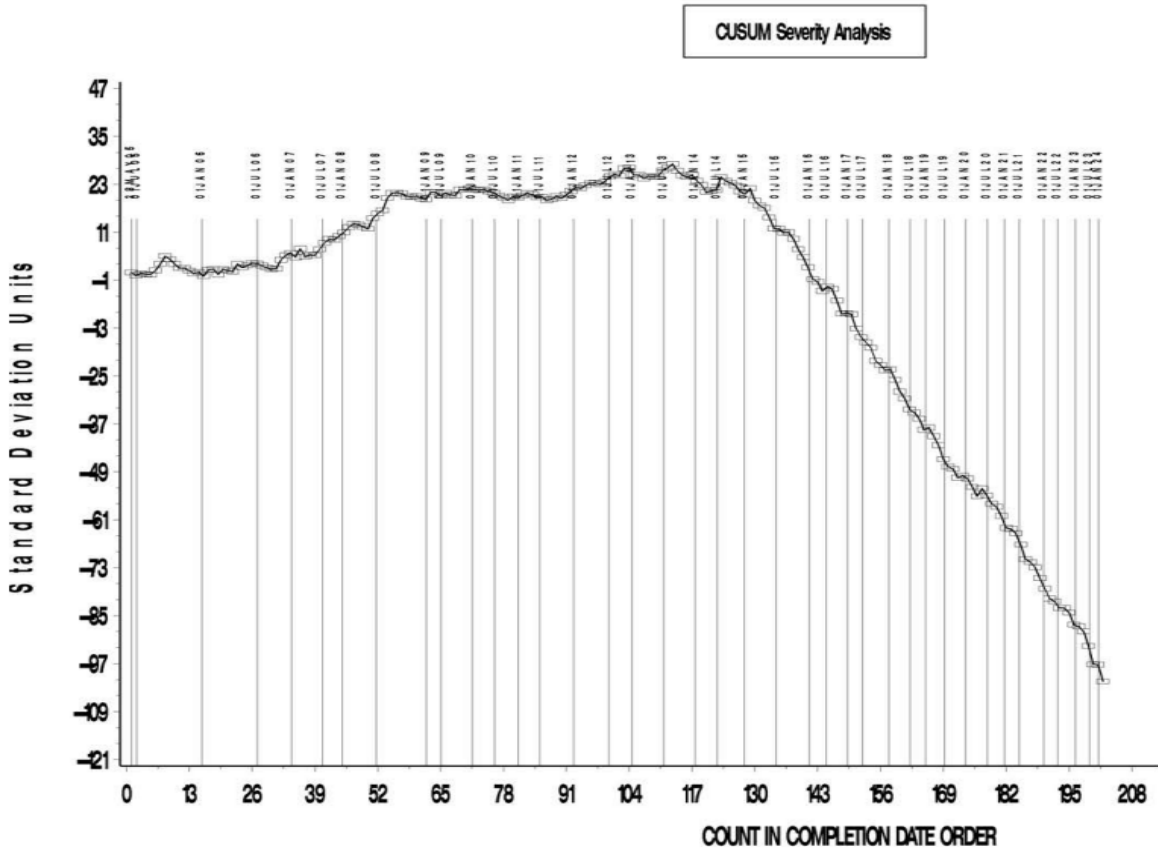
Mack T-11

Mack T-11 Charts – SOOT4

SOOT @ 4 cSt - FINAL RESULT

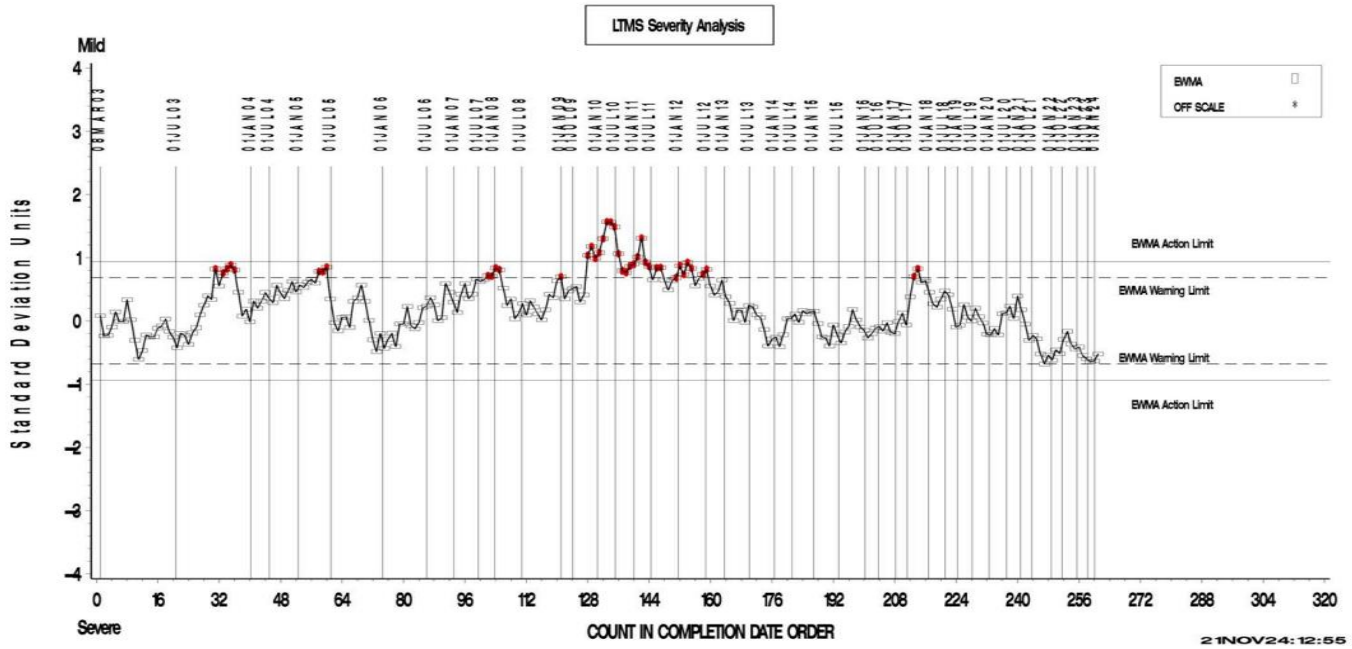


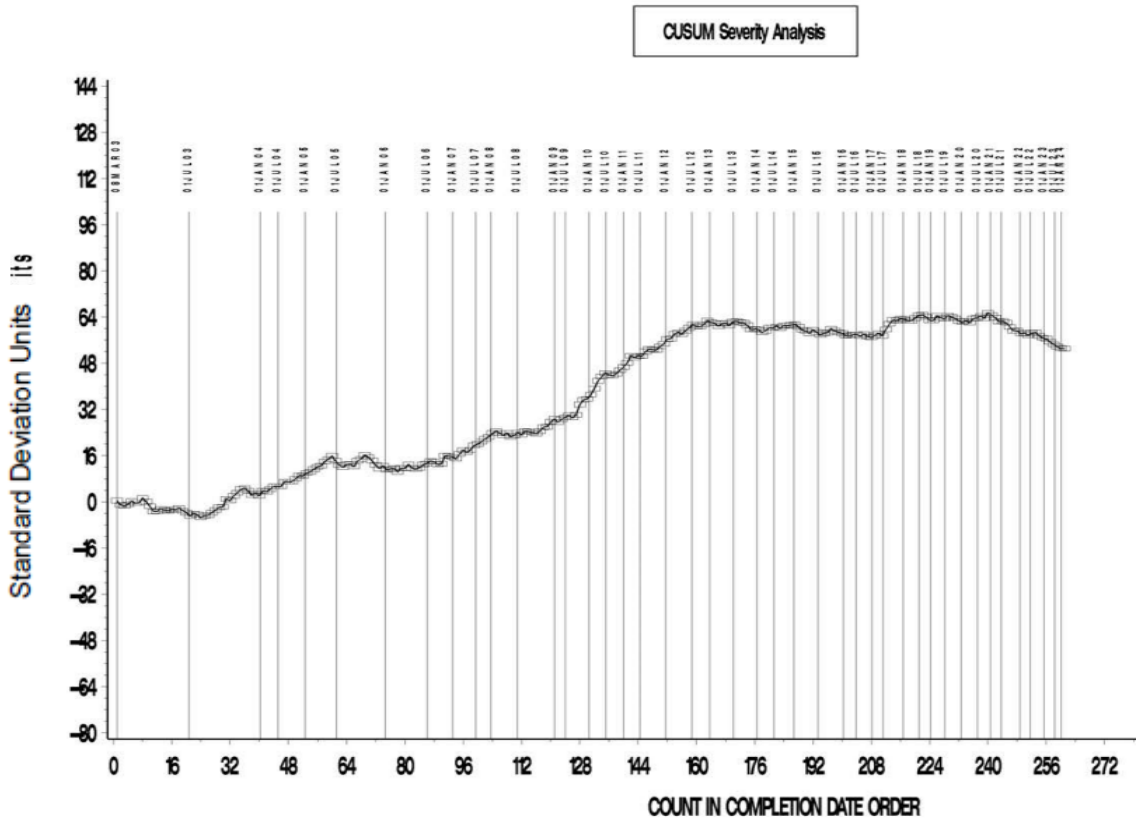


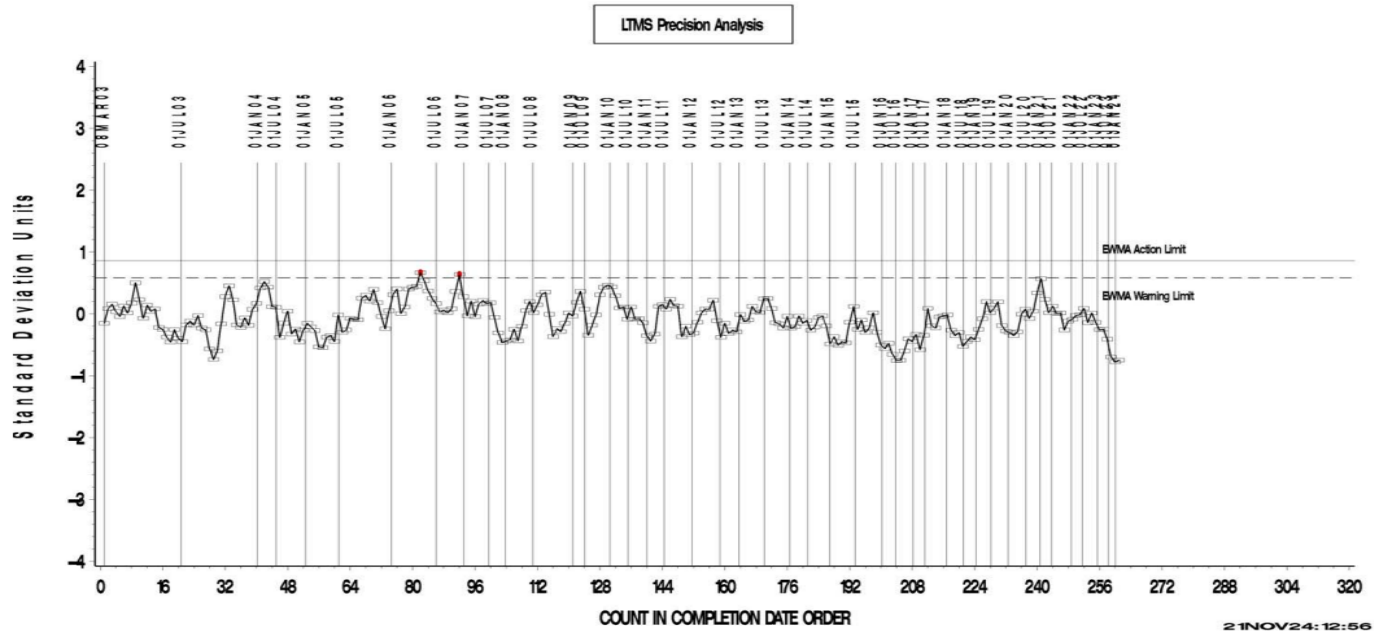


Mack T-11 Charts – SOOT

SOOT AT 12 cSt

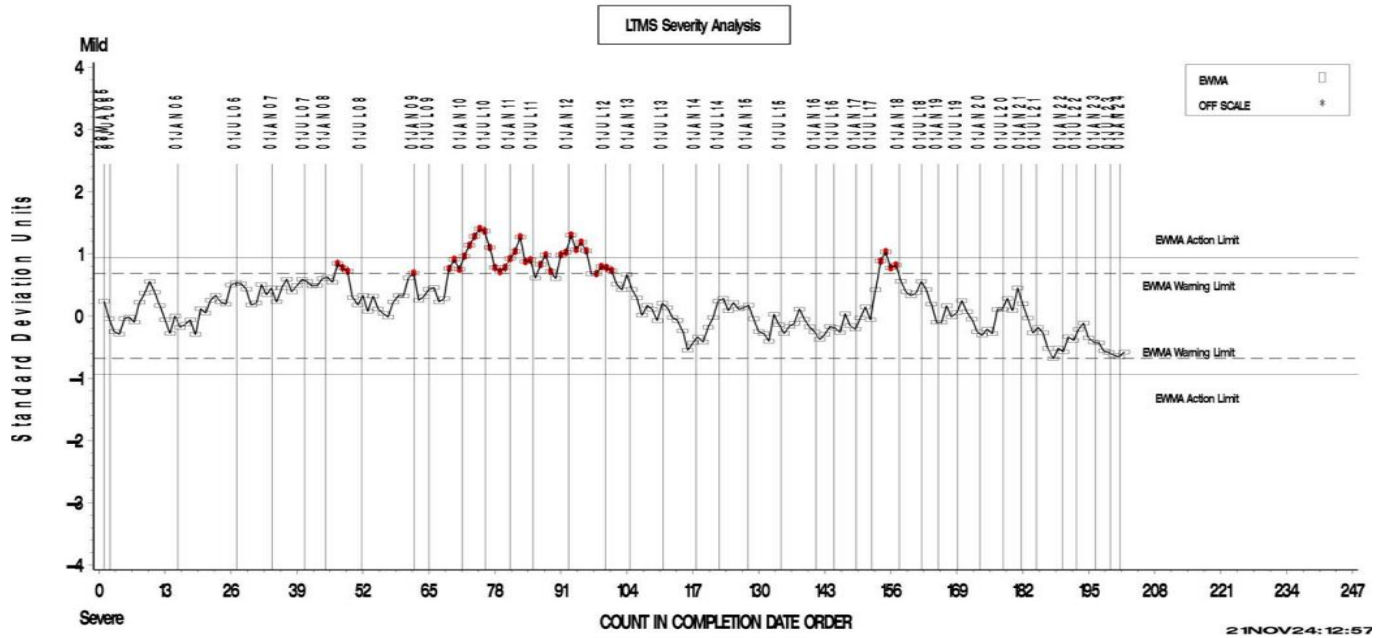


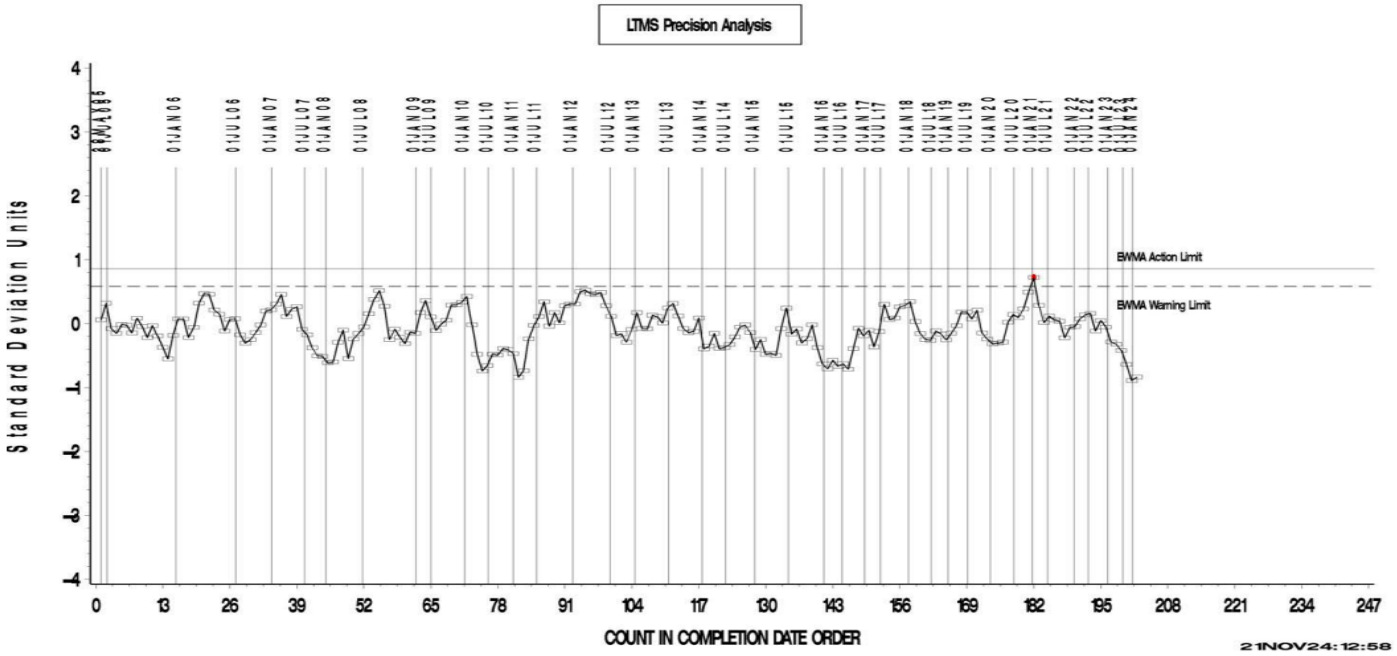


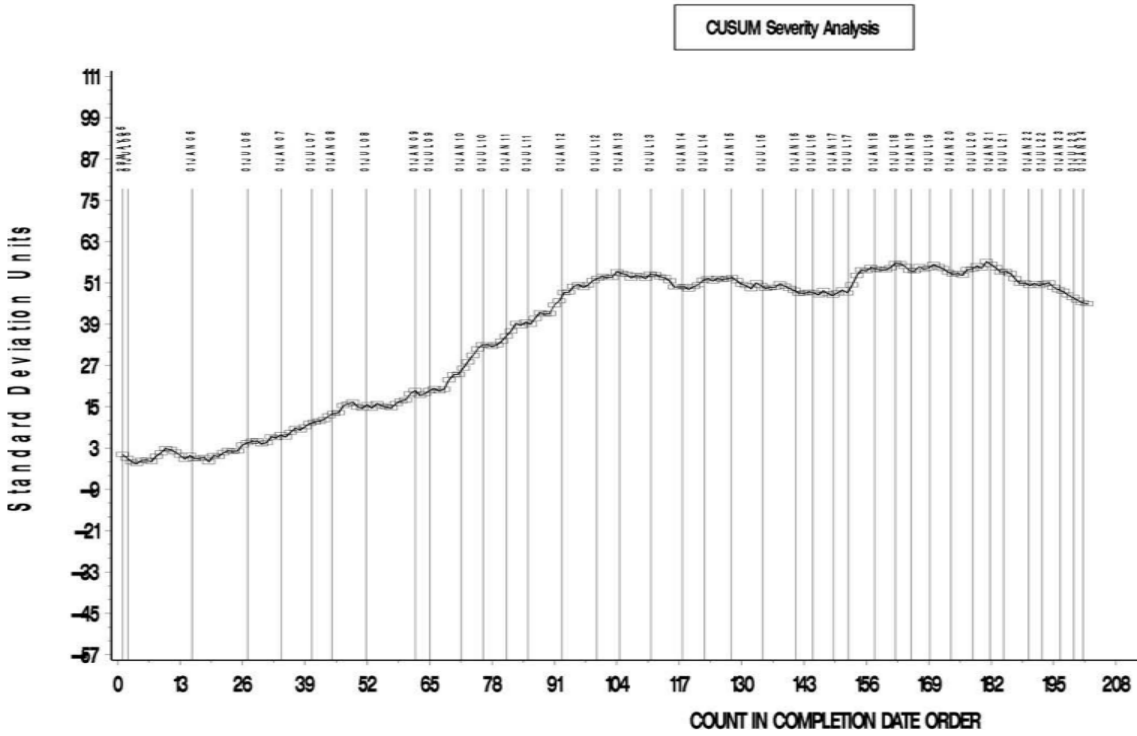


Mack T-11 Charts – SOOT5

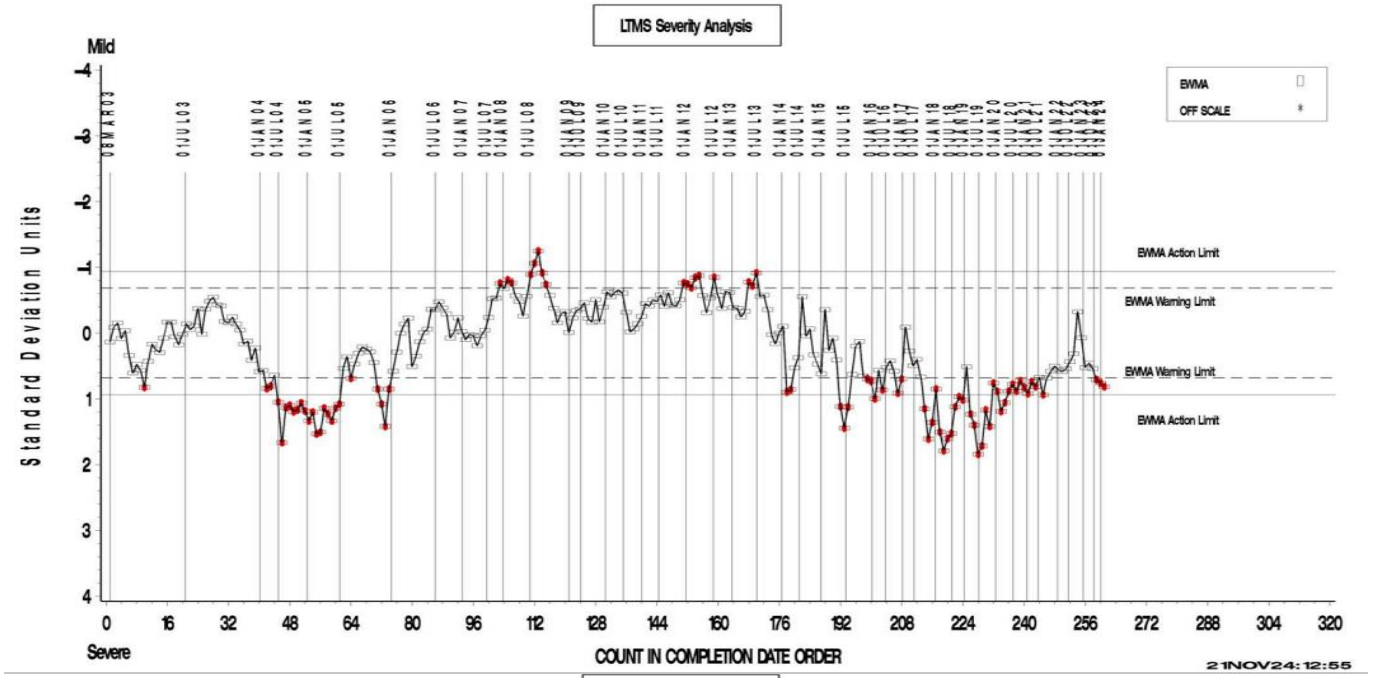
SOOT @ 15 cSt - FINAL RESULT

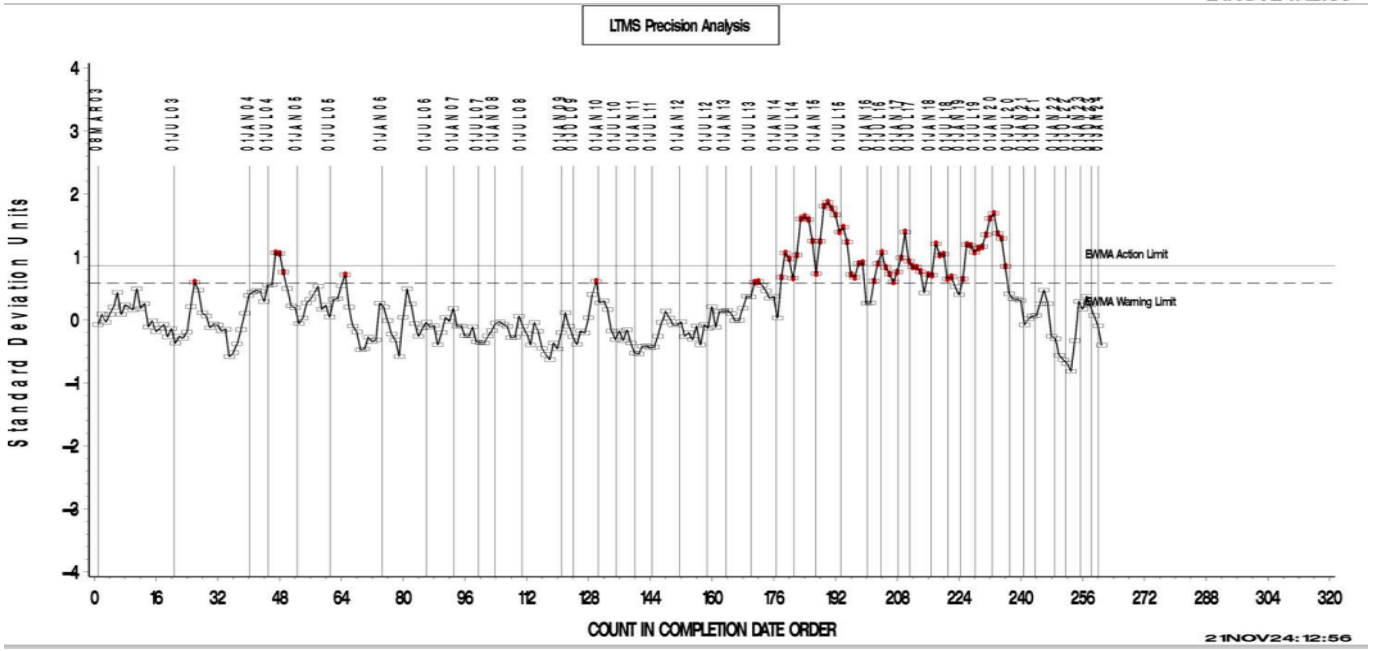




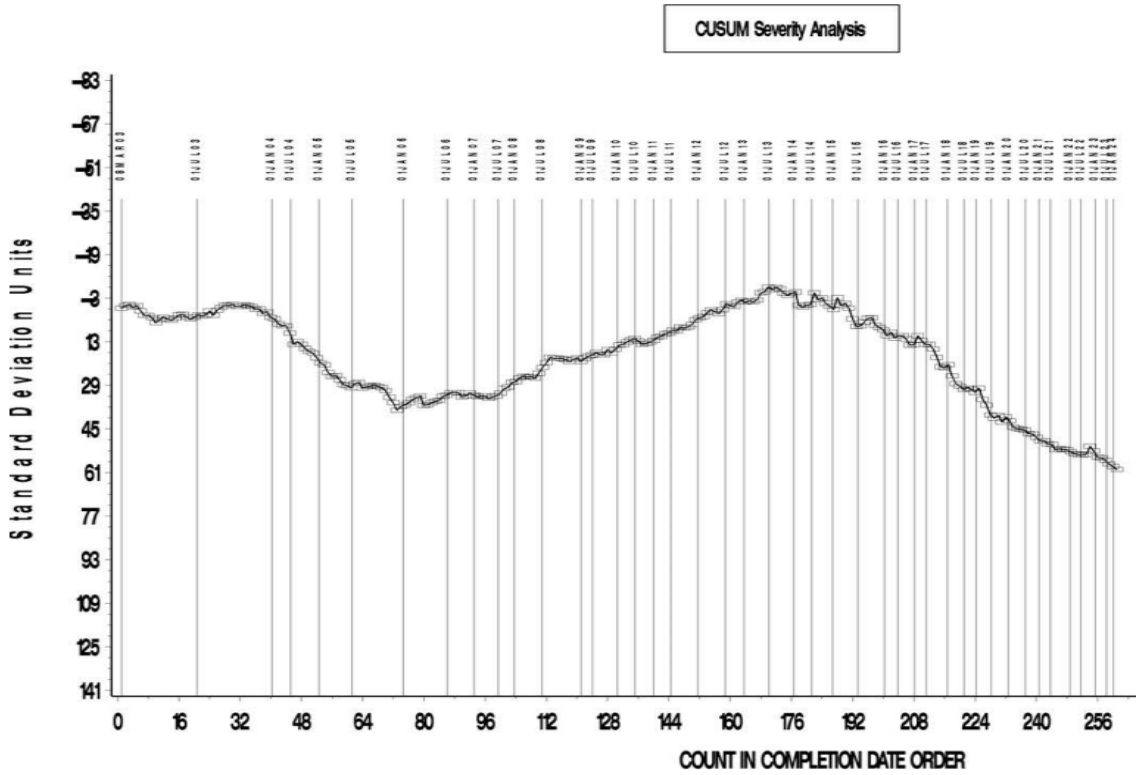


Mack T-11 Charts – MRV





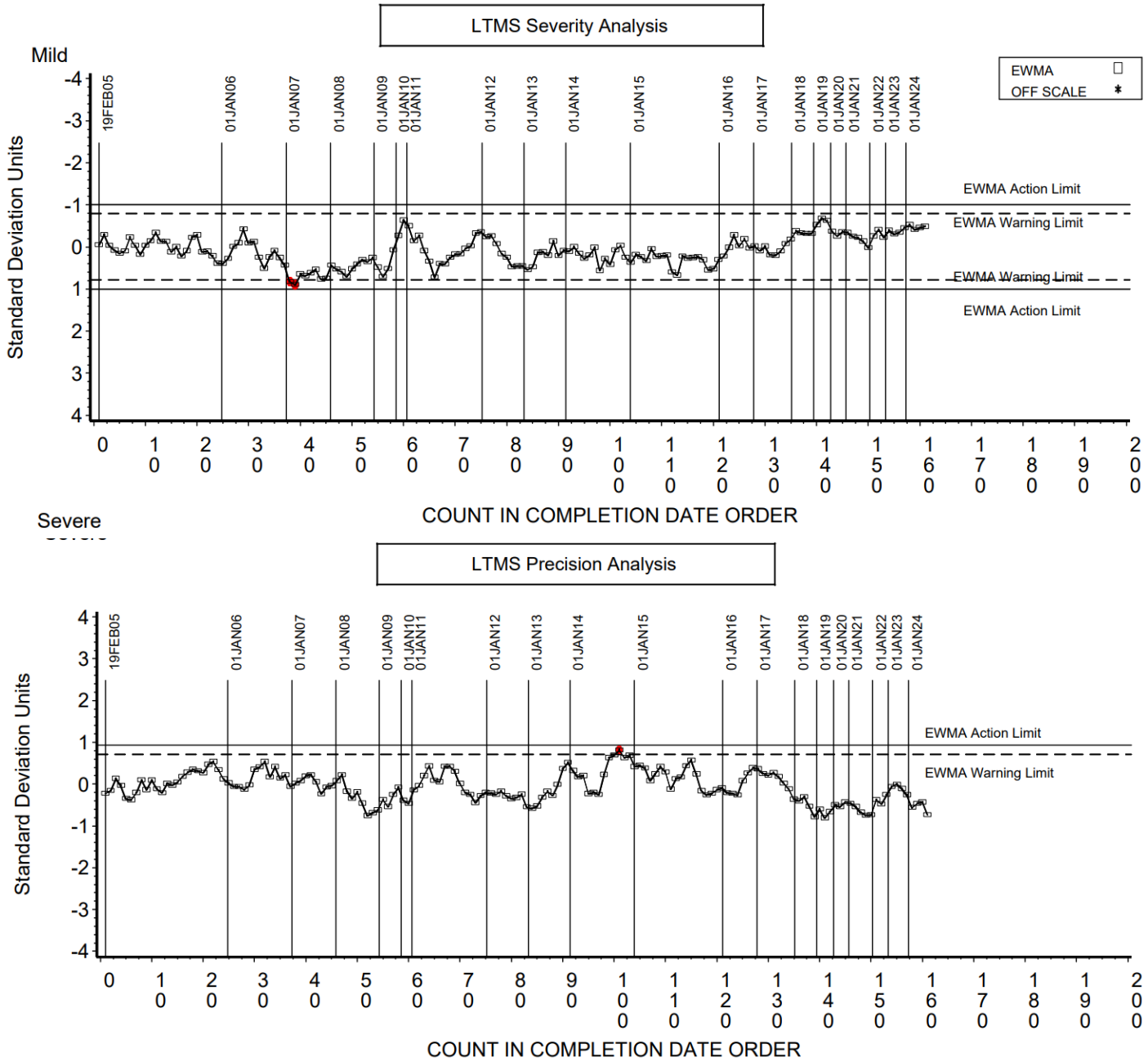
MRV VISCOSITY

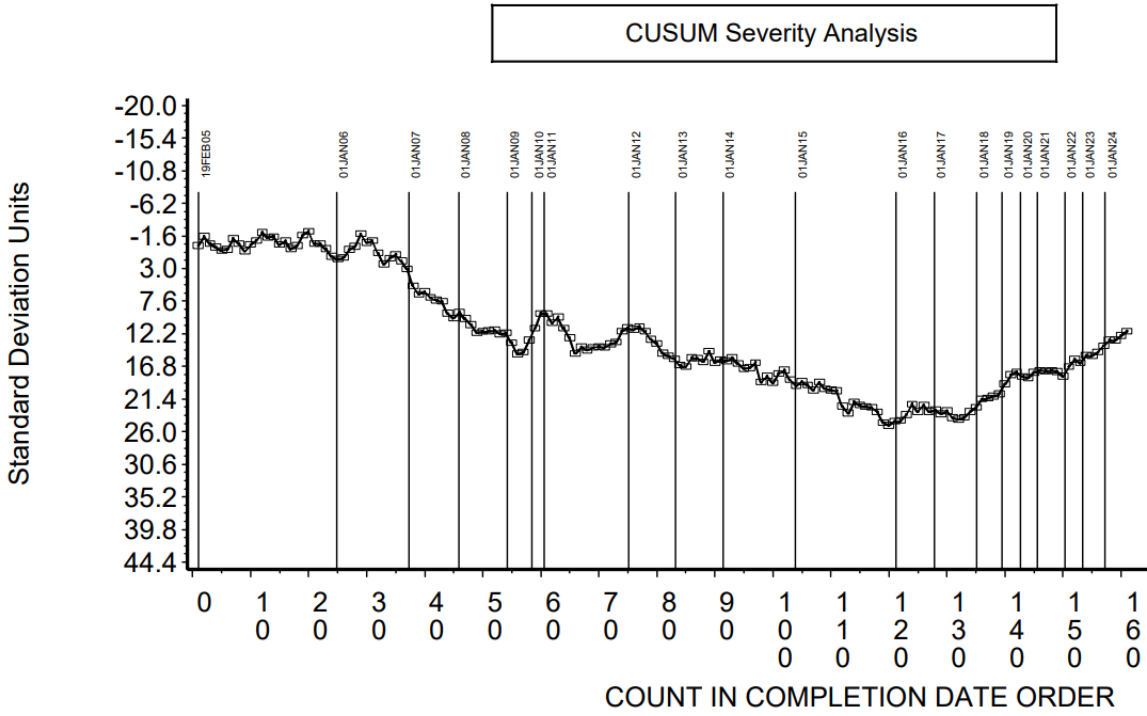


Mack T-12

Mack T-12 Charts – CLW

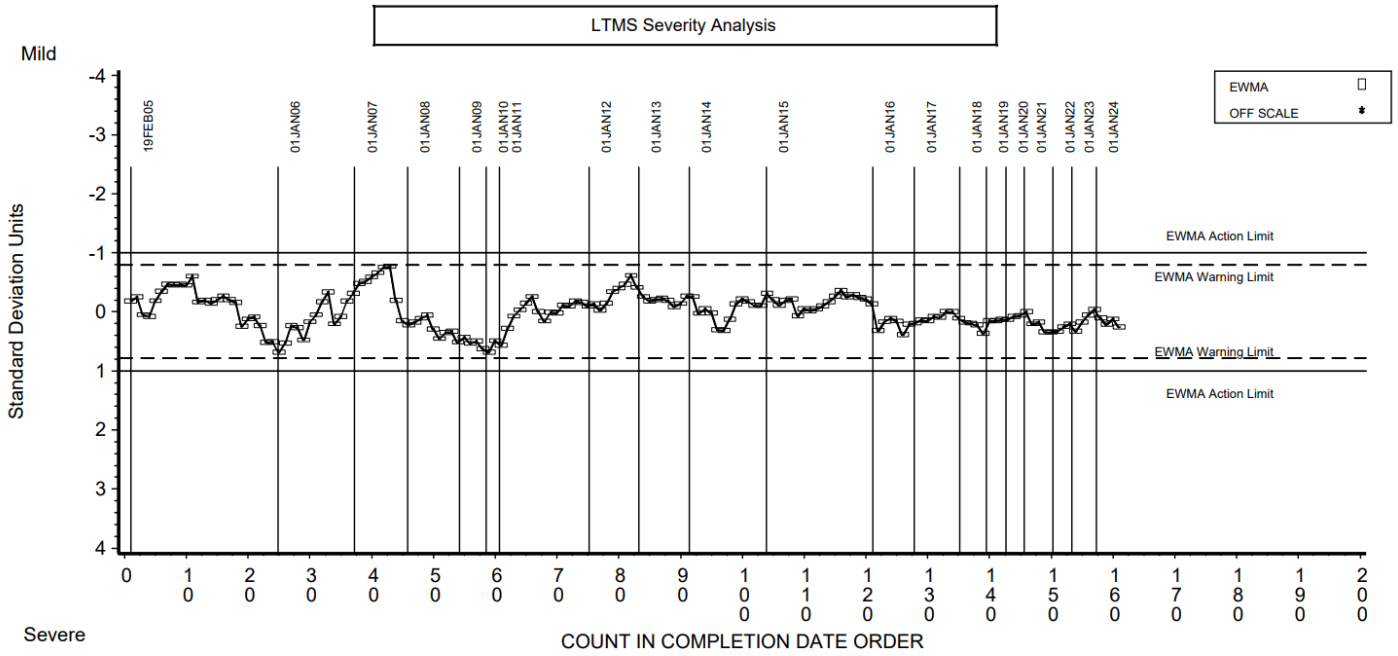
Avg. Cylinder Liner Wear

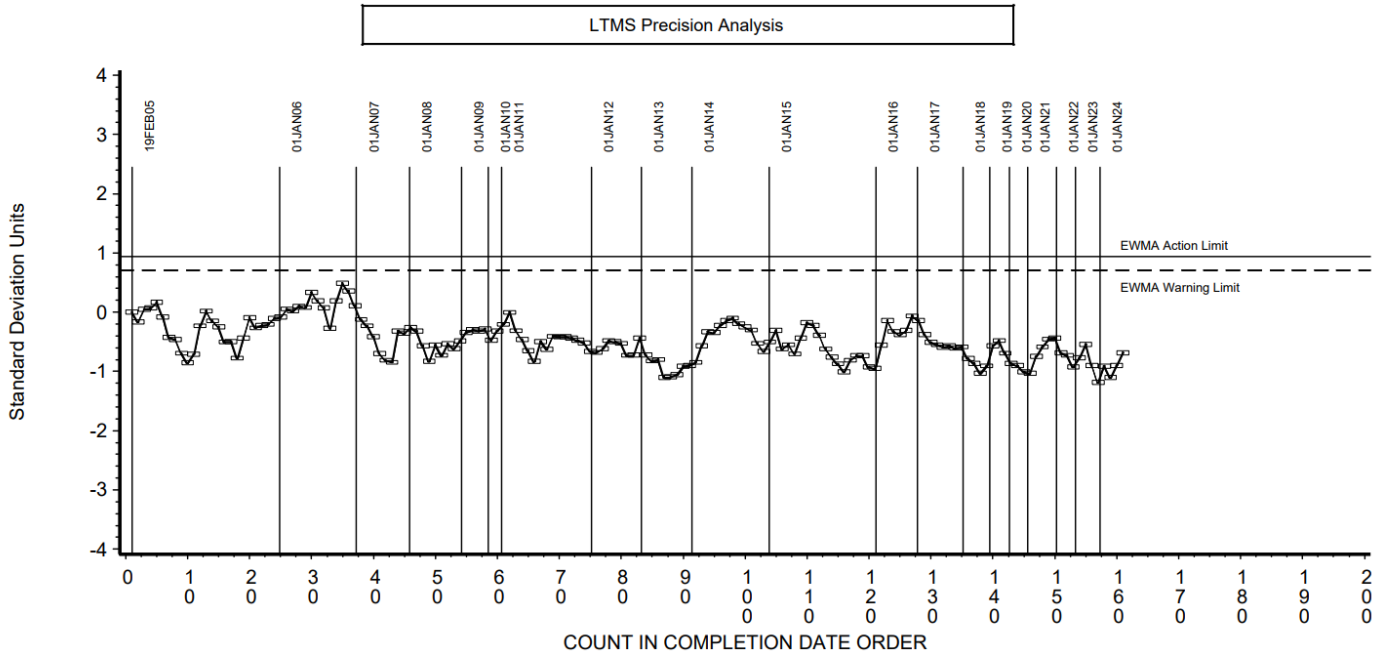


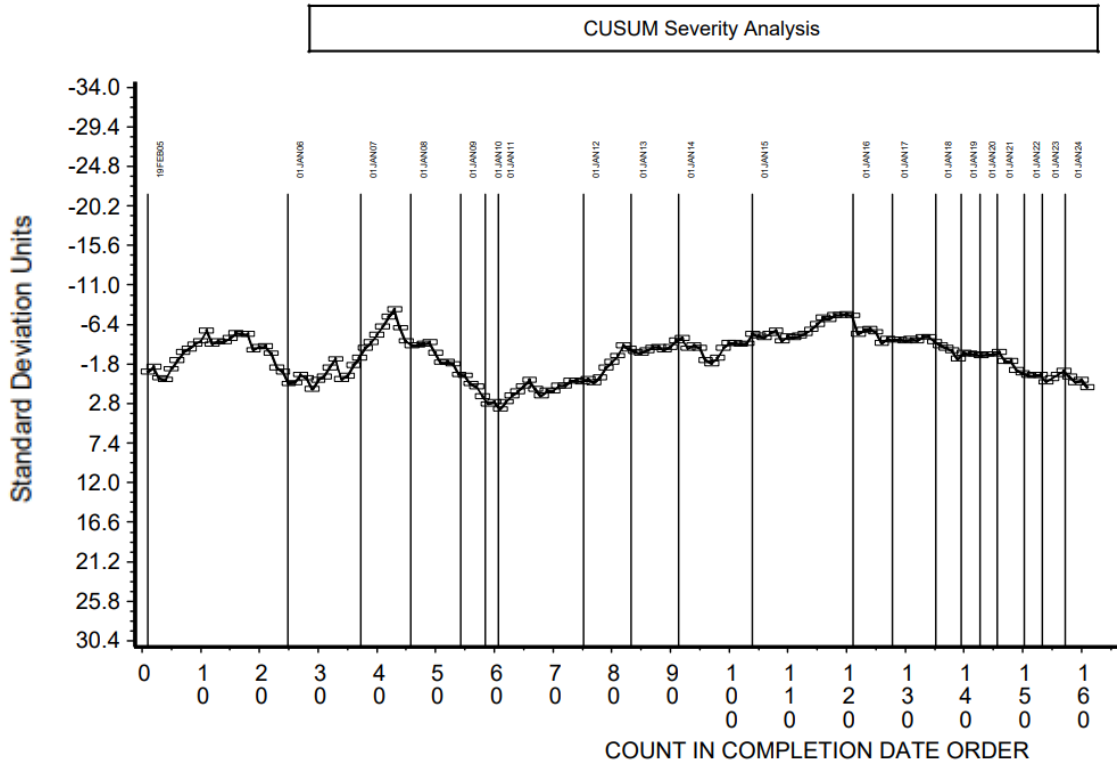


Mack T-12 Charts – TRWL

Avg. Top Ring Weight Loss

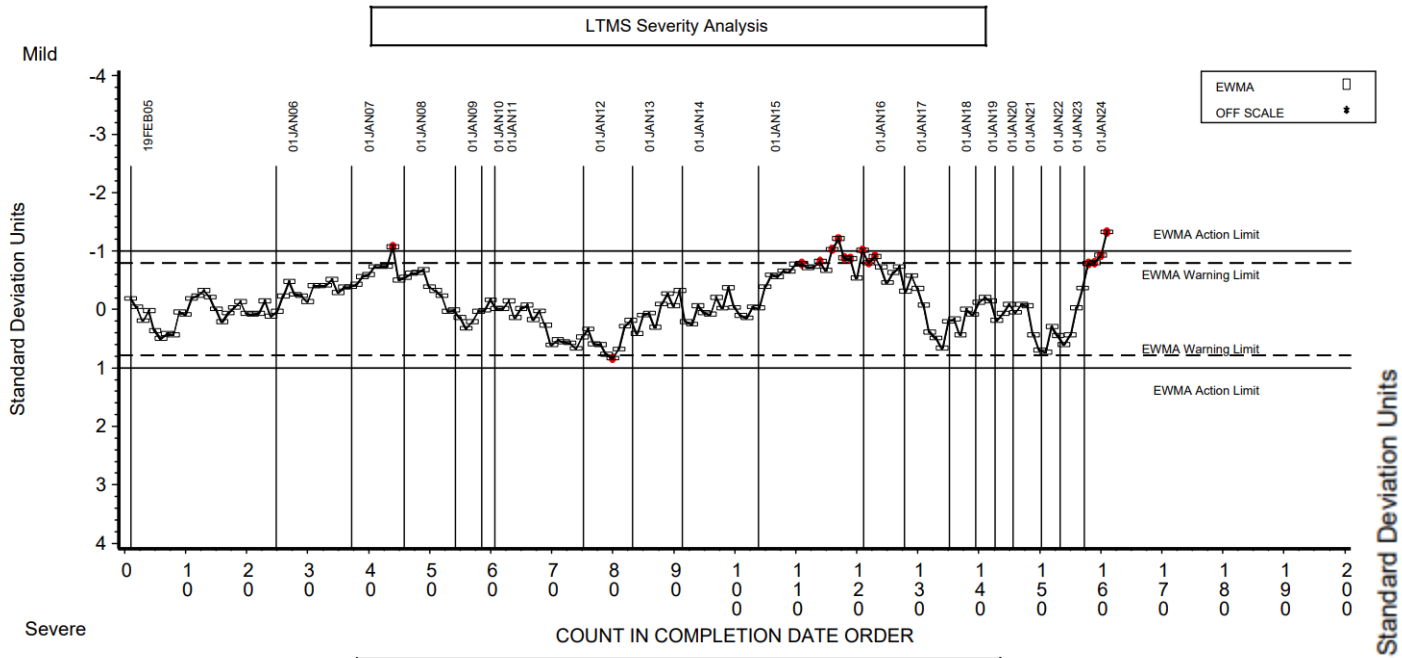


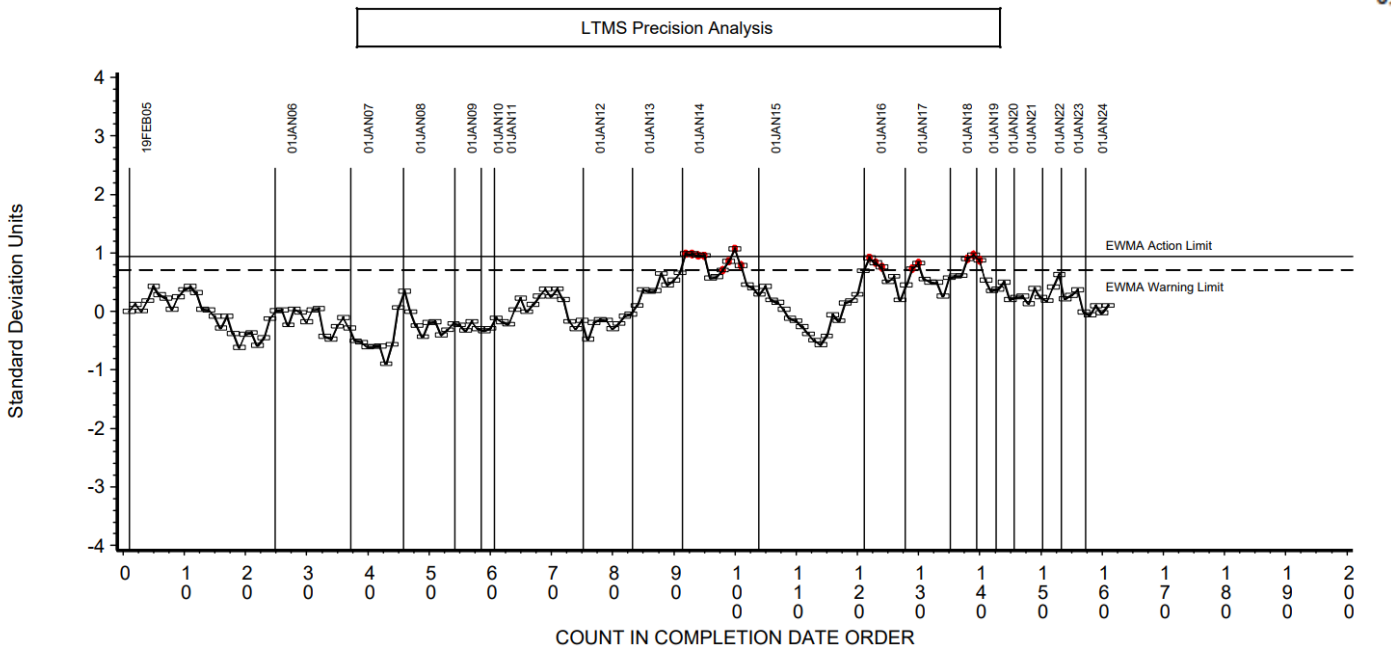


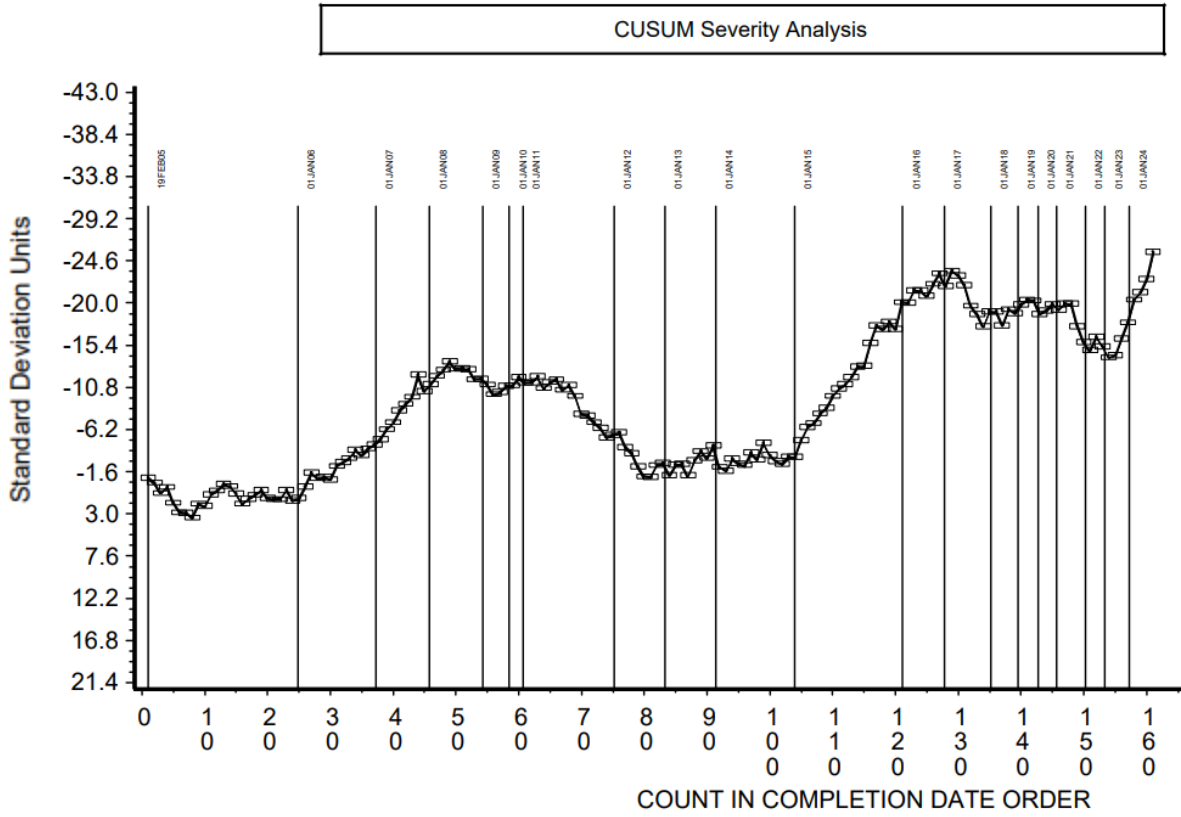


Mack T-12 Charts – PB

Trans. Res. Delta PB @ EOT

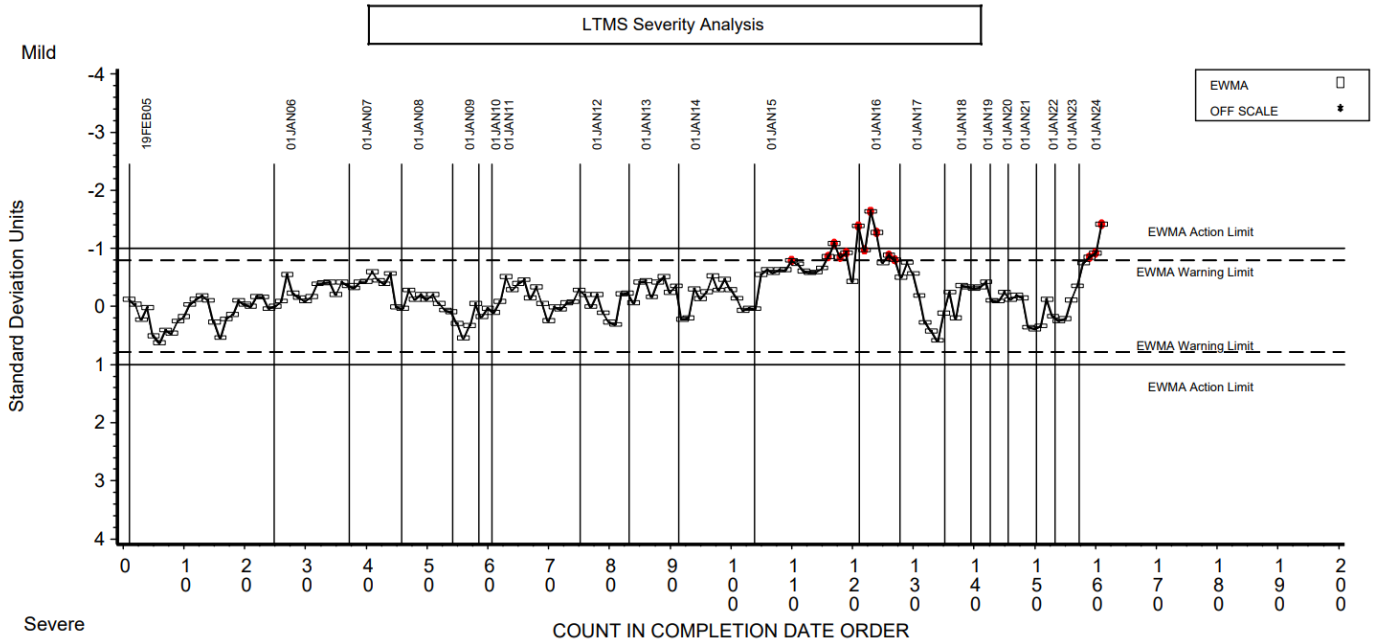


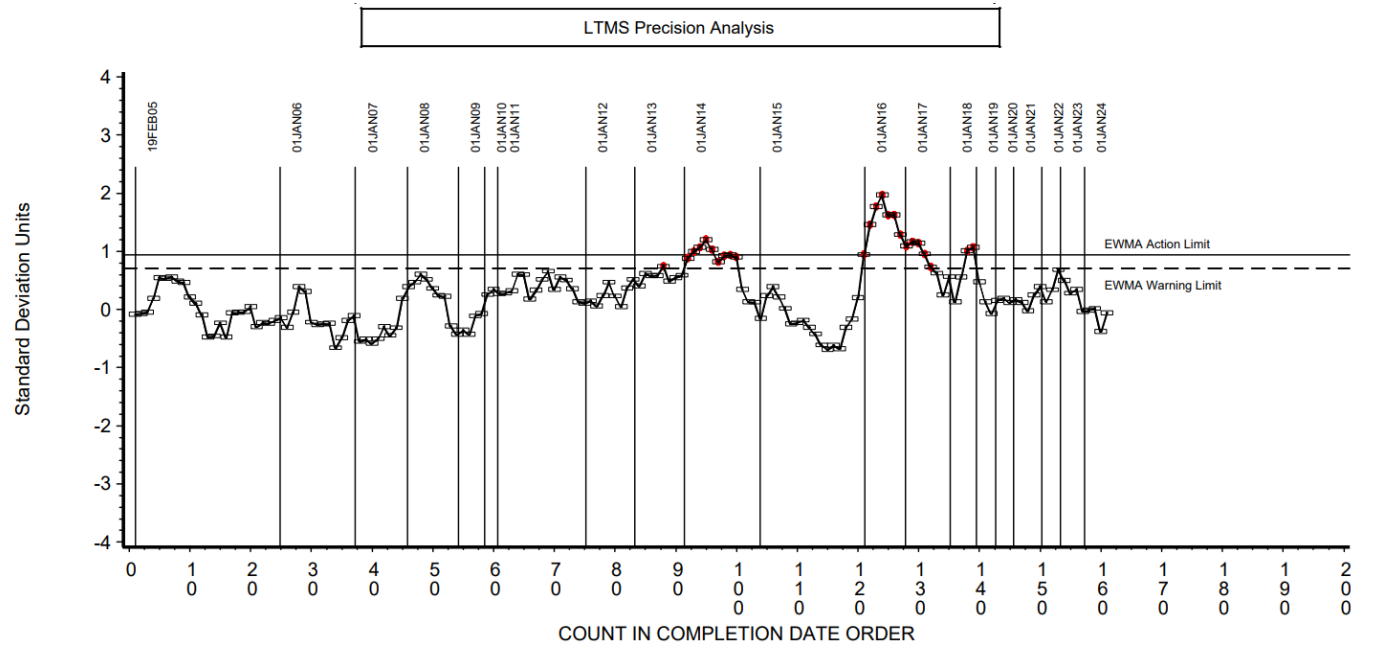


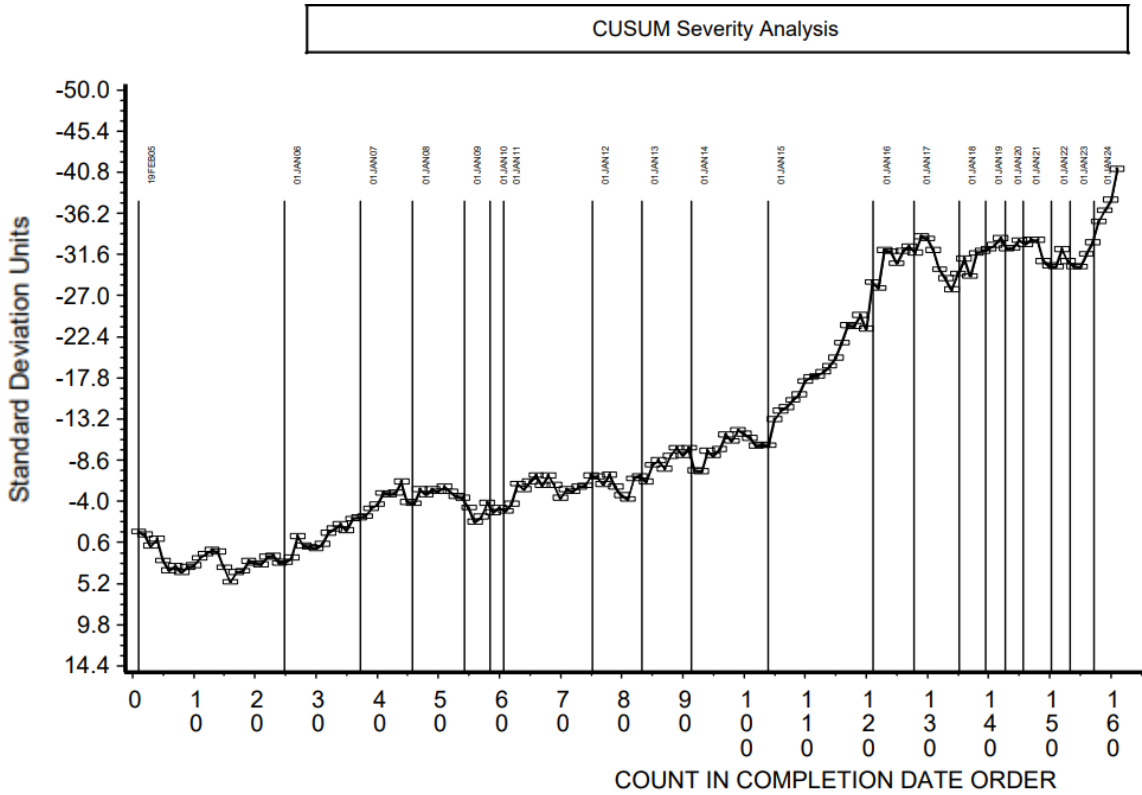


Mack T-12 Charts – PB2

Trans. Res. Delta PB 250-300Hr

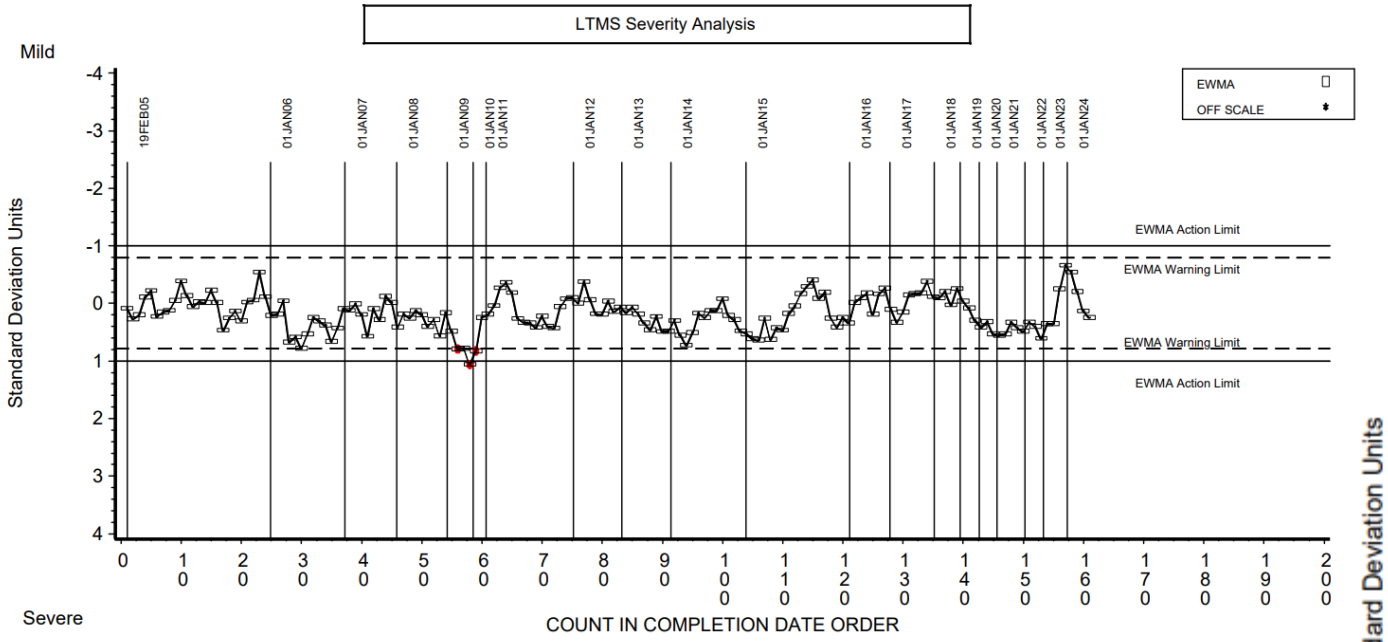


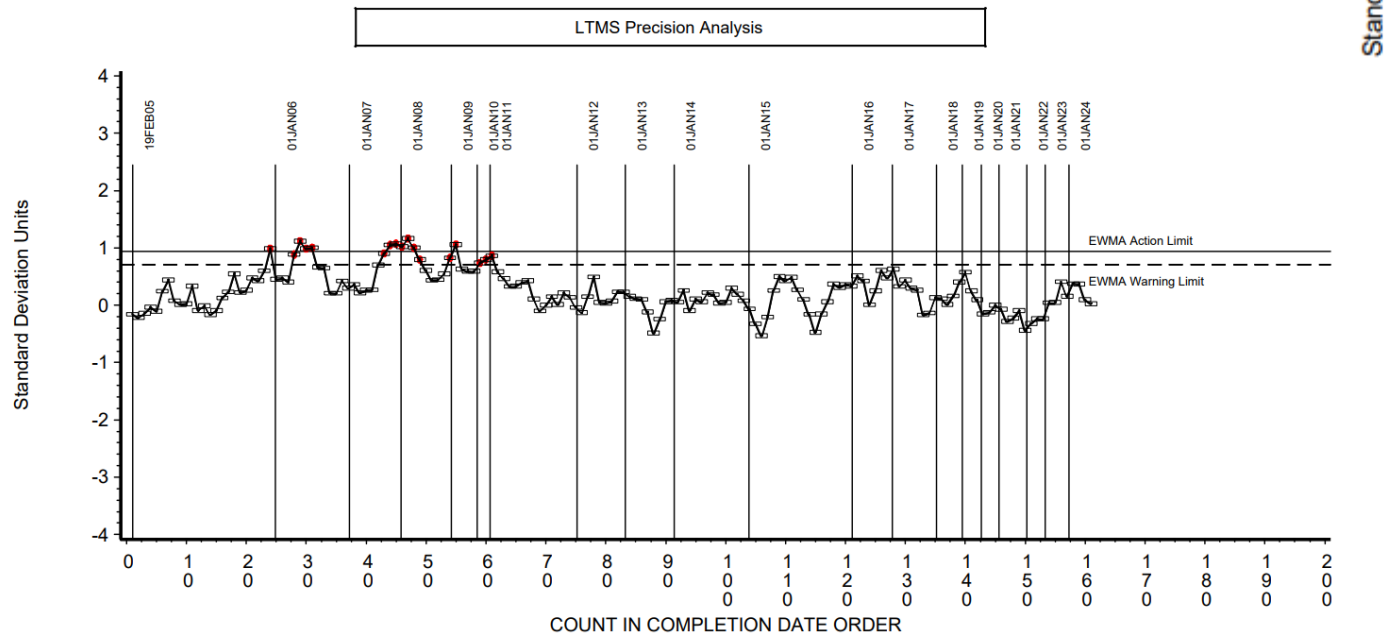


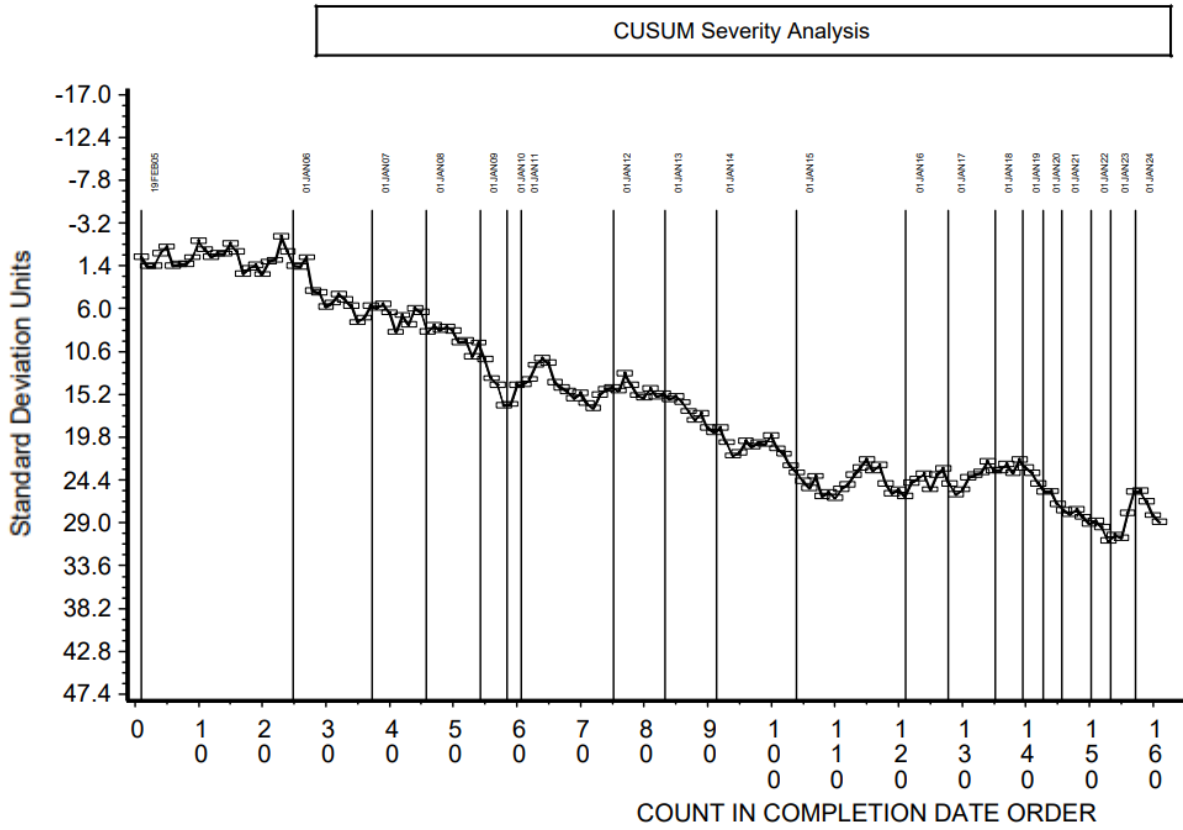


Mack T-12 Charts – OC

Trans. Res. Oil Consumption

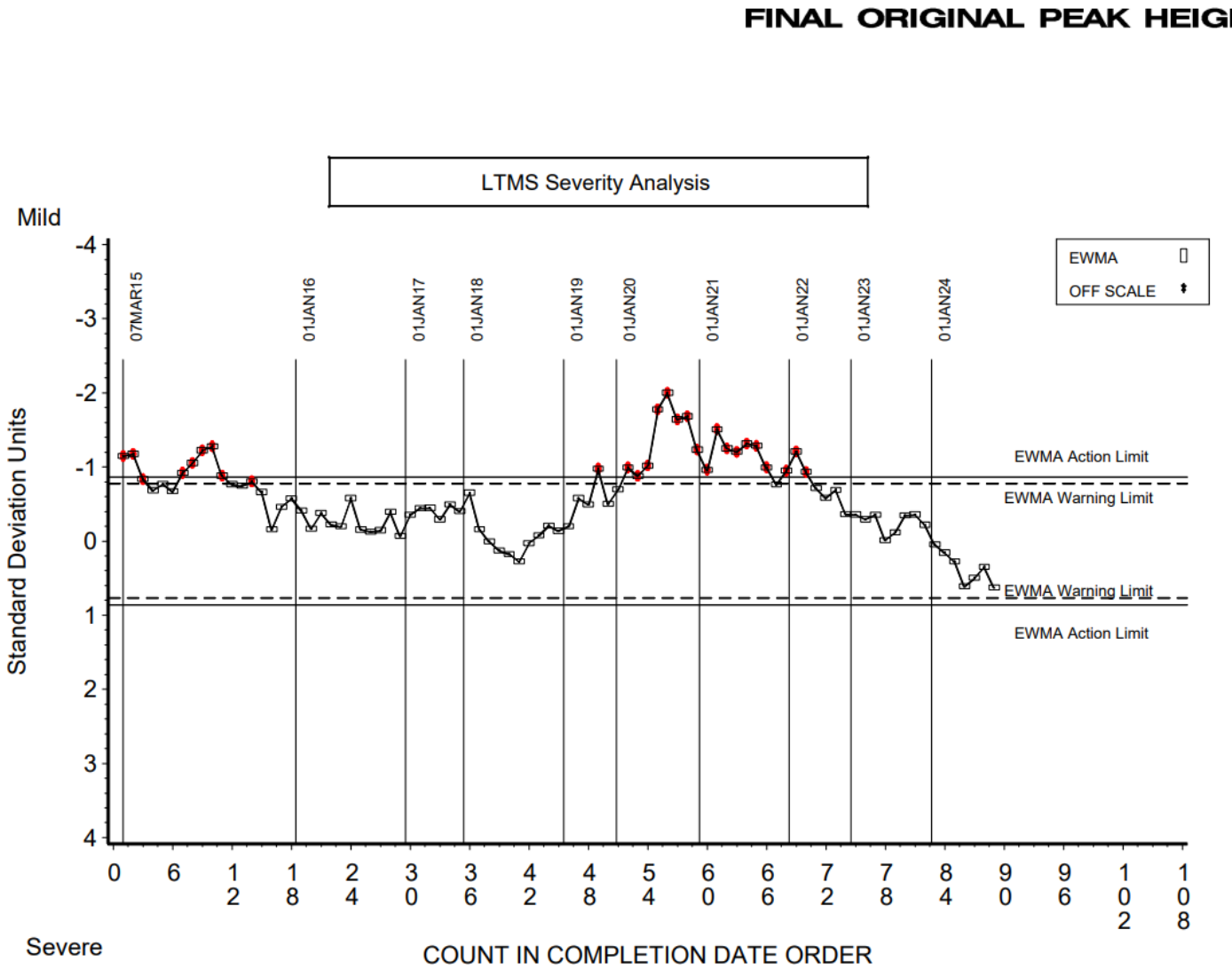


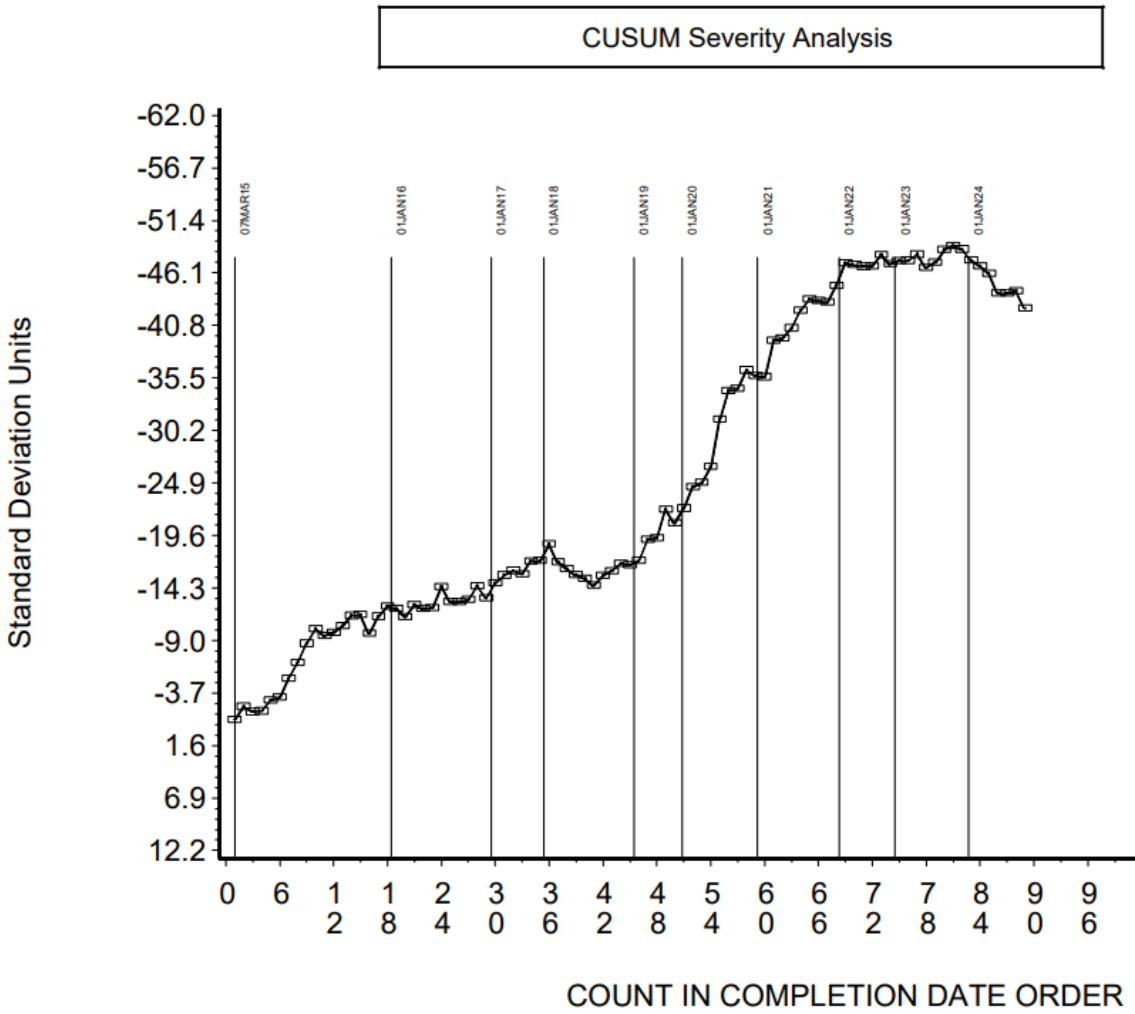




Volvo T-13

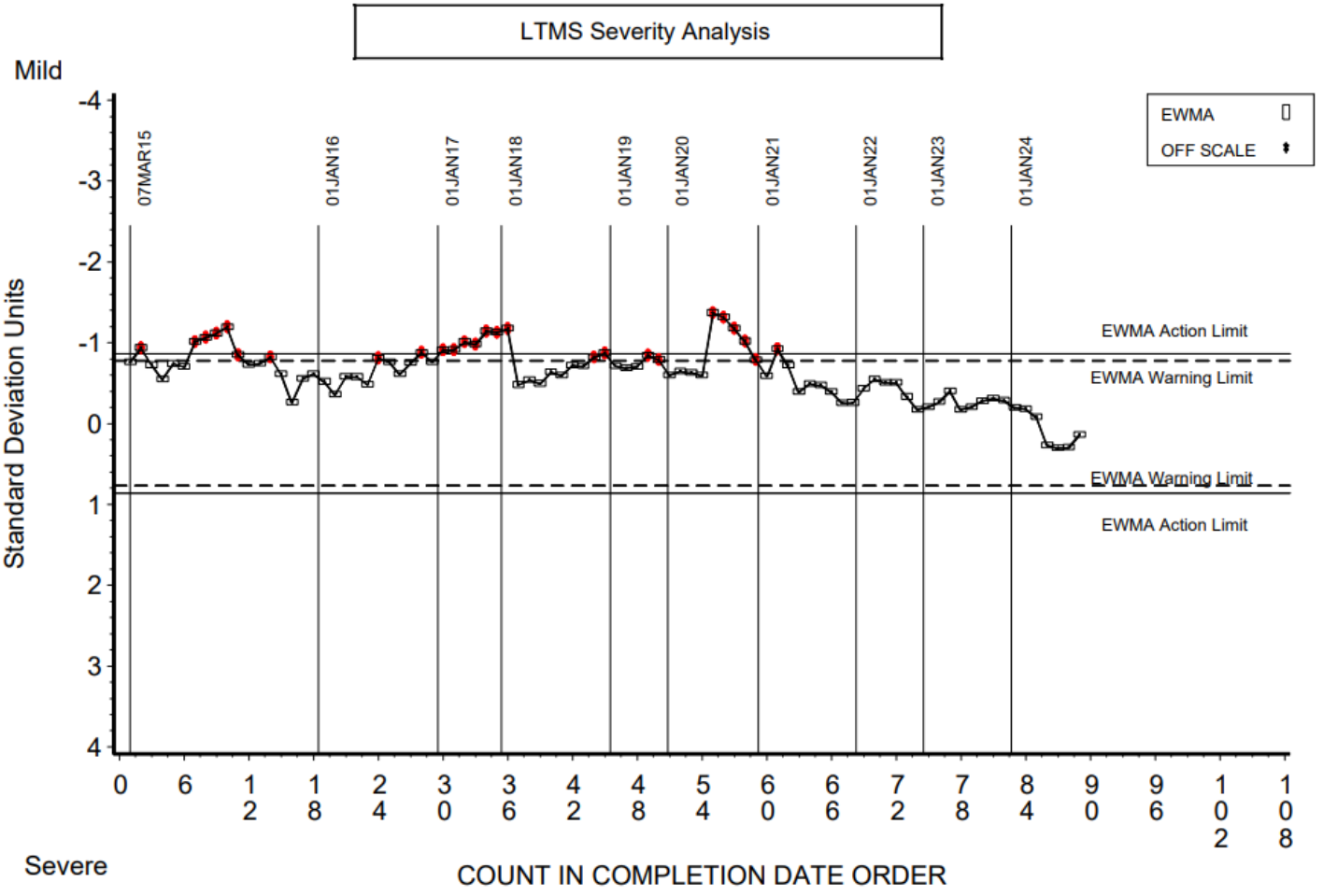
Volvo T-13 Charts – IRPH

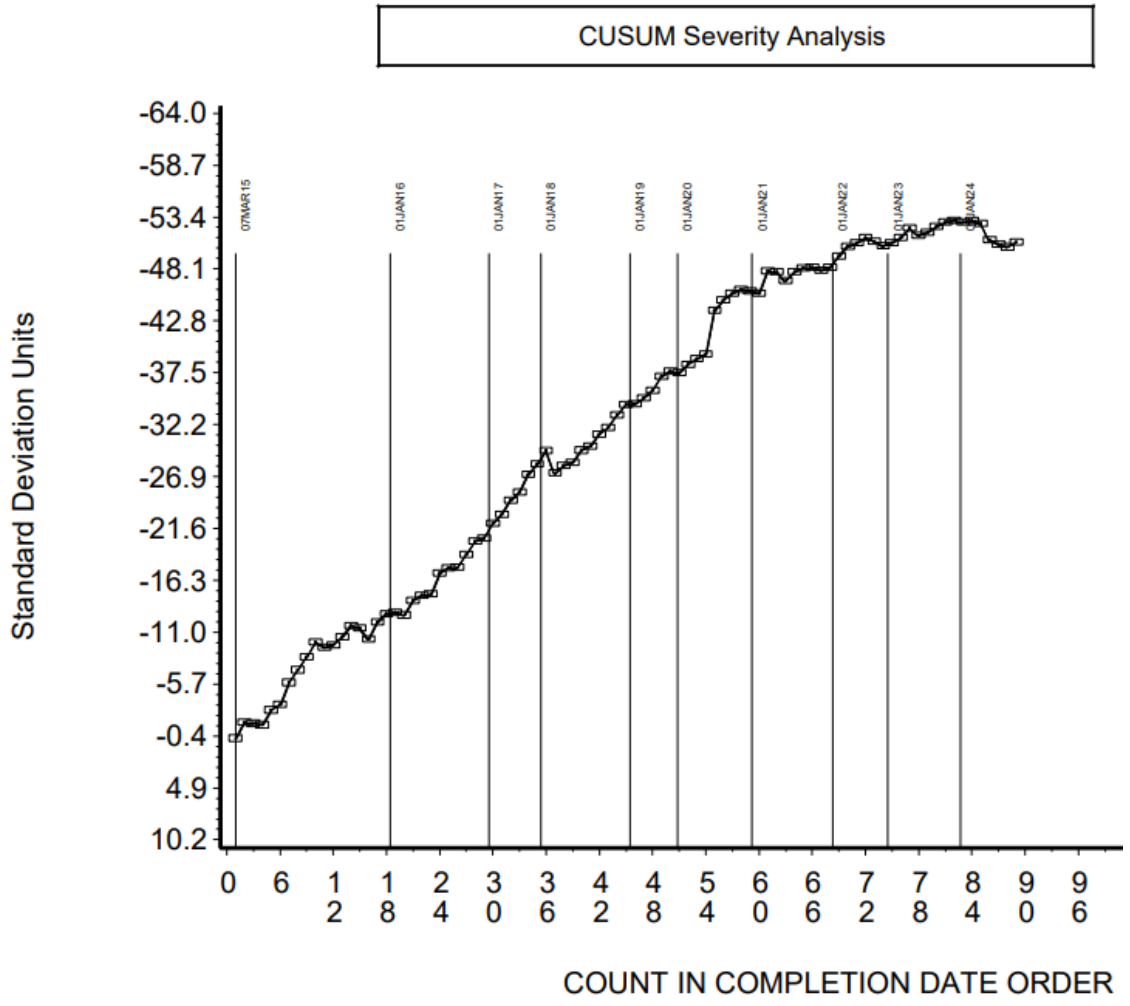




Volvo T-13 Charts – KV40

FNL. ORIG. UNIT KINEMATIC VISCOSITY AT 40 DEG C % CHANGE 300 –360 HRS





Caterpillar Surveillance Panel

HDEOCP Update

Prepared By: Jacob Goodale, S.P Chairman, December 2024

Presented By: Andrew Smith, December 2024

Meetings

- Surveillance panel held 4 meetings
  - April 22nd
  - July 10th
  - September 17th
  - October 30th

Next Meeting

- Not Set

Motions

- Surveillance panel held 4 meetings
  - April 22nd
    - Amending initial motion eliminating outlier screening for Top Ring Mass Loss
      - Passed unanimous
    - Procedural edits, typo
      - Motion carried, unanimous
  - July 10th
    - Adding requirement to run 833-2 before and after 833-1 upcoming references
      - Motion carried, two waives
  - September 17th
    - None
  - October 30th
    - COAT limit proposed to be 12.2 for EOAT equivalency
      - Motion carried, one waive

Key Updates

- Surveillance Panel
  - Josh Ward has stepped down as Secretary, Panel is looking for a replacement
- COAT
  - Reference oil 832-2 not approved for introduction
  - EOAT / COAT Equivalency matrix completed
  - 833-2 introduction started
- C13 Deposit Test
  - Low viscosity prove out completed
    - Strategy to eliminating derate due to low oil pressure running low vis oils
  - Top Ring Mass Loss added to procedure
    - Information letter 24-1 shared 4/25/2024
  - 831-5 introduction plan agreed upon
    - SP to review data once first test completes at Lab B

Reference Oils

Test	Reference Oil	Supply
COAT	TMC 832-1 TMC 833-1 TMC 833-2	5+ year supply 1 Year supply 5+ Year supply
1P, 1R	TMC 1005-5	1 year supply
1R	TMC 822-2	2 Year supply
1N, 1K	TMC 809-1 TMC 811-2	5+ year supply 5+ year supply
C13	TMC 831-4 TMC 831-5	1 Year supply 5+ Year supply
1 M-PC	TMC 873-2	1 Year supply

Updates:

- TMC 833-1: Supply limited
- TMC 833-2: Reference data being generated
- TMC 831-5: Introduction in early 2025 planned

Caterpillar C13 (ASTM D7549)

Labs	Stands	Referenced Stands
4	4	4

Reference Test Activity (As of September 30th 2024)

Test Status	Validity Code	#	Cause
Acceptable Calibration Test	AC	2	
Aborted	XC	1	
TOTAL		**3**	

Test Severity

- TLC is in severity warning alarm in the mild direction. Near action alarm
- R2TC in severity action alarm in the severe direction

Caterpillar COAT (ASTM D8047)

Labs	Stands	Referenced Stands
2	2	2

Reference Test Activity (As of September 30th 2024)

Test Status	Validity Code	#	Cause
Acceptable Calibration Test	AC	2	
Informational	NN	2	
TOTAL		**4**	

Test Severity

- AAVE is in control

Caterpillar SCOTE 1k (ASTM D6750)

Labs	Stands	Referenced Stands
0	0	0

Reference Test Activity (As of September 30th 2024)

Test Status	Validity Code	#	Cause
Acceptable Calibration Test	AC	0	
TOTAL		**0**	

Test Severity

- No 1K tests were run during reporting period. Statements on severity based on prior periods.
- TGF is in warning alarm in the mild direction
- BSOC is in action alarm in the mild direction
- All other parameters are in control

Caterpillar SCOTE 1N (ASTM D6750)

Labs	Stands	Referenced Stands
1	1	1

Reference Test Activity (As of September 30th 2024)

Test Status	Validity Code	#	Cause
Acceptable Calibration Test	AC	1	
TOTAL		**1**	

Test Severity

- TGF is in precision action alarm
- BSOC in severity warning alarm in the mild direction
- All other parameters in control

Caterpillar SCOTE 1P (ASTM D6681)

Labs	Stands	Referenced Stands
1	1	1

Reference Test Activity (As of September 30th 2024)

Test Status	Validity Code	#	Cause
Acceptable Calibration Test	AC	1	
TOTAL		**1**	

Test Severity

- TGC, TLC, OC are in control
- WD is in severity action alarm in the severe direction
- EOTOC is in severity action alarm in the severe direction

Caterpillar SCOTE 1R (ASTM D6923)

Labs	Stands	Referenced Stands
0	0	0

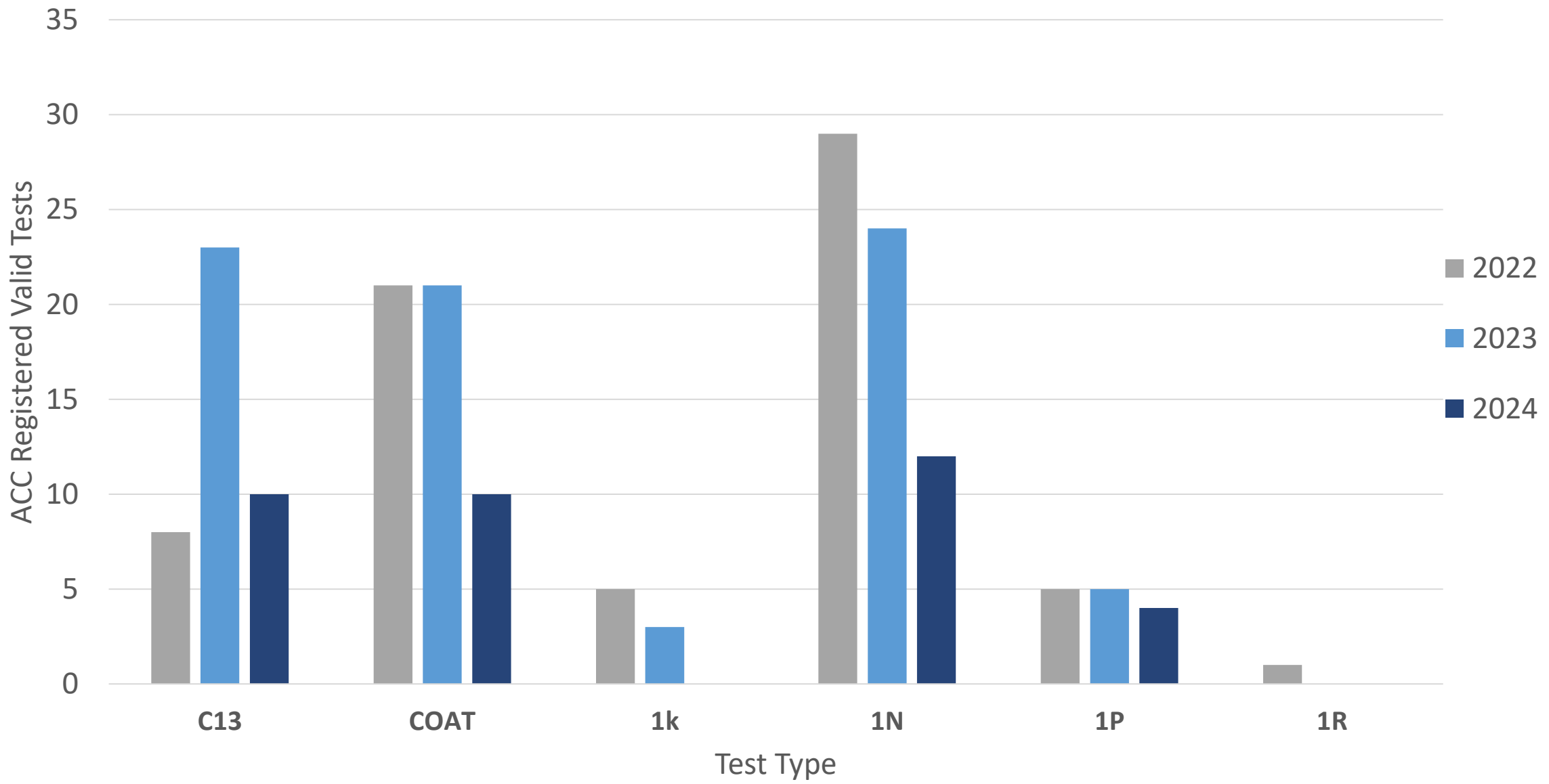
Reference Test Activity (Since June 2024)

Test Status	Validity Code	#	Cause
Aborted	XC	0	
TOTAL		**0**	

Test Severity

- No chartable 1R Tests run during this period no statement on test severity can be made.

Candidate Activity



COAT / EOAT Matrix

- Matrix Overview
  - 6 total tests
    - 3 Lab A
    - 3 Lab G
  - 5 completed
  - Funding from ASTM
- Stats group indicated that with five of six matrix tests completed the equivalency could be established
- Presentation to the Surveillance Panel on October 30th outlined all findings

COAT 1005-6 data review

COAT-EOAT equivalency

Statistics Group

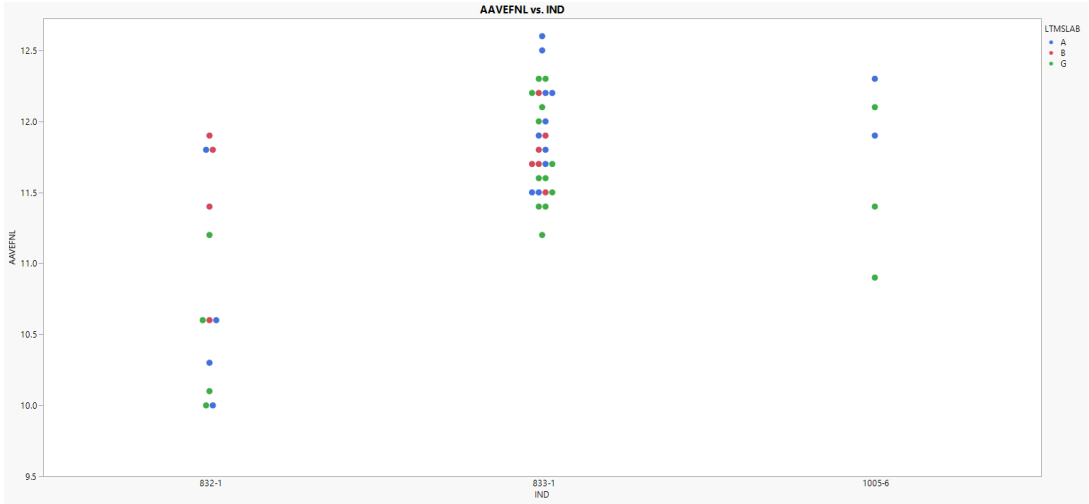
updated Oct. 30, 2024

Statistics Group

- Amanda Stone, Afton/New Market
- Amy Ross, Valvoline
- Dylan Beck, TMC
- Jo Martinez, Chevron Oronite
- Martin Chadwick, Intertek
- Phil Scinto, Lubrizol
- Ricardo Affinito, Chevron Oronite
- Rich Grundza, TMC
- Seth Demel, Shell
- Todd Dvorak, Infineum
- Travis Kostan, SwRI

means and standard deviations

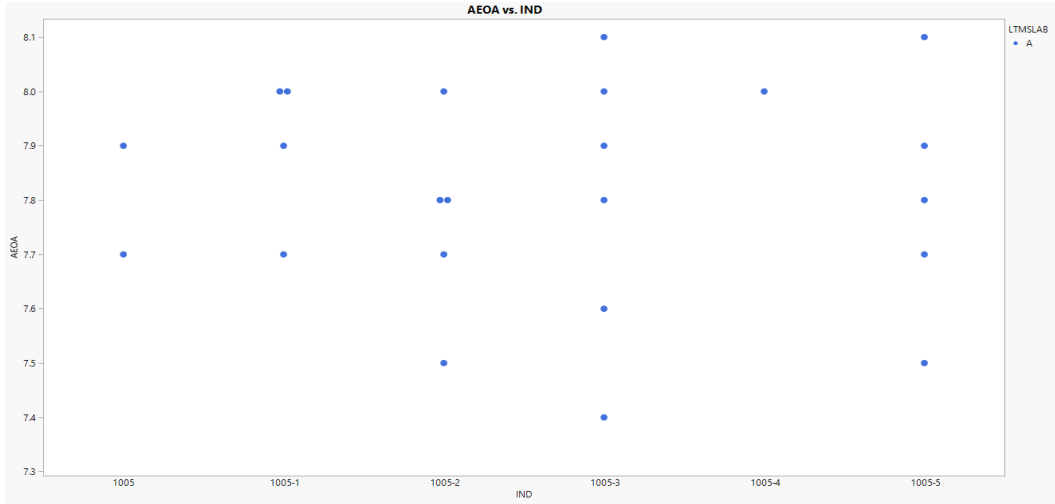
COAT



	AAVEFNL			
IND	N	Mean	Std Dev	Std Err
832-1	12	10.9	0.73	0.21
833-1	28	11.9	0.36	0.07
1005-6	5	11.7	0.57	0.25

		AAVEFNL			
IND	LTMSLAB	N	Mean	Std Dev	Std Err
832-1	A	4	10.7	0.79	0.39
	B	4	11.4	0.59	0.30
	G	4	10.5	0.55	0.27
833-1	A	10	12.0	0.38	0.12
	B	6	11.8	0.24	0.10
	G	12	11.8	0.39	0.11
1005-6	A	2	12.1	0.28	0.20
	G	3	11.5	0.60	0.35

EOAT



	AEOA			
IND	N	Mean	Std Dev	Std Err
1005	2	7.8	0.14	0.10
1005-1	4	7.9	0.14	0.07
1005-2	5	7.8	0.18	0.08
1005-3	6	7.8	0.26	0.11
1005-4	1	8.0	.	.
1005-5	5	7.8	0.22	0.10

equivalent limits calculation

2. Apply the passing rate of oil 1005 in EOAT and determine the equivalent COAT limit with the same passing rate in COAT. This method takes into account the test variability.

Test	Oil	max limit	mean	s	PrPass	
EOAT	1005	8.0	7.8	0.23	0.81	staright s, 1005-3, 1005-4, 1005-5
COAT	1005-6	12.2	11.7	0.57	0.81	straight s

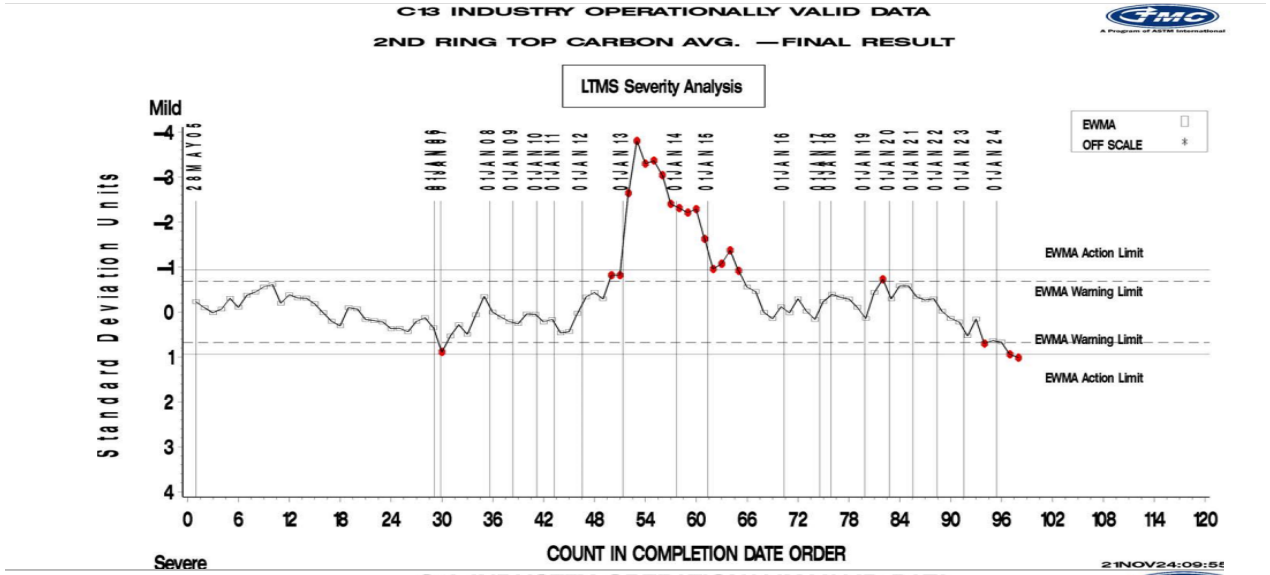
Test	Oil	max limit	mean	s	PrPass	
EOAT	1005	8.0	7.8	0.21	0.83	pooled s, oil 1005 blends
COAT	1005-6	12.2	11.7	0.52	0.83	pooled s, lab

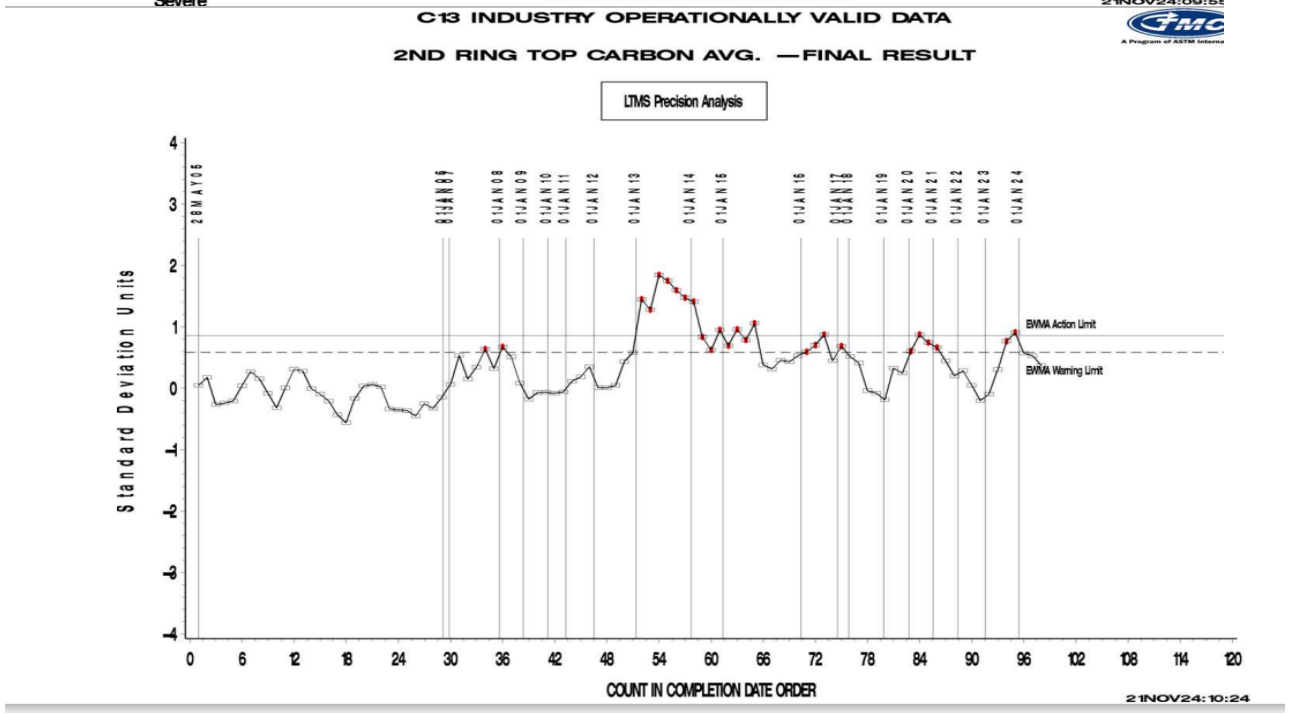
COAT / EOAT Motion

- The Caterpillar Surveillance Panel motions to accept the presented equivalency limit of 12.2 for oils run in the COAT providing equivalency to the EOAT.

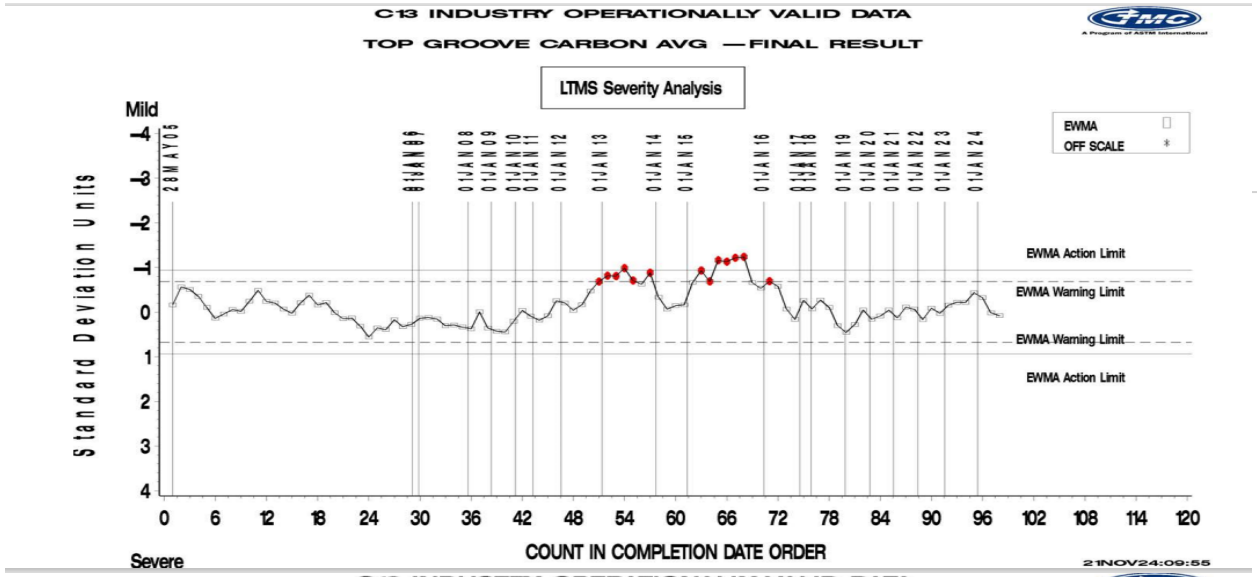
Appendix
Charts

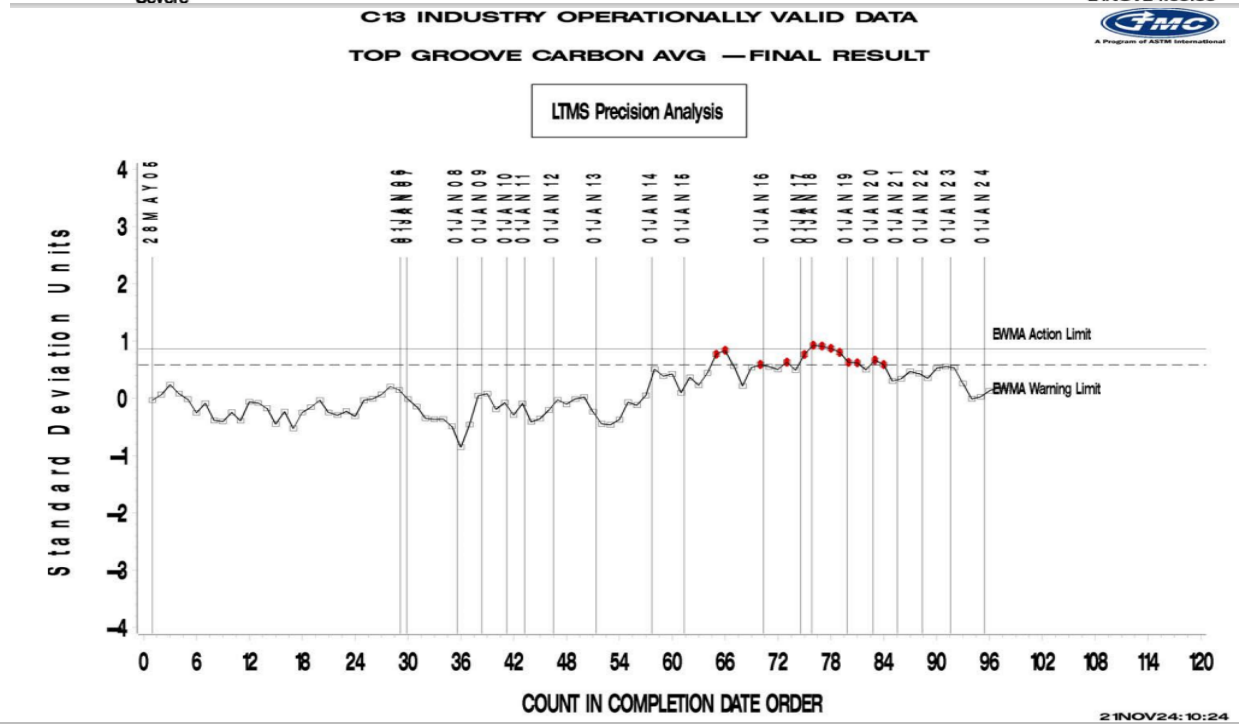
Caterpillar C13 Charts-2nd Ring Top Carbon

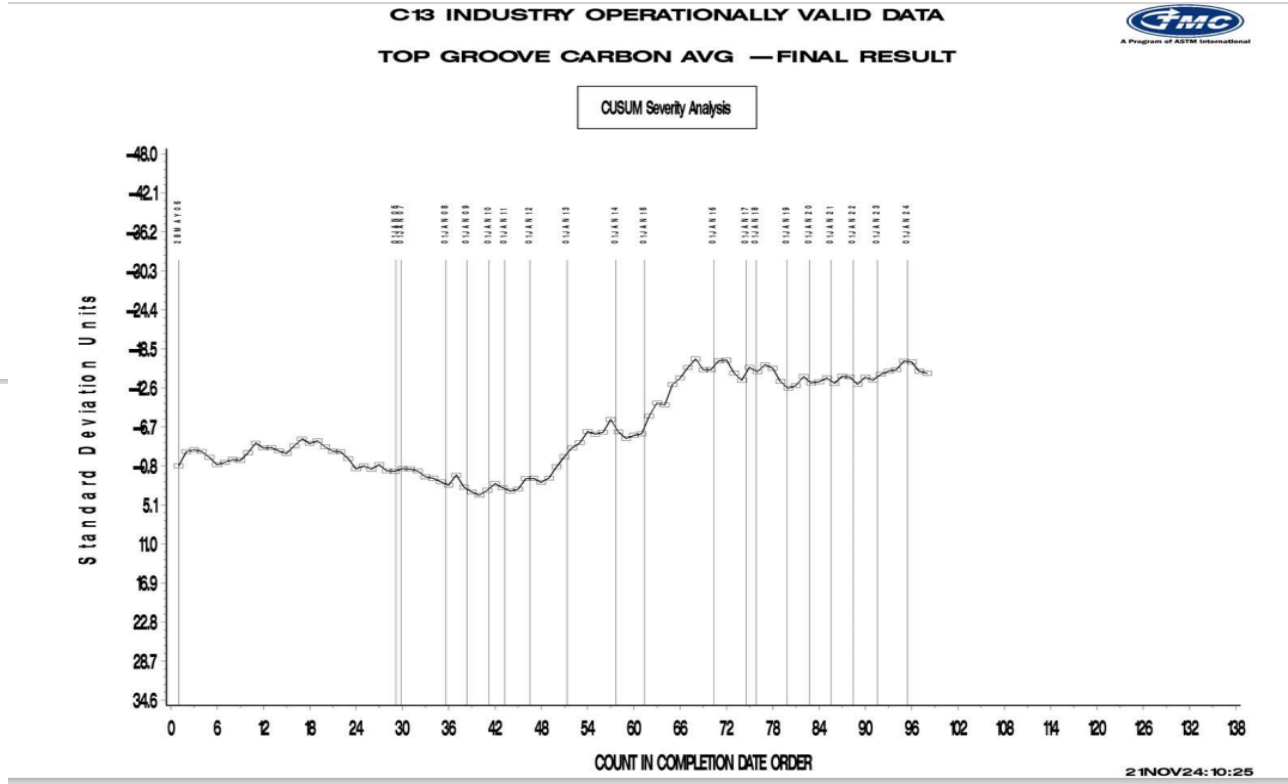




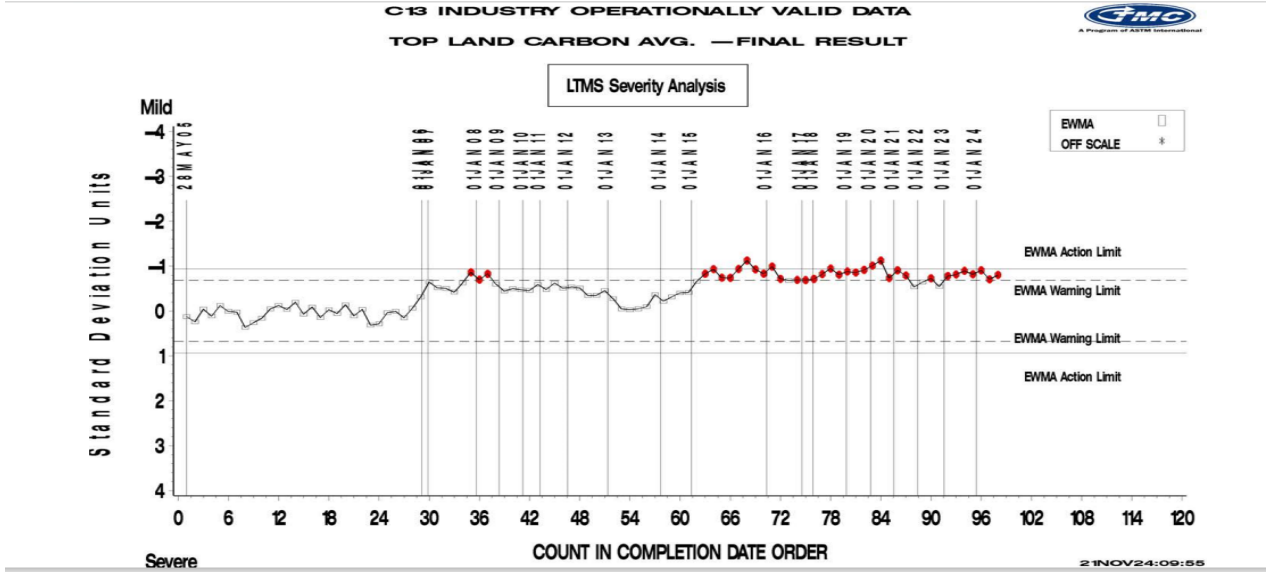
Caterpillar C13 Charts-Top Groove Carbon

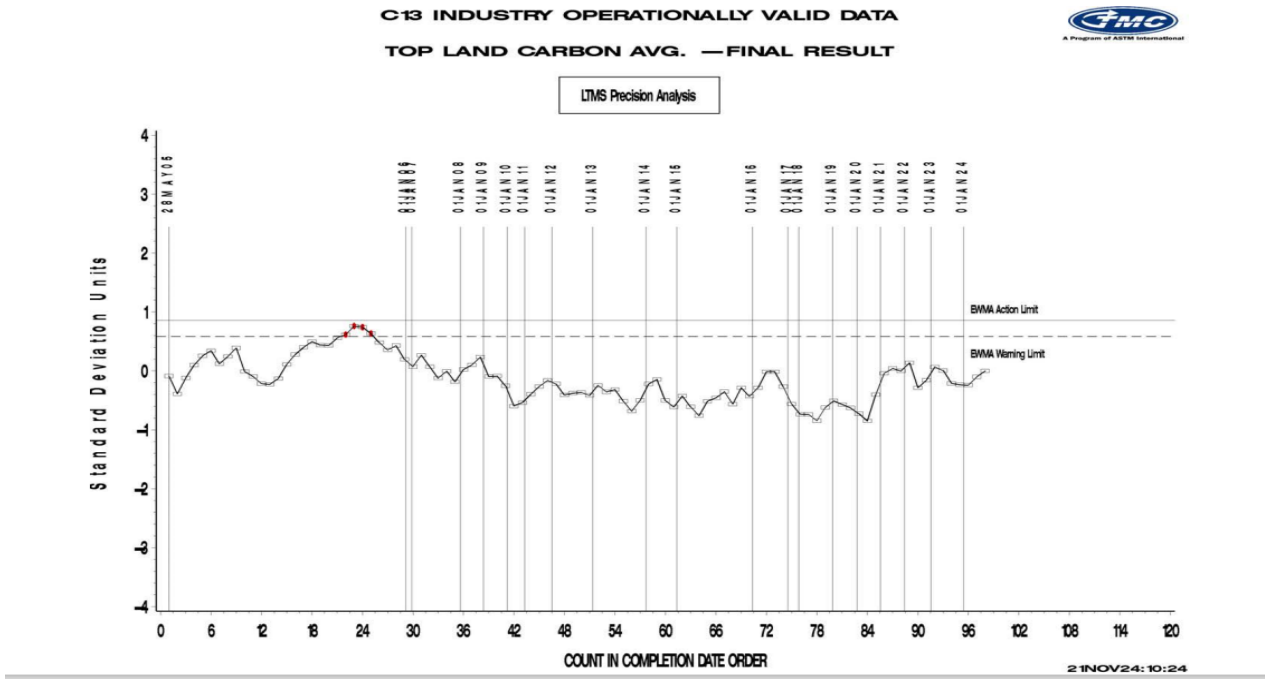


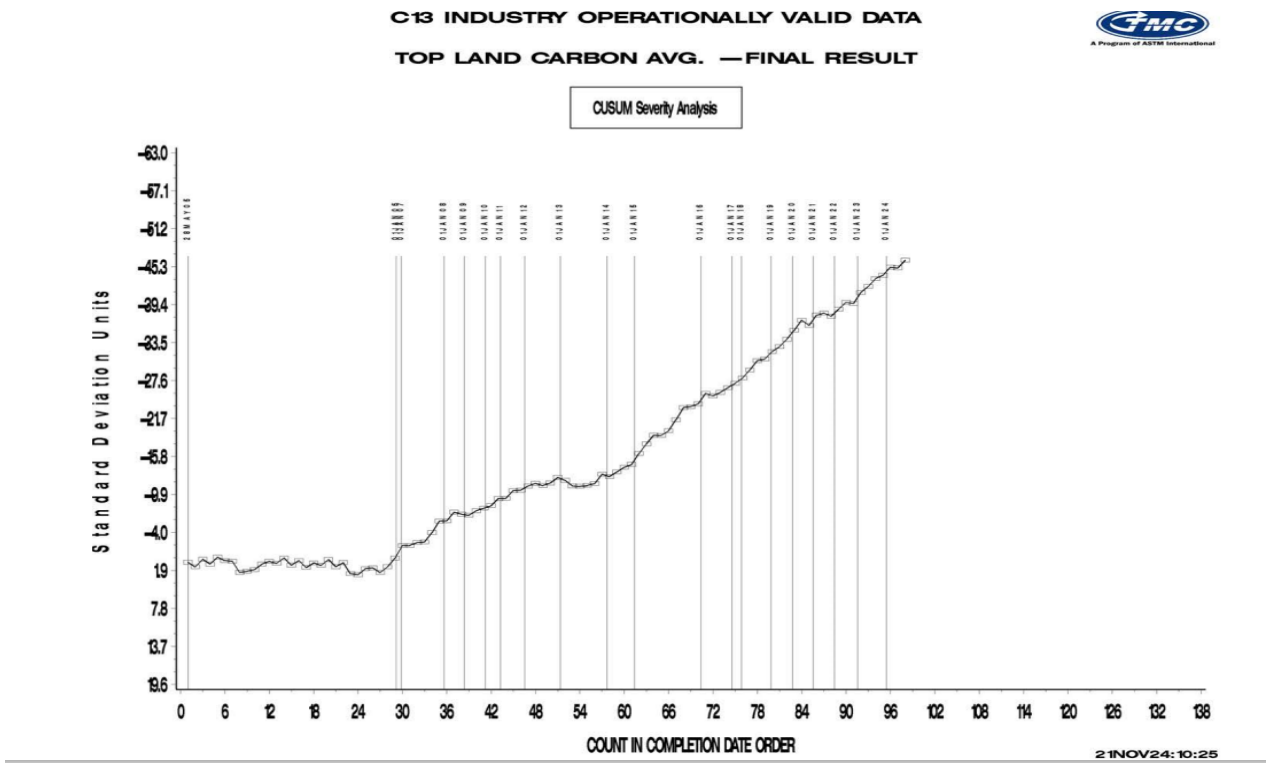




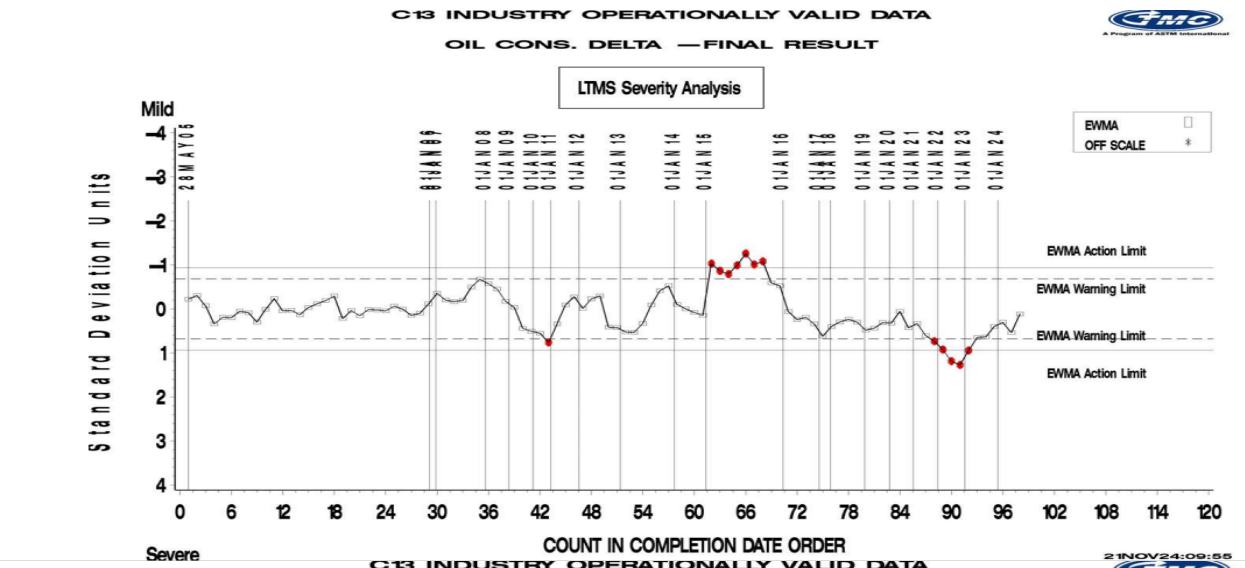
Caterpillar C13 Charts- Top Land Carbon

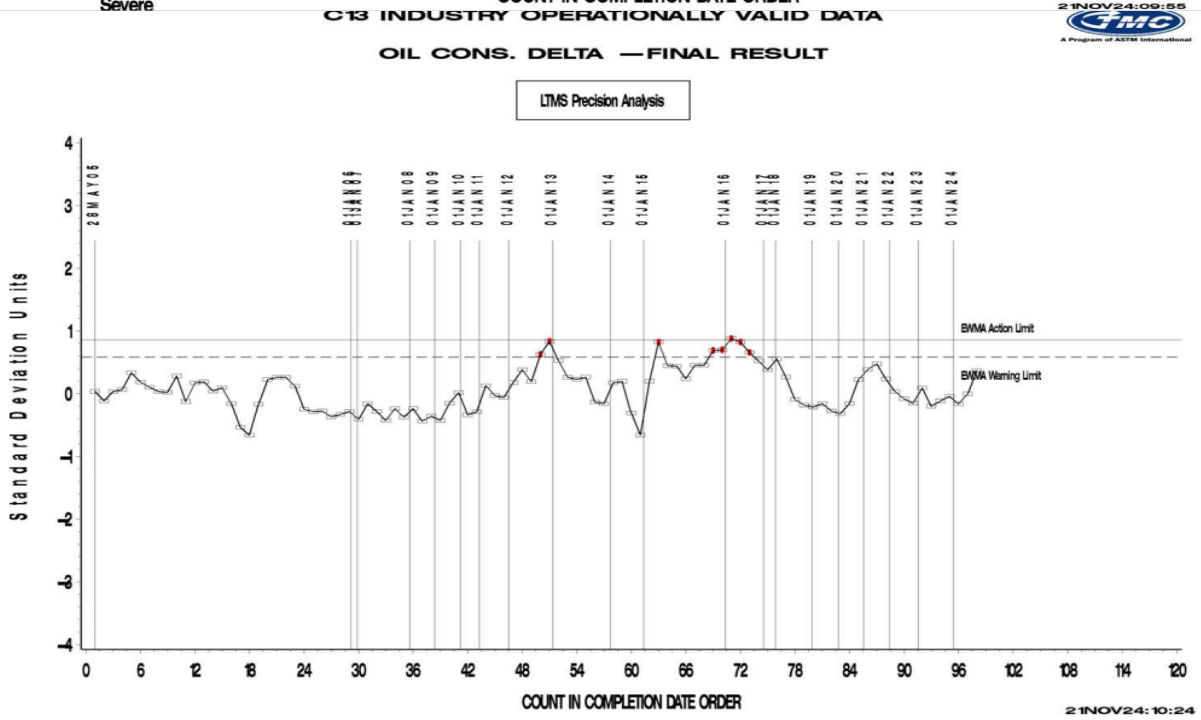


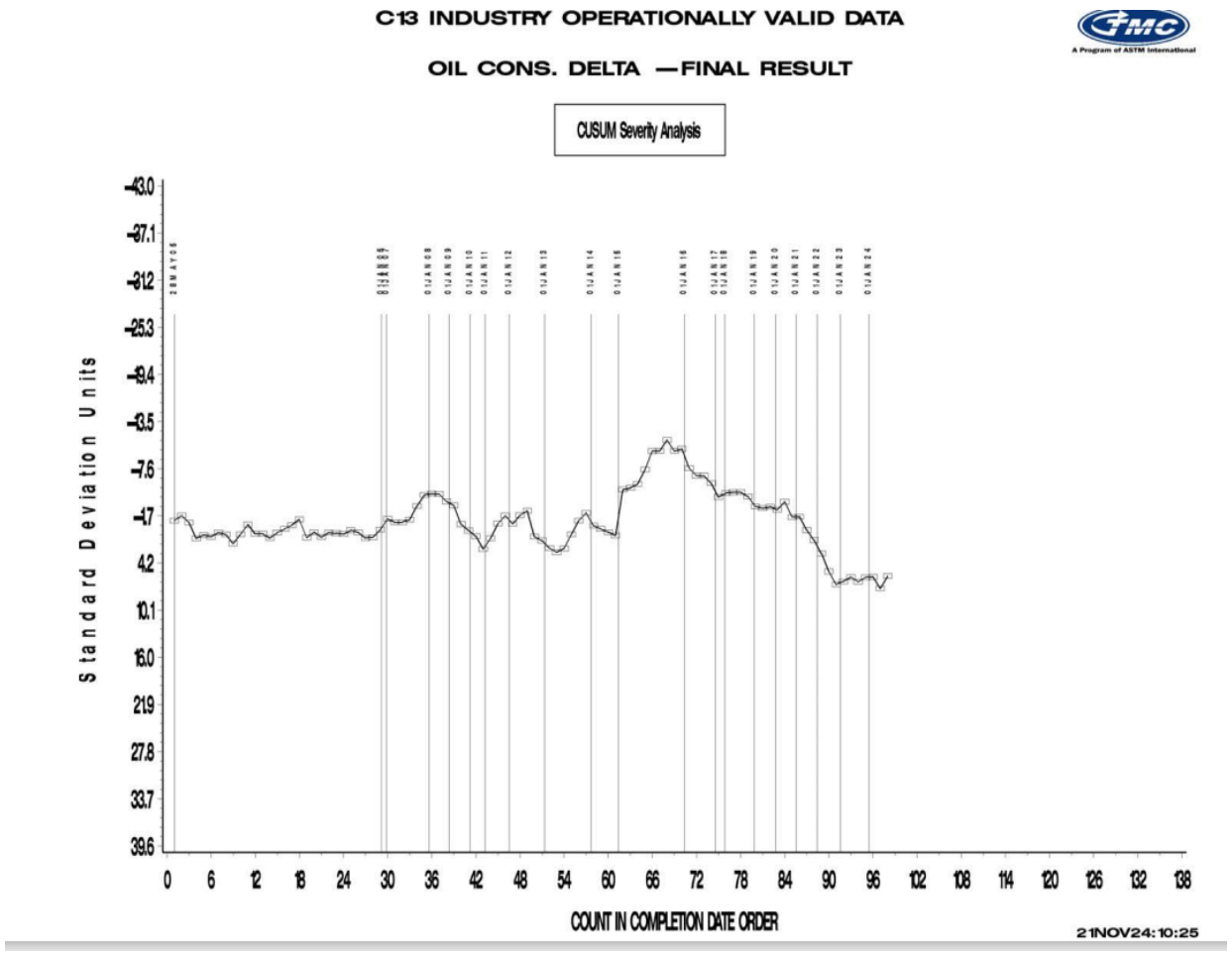




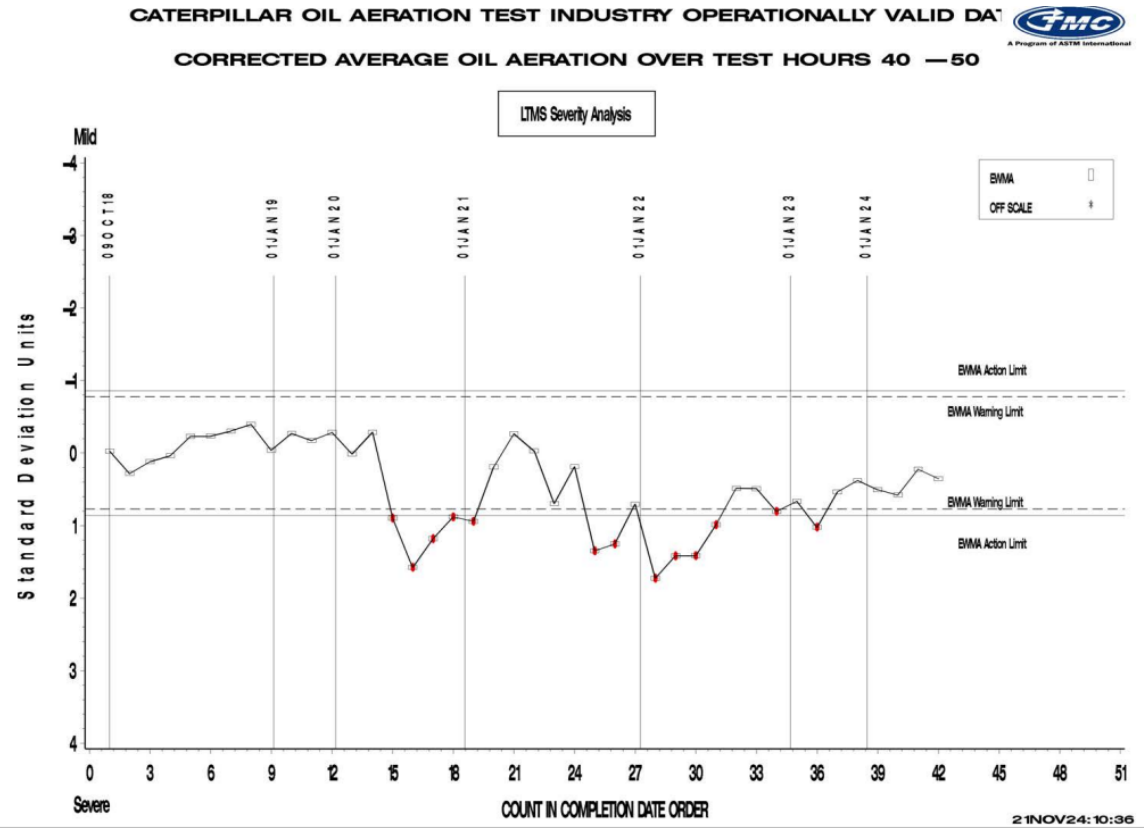
Caterpillar C13 Charts- Oil Consumption Delta

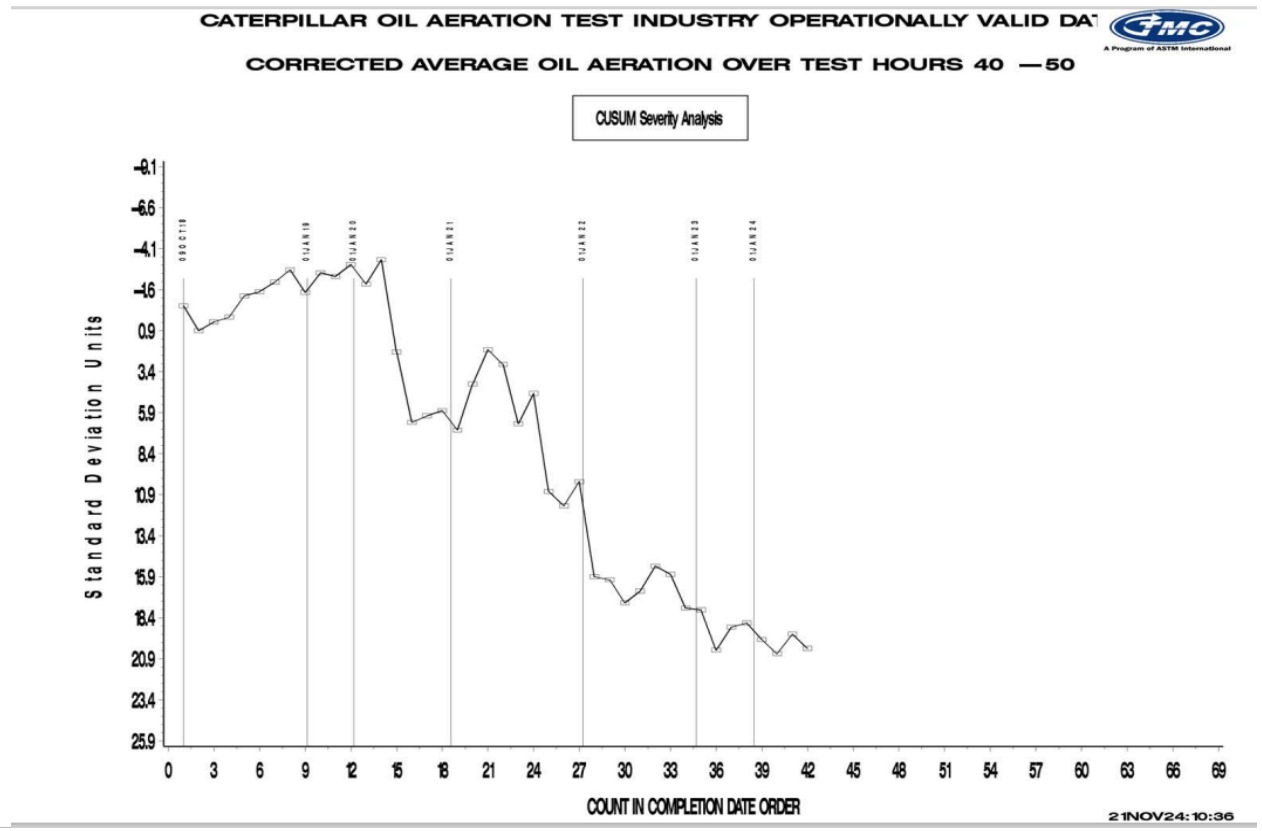




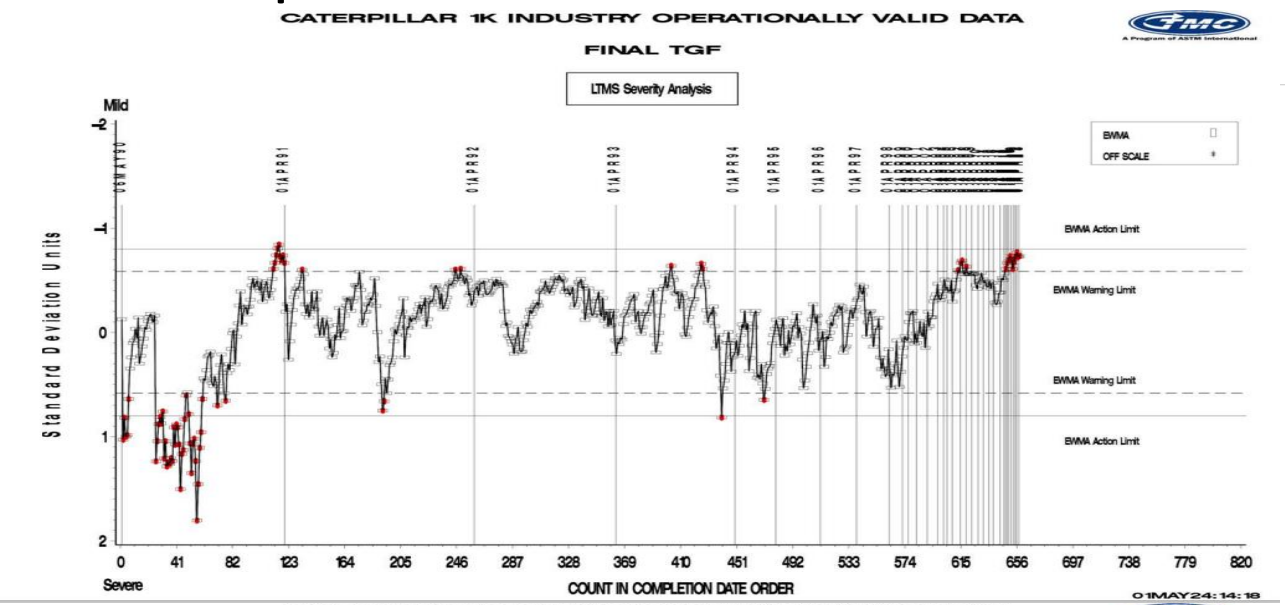


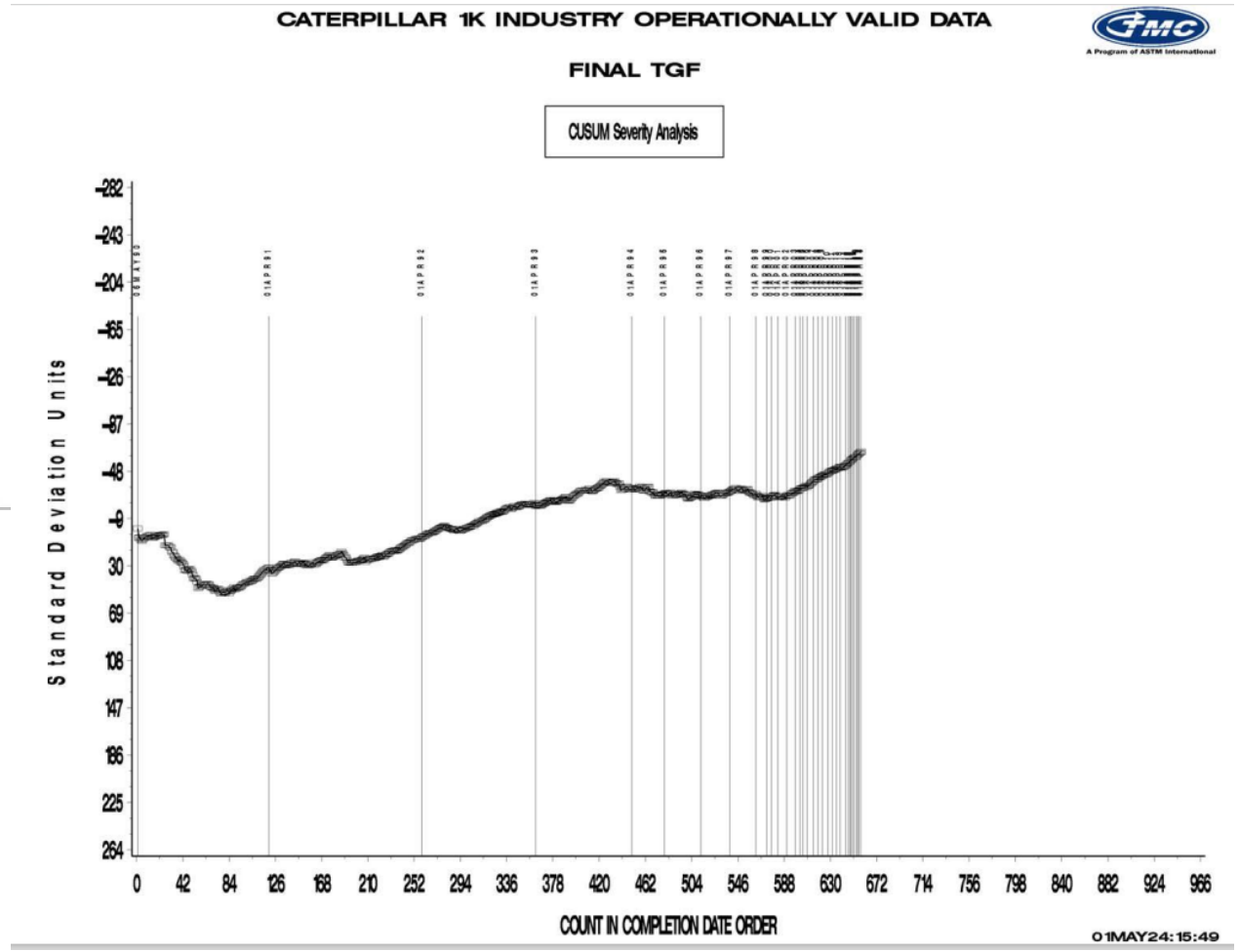
Caterpillar COAT Charts- Corrected Average Oil Aeration over Test Hours 40 - 50

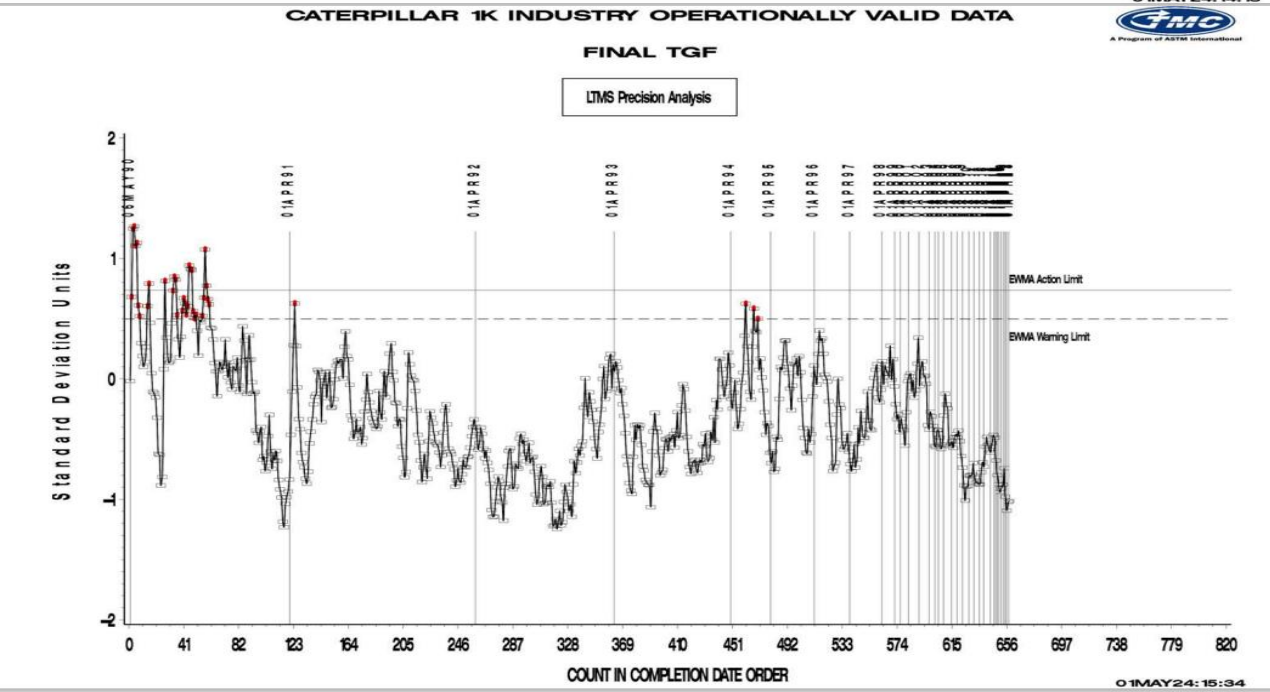




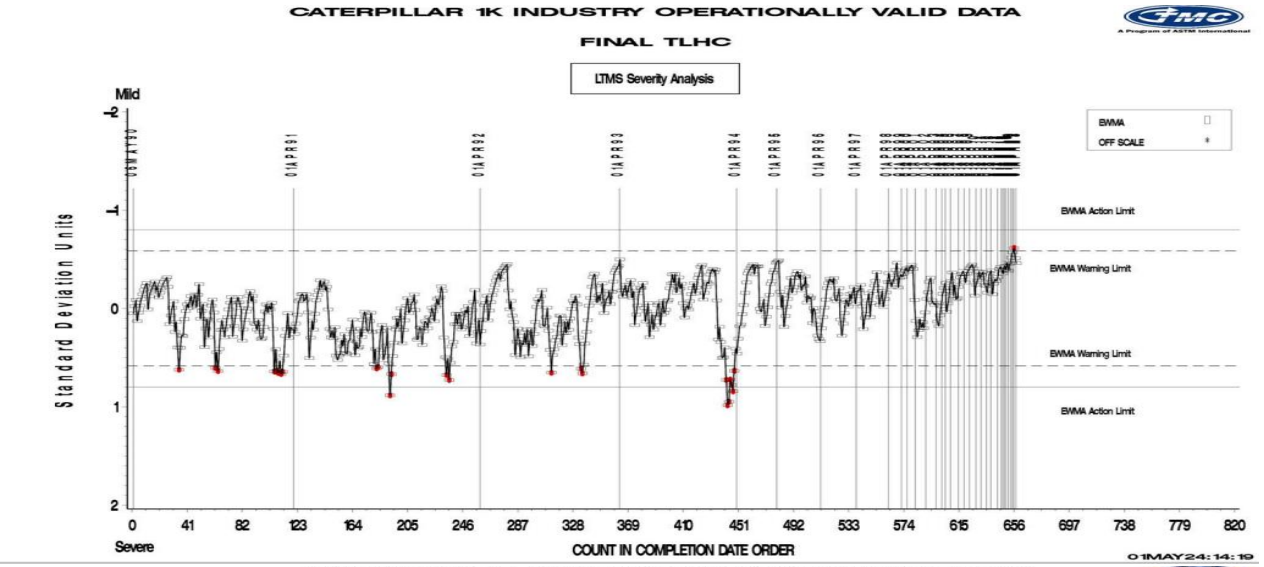
Caterpillar SCOTE 1k Charts- Final TGF

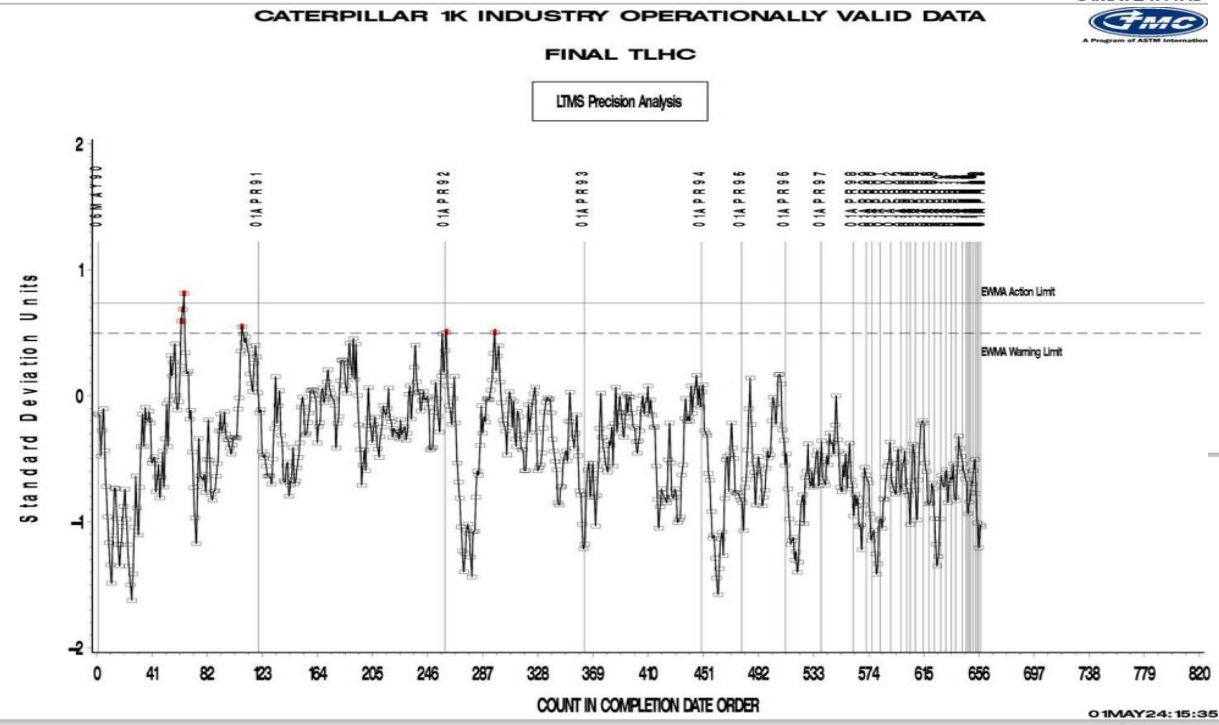


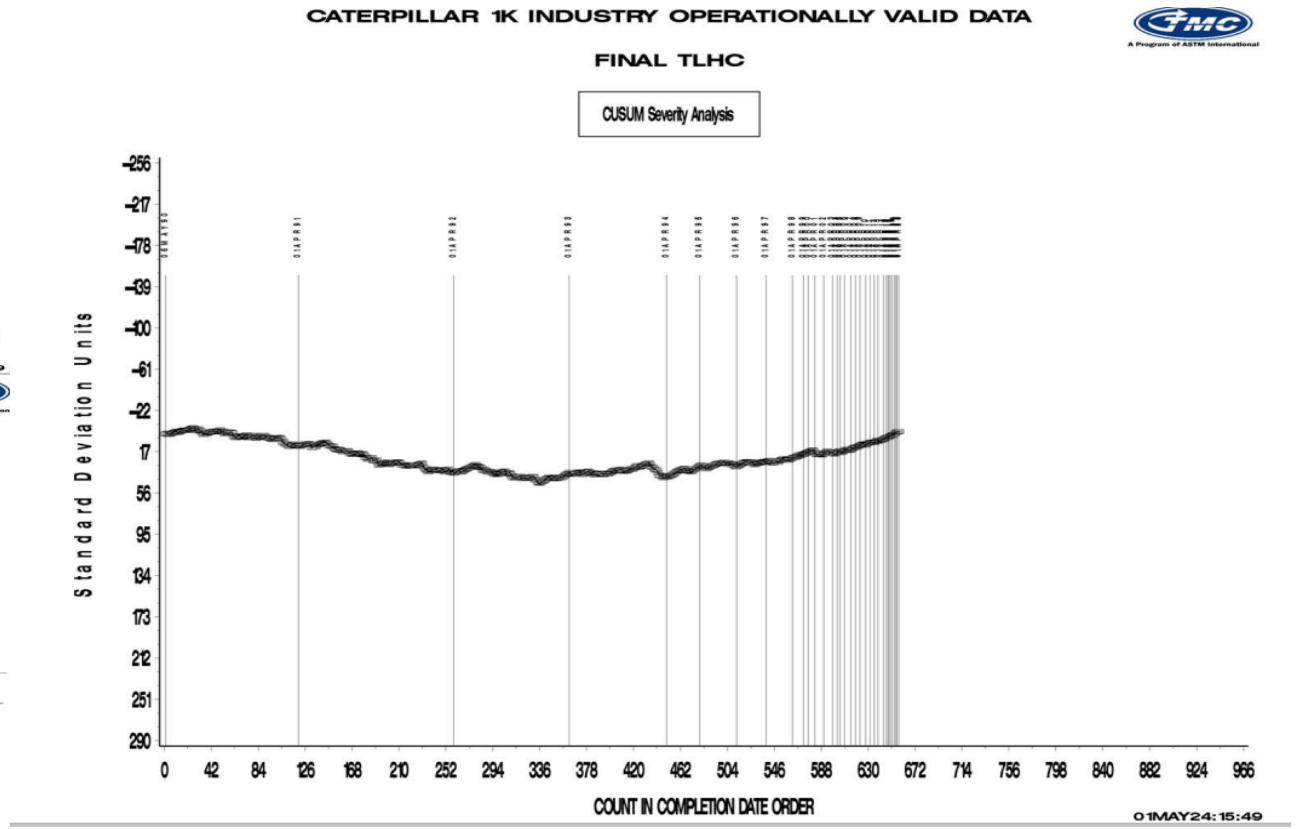




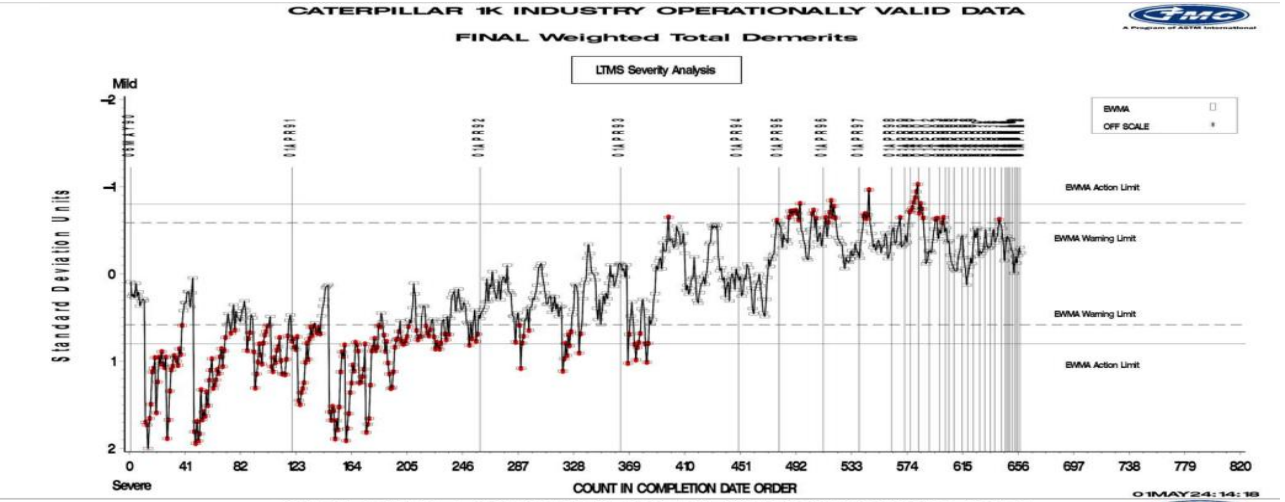
Caterpillar SCOTE 1k Charts- Final TLHC

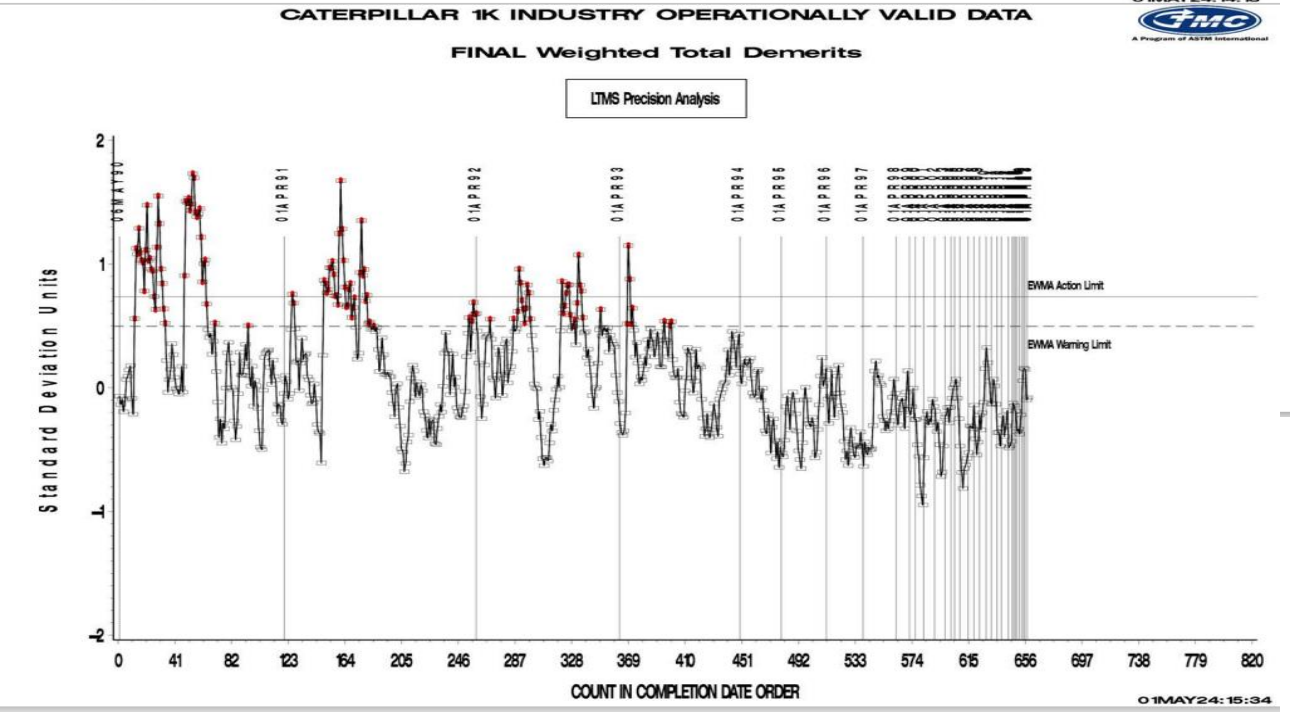


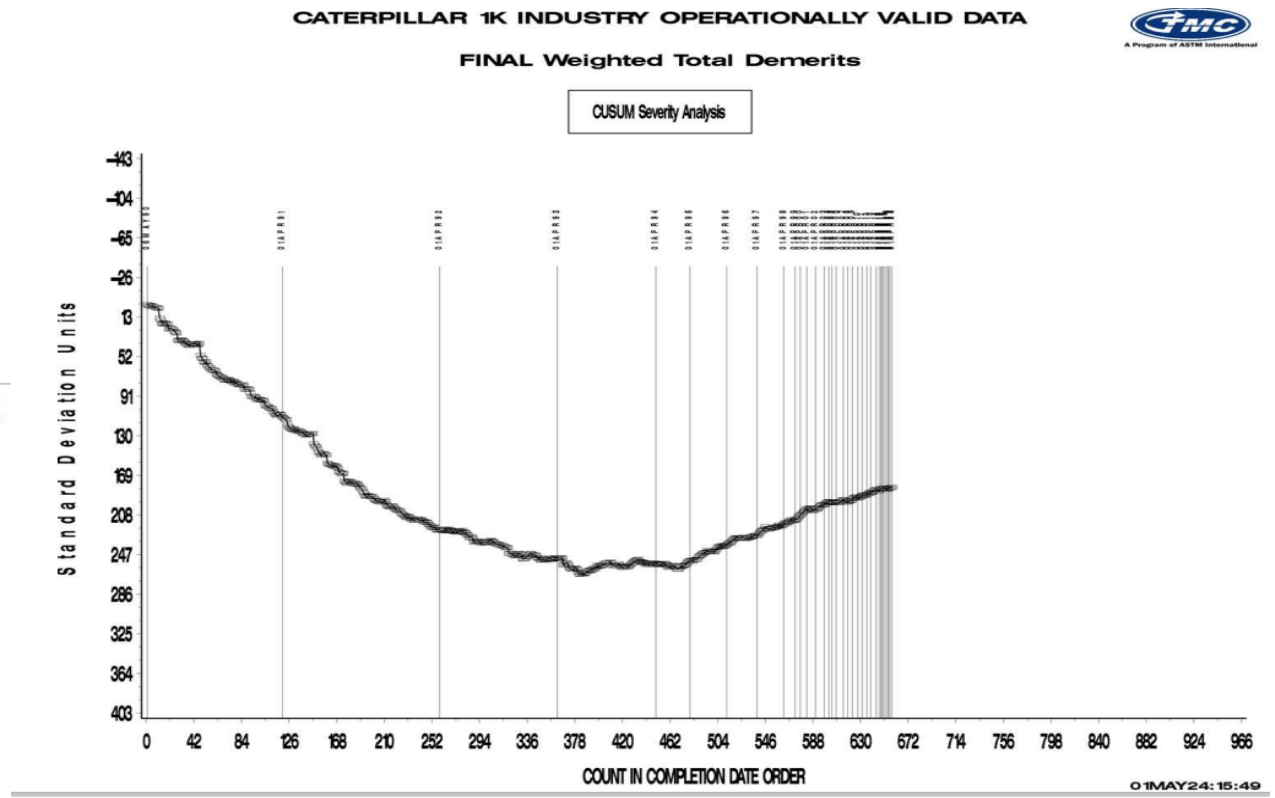




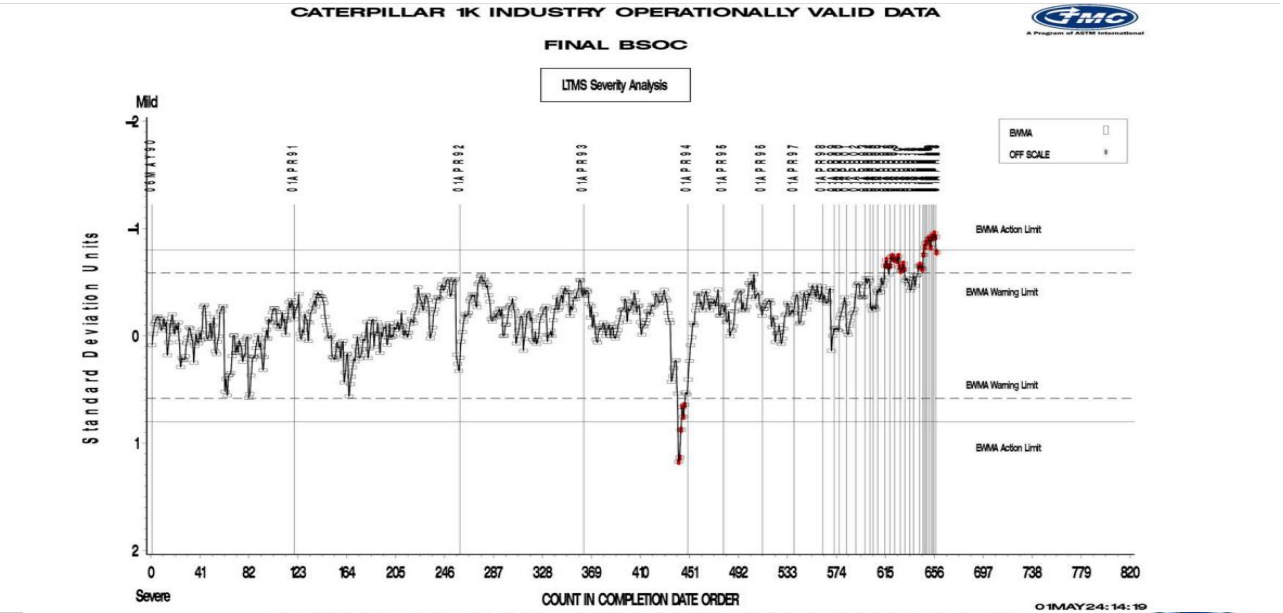
Caterpillar SCOTE 1k Charts- Final Weighted Total Demerits

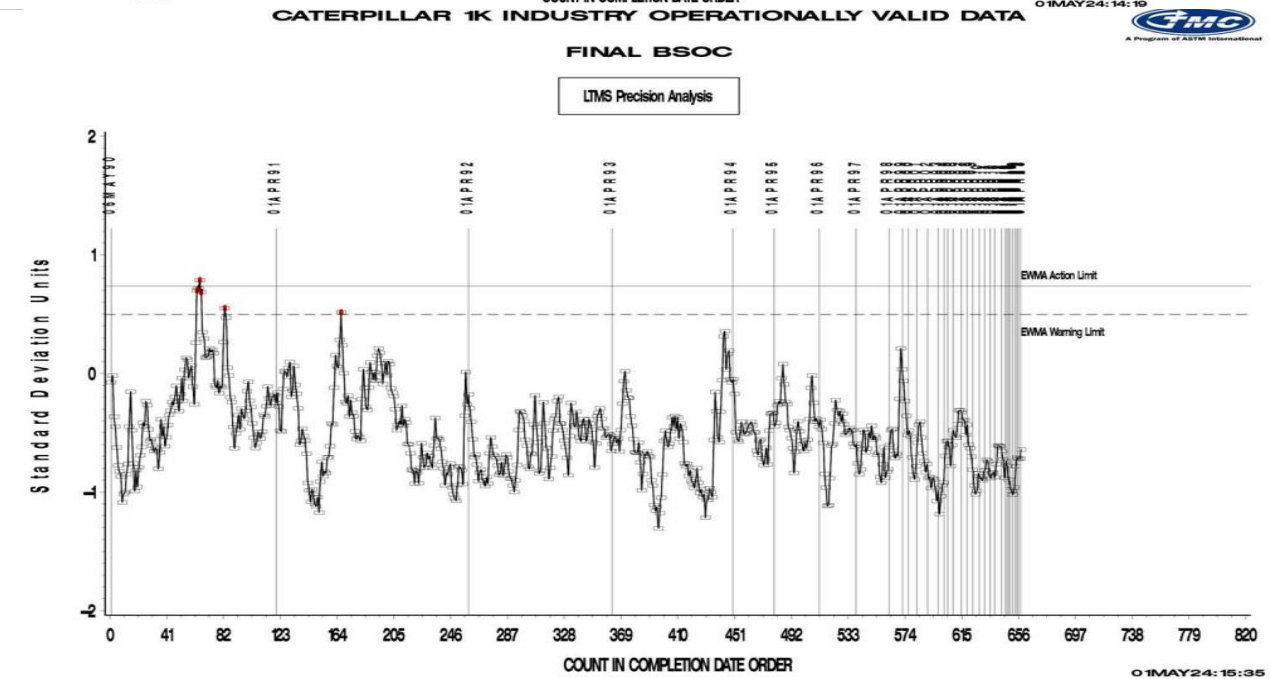


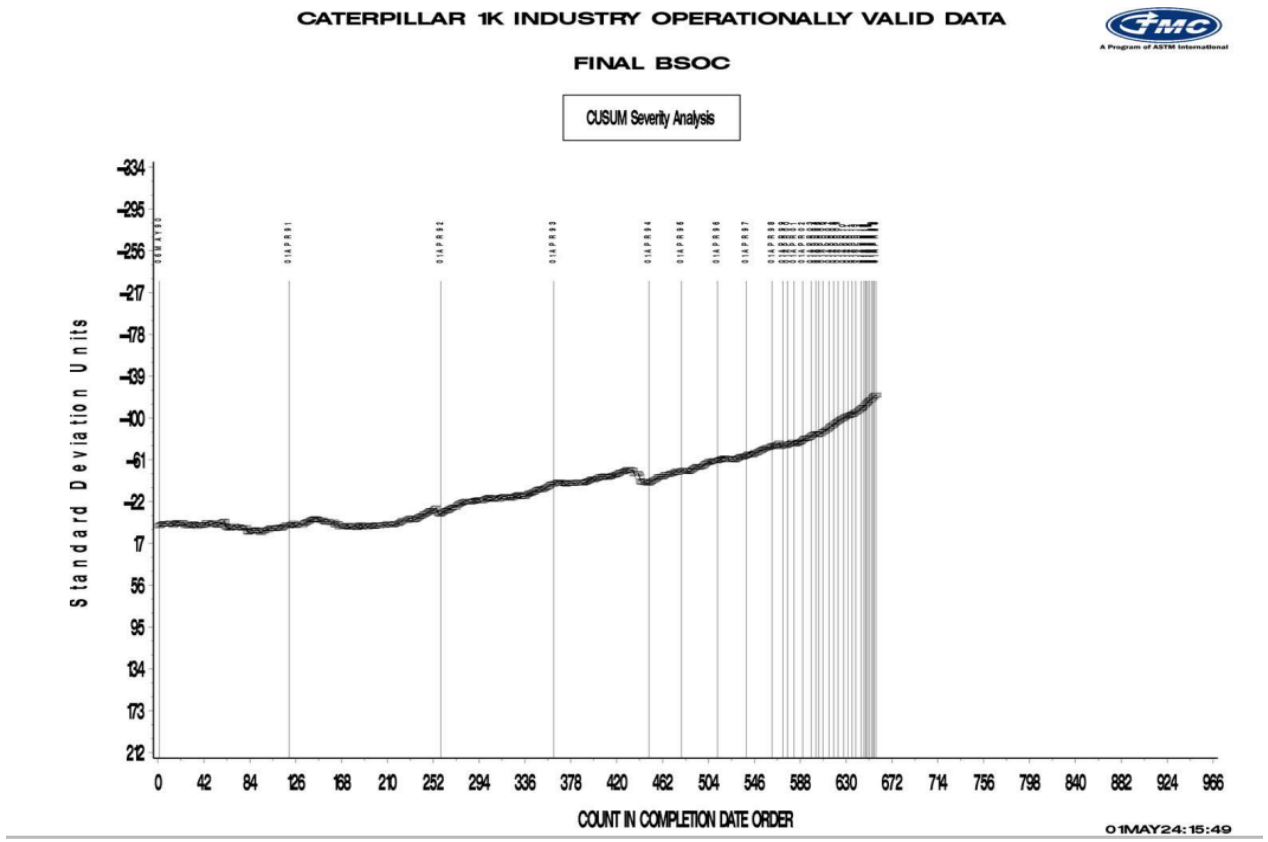




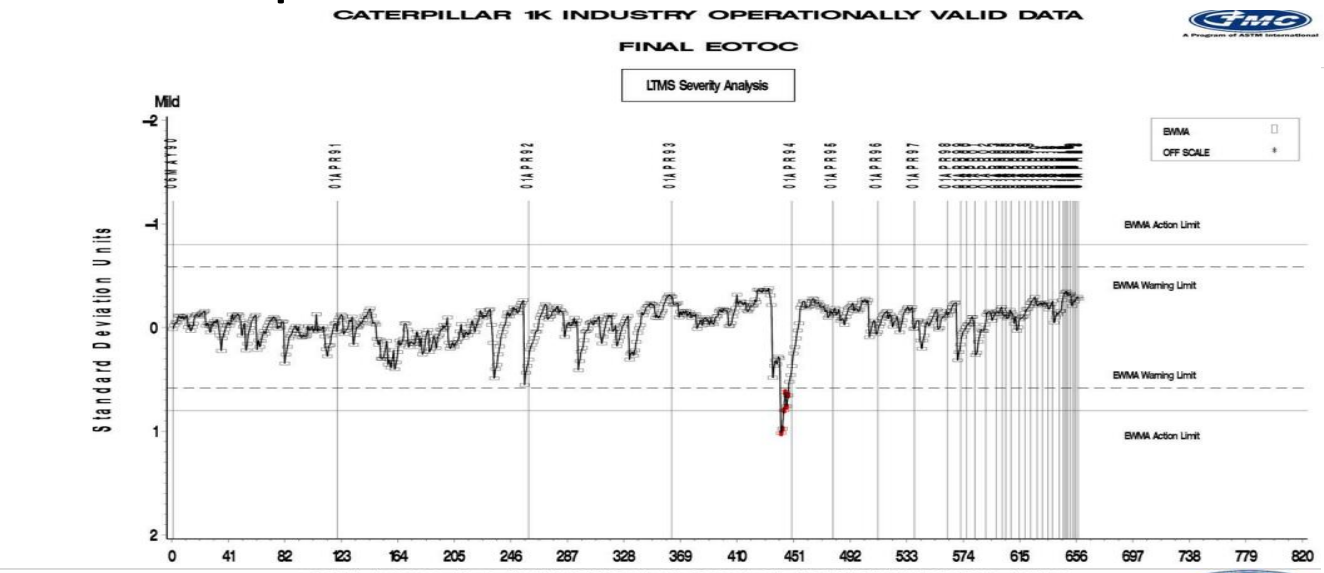
Caterpillar SCOTE 1k Charts- Final BSOC

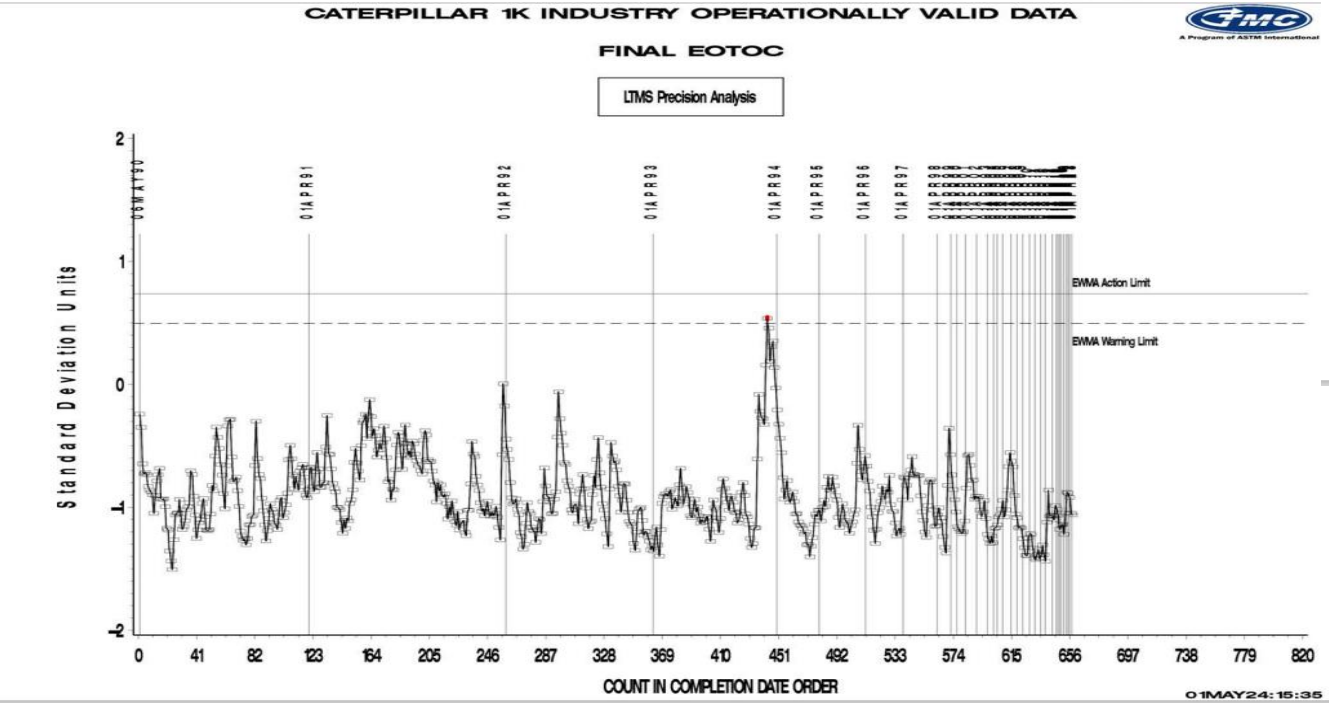


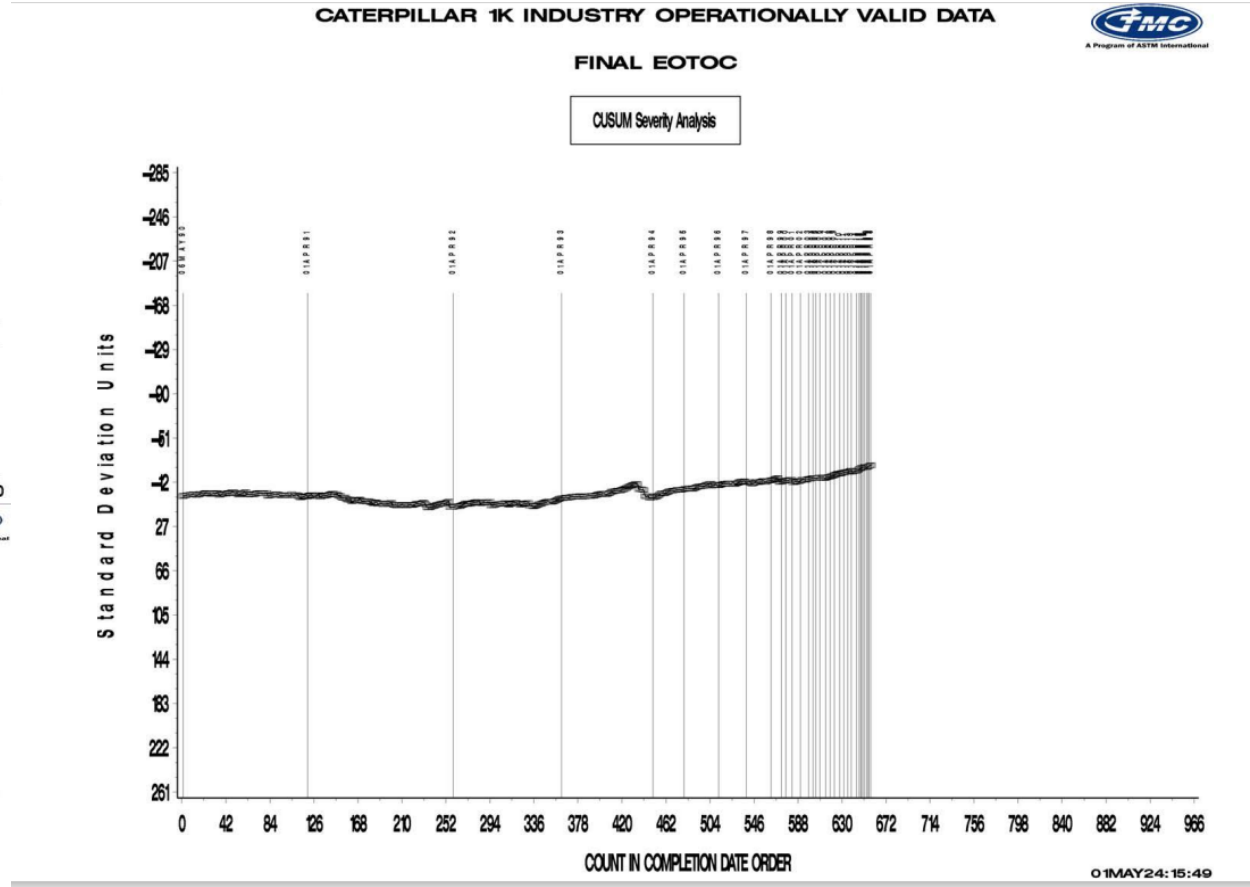




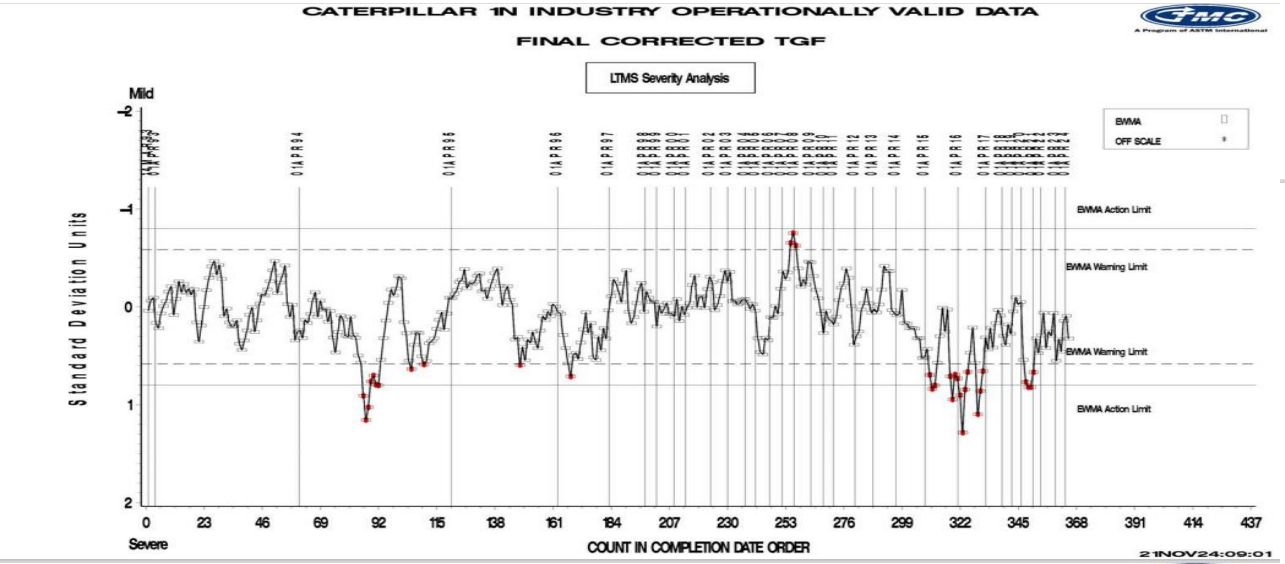
Caterpillar SCOTE 1k Charts- EOTOC

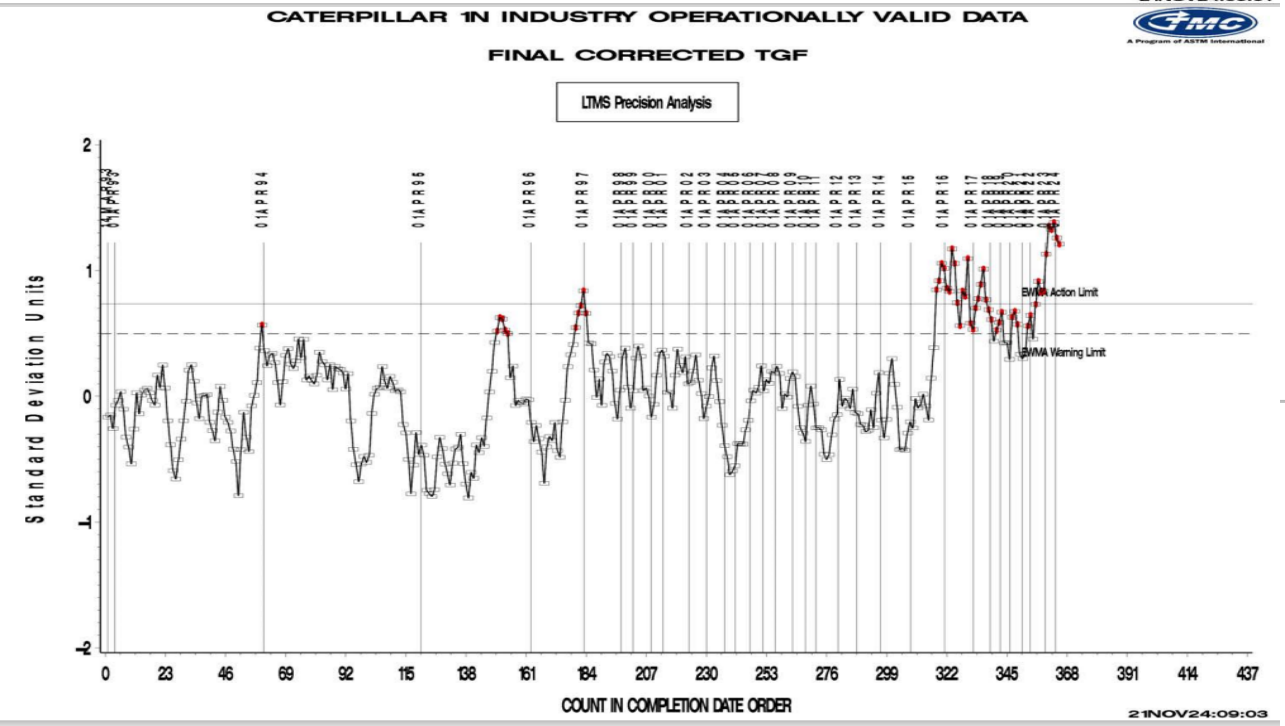


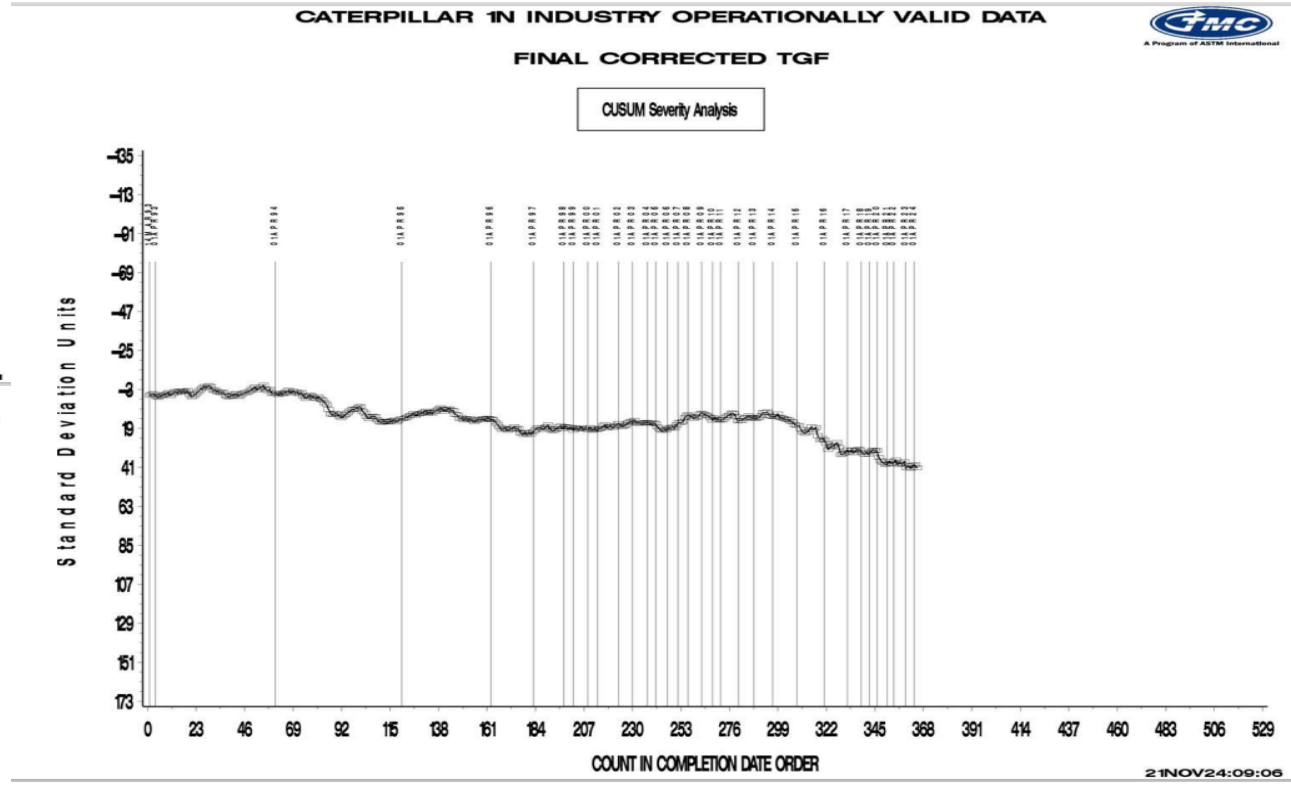




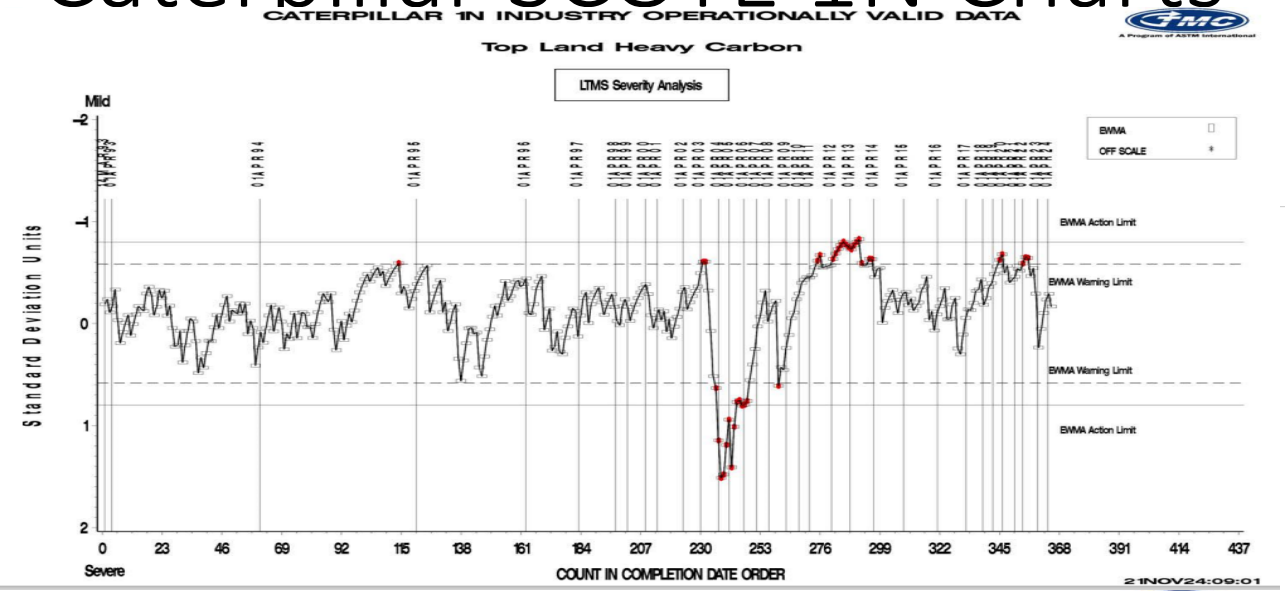
Caterpillar SCOTE 1N Charts- Final TGF

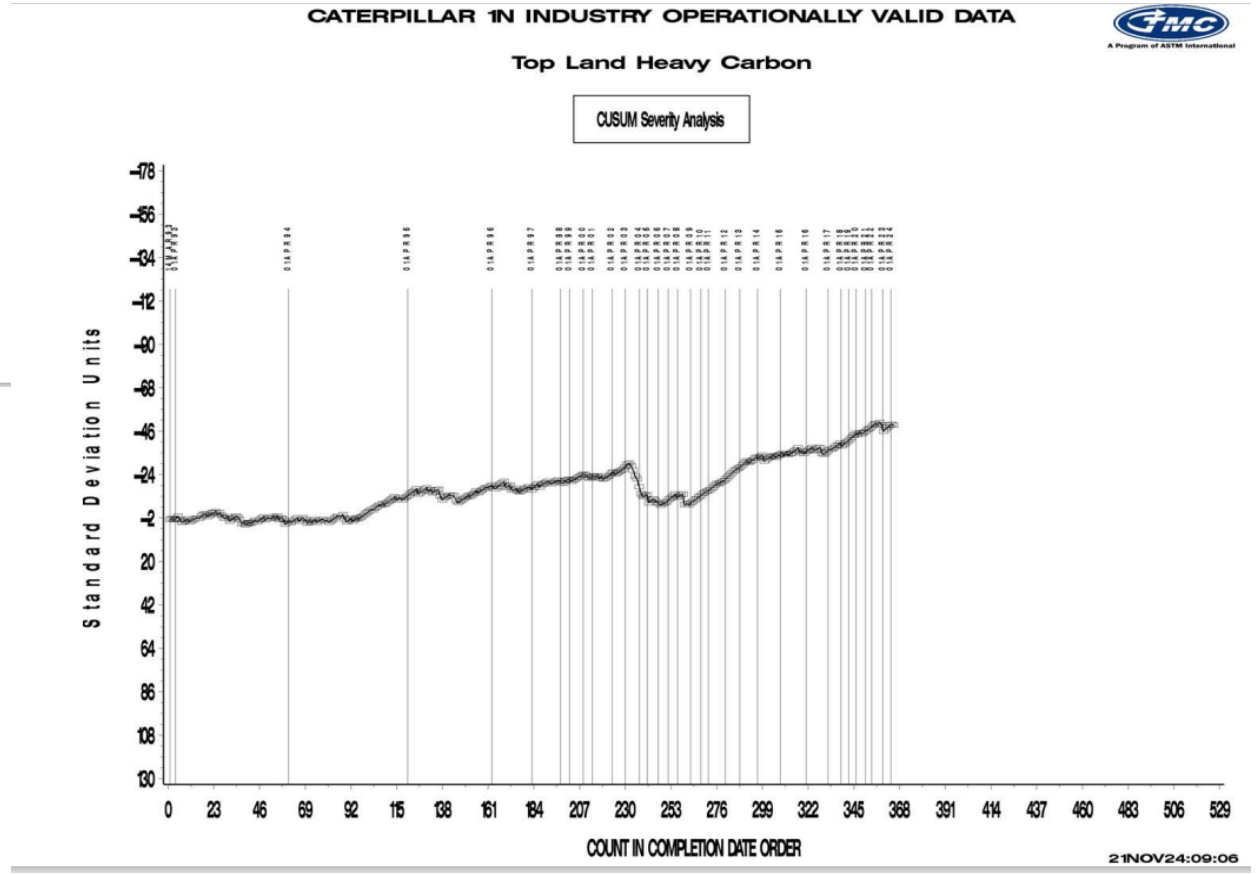


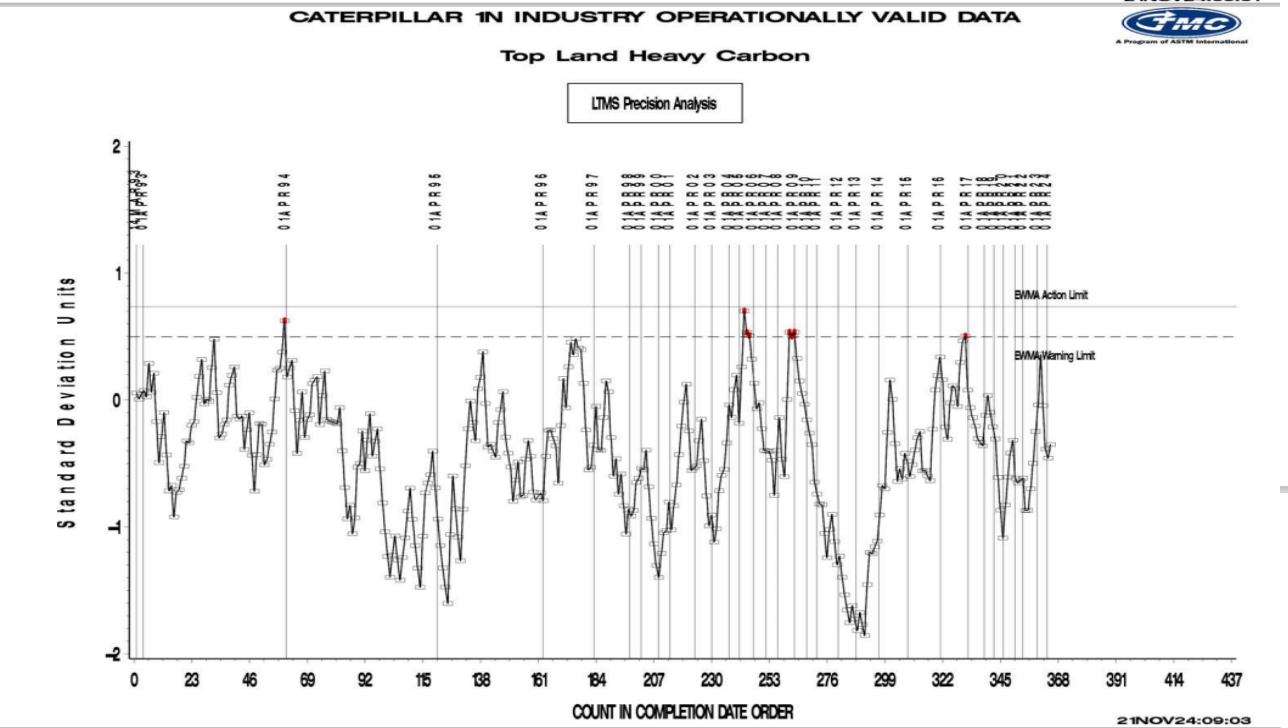




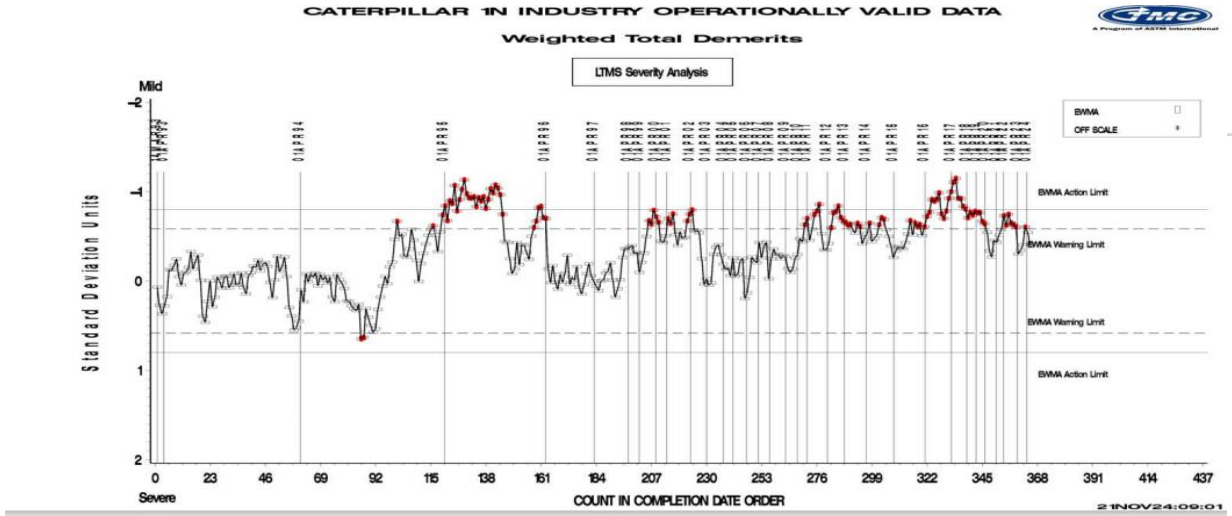
Caterpillar SCOTE 1N Charts- Top land Heavy Carbon

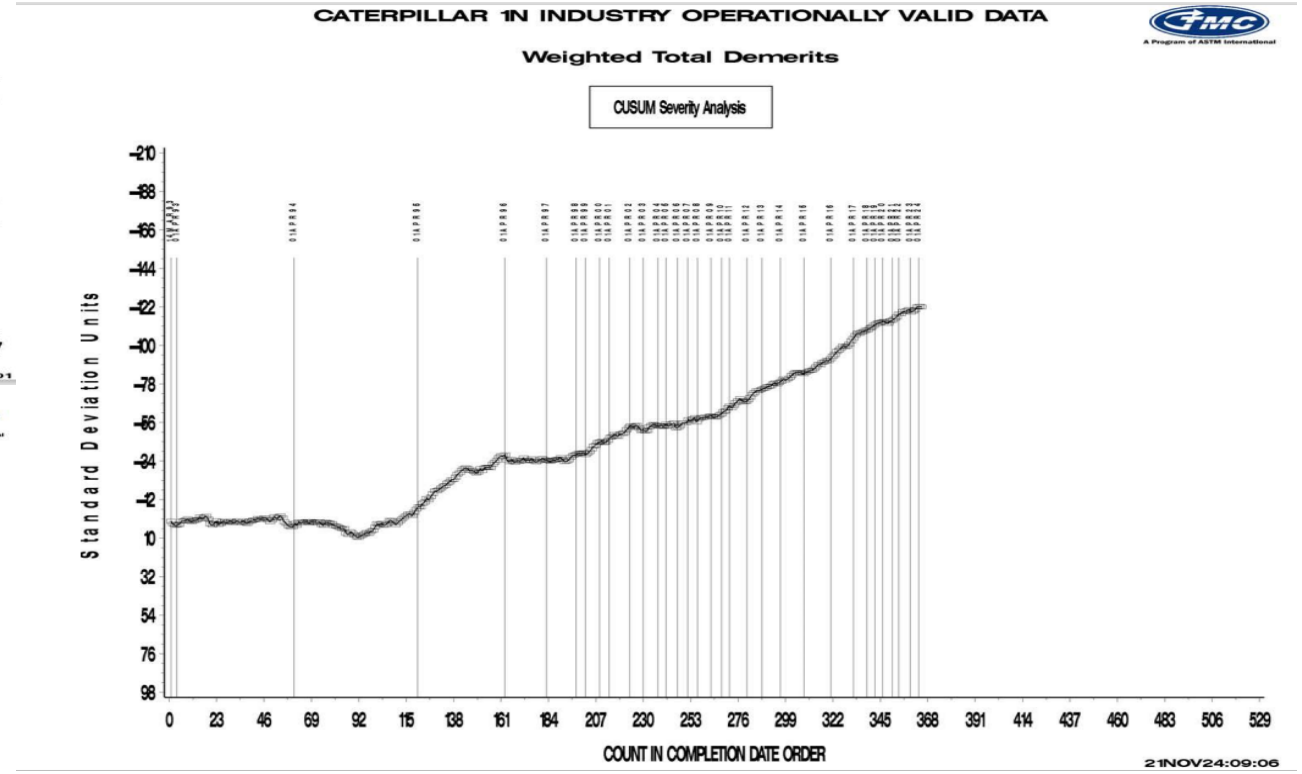


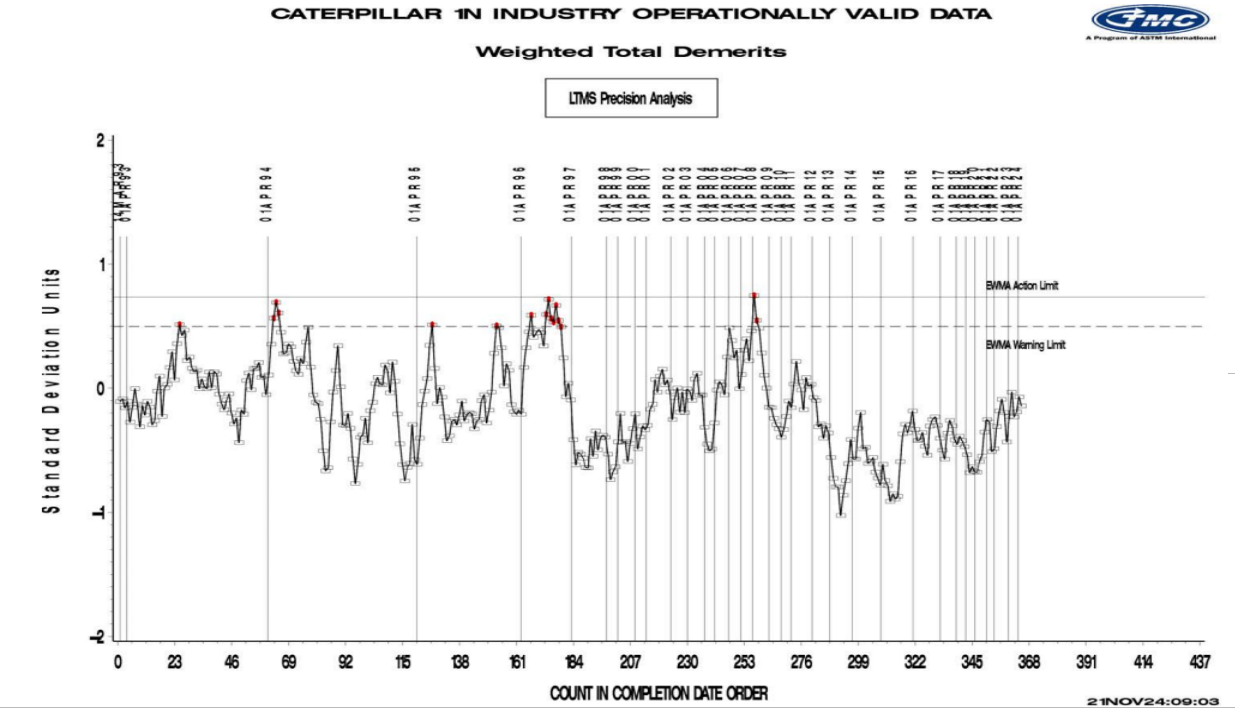




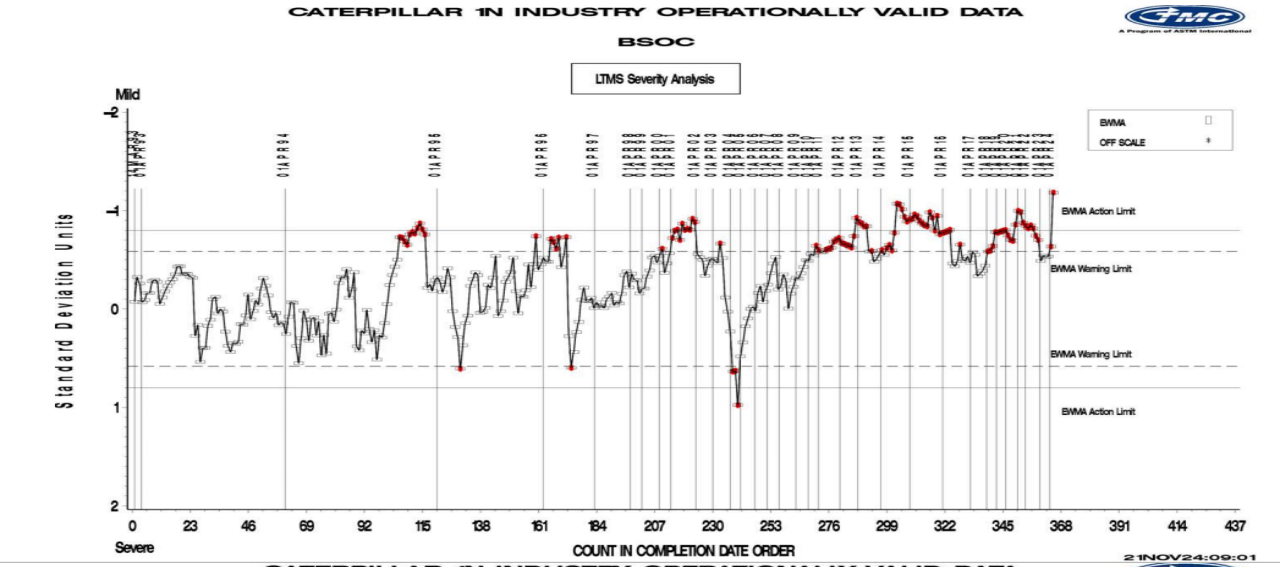
Caterpillar SCOTE 1N Charts- Final Weighted Total Demerits

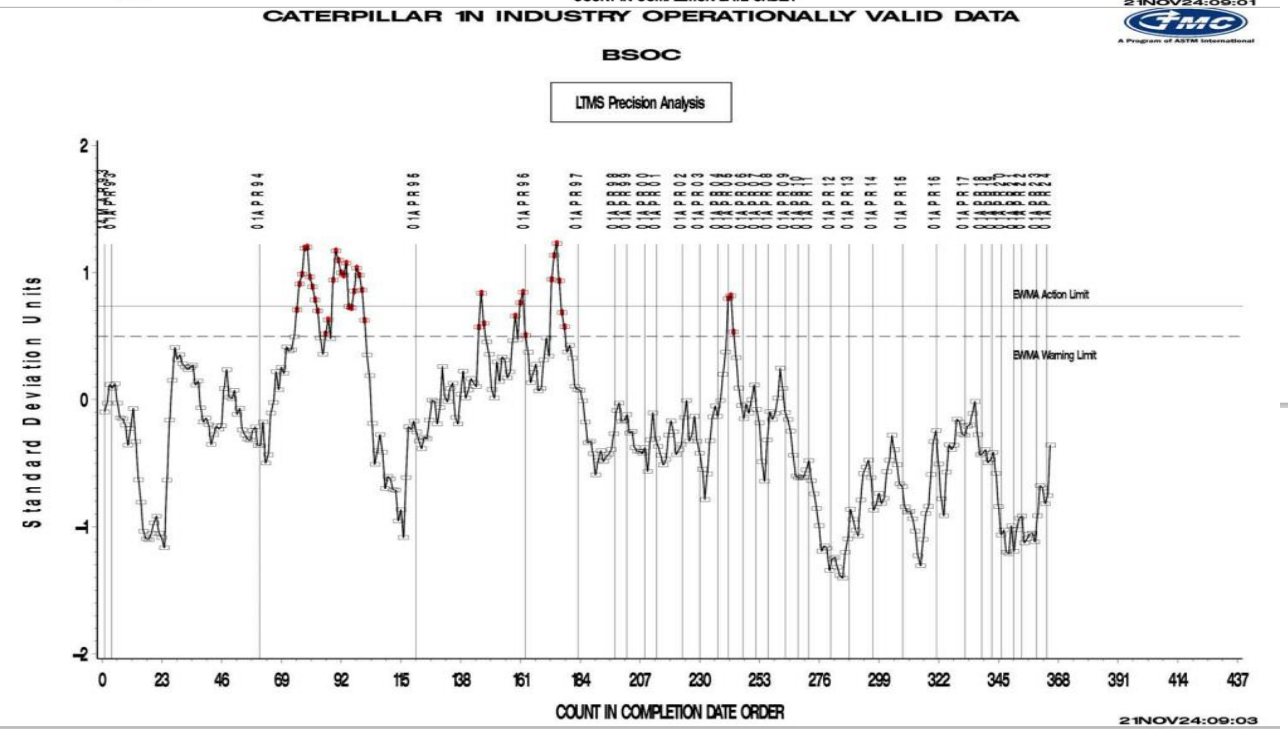


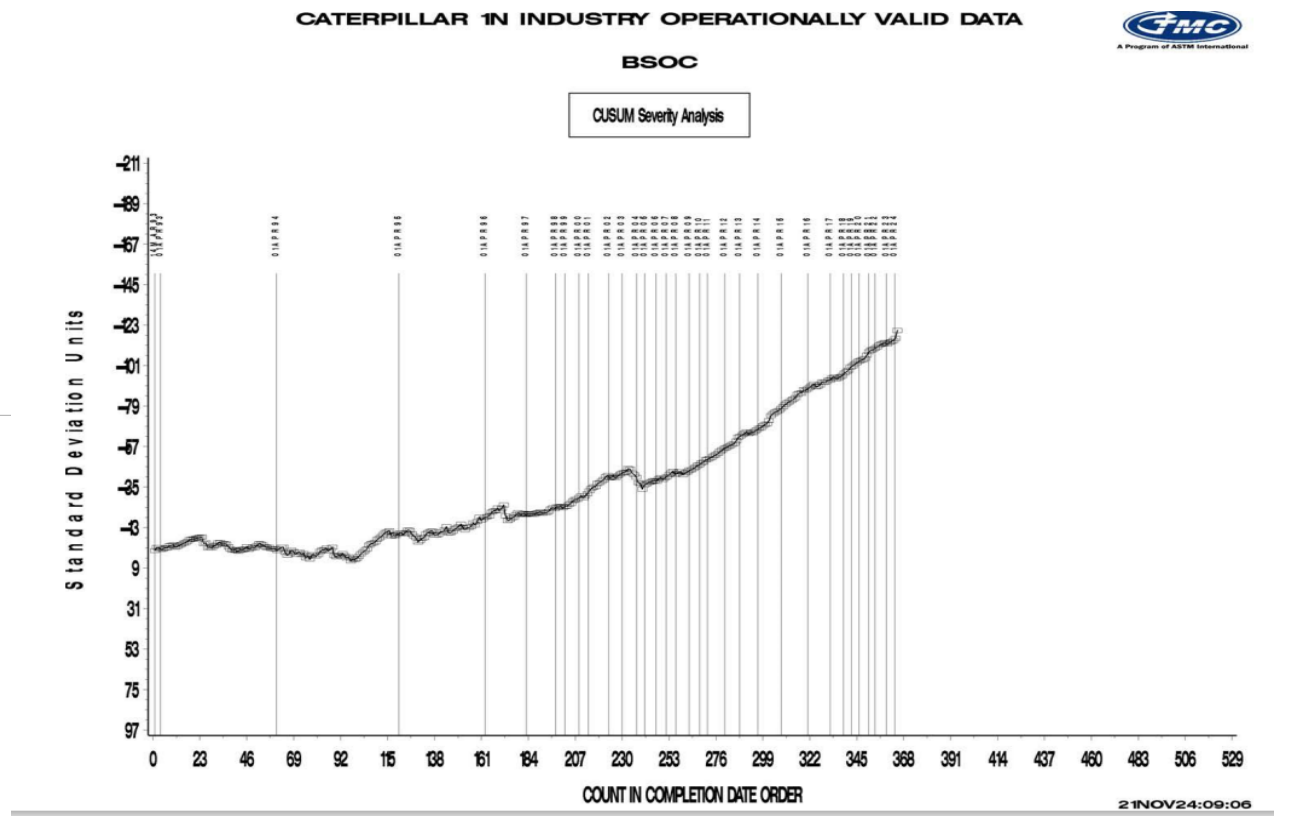




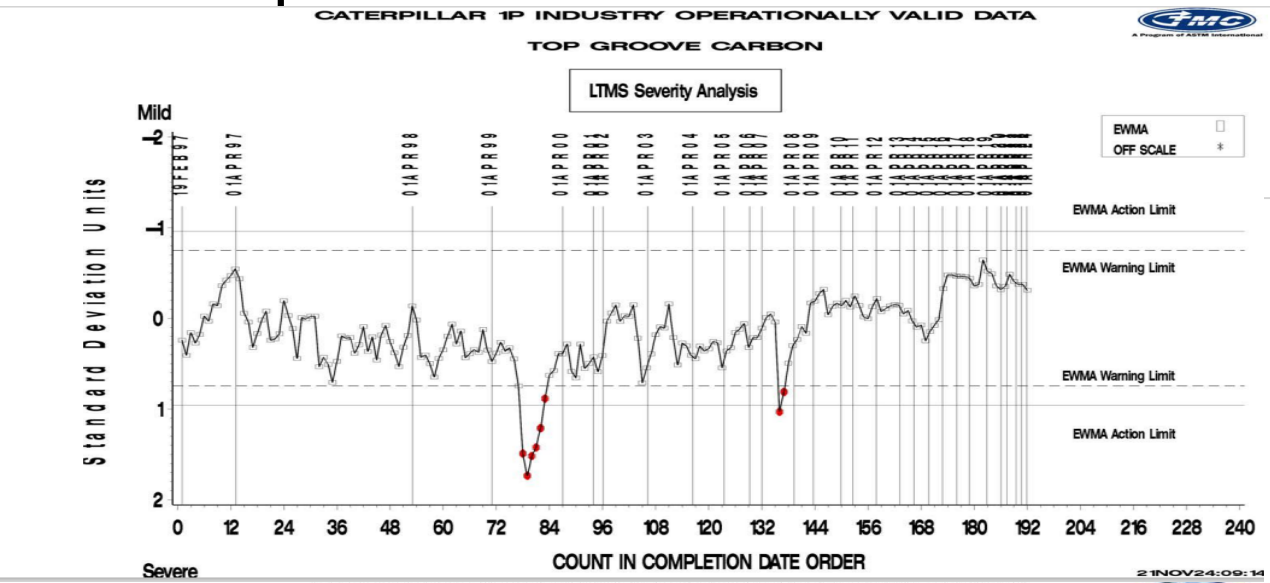
Caterpillar SCOTE 1N Charts- Final BSOC

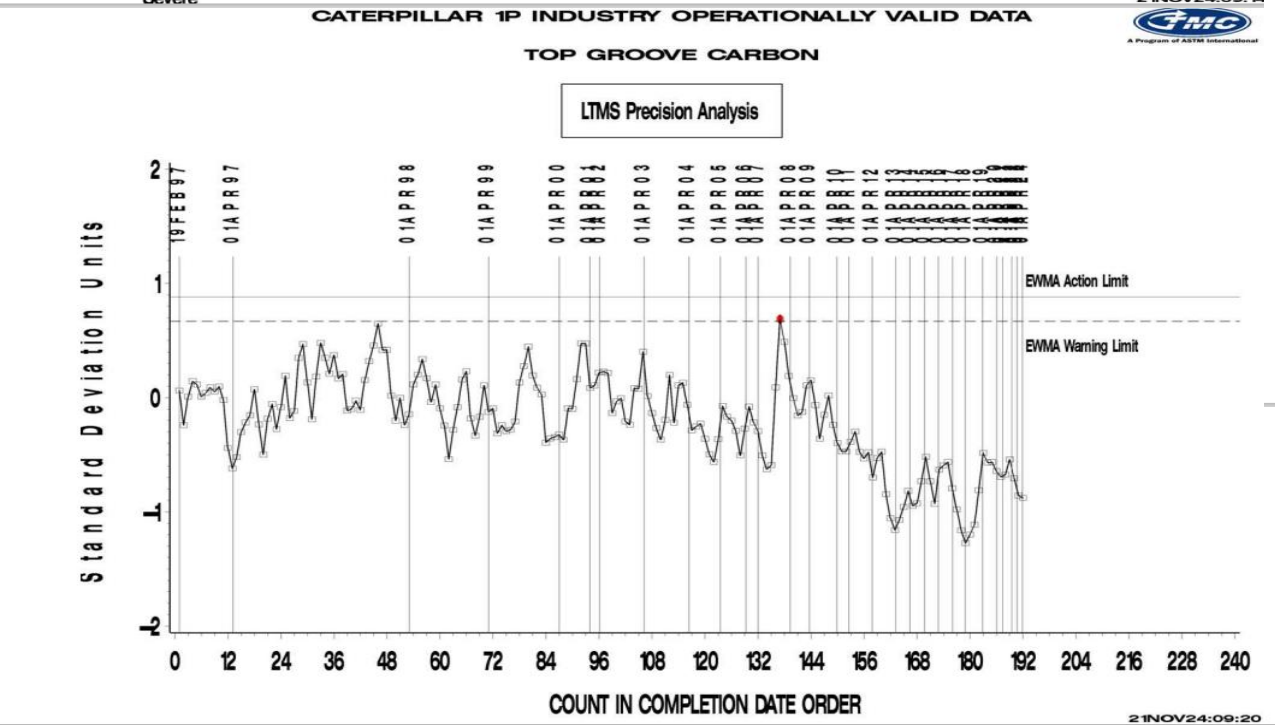


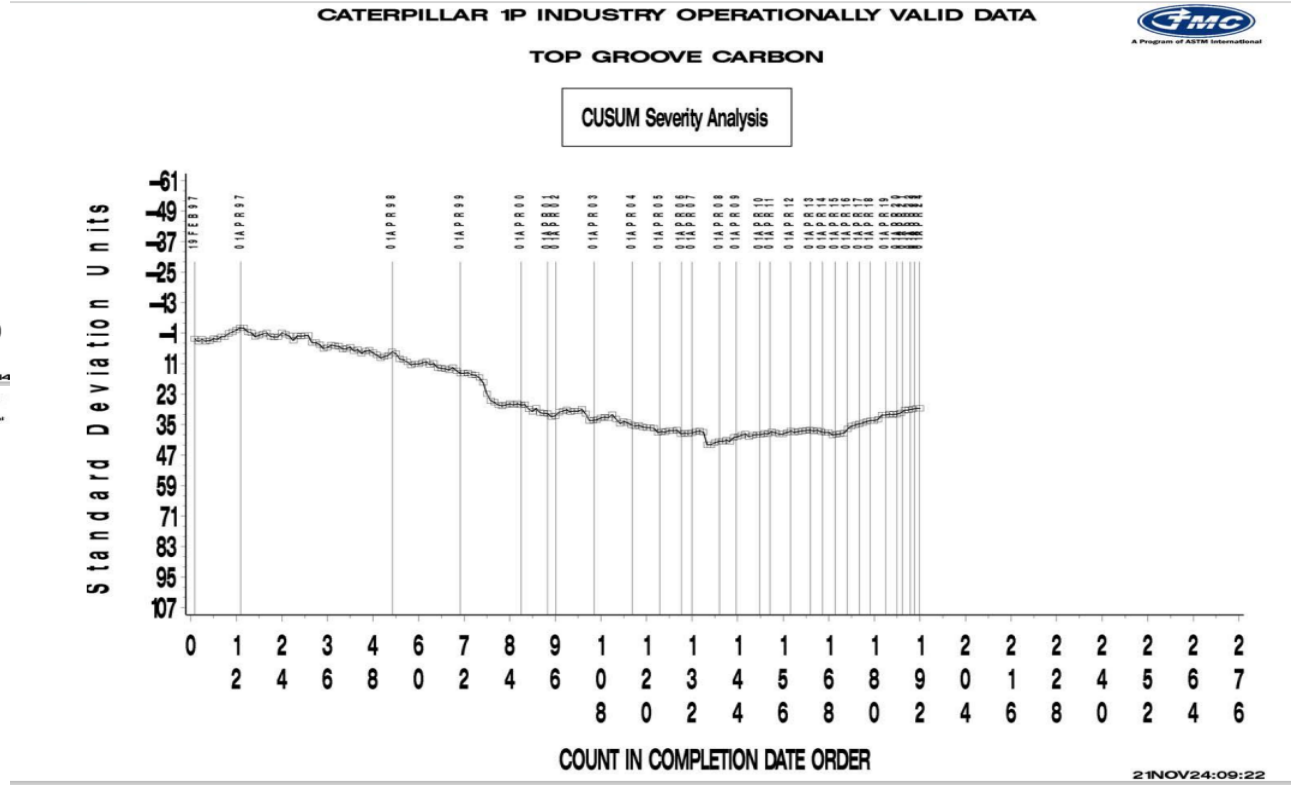




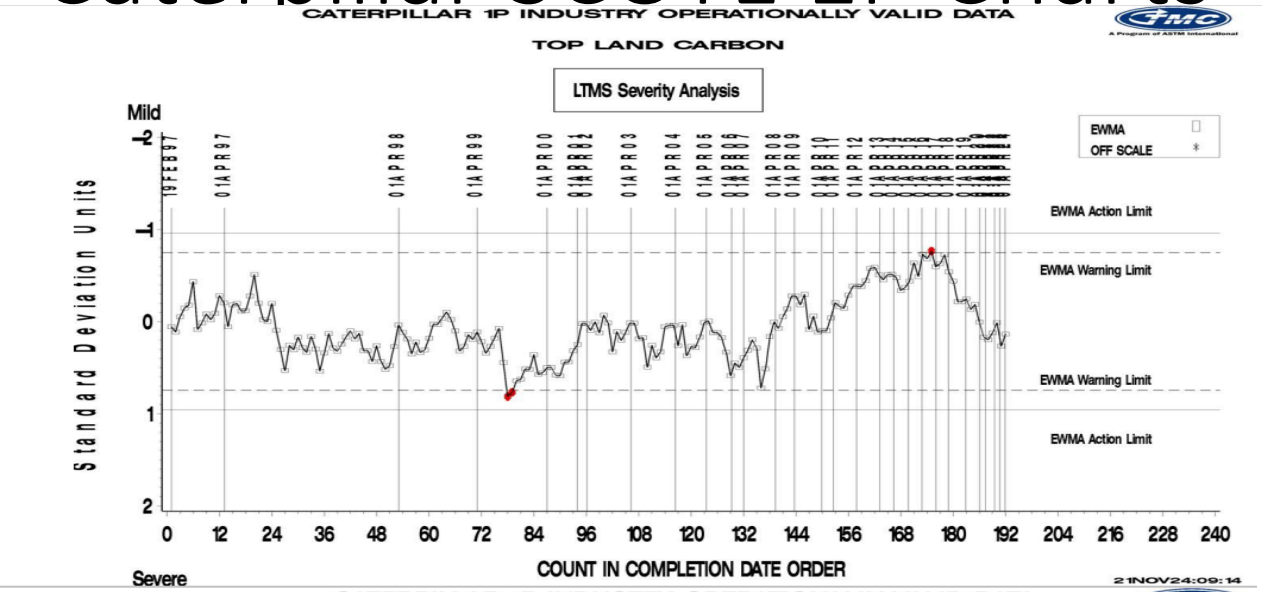
Caterpillar SCOTE 1P Charts- Top Groove Carbon

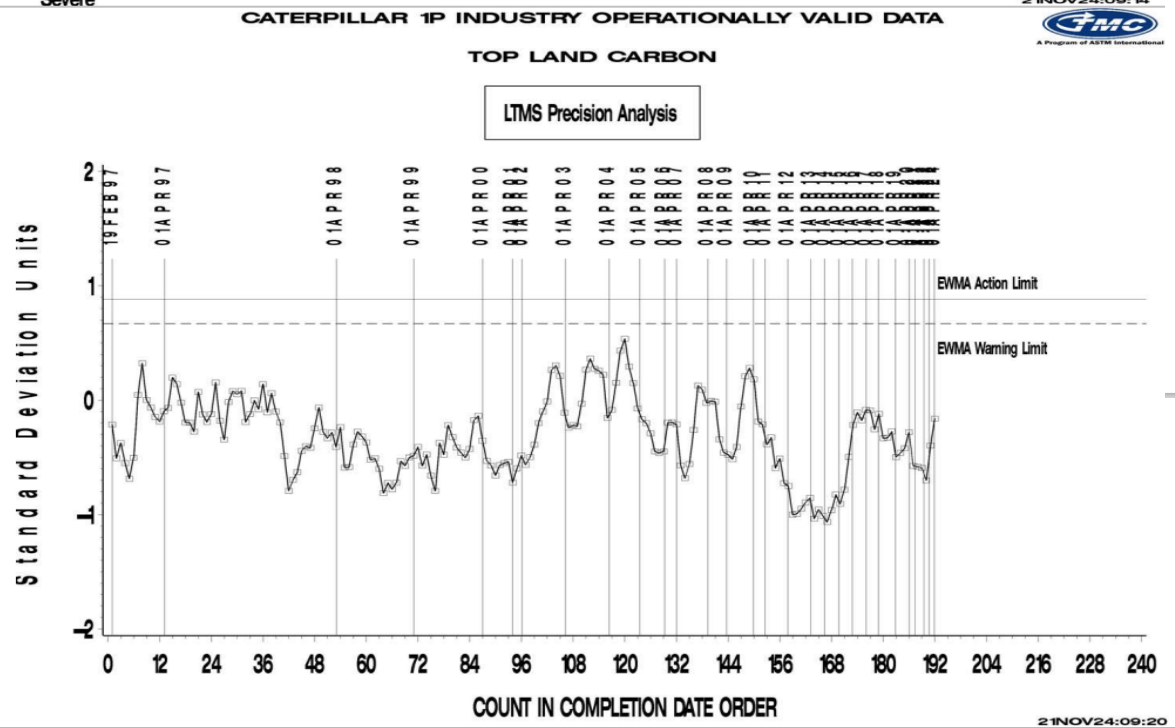


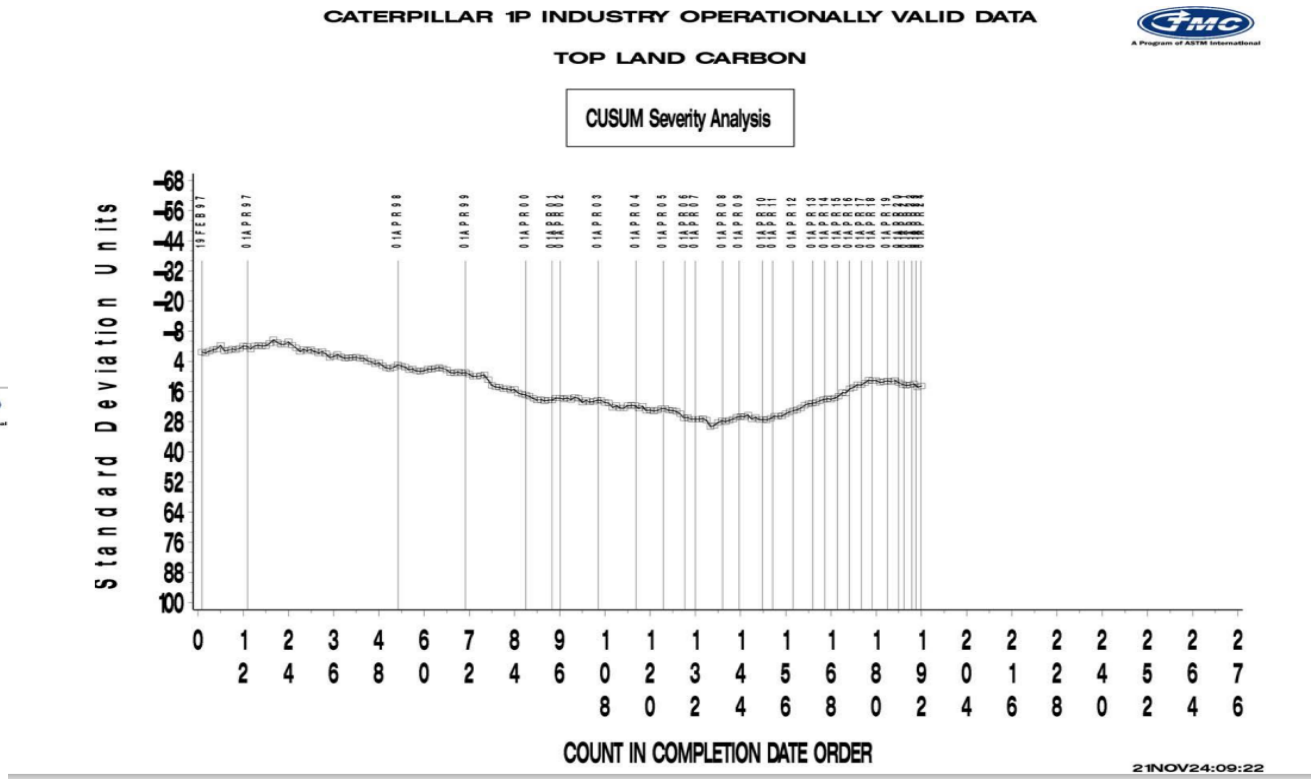




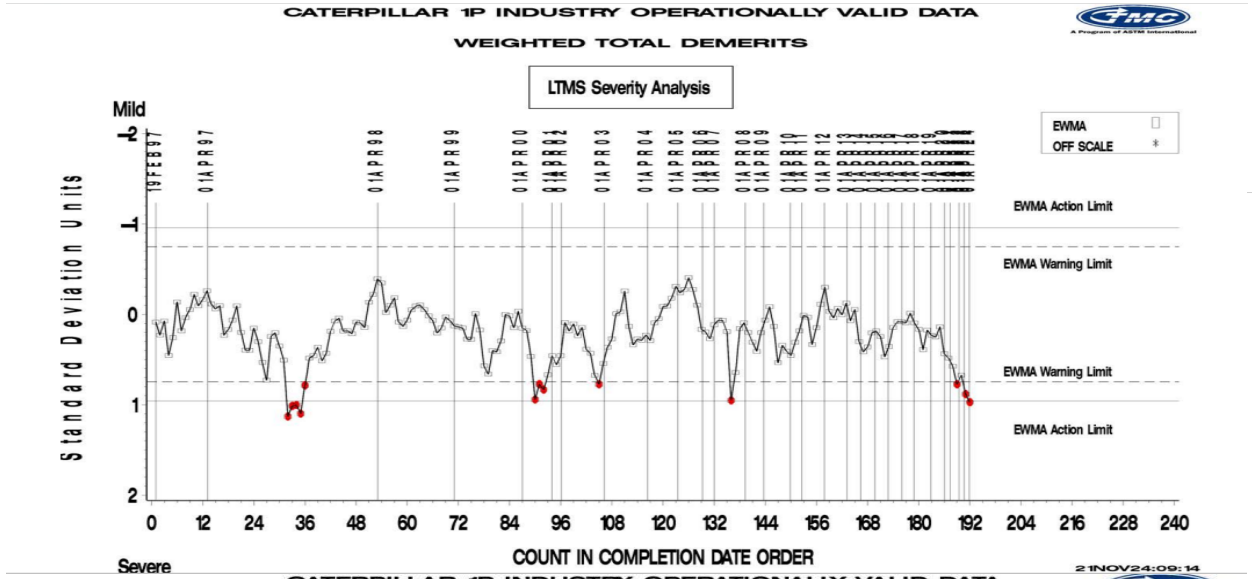
Caterpillar SCOTE 1P Charts- Top Land Carbon

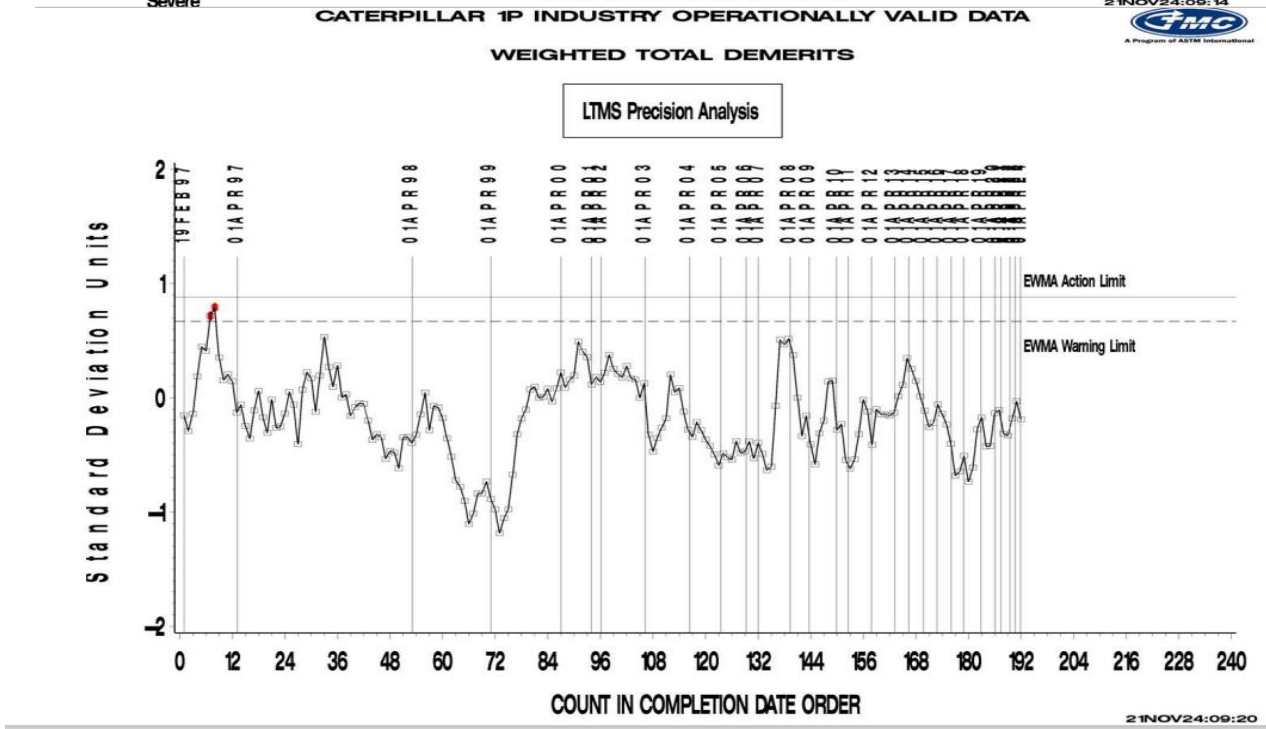


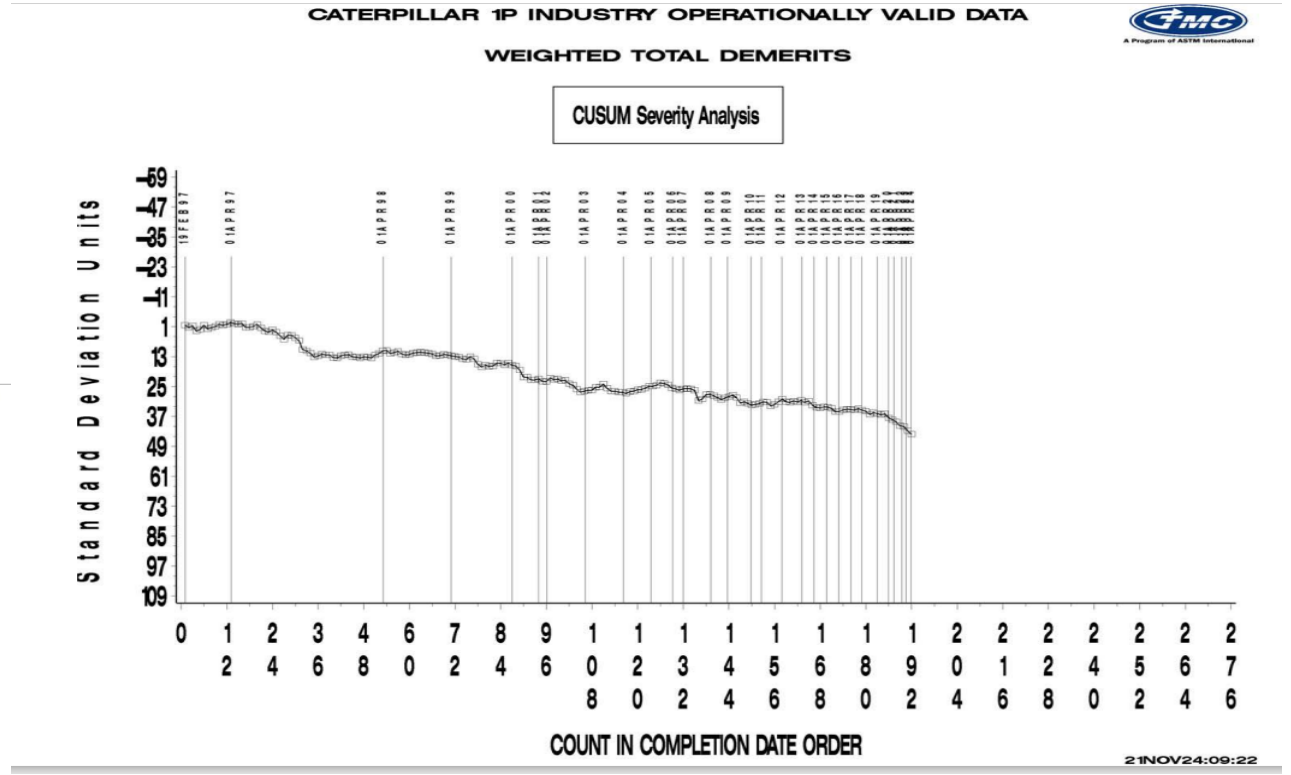




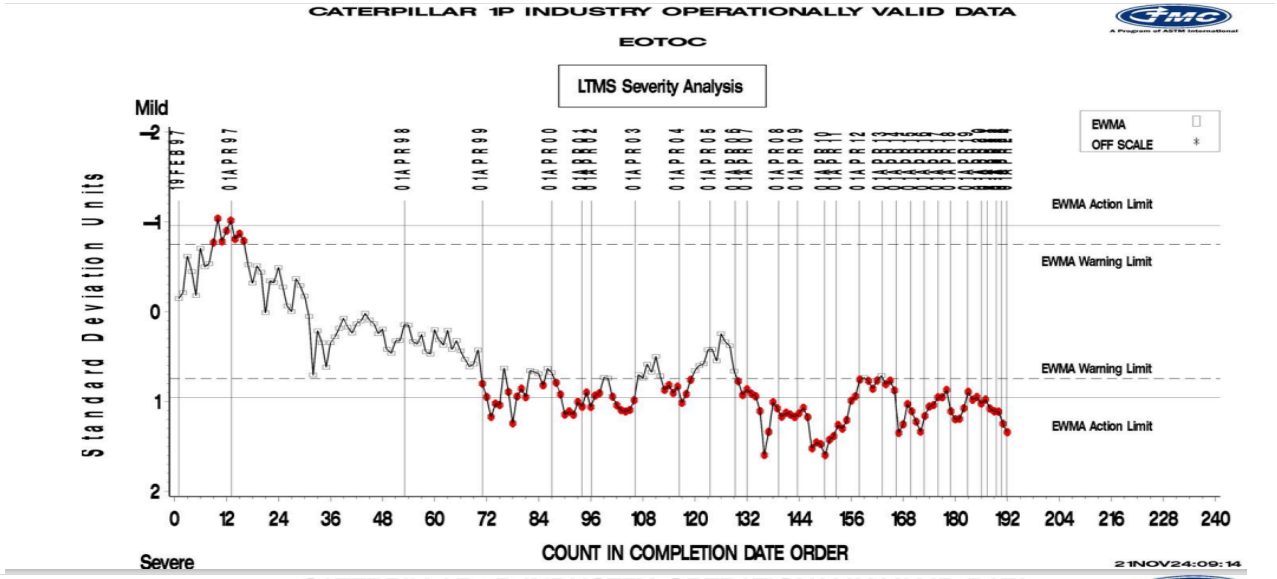
Caterpillar SCOTE 1P Charts- Weighted Total Demerits

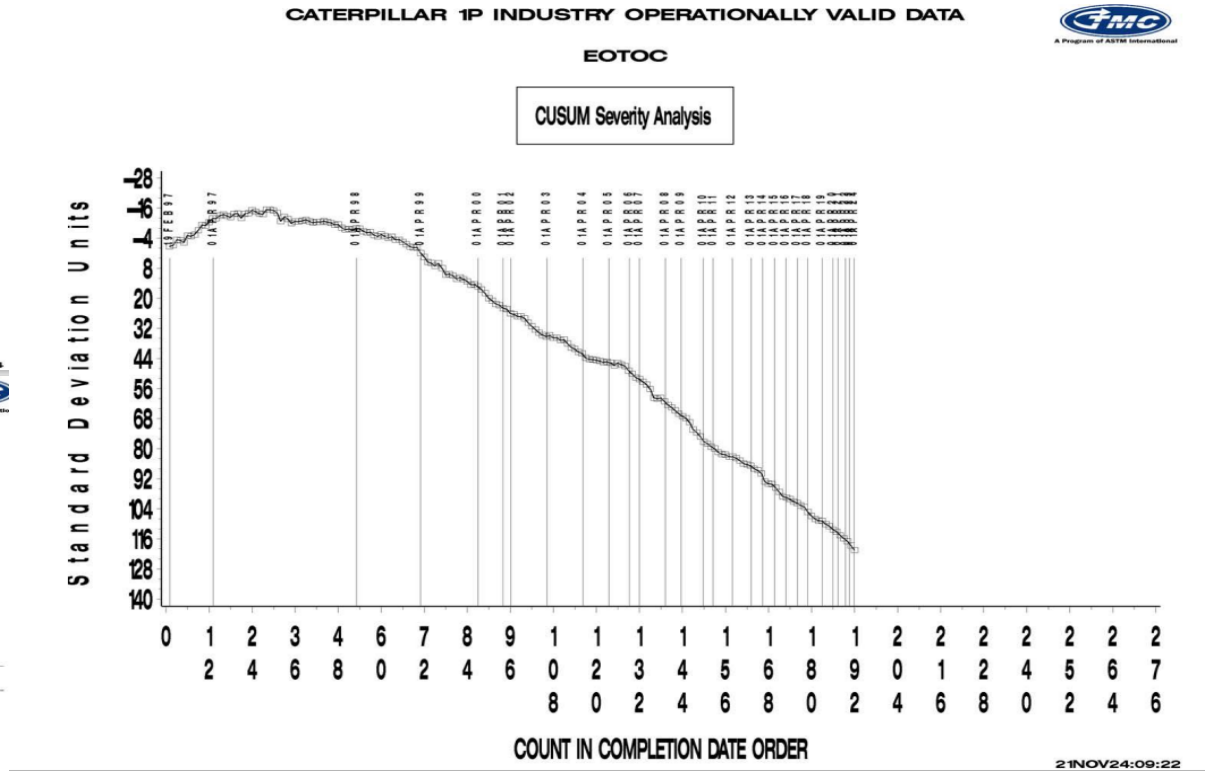


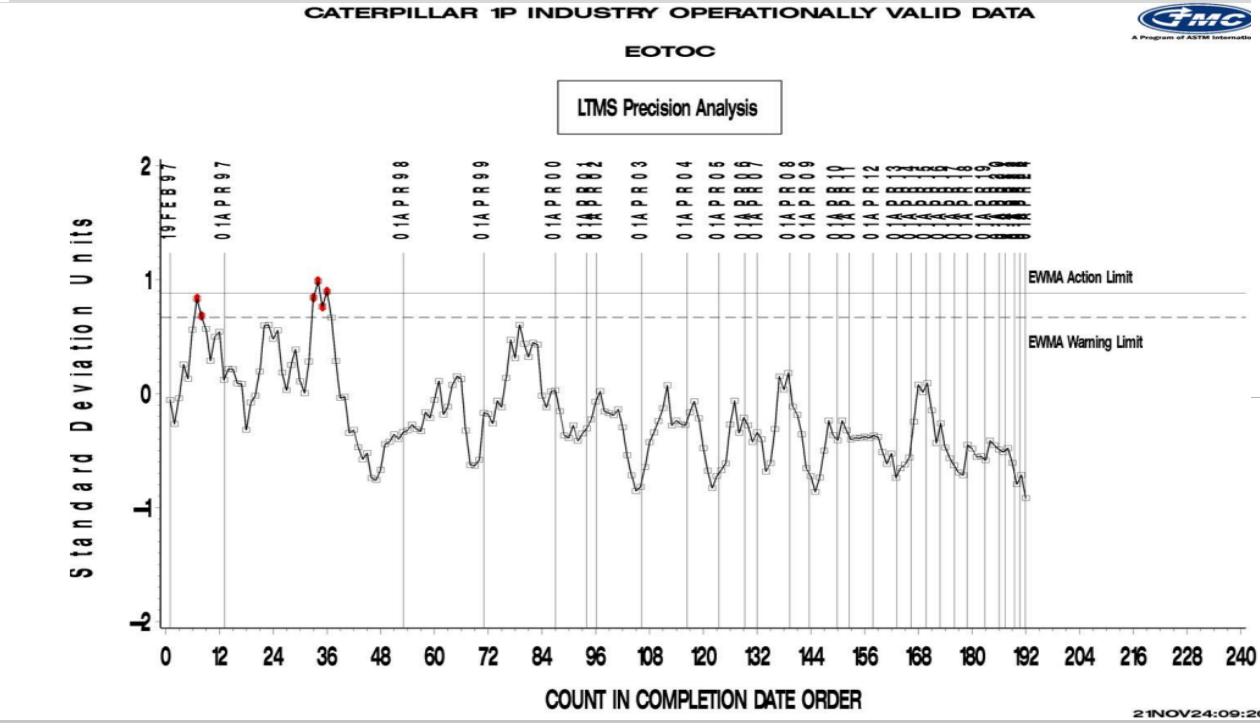




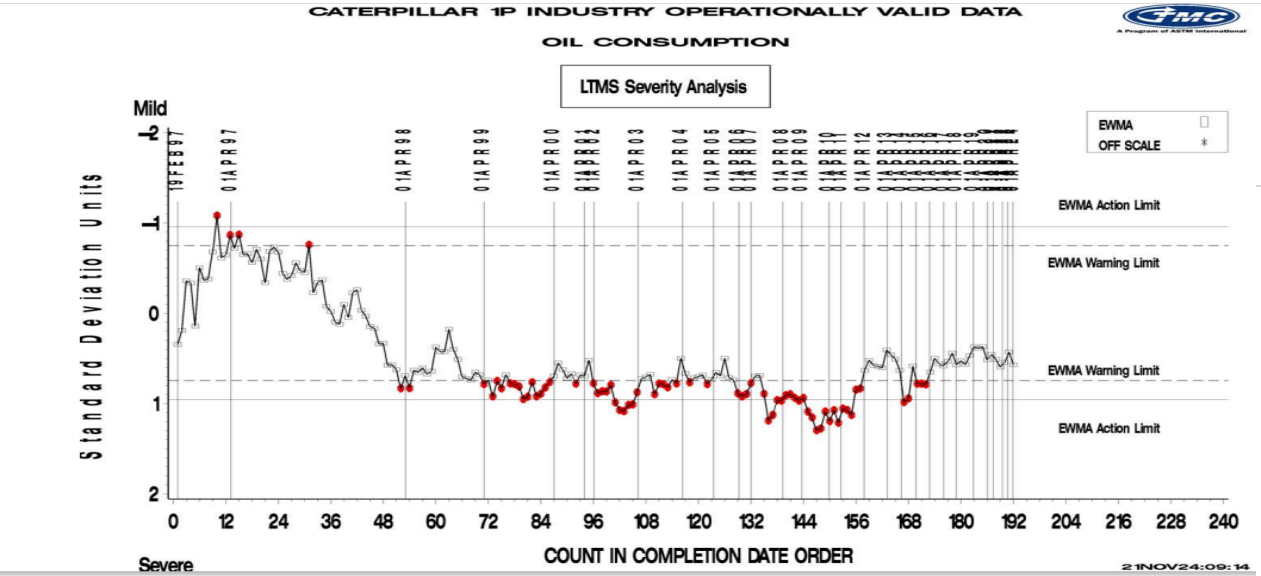
Caterpillar SCOTE 1P Charts- EOTOC

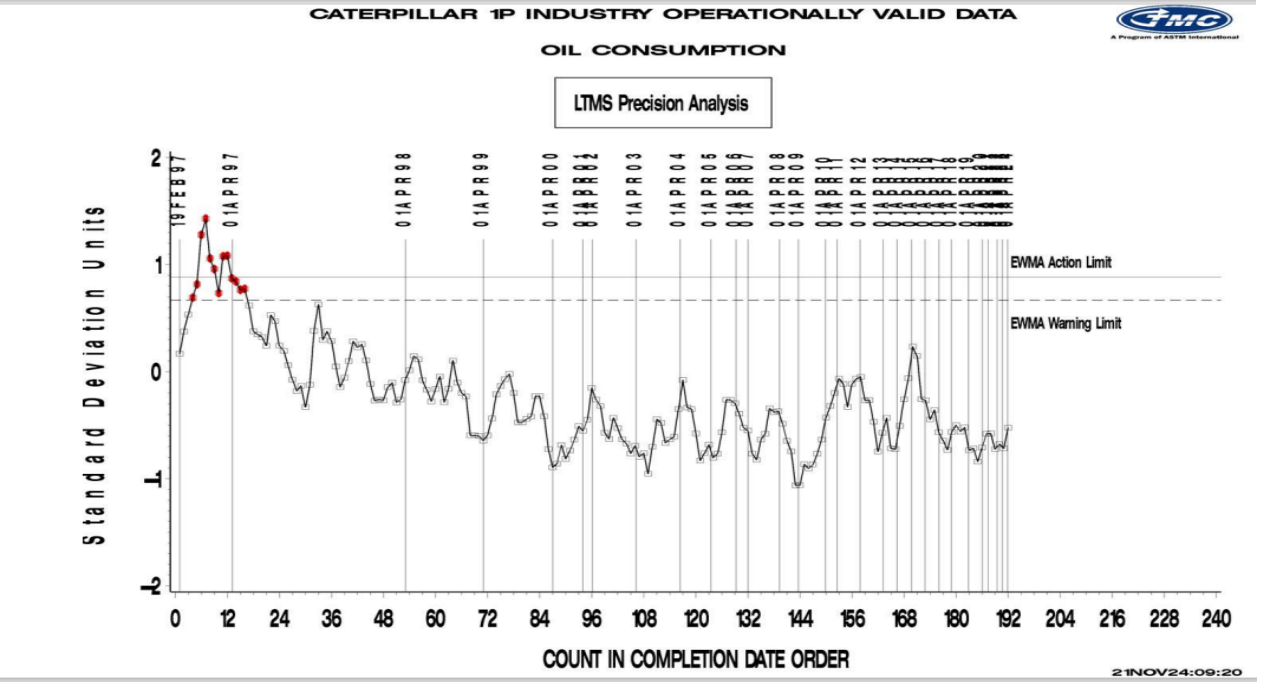


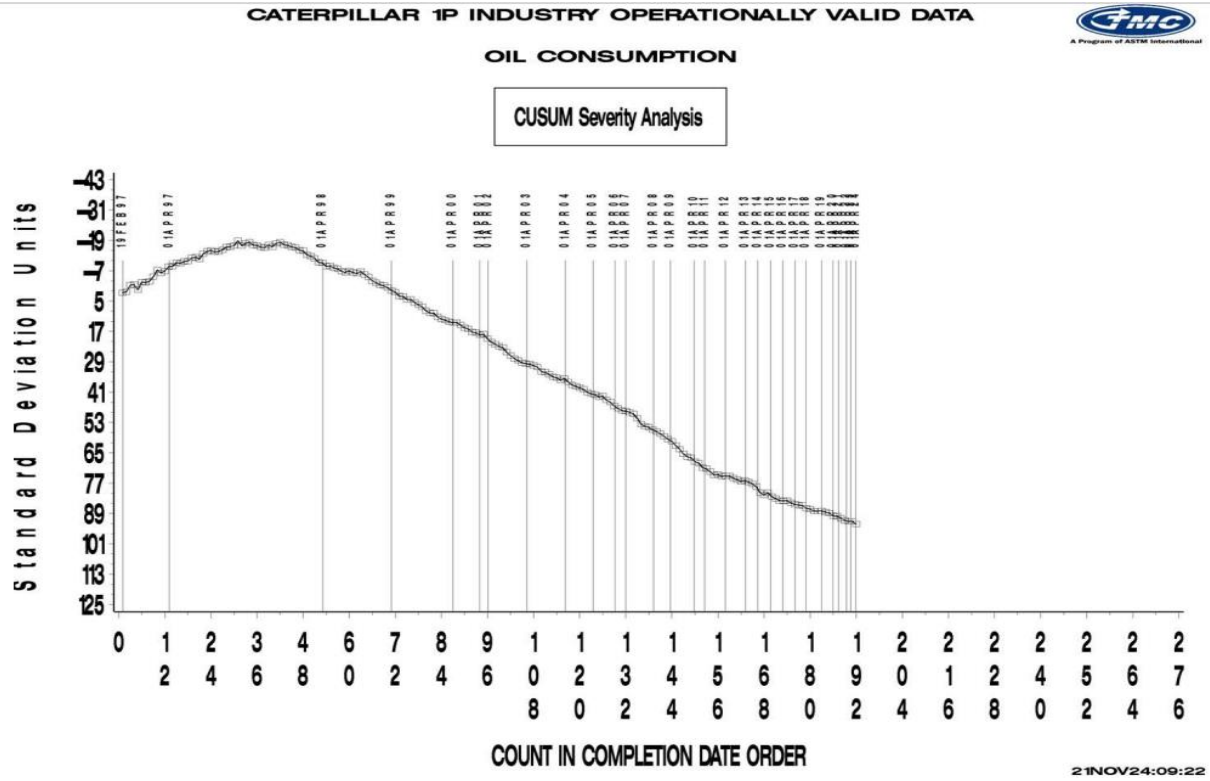




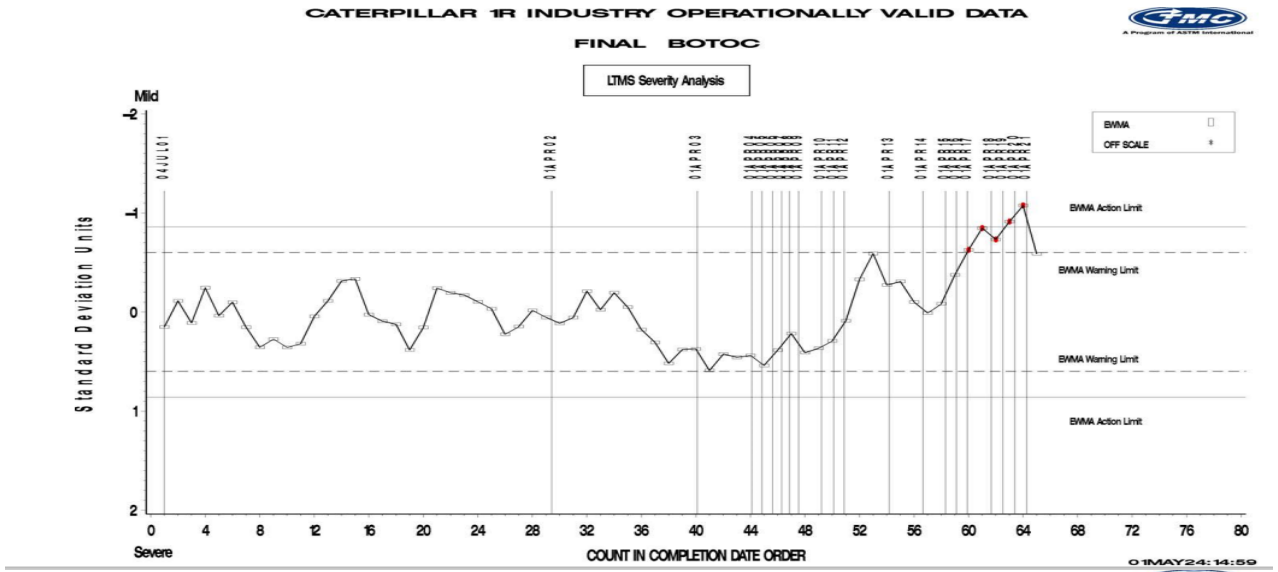
Caterpillar SCOTE 1P Charts- Oil Consumption

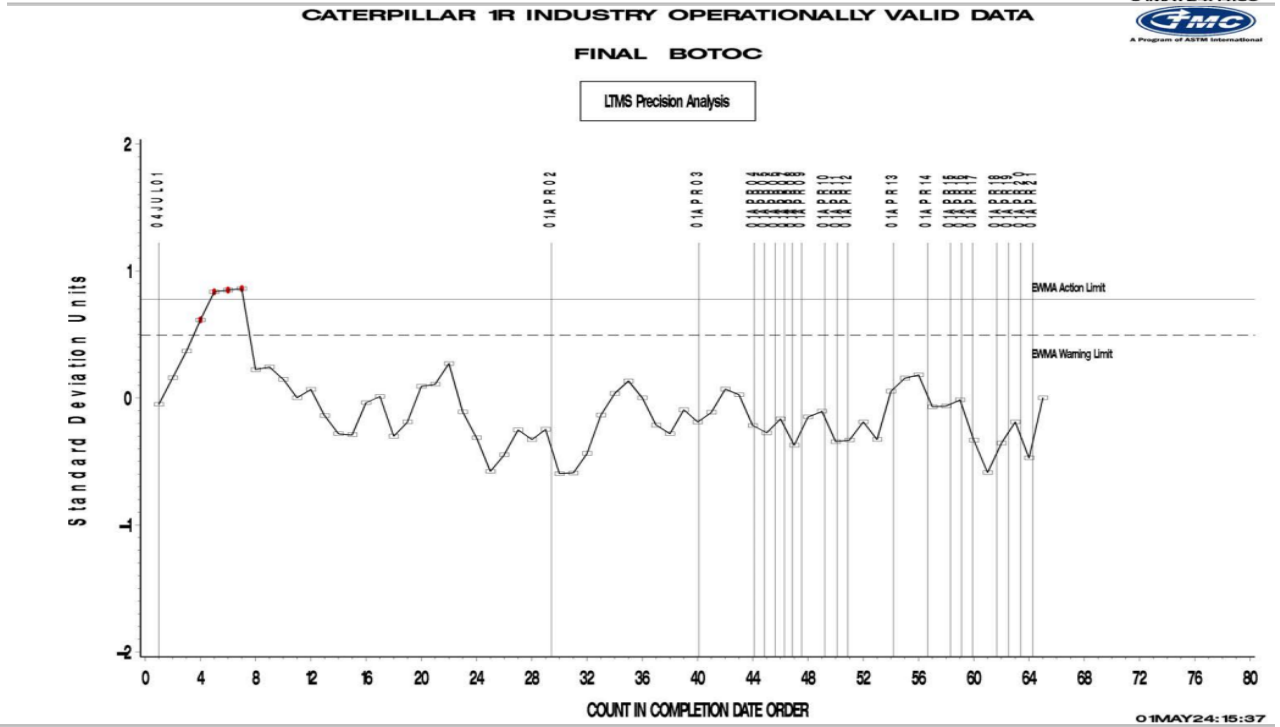


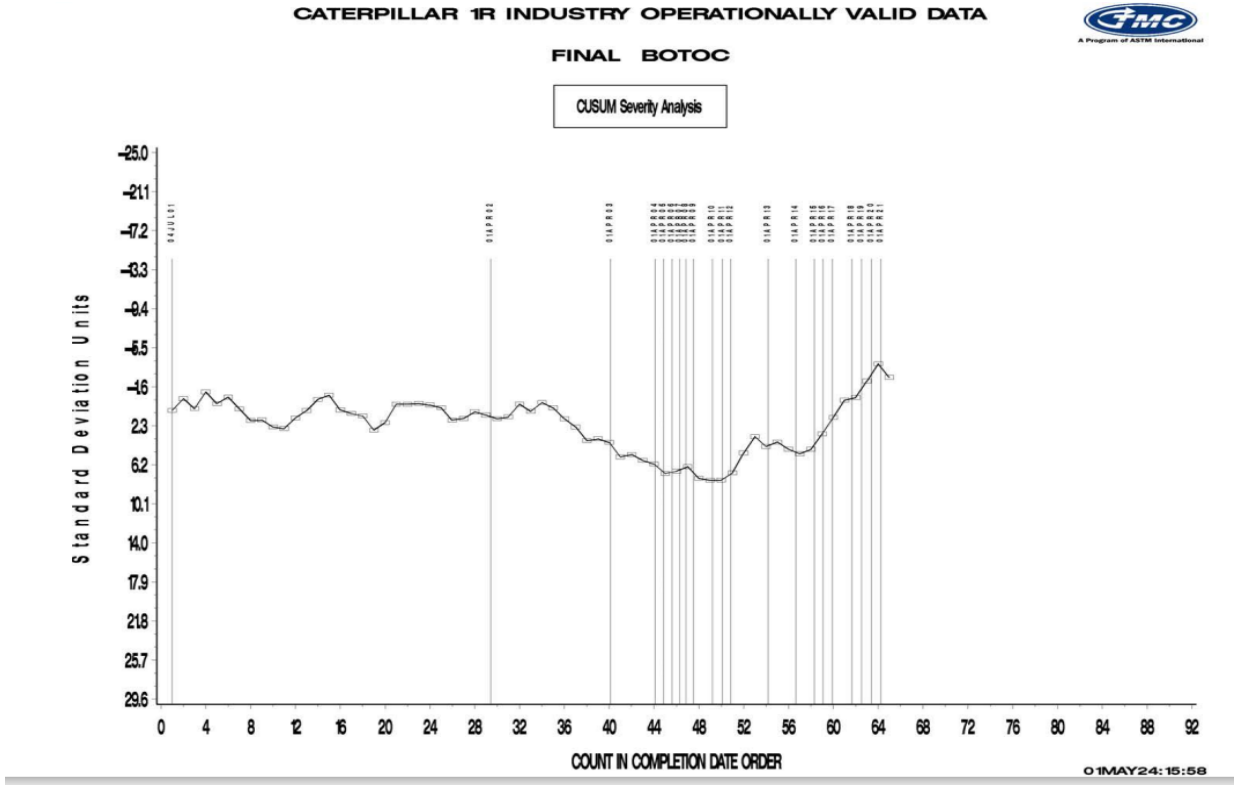




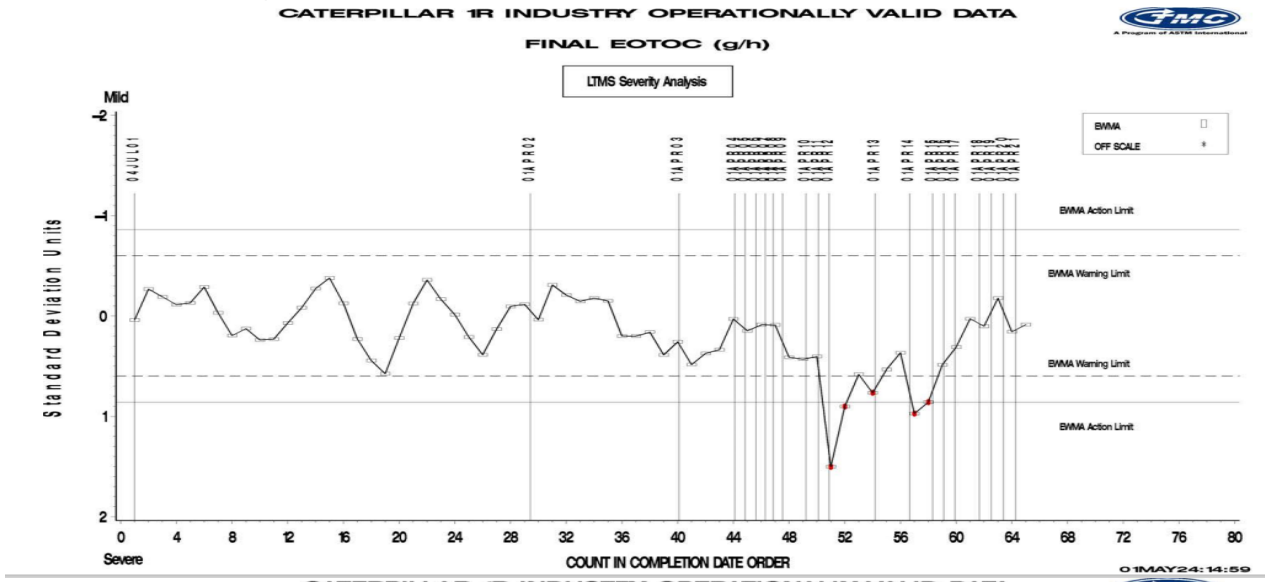
Caterpillar SCOTE 1R Charts- BOTOC

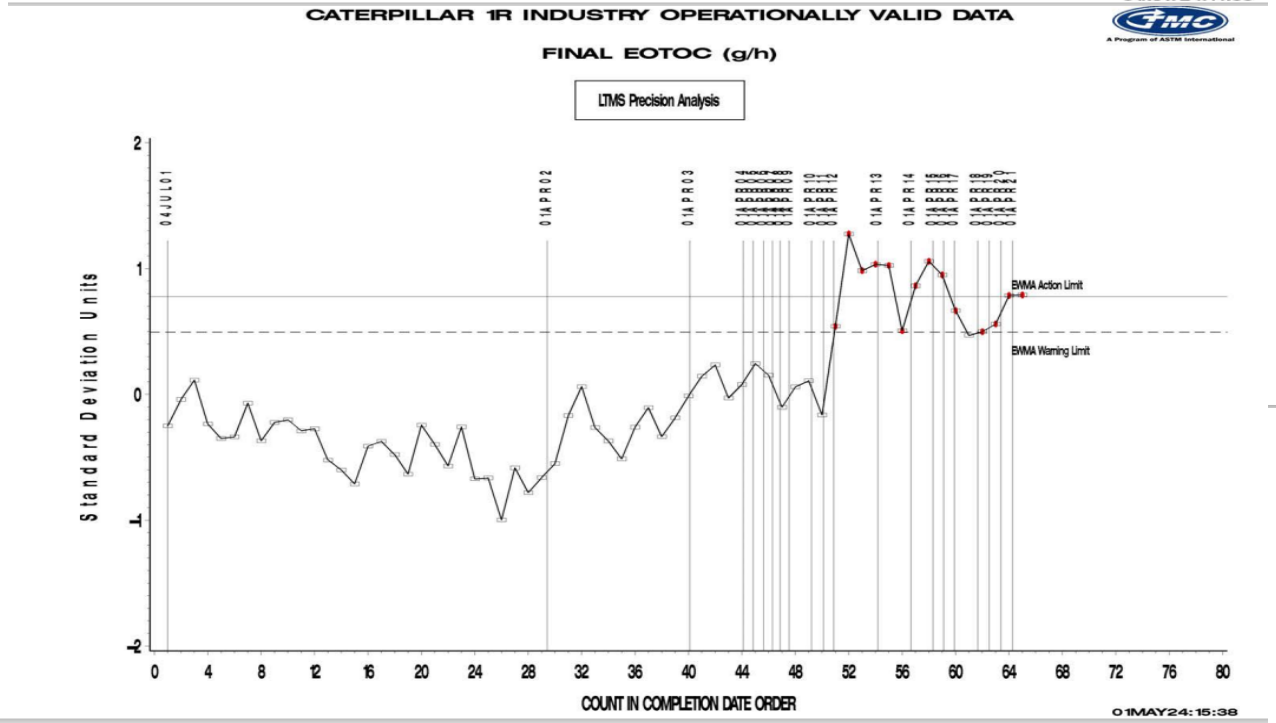


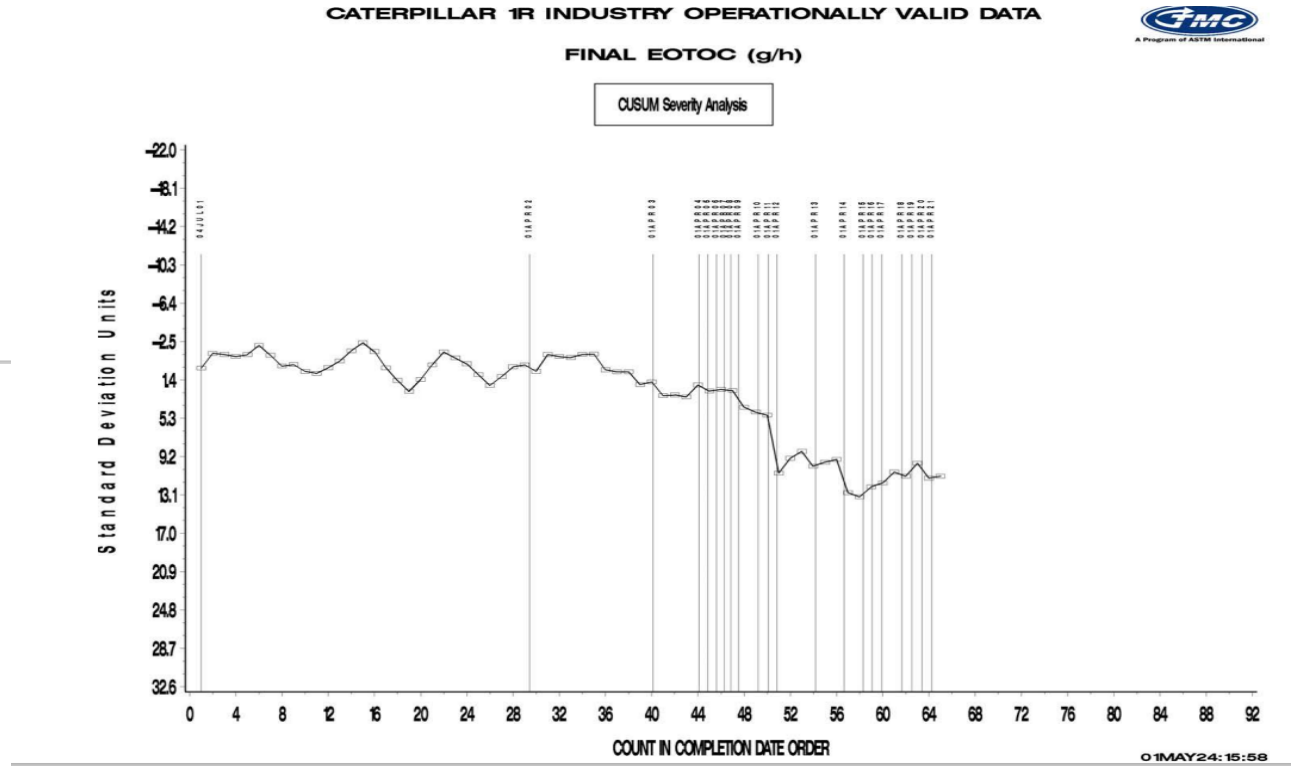




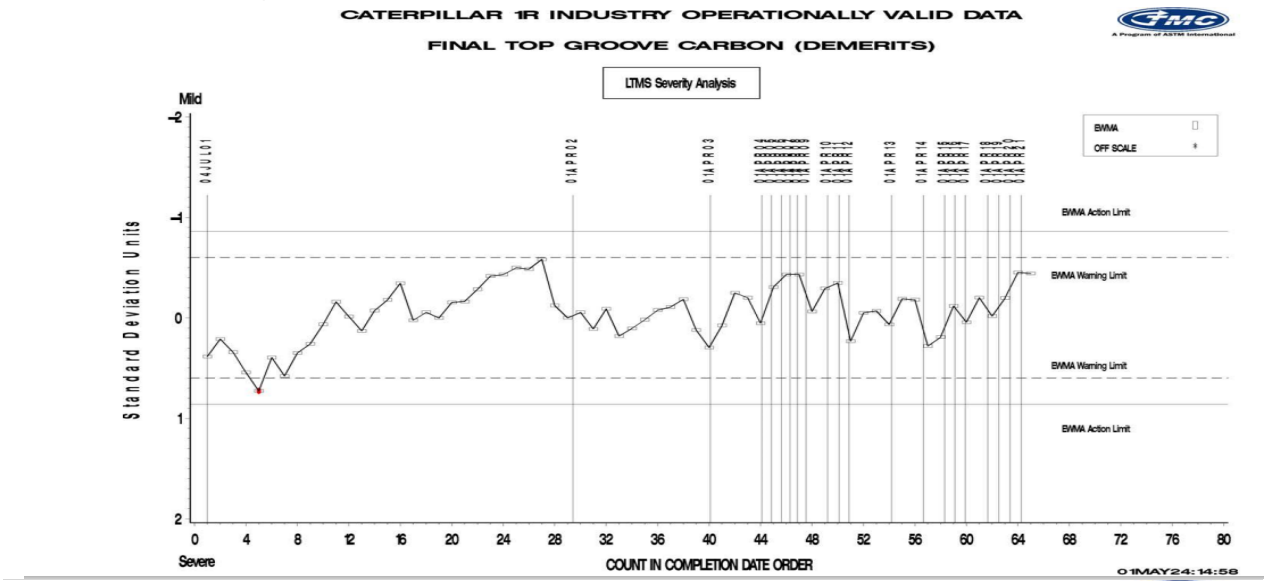
Caterpillar SCOTE 1R Charts- EOTOC

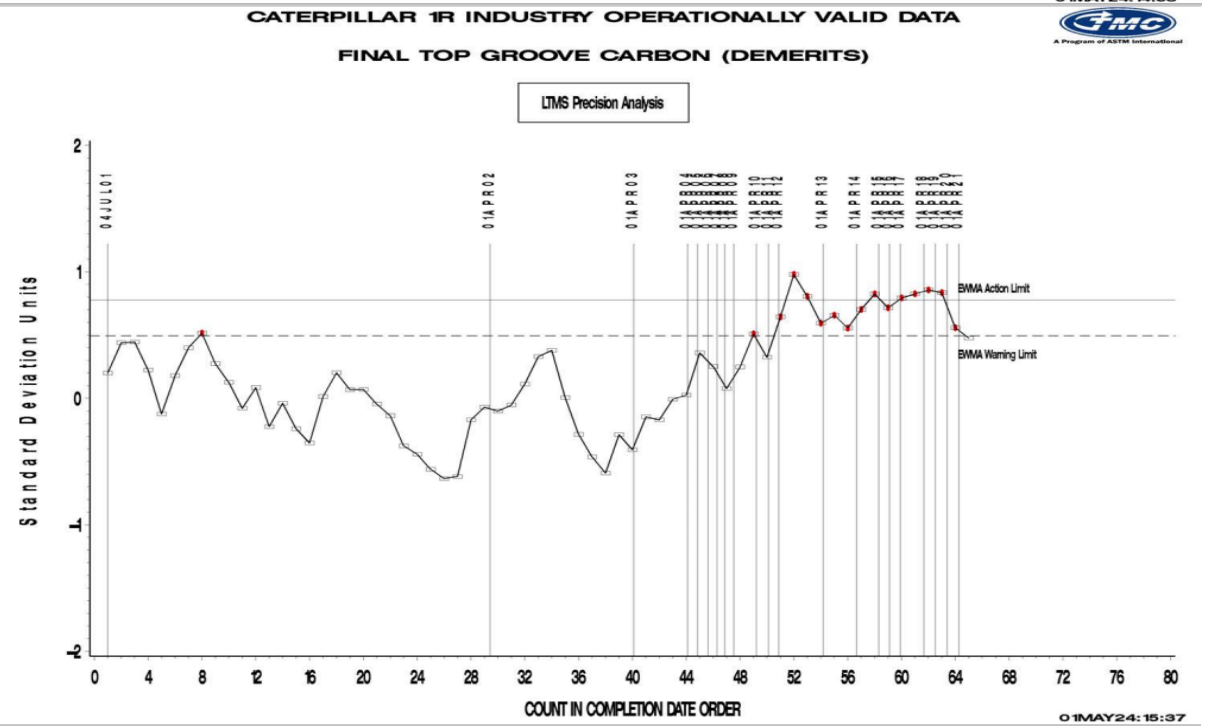


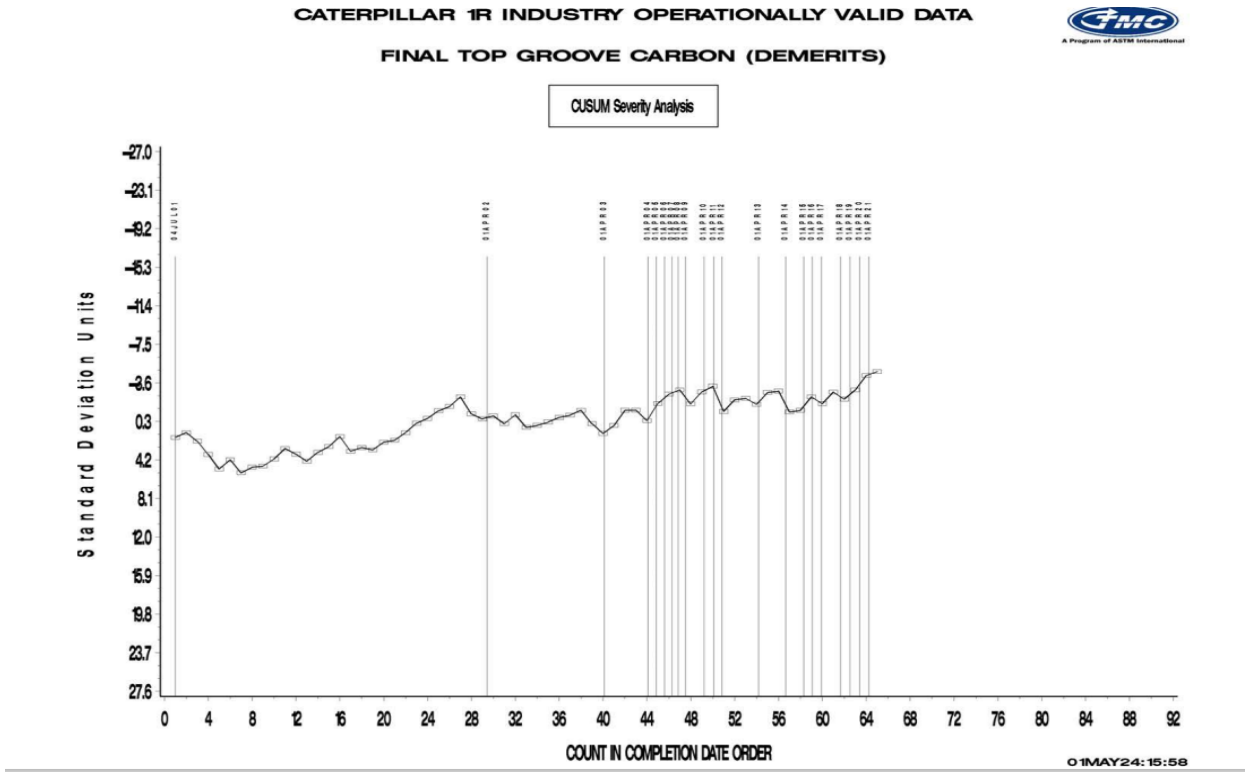




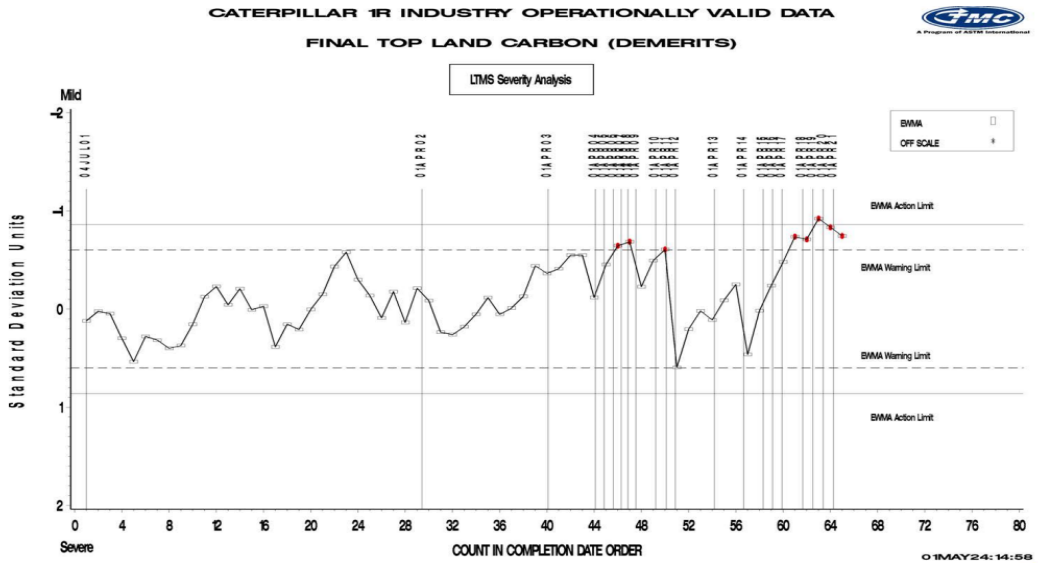
Caterpillar SCOTE 1R Charts- TGC

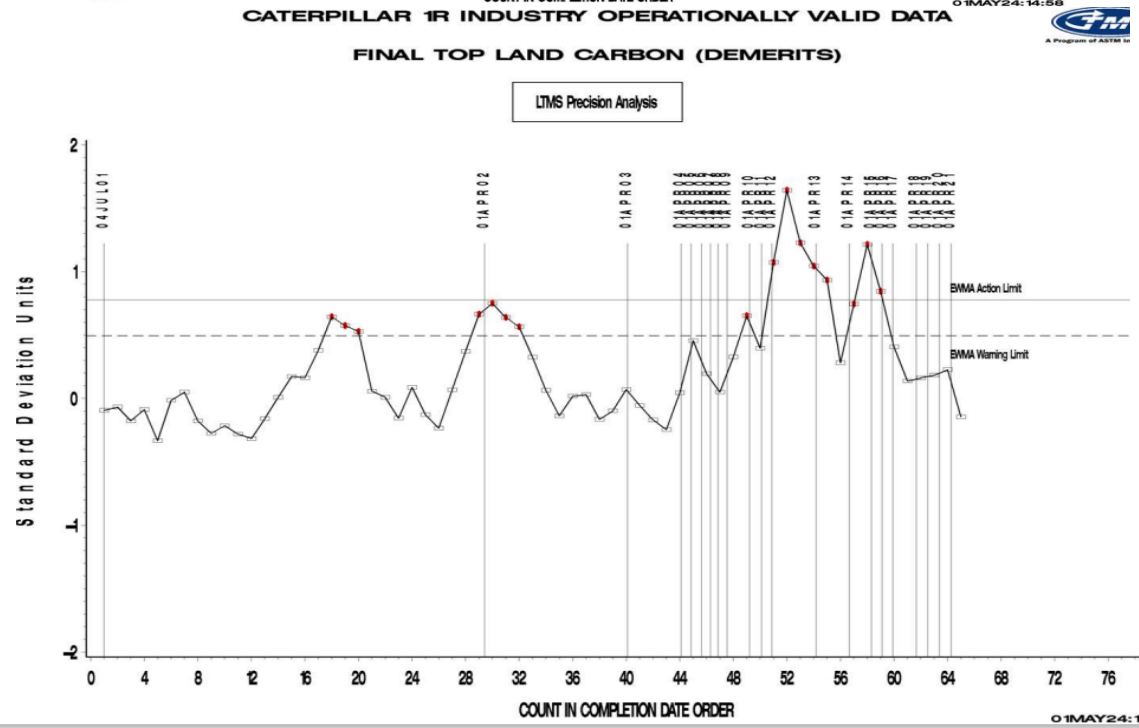


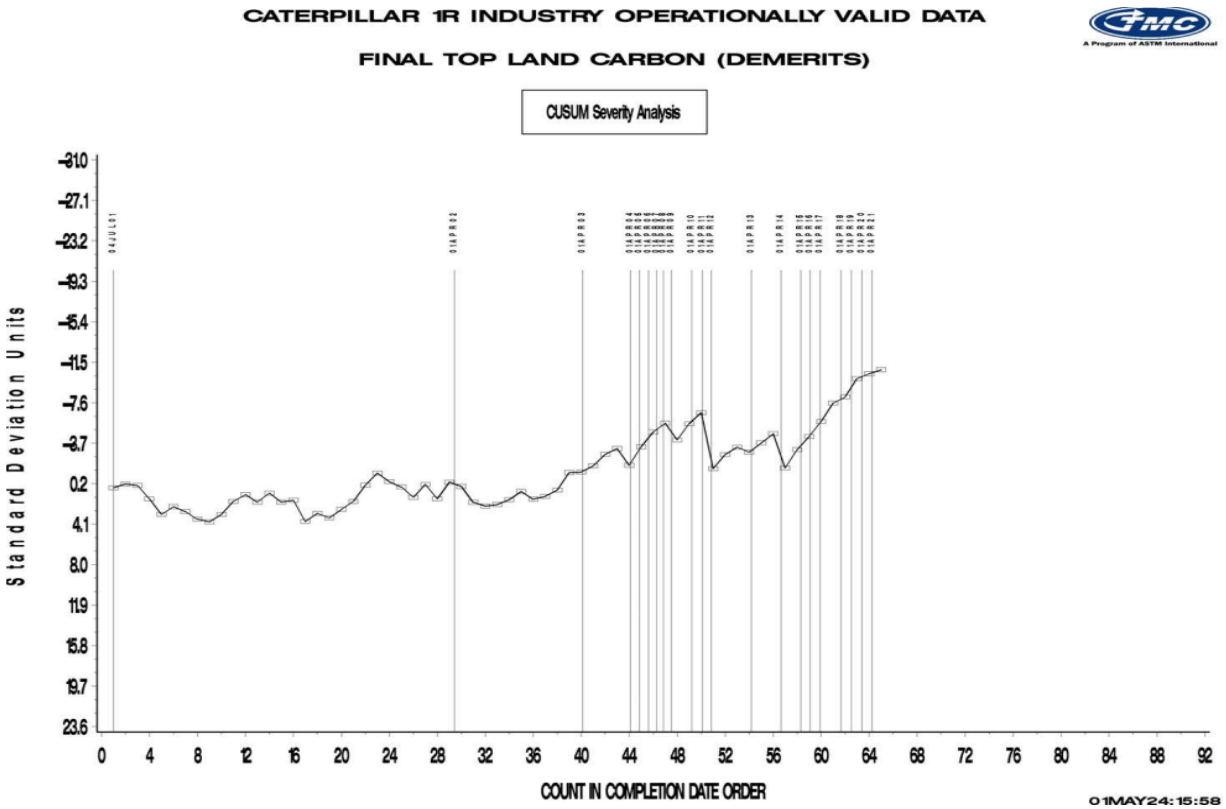




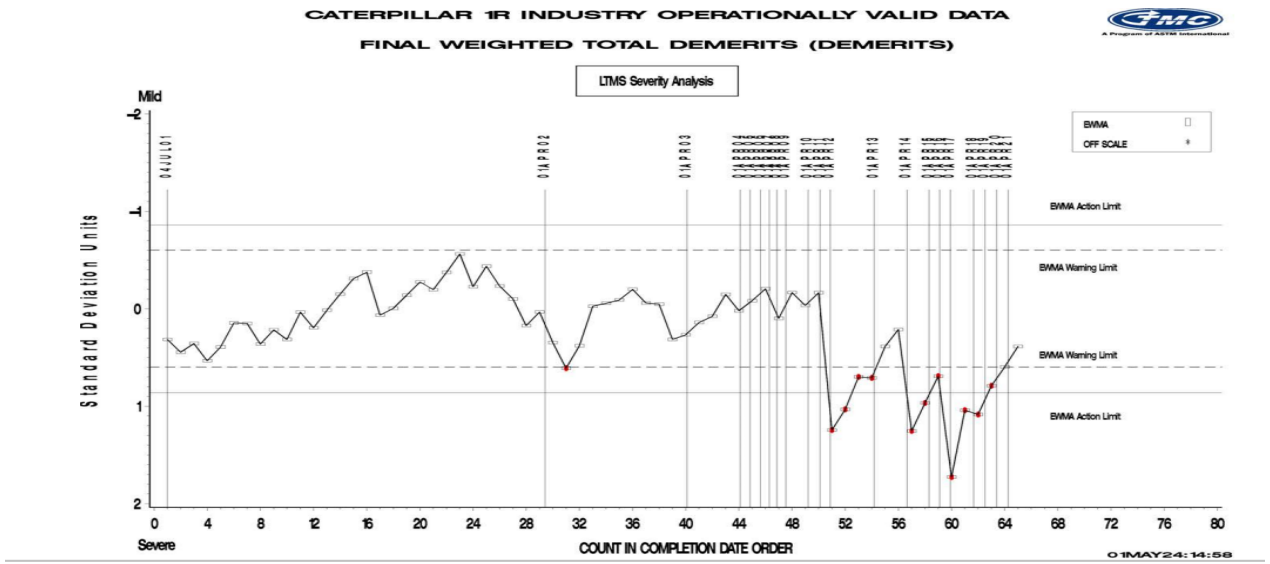
Caterpillar SCOTE 1R Charts- Final Top Land Carbon

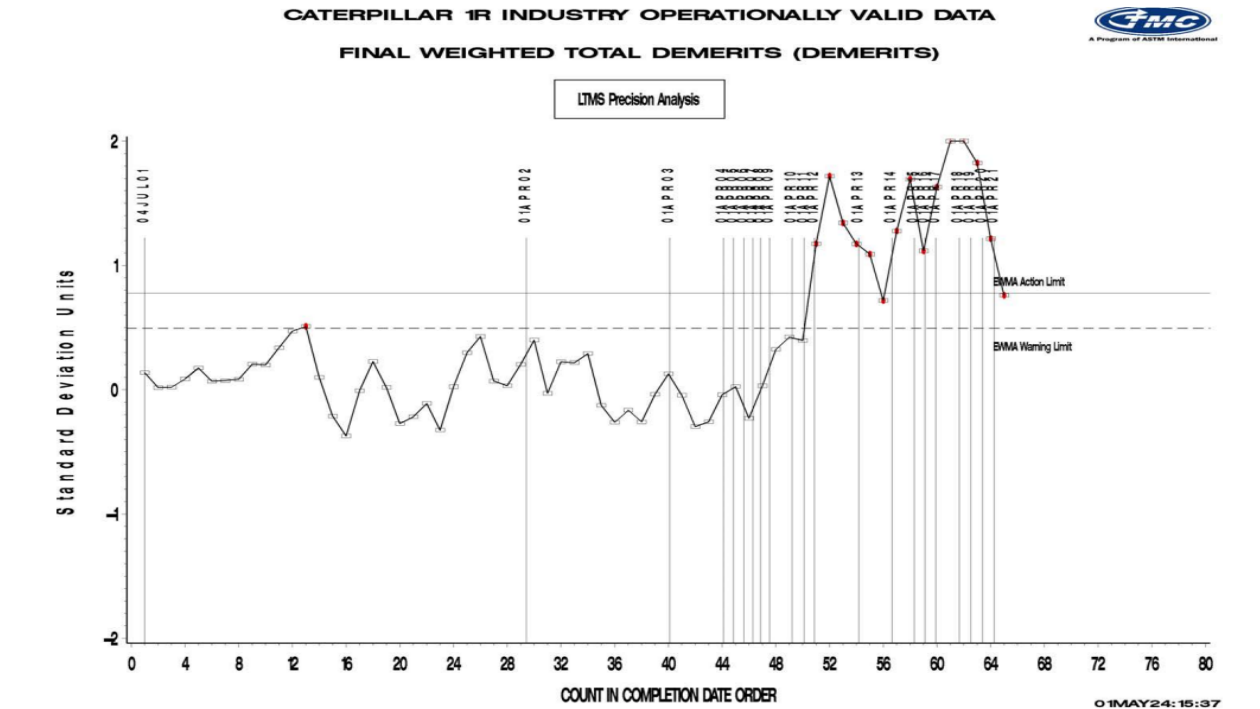


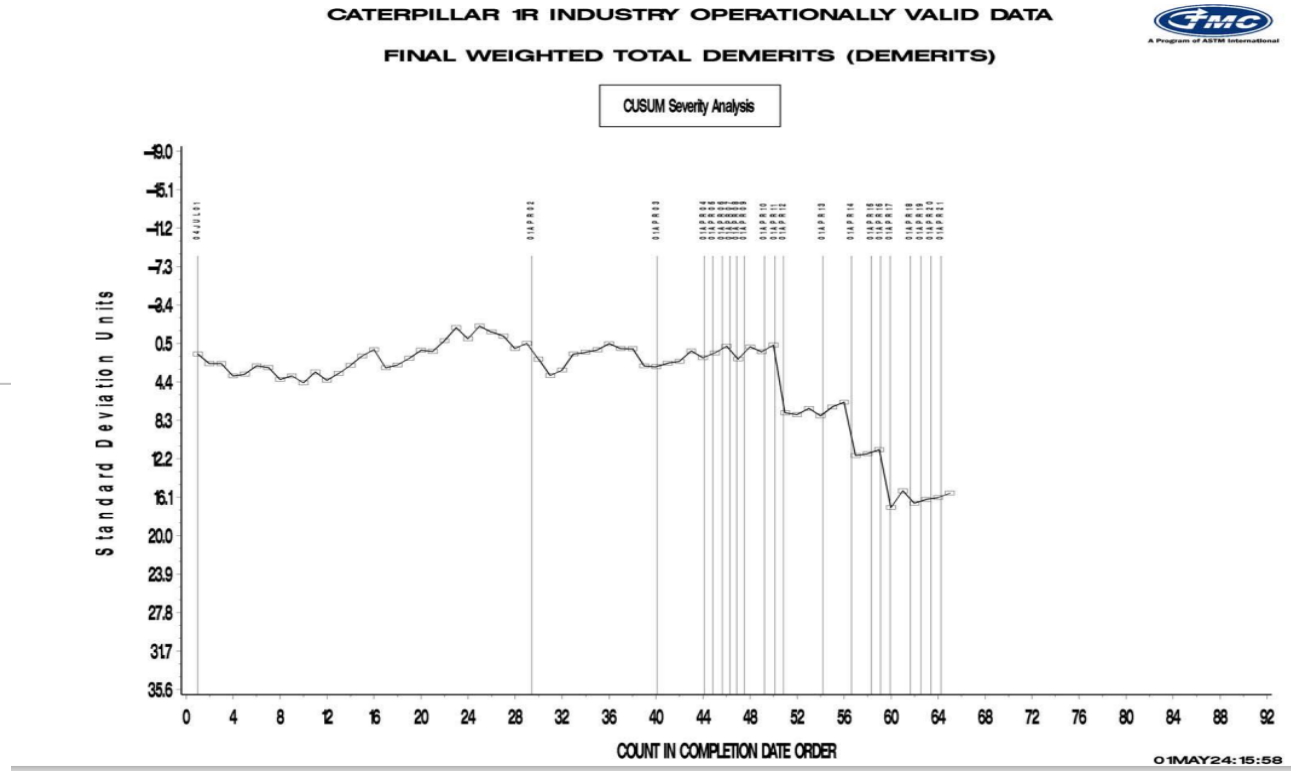




Caterpillar SCOTE 1R Charts-Final Weighted Total Demerits







ASTM D4485 Surveillance Panel

Heavy Duty Class Panel
December 10, 2024
Anaheim, California
Laura Birnbaumer

Chevron Oronite

ADDING UP

Membership

Joe Franklin	Intertek
Beth Schwab	Afton
Sid Clark	TMC
Micheal Kasimirsky	TMC
Sean Moyer	TMC
Jeff Clark	TMC
Robert Warden	SwRI
Micheal Lochte	SwRI
Quancheng Li	ExxonMobil
Greer Gibbons	Lubrizol
Mike Deegan	Ford
Hind Abi-Akar	Caterpillar
Luc Girard	Sanjuro Consulting Inc
Jeremy Styer	Vanderbilt Chemicals
Stephen Ketchum	Chevron Lubricants

Draft Scope

- It is the responsibility of the D4485 Surveillance Panel to maintain ASTM Standard Specification D4485 which covers engine oils for light-duty and heavy-duty internal combustion engines used under a variety of operating conditions in automobiles, trucks, vans, busses and off-highway farm, industrial and construction equipment. D4485 shall contain periodic updates to its contents through the ASTM TMC Information Letter system with subsequent ballot approvals through D02 Sub B0 Committee Membership.

Activity

- D4485-24 was issued in July 2024.
  - Main change was the update to A5 for the new elastomer reference oil.
- SP met in Austin and agreed on 7 updates/corrections for next Edition.

Future

- The Surveillance Panel will meet Wednesday after Sub B to address
  - Formalizing the SP's scope
  - Alignment with ACC Code of Practice Appendix F on MTEP – A2
  - Clarity on running the round robin for elastomers – A5
  - Another other new business
    - Guidance from the Class Panel(s) and D02.B0
      - Foam footnote
      - COAT as an EOAT alternative

Old Business

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

6.0 All API CJ-4 tests and limits

6.1 Lew Williams showed the summary of the full slate of tests. See Attachment **4**. The [illegible] for the 90 cycle shear test. The Volatility is OK. Aeration should list the MTAC limits. For Foam, there was discussion whether to include Option A or not. The HUEI is more severe than the foaming test and should provide protection. Charlie Passut **moved** to drop the comment for "No Option A" and use D892 as written. Steve Kennedy seconded. The **motion carried** on a unanimous voice vote. Seals are OK. There is a new ASTM number

Foam for API CJ-4, CK-4 and FA-4

- From the January 26, 2006 HDEOCP minutes, the removal of “Option A is Not Allowed” from D892 is an intended change and not a copy/paste error.
- Motion:
  - Add a footnote by the D892 test method to Tables 4, 5 and 6 stating that the removal of “Option A is Not Allowed” is an intended change from the previous Service Categories.

CLOG Update to HDEOCP

December 10, 2024

Agenda

- Review status and action items:
  - Mack T-8E/11 viscosity increase
  - Mack T-11A/T-12A sooted oil MRV
  - Mack T-12 wear
  - Mack T-12 lead

Mack T-11 Equivalency Plan

- CLOG will ask industry statisticians to analyze results from ISB Viscosity precision matrix to establish
  - PM is complete; results have been posted
- CETAG is facilitating collection of additional data for comparison
  - Data collection is underway but not compete
  - CETAG is handling multiple data collection requests and needs more time
  - CLOG will await additional data from ACC
- CLOG utilize the PM analysis and additional data to recommend equivalency limits

Mack T-8E Equivalency Plan

- ISB Viscosity test does not share a reference oil with Mack T-8E
  - No additional donated data expected

- A proposal was reviewed to use a 15W-40 blend with RO834 additive technology and run 4 Mack T-8E tests

- Instead, CLOG recommended to review RO 1005 data generated during ISB Viscosity test development and if more data are needed, run RO 1005 in ISB Viscosity test
  - A new proposal will be generated

Mack T-11/12A MRV

- ISB Viscosity test evaluates Sooted Oil MRV at 96hr and 108hr

- Mack T-10A, T-12A, T-11A and ISB Viscosity all sample for MRV measurement at approximately 5% soot

Mack T-12 Ring/Liner Wear

- Mack T-12 usage rate has lowered, extending the forecasted life to ~2030
- Option 1: deem ISB cam lobe wear is redundant with T-12 ring/liner wear and adopt the ISB wear test into CH-4 and CI-4
  - Will the ISB run to completion with CH-4 and CI-4 oils?
  - CLOG members were asked to investigate CH-4 and CI-4 oils in the ISB Wear test
- Option 2: ask SwRI to revisit bench wear test development with used oil
  - SWRI will advise whether they are willing to revisit this activity
- Option 3: develop the OM471 FE1 into a 400hr test procedure
  - OM471 FE1 at 600hr is a CEC test procedure, running in Europe
  - Potential to measure liner wear and oxidation
  - Test development would be necessary
- Option 4: develop the Daimler SRV test into an ASTM method
  - Potential to correlate to liner wear
  - Test development would be necessary

Mack T-12 Lead Status

- A shortened Volvo T-13 oxidation test could be developed to replace the Mack T-12 lead parameters
  - Review T-12 reference oil data during T-13 development
  - Test development would be required

- CLOG requested ACC to compare Mack T-12 lead data with Seq. IIIF, IIIG and IIIH oxidation tests
  - CETAG has not received sufficient response to report any data
  - CLOG will await a final response from ACC