Sequence X

ASTM D8729

Ford Chain Wear Test
Surveillance Panel Meeting Minutes

May 2nd, 2023

Prepared By: Alfonso Lopez, S.P. Chairman

Sequence X Surveillance Panel Meeting Agenda 05/02/23

- Roll call
- Approval of the meeting minutes 02/28/23
- TMC Report
- Fuel Report
  - Review of COA's from severity shift time periods
- Alternative Fuel Report
- San Antonio lab visit summary
- Action items
  - Hardware review for GF7
  - OH Chair appointment
- Report to Sub B in Denver (June 27th)
- Next Meeting

Motion/ Action List

- Approval of the meeting minutes from 11/16/22
  - Motion – Rich Grundza
  - Second – Robert Stockwell
  - Passed unanimous

- Action List
  - Update Fig A.9.10 , add spec to hose from PCV.
  - Poll labs on BB stack configuration – what are they using.
  - Clarify wording for timing of ramp and window for taking blowby.
  - Schedule a build workshop.

TMC Report

- Plots below presented by Rich Grundza
  - Industry data continues trending mild but acceptable

- Information Letter 23-1 for the use of oil 271 as a discrimination oil was issued May 3rd

Sequence X

April 2023

Test Monitoring Center
https://www.astmtmc.org

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Sequence X Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	5
Aborted Calibration Test	XC	1
Total Number of Tests		**6**

Sequence X – Lost Tests*

Test Status	Cause	#
Aborted	Test Terminated After Oil became Contaminated during Blowby Rework	1
Totals		**1**

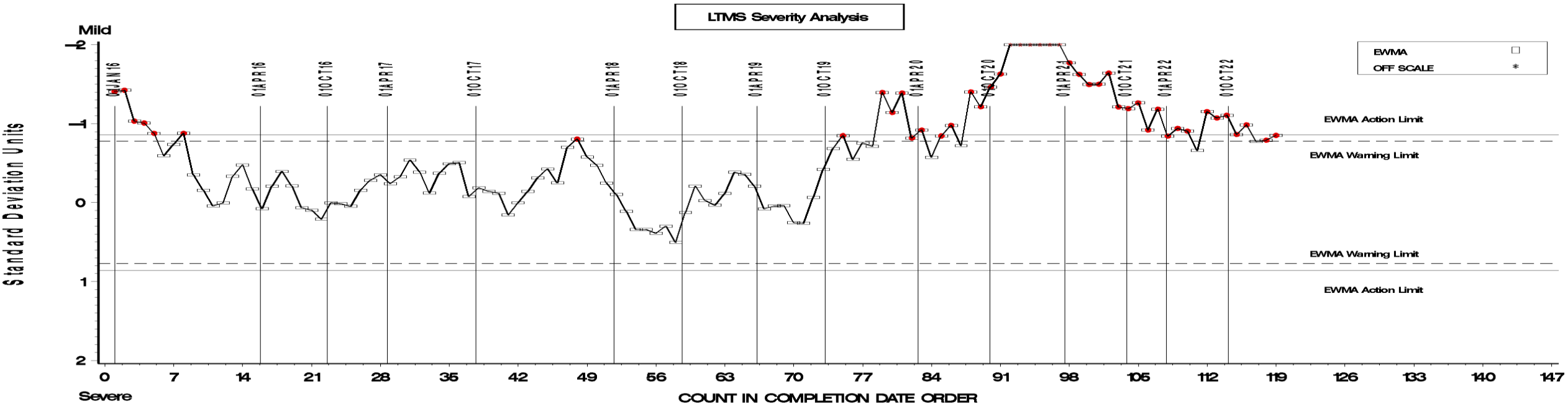
*Invalid and aborted tests

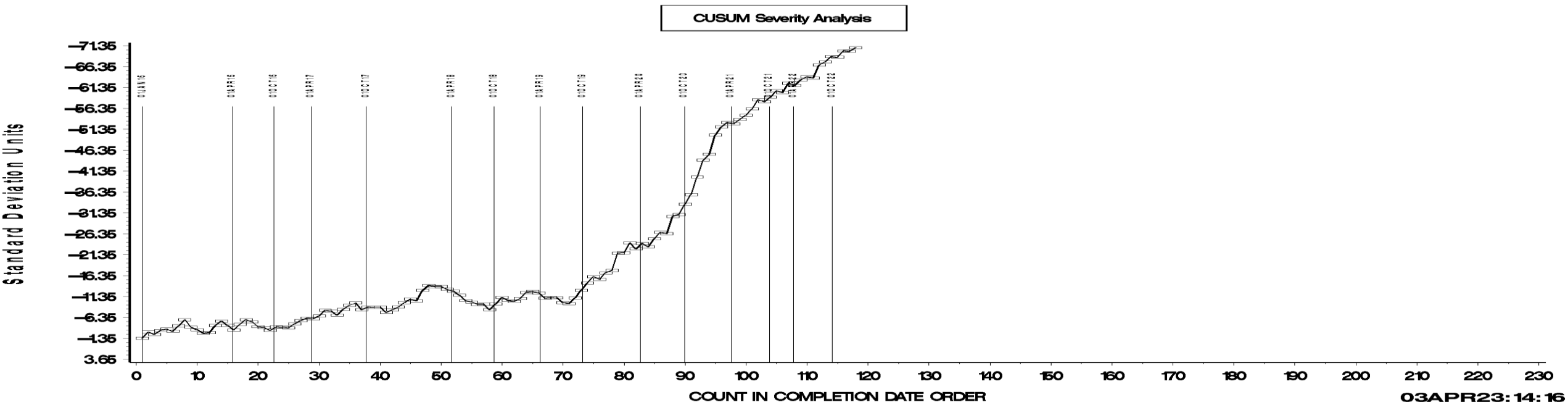
Sequence X Test Severity

- Average Chain Stretch % in Severity warning Alarm (mild).

SEQUENCE X INDUSTRY OPERATIONALLY VALID DATA

END OF TEST CHAIN WEAR FINAL RESULT





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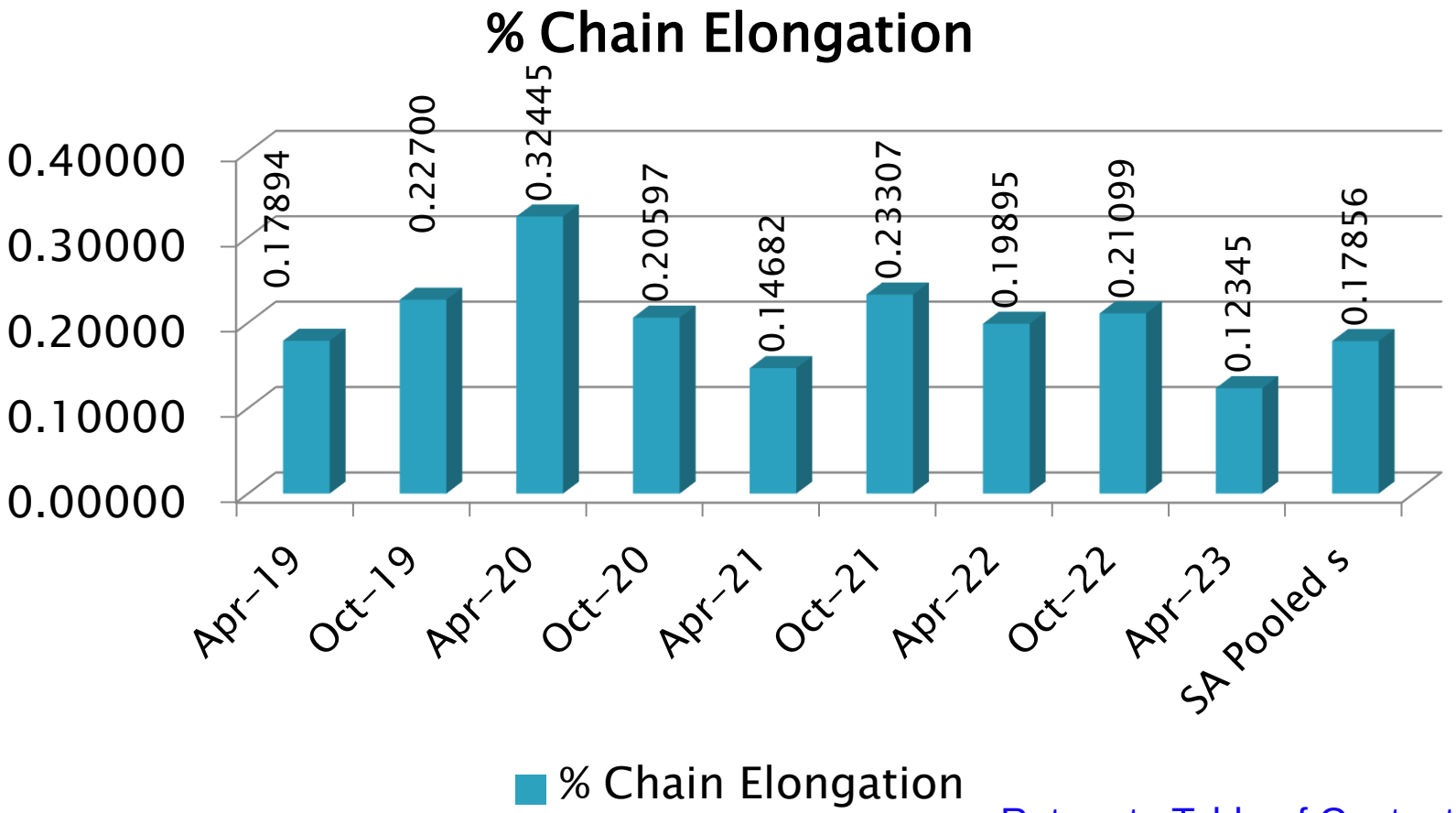
Sequence X Precision Estimates



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Information Letters

April 2023

Test Monitoring Center
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Information Letters*

Test	Date	IL	Topic
IIIH	20221216	22-4	Allowed the use of alternate cooling pump and Type K thermocouples.
IIIH	20230223	23-1	Updated reference to Rating Workshop to ASTM Deposit Rating Workshop
IVA	20230123	23-1	Increased calibration period to One year
VH	20230310	23-1	Updated reference to Rating Workshop to ASTM Deposit Rating Workshop
X	20230313	23-1	Increased calibration period to One year

*Available from TMC Website

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Reference Oil Inventory

- Actions, Re-blends, Inventories and Estimated Life

Test Monitoring Center
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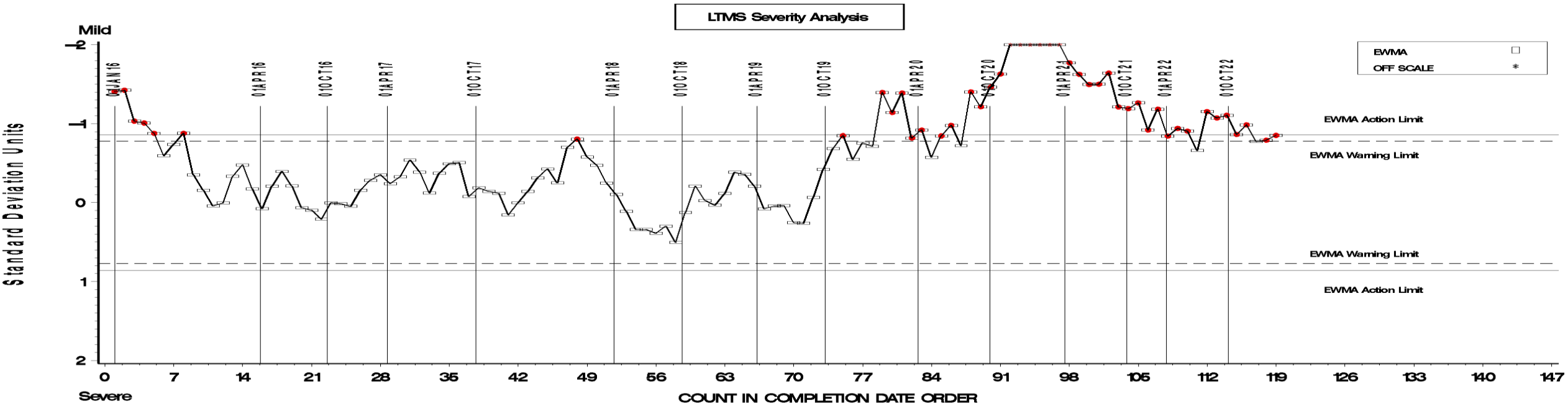
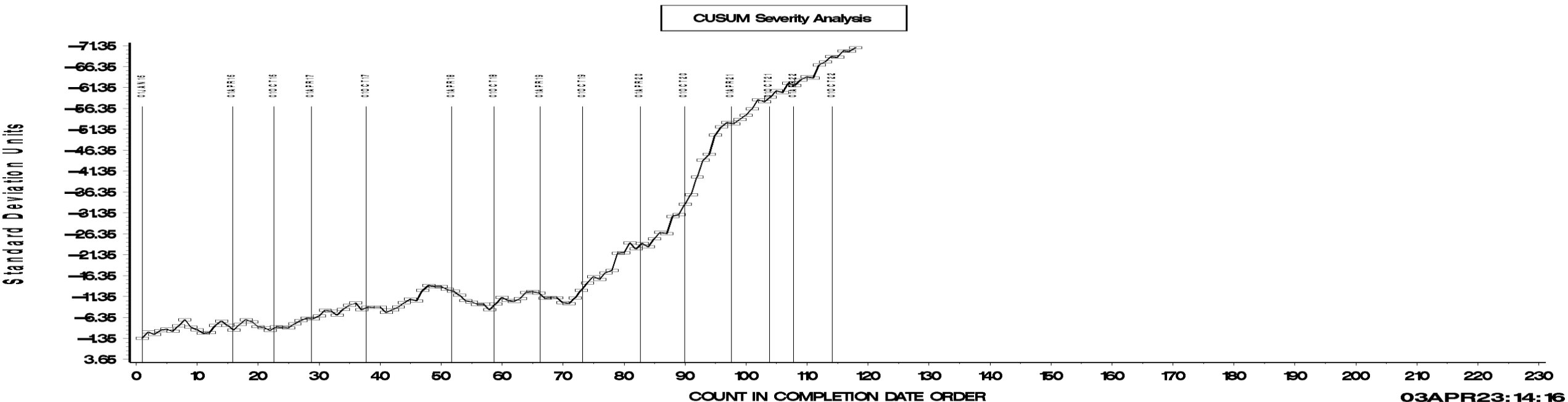
Fuel Report

- William Hairston of Haltermann reported EEE fuel inventories. No supply issues.
- Haltermann has been studying the COA and raw material components of the fuel batches that were used around the 2019 time period when the test went mild. Rich presented Batch ID plots – see below.
- The plots show batch HA3021LT10 at the inflection point of severity. Haltermann to continue investigation.
- Lab B has not seen the shift in severity with any fuel including HA3021LT10

SEQUENCE X INDUSTRY OPERATIONALLY VALID DATA

END OF TEST CHAIN WEAR FINAL RESULT





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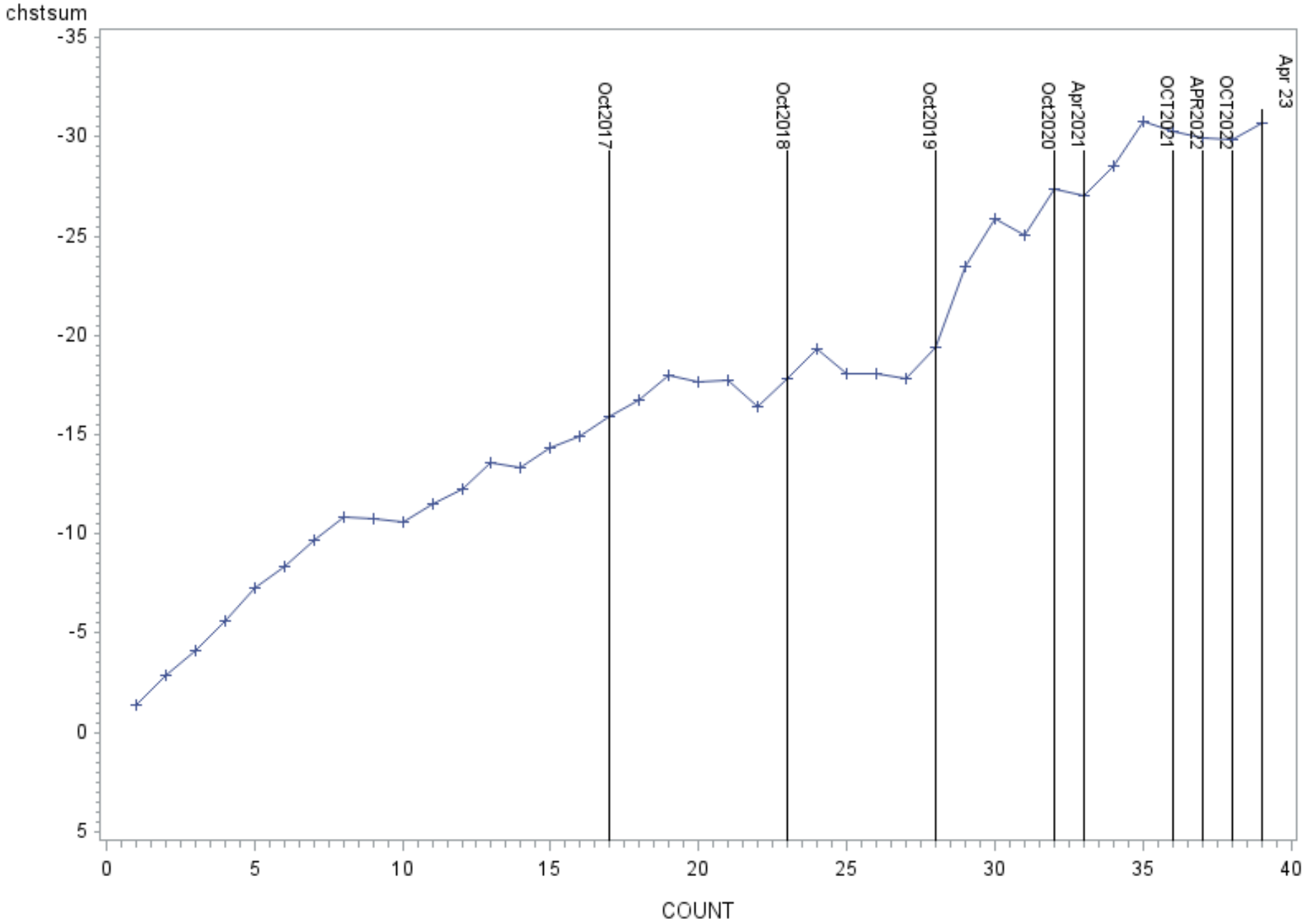
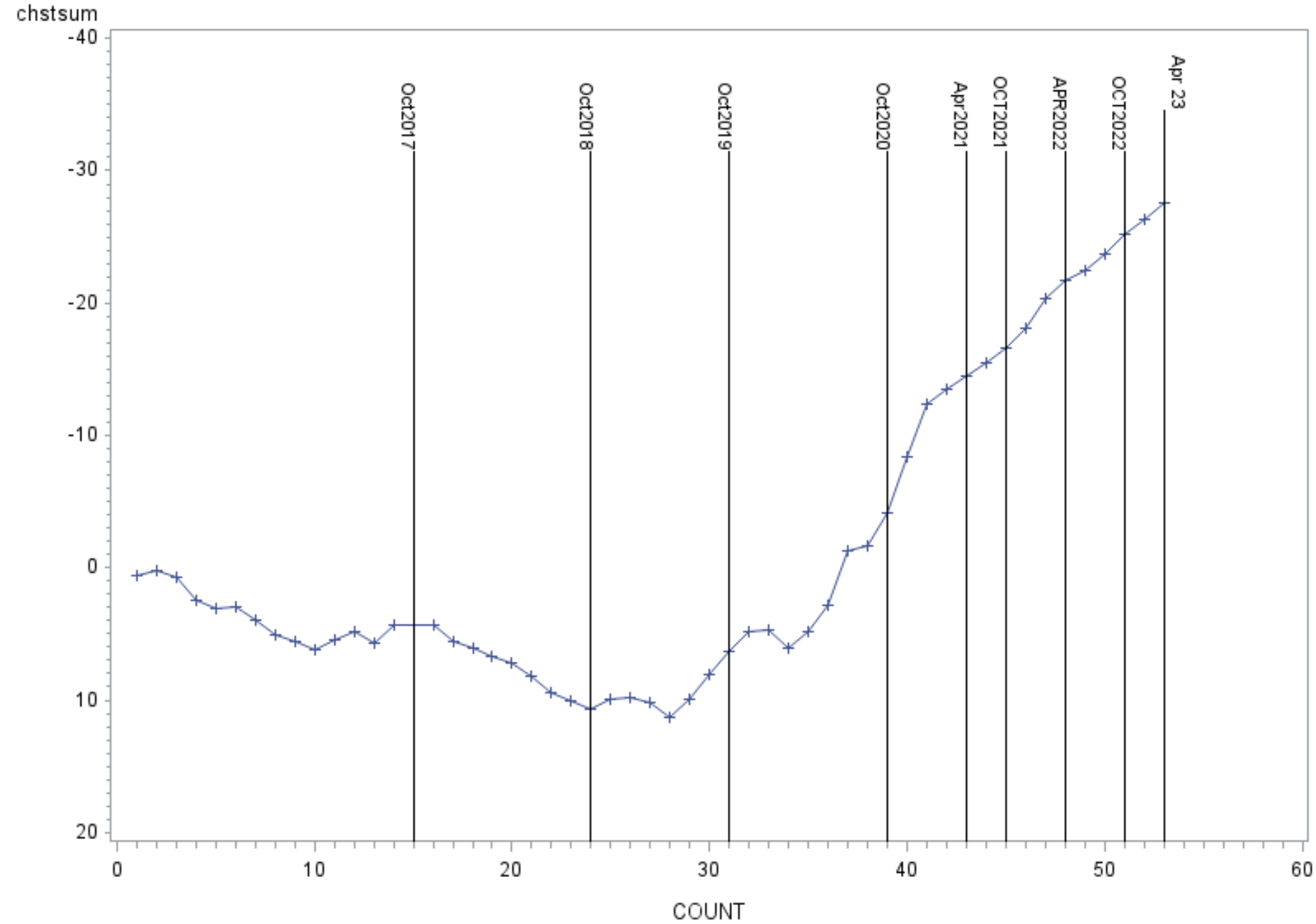
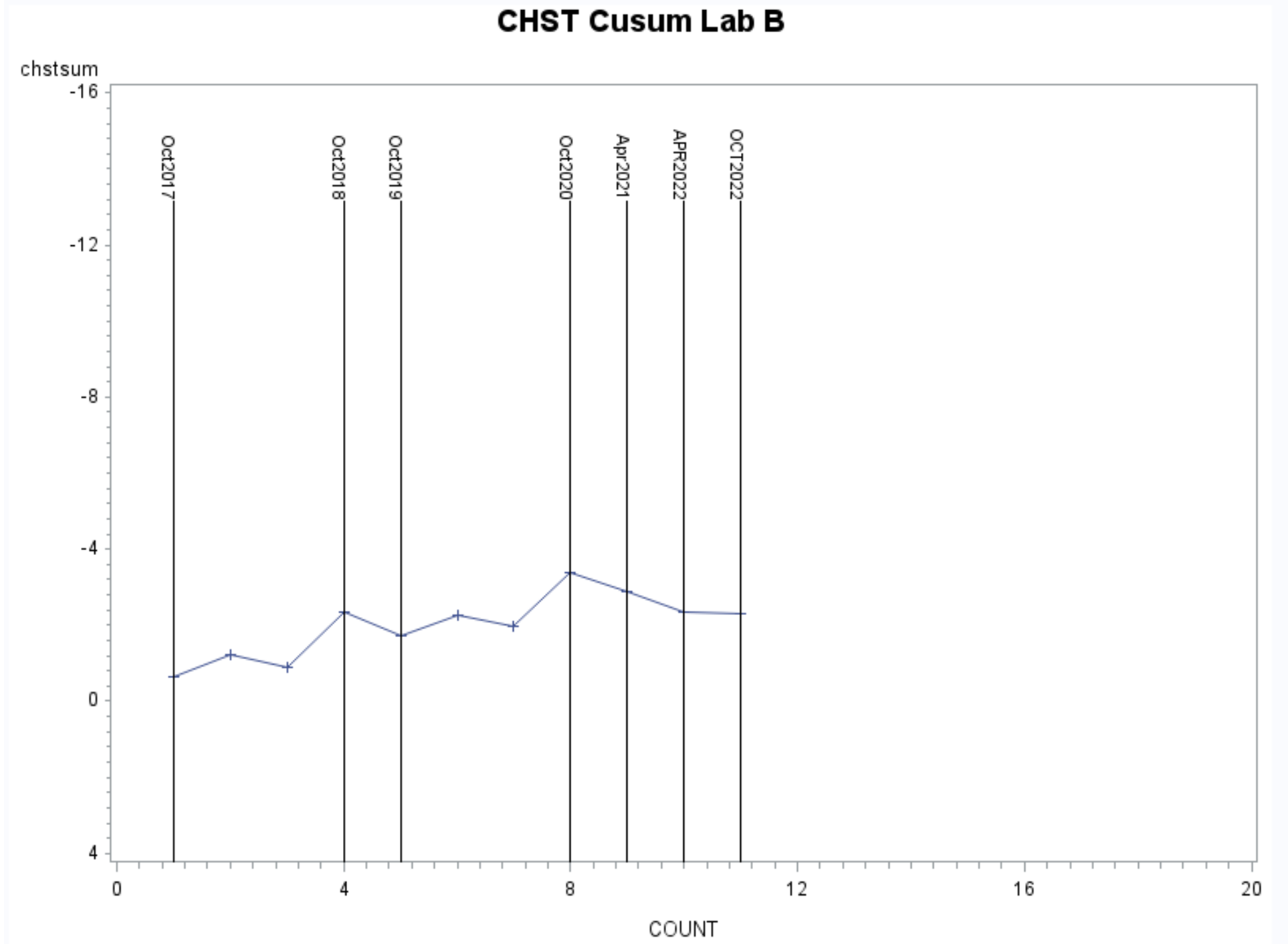
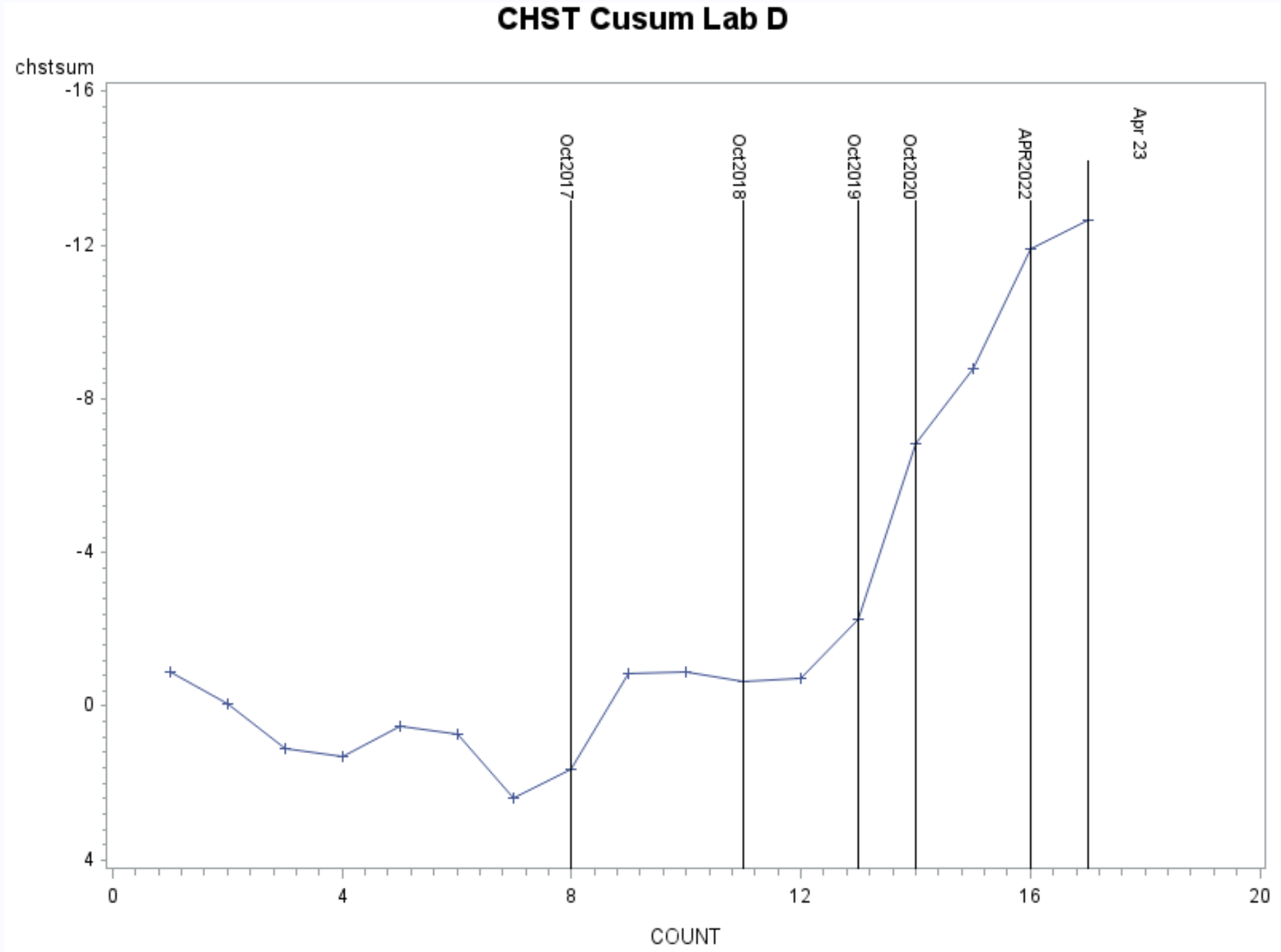
CHST Cusum Lab A

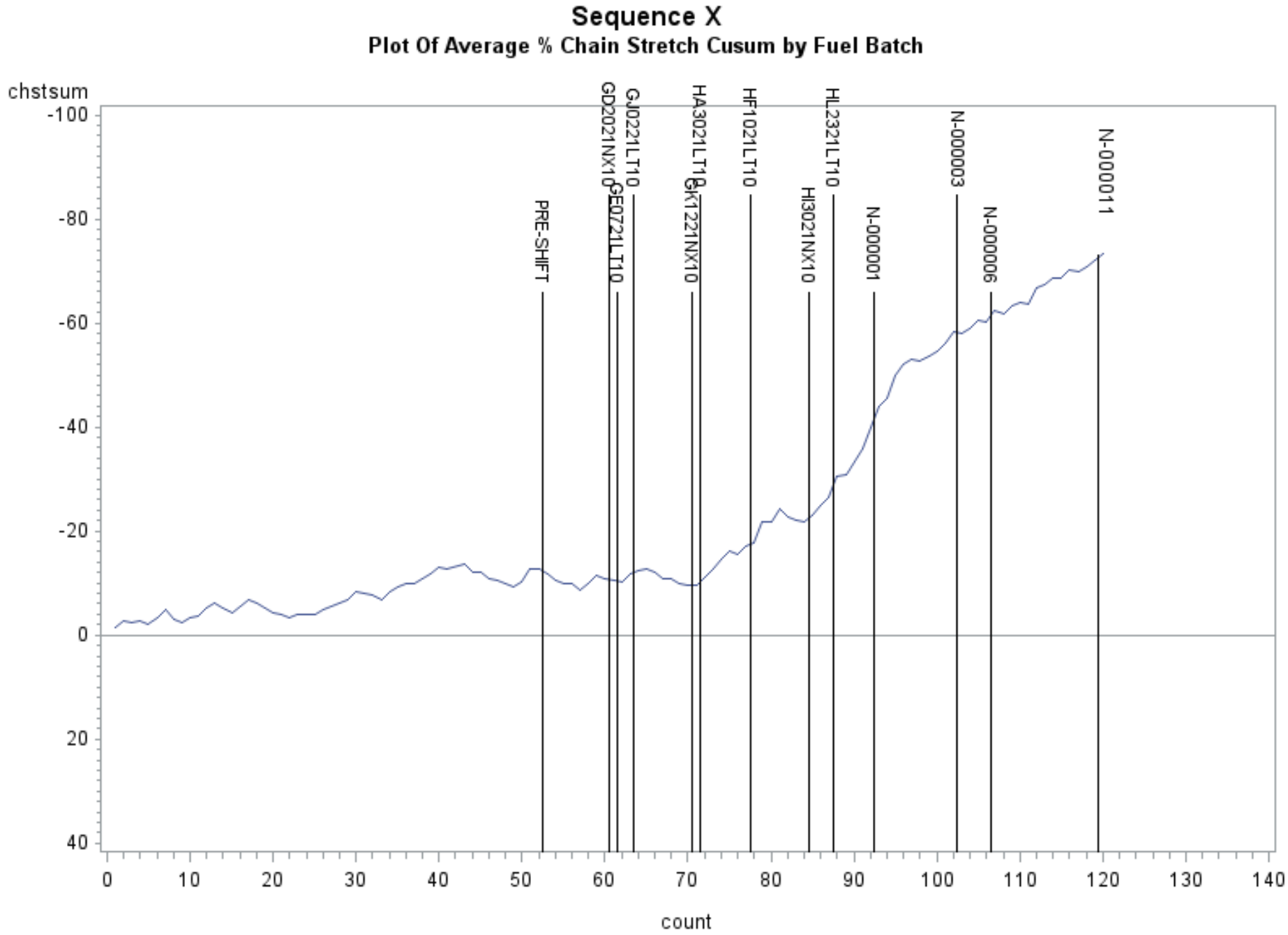


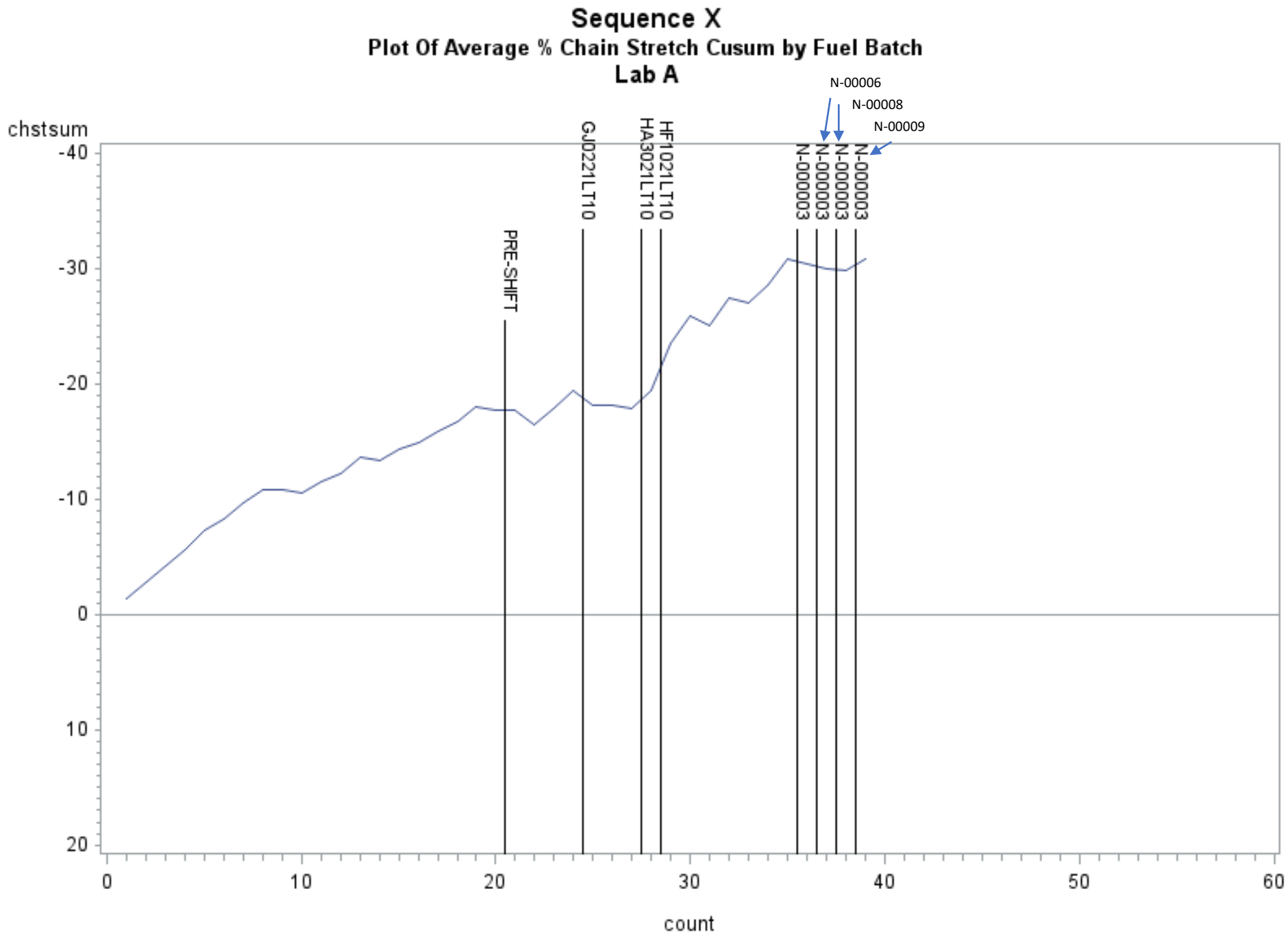
CHST Cusum Lab G

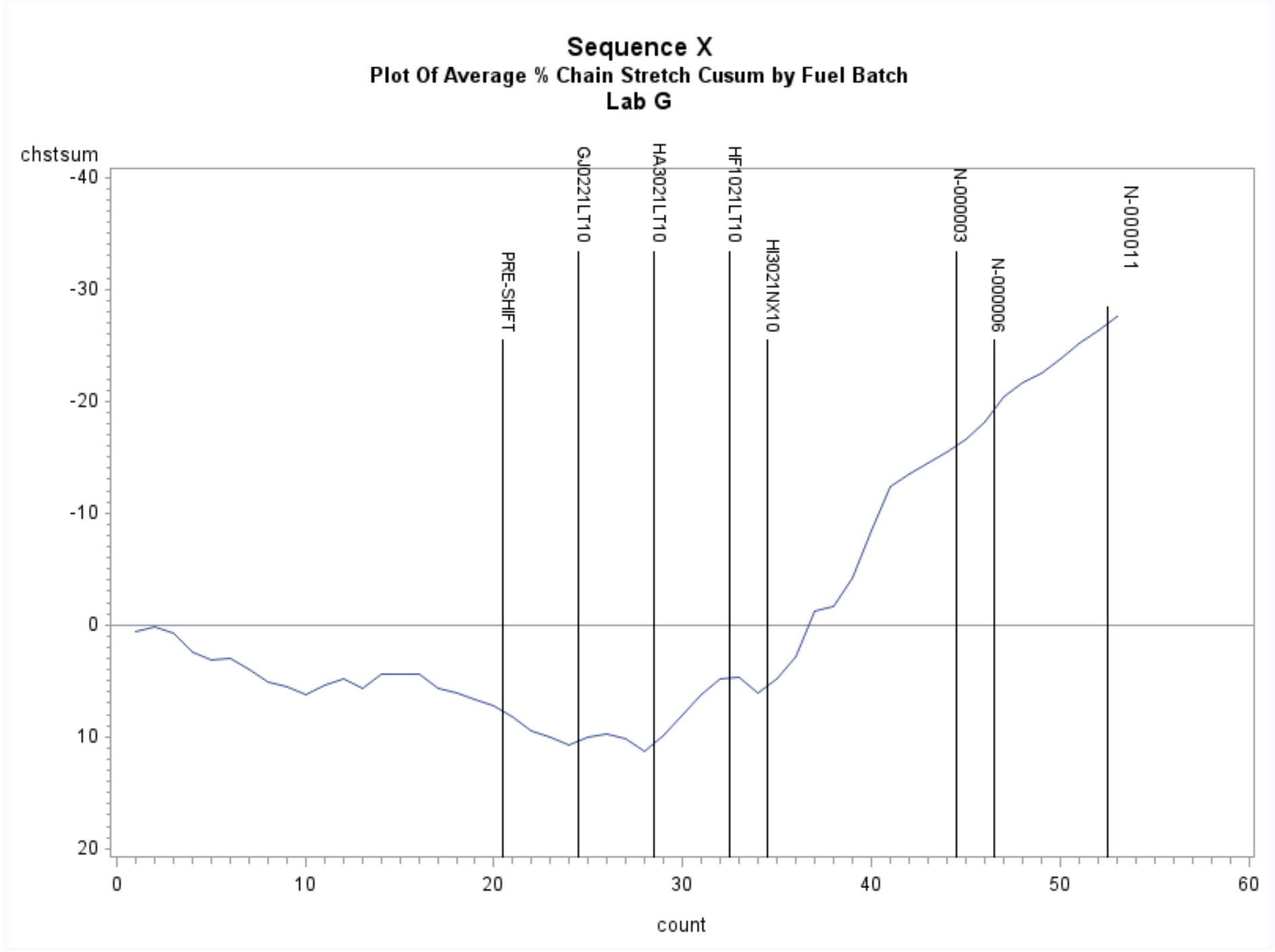


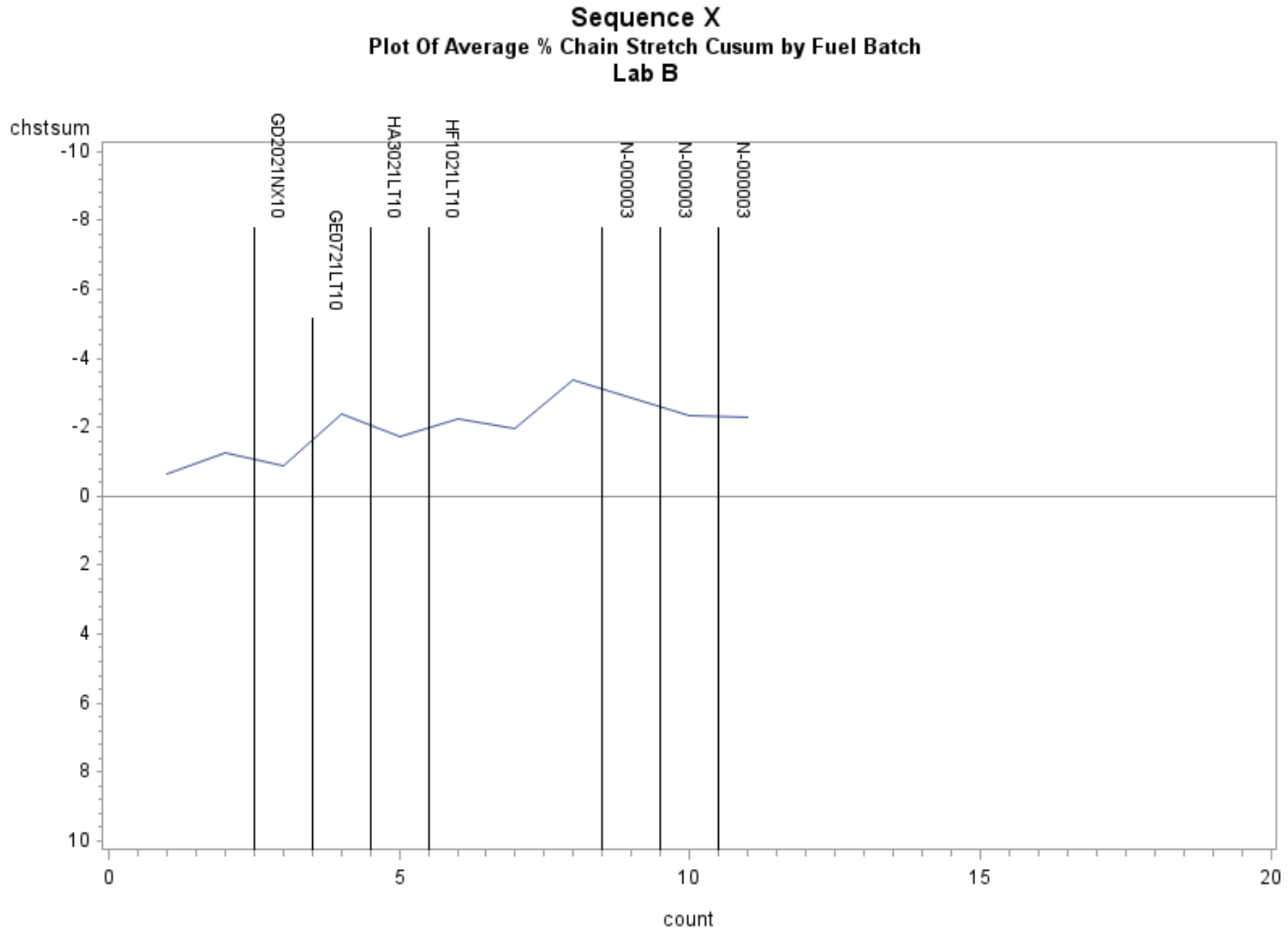

CHST Cusum Lab B
chstsum
-16
-12
-8
-4
0
4
Oct2017
Oct2018
Oct2019
Oct2020
Apr2021
APR2022
OCT2022
0
4
8
12
16
20
COUNT


CHST Cusum Lab D
chstsum
-16
-12
-8
-4
0
4
Oct2017
Oct2018
Oct2019
Oct2020
APR2022
Apr 23
0
4
8
12
16
20
COUNT


Sequence X
Plot Of Average % Chain Stretch Cusum by Fuel Batch
chstsum
-100
-80
-60
-40
-20
0
20
40
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
count
PRE-SHIFT
GD2021NX10
GE0721LT10
GJ0221LT10
HA3021LT10
GK1221NX10
HF1021LT10
HI3021NX10
HL2321LT10
N-000001
N-000003
N-000006
N-000011


Sequence X
Plot Of Average % Chain Stretch Cusum by Fuel Batch
Lab A
N-00006
N-00008
N-00009
chstsum
-40
-30
-20
-10
0
10
20
PRE-SHIFT
GJ0221LT10
HA3021LT10
HF1021LT10
N-000003
N-000003
N-000003
N-000003
0
10
20
30
40
50
60
count

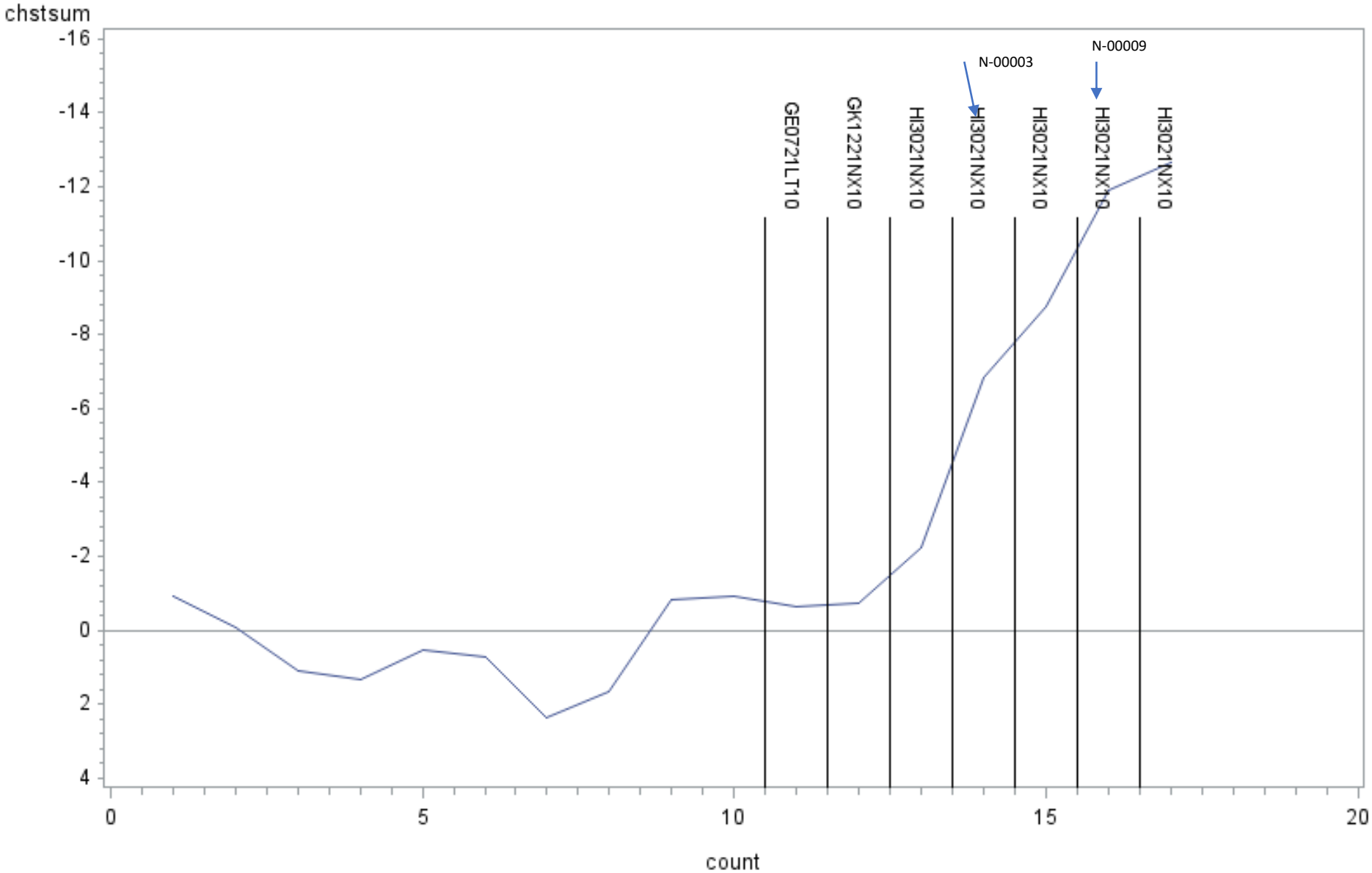

Sequence X
Plot Of Average % Chain Stretch Cusum by Fuel Batch
Lab G
chstsum
-40
-30
-20
-10
0
10
20
PRE-SHIFT
GJ0221LT10
HA3021LT10
HF1021LT10
HI3021NX10
N-000003
N-000006
N-000011
0
10
20
30
40
50
60
count


Sequence X
Plot Of Average % Chain Stretch Cusum by Fuel Batch
Lab B
chstsum
-10
-8
-6
-4
-2
0
2
4
6
8
10
GD2021NX10
GE0721LT10
HA3021LT10
HF1021LT10
N-000003
N-000003
N-000003
0
5
10
15
20
count

Sequence X

Plot Of Average % Chain Stretch Cusum by Fuel Batch

Lab D



Sequence X Alternate Fuel Supplier Discussion

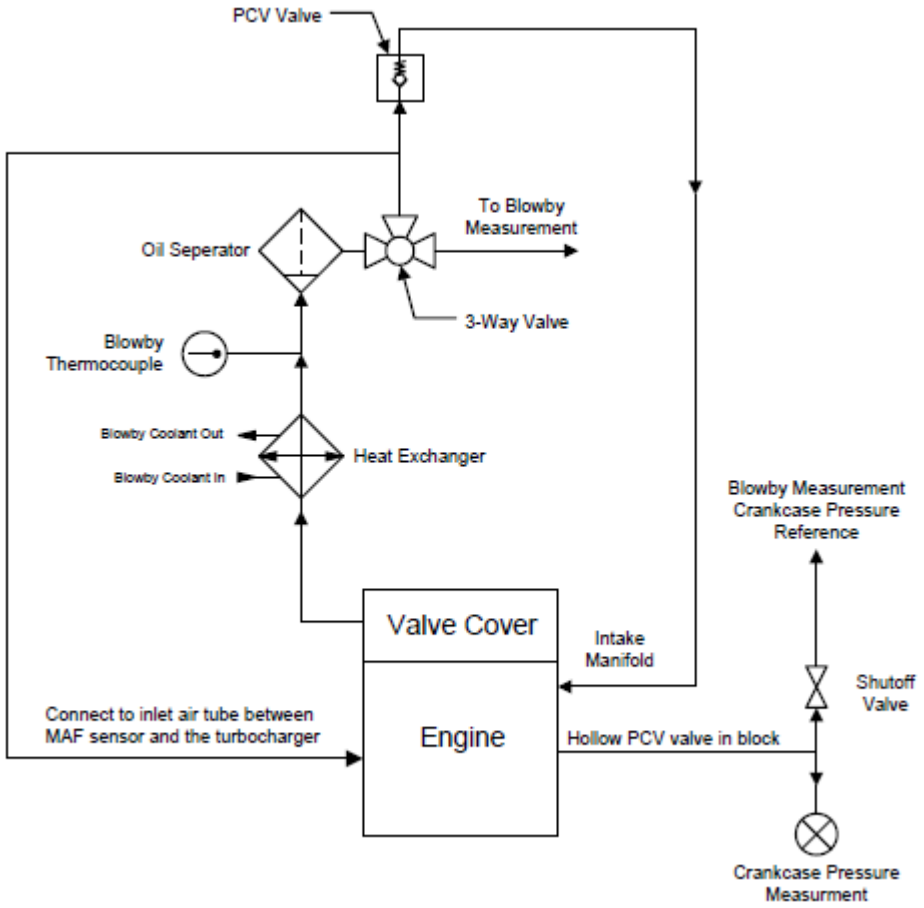
- The first meeting was held 02/28/22. The technical group agreed to proceed with the discussion of introducing a new fuel. Additional discussion was halted until the Sequence X mild severity shift was resolved.
- The second Task Force meeting was held 04/11/23 to discuss the requirements to develop an alternate fuel supplier procedure for the Sequence X.
- The Sequence IIIH and VI alternate fuel requirements were reviewed and used as examples.
- The group agreed to use two reference oils in the matrix design (TMC 270 and 271). TMC 270 would be used for most of the runs.
- All tests will be conducted on the alternate fuel, preferably after a successful reference test.
- The statisticians have been tasked to develop a matrix that can vary in the number of stands and tests per lab.

Lab Visit Report

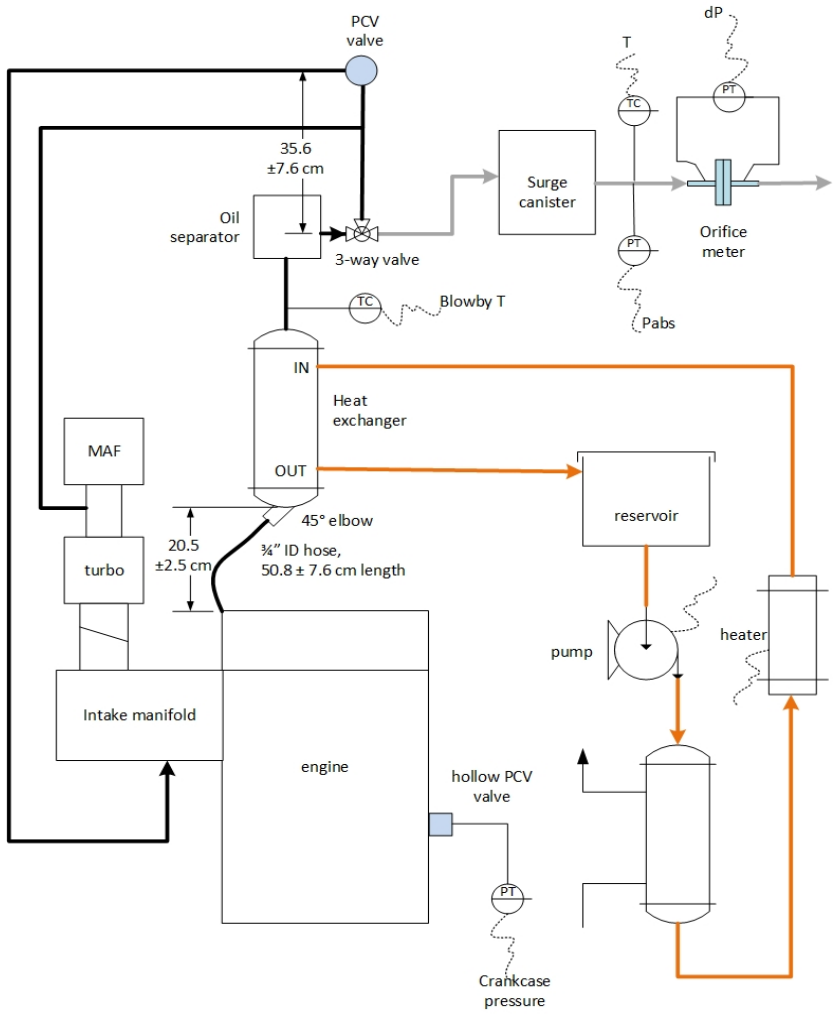
- Participants
  - Christine Eickstead – SWRI
  - Craig Springer - SWRI
  - Jason Soto – IAR
  - Al Lopez – IAR
  - Ivica Filipovic - IAR
  - Bob Campbell – Afton
  - Jason Lekavich – Afton
  - Ben Maddock – Afton
  - Amol Savant - Valvoline
  - George Szappanos – Lubrizol
  - Tony Catanese – Lubrizol
  - Rich Grundza - TMC

- The participants visited IAR and SWRI Sequence X Stands
- Focus was on the crankcase ventilation and BB stack see photos)
- Drawings on next slide show schematic of system that was audited.
- A follow up meeting after the lab inspections took place.

Crankcase Vent. System

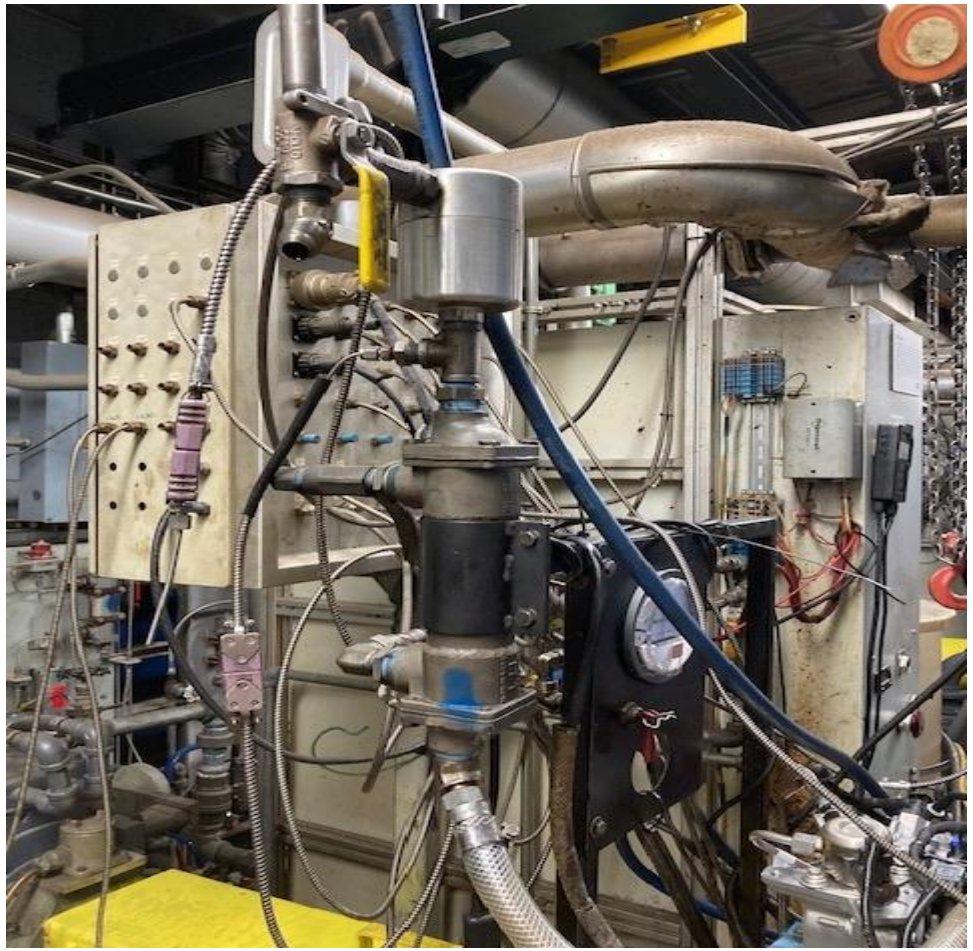


ASTM D8279 Fig. A9.10



LZ Drawing

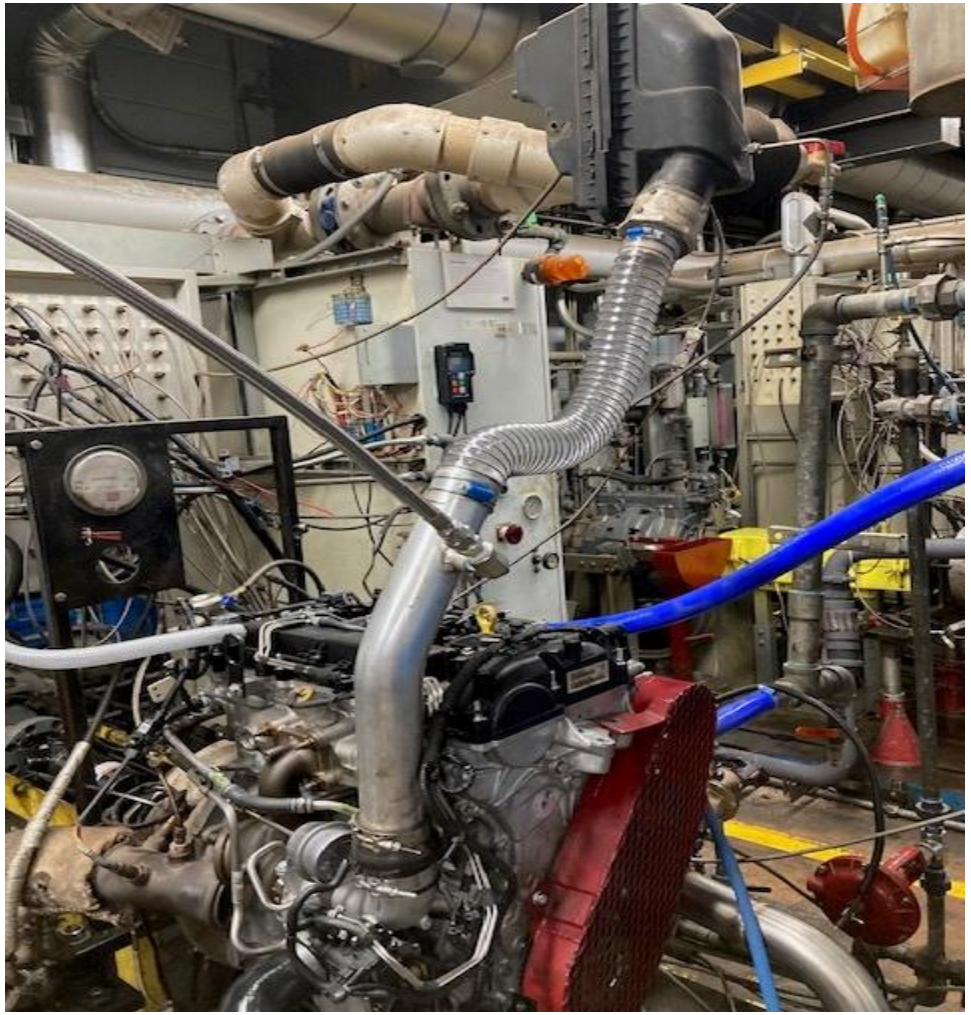
Blowby Stack Comparison



IAR

SWRI

Air Inlet Comparison



IAR

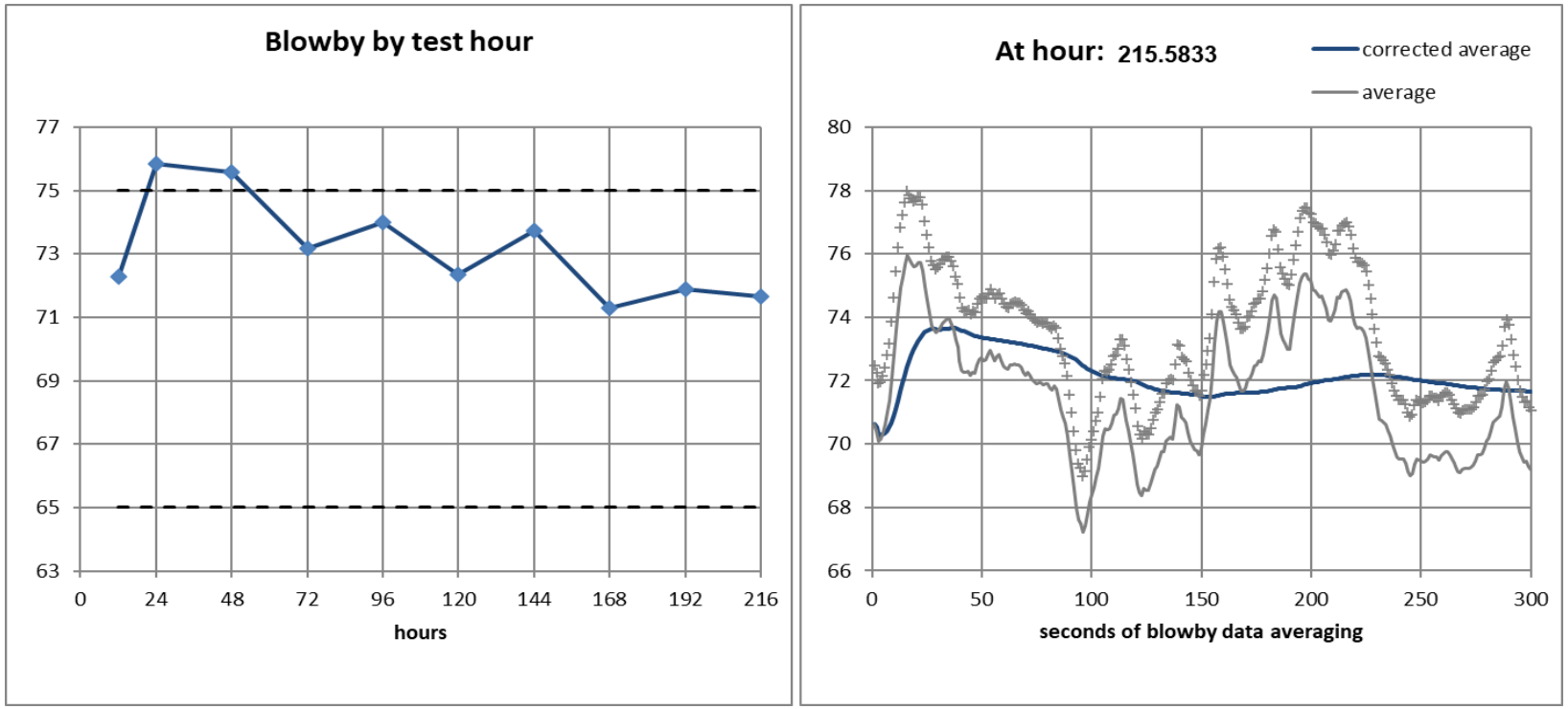
SWRI

Lab Visit Summary

- Lab G has 5/8 hose instead of ¾ at the inlet air tube
- Hose from the PCV to intake has no specs in the procedure
- Lab A is using the factory snorkel. Lab G is using fabricated hose.
- George presented BB plots to show the measurement variability. Attached on next slide.

- Action
  - Update Fig A.9.10 , add spec to hose from PCV.
  - Poll labs on BB stack configuration – what are they using.
  - Clarify wording for timing of ramp and window for taking blowby.
  - Schedule a build workshop.

LZ Automated BB Data Capture



Lubrizol has adopted an automated blowby measurement system that removes the need for hands-on technician support. This improves safety and efficiency, and also removes the subjectivity from the measurement. The system has revealed the true level of variability with blowby on this engine type, which seems to be much higher than other test types based on LZ's experience. The panel was queried as to their own assessment of variability with the hopes of identifying the cause and improving the precision of the measurement.

Attendance Roster

Sequence X Surveillance Panel Meeting

May 2, 2023

	Attendance	
Porter, Christian <Christian.Porter@AftonChemical.com>		Afton
Martin Chadwick Intertek <martin.chadwick@intertek.com>		IAR
Dan Lanctot <DLanctot@tei-net.com>	x	TEI
Dave Passmore	x	IMTS
Mathew Bowden	x	OHT
Jason Bowden <jhbowden@OHTech.com>		OHT
'Rich Grundza' (reg@astmtmc.cmu.edu)	x	TMC
Jason Soto Intertek <jason.soto@intertek.com>	x	IAR
Martinez, Jo G. (jogm) <JoMartinez@chevron.com>	x	Chevron
J.Hsu@shell.com	x	Shell
Samuel Seth Demel	x	Shell
Gleason, Joseph <Joseph.Gleason@lubrizol.com>		Lubrizol
Kostan, Travis G. <travis.kostan@swri.org>	x	SWRi
William Hairston	x	Haltermann
Indresh Mathur		Haltermann
Khaled , Zreik Khaled.zreik@gm.com		GM
Chiappelli, Maria <Maria.Chiappelli@Infineum.com>		Infineum
Scudiero, Michael A <michael.a.scudiero@exxonmobil.com>		ExxonMobil
Paul Rubas, ExxonMobil	x	ExxonMobil
Charlie Leverett <charlie.leverett@yahoo.com>		
Amol C Savant <ACSavant@valvoline.com>	x	Valvoline
Eickstead, Christine M. <christine.eickstead@swri.org>	x	SWRI
'Bob.Campbell@aftonchemical.com'	x	Afton
Amanda Stone		Afton
Jason Lekavich	x	Afton
Patrick M. Lang <patrick.lang@swri.org>	x	SWRI
Stockwell, Robert T (Robert.Stockwell@chevron.com)	x	Chevron
Bill Buscher Intertek <william.buscher@intertek.com>	x	IAR
Ritchie, Andrew <Andrew.Ritchie@Infineum.com>	x	Infineum
Todd Dvorak	x	Infineum
Rais, Khaled <khaled.rais@swri.org>		SWRi
Stevens, Andrew <Andrew.Stevens@Lubrizol.com>		Lubrizol
Matthews, Tim <Tim.Matthews@uk.bp.com>		BP
preston.tarry@bp.com		BP
Lopez, Alfonso <al.lopez@intertek.com>	x	Intertek
Deegan, Michael (M.D.) <mdeegan@ford.com>	x	Ford
Lochte, Michael D. <michael.lochte@swri.org>	x	SWRi
George Szappanos	x	LZ
Tony Catanese	x	LZ
Timothy Cushing <timothy.cushing@gm.com>	x	GM
Wingert, Dean (D.) <dwingert@ford.com>		Ford
Michael Luhard		Afton
Ben Maddock	x	Afton
Angela Willis		
Haing Tang		Chrysler
Gabrel, Izabela <IGabrel@h-c-s-group.com>	x	Haltermann Carless
juan vega		IAR
Joseph Hoen		Afton
na.tyrer@gm.com	x	GM
Ricardo Affinito	x	Chevron
sam@astmtmc.org, Sean Moyer		TMC

Sequence X History

Sequence X Milestones	
1/1/2012	Start of Chain Wear Test Development
12/7/2017	AOAP Approval for GF6
4/2/2018	Live Registration (03/19/16 Retro - Registration)
2/20/2019	Surveillance Panel Procedure Acceptance Vote
4/4/2019	Subcommittee B Ballot
6/16/2019	Main Committee D02 Ballot - ASTM Procedure D8279
11/7/2019	Memorandum 19-043 Use of Calibrated Sequence X Stands to Generate Used Oil Samples for Seq IX (LSPI)
11/20/2020	Information Letter 20-1 Procedure Edits / Drive Shaft Spec
1/27/2020	Information Letter 20-2 Criteria for Multiple Test Type Calibration
6/1/2020	Mild Severity Shift Task Force Formed
9/11/2020	Information Letter 20-3 Correction to Table 12
10/14/2020	Information Letter 20-4 (1) Correcting PCV Flow Meters (2) Correction to Section 12.1.1
4/8/2021	Oil 271 Suspended from use due to mild results
9/17/2021	Information Letter 22-1 Engine run limits, honing procedure, connecting rod orientation, blowby gas thermocouple orientation
05/03/2023	Information letter 23-1. Use oil 271 as a discrimination oil