Sequence V Surveillance Panel Meeting
November 29th, 2021 1:30 PM EST, via Webex

Roll Call:

Afton:	B. Campbell, B. Maddock
ExxonMobil:	A. Meier, A. Montufar
Ford:	M. Deegan, R. Zdrodowski
General Motors:	M. Hopp, N. Siebert, K. Zreik
Haltermann:	P. Tumati
HCS Group:	I. Gabrel
Infineum:	D. Boese, C. Laufer, C. Leverett, A. Ritchie (Chair)
Intertek:	J. Franklin, A. Lopez
Lubrizol:	J. Gingerich, A. Stevens
OHT:	J. Bowden
Oronite:	R. Stockwell
PSL Services:	C. Taylor
SwRI:	D. Engstrom, M. Lochte, T. Kostan, P. Lang
TEI:	D. Lanctot
TMC:	R. Grundza
Valvoline:	A. Savant

Meeting Summary:
The fuels contract has been signed by Haltermann. The new batch of fuel is expected to start in January and it is reasonable to expect the approval tests can start in February. 7 out of the 8 tests with 1011-1 have been reported to date and the panel will wait for the 8th test to be reported before introducing 1011-1 and setting targets. The panel reviewed a draft of the semi-annual B report, which focused on open action items to address test variability concerns and on the LTMS charts.

New/Open Actions:

1. From March 26th meeting: **Lab engineers** to meet to investigate severity shifts (share operational data, build data, ratings, etc.). 4 out of 5 lab inspections were recently completed by TMC and reports sent to OEM sponsor. Lab/Stand severity Task Force call scheduled for December 13th and lab engineers will make lab visits in early 2022.
2. From Sept 9th meeting: **Statisticians Group** led by Doyle Boese (Infineum) to provide update around potential ways to improve current lab-based system. Interim recommendation is to not adopt a stand-based system.
3. From Feb 25th meeting: **Robert Stockwell (Oronite)** to lead task force on obtaining clarity around test validity, QIs, 2 hours of no data, etc. (CLOSED)
4. From Sept 9th meeting: **Haltermann** to report monthly inventory via email to V SP. Monthly updates are being provided.
5. From June 24th, 2020 meeting: **Haltermann** to look at fuel data from Sec 8.2.6 requirement and report back to panel.
6. From today's meeting: **Haltermann** to include extra column in fuels data to indicate which fuel goes with which test.

Next call: Monday, December 13th, 2021 @ 11 AM EST, via Webex

Meeting Details:

Agenda:

1. Opening remarks
2. Fuel contract update and outline of plan to proceed
3. 1011-1 new data and outline of plan to proceed
4. Ballot D02 (21-04) Revision of D8256: AES ICF
5. Item to address when ballot closes
6. Review of semi-annual report
7. Plan for future calls in December (after 12/13)
8. New business
9. Old business

1. Opening remarks

The Chair announced that Lubrizol's Jerry Brys is retiring. The panel remembers his very significant contributions and most importantly the warm friendship and support he has provided to so many panel members over the years. The panel congratulates and wishes Jerry well!

2. Fuel contract update and outline of plan to proceed

The contract has been signed by Haltermann and sent last week to Mike Lochte, chair of the contract team. The contract is awaiting signatures from the labs. Prasad Tumati (Haltermann) described the plan to prepare the new batch: Haltermann will use the same tank, which currently has 108,000 gal. Once the fuel depletes to about 75,000 gal, Haltermann will offload into ISO tanks and bring in the new components to start blending. Blend is expected to start in January and will take about 4 weeks to complete. It would be reasonable to start the approval tests in February timeframe.

Once Haltermann prepares the blend, the Chair summarized that as before, the same 3 labs Afton, SwRI and IAR will embark on the same 15 test matrix, to evaluate the new fuel batch. The panel concurred with this plan.

3. 1011-1 new data and outline of plan to proceed

Rich Grundza (TMC) shared that the 8th test is close to completing. The 7 results collected so far were shown:

APPARATS	AP50	AP50SA	AP50 adj	AE50	AE50 sa	AE50 adj	AES	SA	AES adj	RAC	RACti	SA	RAC adj
G3	8.58	0.11	8.69	9.26	-0.03	9.23	8.35	-0.02	8.33	9.52	-0.73397	0.2116	-0.5223
G2	8.91	0.11	9.02	9.5	-0.03	9.47	8.69	-0.02	8.67	9.54	-0.7765	0.2116	-0.564
G5	8.71	0.11	8.82	9.44	-0.03	9.41	8.13	-0.02	8.11	9.33	-0.4005	0.2116	-0.188
A2	9.05	-0.01	9.04	9.55	0	9.55	9.12	0.64	9.76	9.48	-0.6539	0.0032	-0.650
A5	8.73	-0.01	8.72	9.2	0	9.2	8.33	0.64	8.97	9.44	-0.5798	0.0032	-0.576
D1	8.6	0.22	8.82	9.4	0.2	9.6	7.96	0.23	8.19	9.44	-0.5798	0.0484	-0.531
G1	9.08	0.11	9.19	9.55	-0.03	9.52	8.15	-0.02	8.13	9.36	-0.4463	0.2116	-0.234
Means	8.808571		8.9	9.414286		9.425714	8.39		8.594286		-0.59582		-0.4670
Std dev	0.205704		0.185921	0.138306		0.156083	0.395432		0.604038		0.139118		0.17974
Target mean	8.67		8.67	9.26		9.26	8.43		8.43		-0.5294		-0.529
Target s	0.48		0.48	0.21		0.21	0.57		0.57		0.1924		0.192

Rich commented that AES, adjusted or unadjusted, falls around the original mean. The precision is about the same as it was for the original 1011 blend. May not be necessary to update the targets for AES. Similar assessment for RAC. A target and adjustment may be needed for varnish parameters (AEV and APV) because the data suggests varnish is milder for this batch. To be determined when the 8th data point comes in, which the panel can look at and discuss soon.

Bob Campbell (Afton) asked if 8 tests were in discussion previously. Rich clarified that when one lab was not able to commit to testing (see page 3 of Oct 15th meeting minutes), we allowed additional tests to be run.

The Chair confirmed the group will need to reconvene soon to set the 1011-1 targets.

4. Ballot D02 (21-04) Revision of D8256: AES ICF

The ballot for AES ICF closes end of the week. Action from this will be determined by the outcome of the ballot. If more than 2/3 finds Amol Savant's negative technically persuasive, this panel will be instructed to rescind the Information Letter and remove the AES ICF. If this is the outcome, Rich Grundza (TMC) explained that we will place a closing date on the ICF and the labs will have to pull the ICF on the tests and rerun SAs to use moving forward.

5. Review of semi-annual report

The Chair reviewed the semi-annual report (see Appendix for slides).

Slide 2 – Candidate Test Activity. VH has seen the most activity in the last 2 reporting periods than we ever have. Amol Savant (Valvoline) asked about whether the reported number of tests were registered tests. Rich Grundza (TMC) clarified these are Part B registered from the ACC website.

Slide 3 – LTMS Lab / Stand distribution. Rich added that Lab E has 1 stand calibrated now.

Slide 4 – Industry Reference Severity Summary. Rich explained that this is a snapshot of where we are in this reporting period. One can see that RAC is about 5 tenths standard deviation units mild, AES is severe by about 4 tenths standard deviation units, and APV and AEV are on target.

Slide 5 – Status of the VH reference oils. Note that the charts in the subsequent slides will be somewhat unrepresentative because they do not include the recent 1011-1 data. Charlie Leverett (Infineum) asked how much of 940 and 931 we have remaining. Rich confirmed we have more than 5 years' worth of 931 and about 1.5-2 years' worth of 940 remaining.

Slide 6 – Seq VH 2Q 2021 Activity.

Slide 7 – Open actions.

1. 4 out of 5 lab inspections were recently completed by TMC. Inspection reports were sent to the labs, OEM sponsor, and TMC management. Lab/Stand severity Task Force call scheduled for December 13th and lab engineers as a group will make lab visits in early 2022. The Chair checked if each of the calibrated labs are ok to look at the stand set ups and try to find the answers to some of the panel's concerns:
    - Al Lopez (Intertek) – yes
    - Dan Engstrom and Pat Lang (SwRI) – yes
    - Bob Campbell (Afton) – yes
    - Andrew Stevens (Lubrizol) – yes, depending on travel restrictions, but as he's relatively new, Andrew asked for clarification on the intent of the visits. The Chair replied the intent is for the labs to get together to try to address some of the concerns we have. Bob suggested to tie it together with IX and X visits, citing travel efficiencies. The Chair raised concerns that the V must get the full focus of the engineers group.
    -

    Al Lopez (Intertek) asked what prompted this to investigate severity shift and what the problem is that we're trying to fix. Rich Grundza (TMC) stated that there are concerns about differences in lab severity. The Chair added that there are people who feel this needs to be given higher priority and more focus and the panel needs to respond and address it. Al pointed to the 1011-1 data that was shared today which looks ok and asked the group if there is a concern with the data. Mike Deegan (Ford) commented that this is about trying to get a better understanding of our trends and given all the discussions the past several months about correction factors, it would be good to ensure that the labs are all running the same way. Nathan Siebert (GM) agreed and explained that the group should not be applying correction factors and more math at the problem, but rather should be looking at hardware, etc. to understand where the variation is coming from. Caroline Laufer (Infineum) reminded the panel about the discussion we had on March 26th when TSA, ICF topics were debated. She highlighted top of page 5 of the minutes where members of the panel agreed that when there's an inflection in the CUSUM plots, there's an assignable cause that should be investigated; and with support from the labs, TMC, the OEM sponsor, and the Chair, it was agreed to form a group to start sharing data (operational data, build data, etc.) to help resolve some of these differences. In principle, Al agreed with the action item, but fundamentally, wasn't sure what we're looking for. The Chair stated that we can accept that we want to look at this and try to address any possible improvements that can be harvested from a closer look. Charlie Leverett (Infineum) offered to chair the group, which the panel supported. Nathan commented that this is a good plan and believes this should be a very thorough, much more in-depth look than what the panel has been doing for the last several months.

2. Initial recommendation was to not adopt a stand-based system. Doyle Boese (Infineum) reported that the stats group would look into possibly a hybrid method, a lab/stand system, but have not been able to meet to progress further. A hybrid method may work now but we need to be careful that it doesn't cause any issues down the road. It will be discussed at a future meeting.

3. Robert Stockwell reported that he met with the labs and others to discuss adding additional clarity on what made a valid test but there was no strong support to move beyond what we already have. Consider the action item closed.

4. Haltermann has been providing monthly updates to the panel. The Chair requested that it an additional column be added so we know which fuels goes with which test.

5. Prasad Tumati (Haltermann) sent fuel data to the labs and we will discuss what the next steps are. Bob Campbell (Afton) asked if the data could blind coded so we can review all the data from all the labs. Rich Grundza (TMC) noted that the data should be there on the TMC website.

6. Introduction of 1011-1 with targets set by 8 recent calibration test results. This will occur in the next 2 weeks.

Slides 8-14 – Rich Grundza (TMC) took the panel through each of the charts. He explained that the plot on slide 8 shows the data without the ICF applied. The plot on slide 9 shows the data with the ICF applied, and we appear to be coming back into a period where it might no longer be in control. But he reminded the group to keep in mind that the 1011-1 data hasn't been charted yet. The Chair echoed some earlier comments from Nathan and Amol (page 5 of June 16th meeting minutes) that suggest application of the ICF might have been premature because the chart on Slide 9 shows it might be going under the line. The Chair acknowledged the good arguments but at the time, the panel made what we thought was the best decision with the data we had but can see how the chart appears to have corrected itself. Pointing to the fact that now we appear to be on the low side, Nathan Siebert (GM) asked how the panel will address this. Amol Savant (Valvoline) agreed and said that falling out on the negative side was already examined in his analysis, where at least 2 labs would be adversely affected by the ICF. Amol reminded the panel that his biggest objection was attributing the mild shift to the fuel. His analysis found that fuel effect was not significant (see page 7 of June 14th meeting minutes). Bob Campbell (Afton) noted that slide 11 shows we're in a better place with the ICF. Amol commented that the stands would have likely failed calibration without ICF, at which point, it should be investigated, and we should not keep moving the goal post. For the RAC chart (slide 12), Nathan pointed out the irony of the panel not addressing this when it looks very similar to AES. The Chair understands the point as RAC is a part of the AES, but the statistician recommendation was that RAC was borderline significant. Varnish parameters never had an issue but Rich noted that CUSUM suggests a milder shift over time but in reality, it's moving around.

The Chair thanked TMC for their significant support, and announced that the panel will meet next week and endeavors to develop a better test for everyone who uses it to support the qualification of their products.

6. Plan for future calls in December (after 12/13)
7. New business
None.

8. Old business

Bob Campbell (Afton) motioned to approve the following minutes. Seconded by Charlie Leverett (Infineum). All in agreement.

March 26th:
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20210326ConferenceCall.pdf

June 14th:
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20210614ConferenceCall.pdf

June 16th:
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20210616ConferenceCall.pdf

September 9th:
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20210909ConferenceCall.pdf

October 15th:
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20211015ConferenceCall.pdf

Meeting adjourned at 3:34 PM EST.

Appendix: Sequence VH SP report to B December 2021.ppt (final version shared with B, includes all comments/edits from Nov 29th SP meeting)

Slide 1:

Sequence VH S.P. (ASTM D8256)

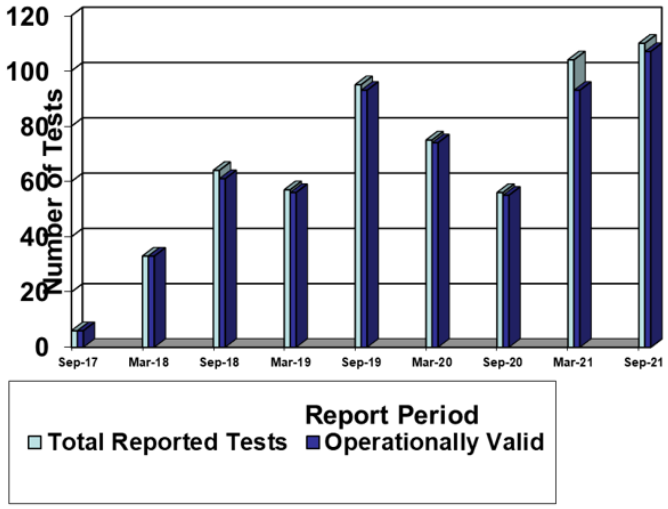
Semi-annual Report to Subcommittee D02.B

Prepared By: Andrew Ritchie, S.P. Chairman, December 2021

Slide 2:

Sequence VH S.P. Report

Candidate Test Activity



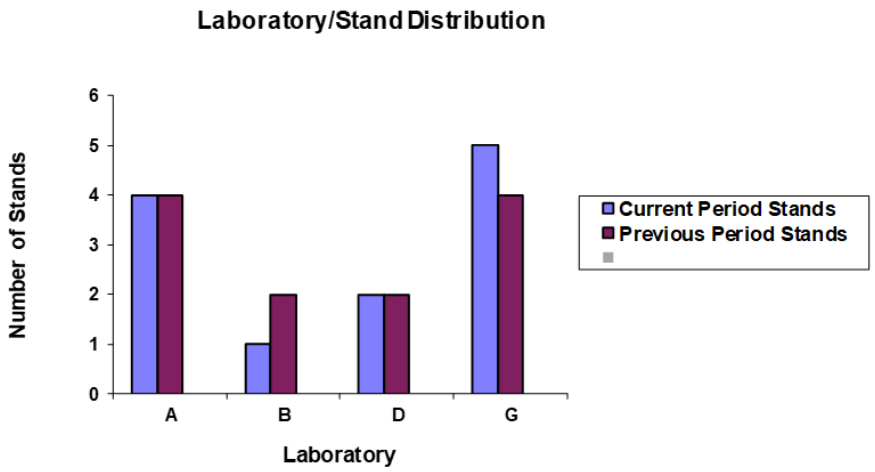
- VH Candidate registration began May 2017
- Over 200 VH candidate tests in last 2 reporting periods

Slide 3:

Sequence VH S.P. Report

LTMS Laboratory/Stand Distribution

	Reporting Data	Calibrated as of 9/30/21
Number of Laboratories	5	5
Number of Stands	13	13



- Lab E is also now calibrated with a single VH stand

Slide 4:

Sequence VH S.P. Report

Industry Reference Severity Summary

6 month time frame

Variable	Pooled s All Oils	Mean Delta/s	Based on	Delta in Reported Units
RAC	0.474	-0.412	8.0	0.52
AES	0.78	-0.53	7.8	-0.41
APV	0.19	0.04	7.5	0.01
AEV	0.31	-0.00	8.9	-0.00

Slide 5:

Status of VH Reference Oils

- ***1011*** *SAE 0W-16 passing reference oil*
  - *8 recent VH tests on reblend 1011-1*
  - *Targets need to be set to introduce it*
  - ***Without these tests in the charts there is very little recent chartable data***
- ***940*** *SAE 5W-30 failing reference oil.*
  - *940-1 will be introduced next year*
- ***931*** *SAE 0W-20 borderline reference oil.*

Slide 6:

Sequence VH 2H 2021 Activity

- High testing levels around dexos GEN 3 approval work.
- Status of current fuel batch.
  - About 108,000 gallons remain at fuel supplier.
- Fuel contract team separated from SP, recently selected the fuel supplier for the next fuel batch. Contract is signed.
  - New fuel batch will be around 400,000 gallons
  - Timing is now extremely tight and matrix testing to approve the new fuel must start as soon as possible.
- TMC conducted 4 out of 5 Sequence VH lab visits.
  - In 2 cases no findings were reported
  - In 2 cases small exceptions were noted and corrected
  - Remaining lab for inspection was on hold due to COVID restrictions
- Lab/Stand Severity Task Force will convene on December 15th and proceed with lab visits in early 2022.
- Parts check for life of ILSAC GF-6 reported no concerns at this time.
- Industry correction factor (ICF) for AES (-0.32)
  - Information Letter IL 21-01 was balloted by Subcommittee B and outcome will be reported shortly
  - Impact of the AES ICF is covered in the following slides.

Slide 7:

Open Action Items from SP

1. From March 26th meeting: **Lab engineers** to meet to investigate severity shifts (share operational data, build data, ratings, etc.). 4 out of 5 lab inspections were recently completed by TMC and reports sent to OEM sponsor. Lab/Stand severity Task Force call scheduled for December 15th and lab engineers will make lab visits in early 2022.
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Links to above meeting notes:

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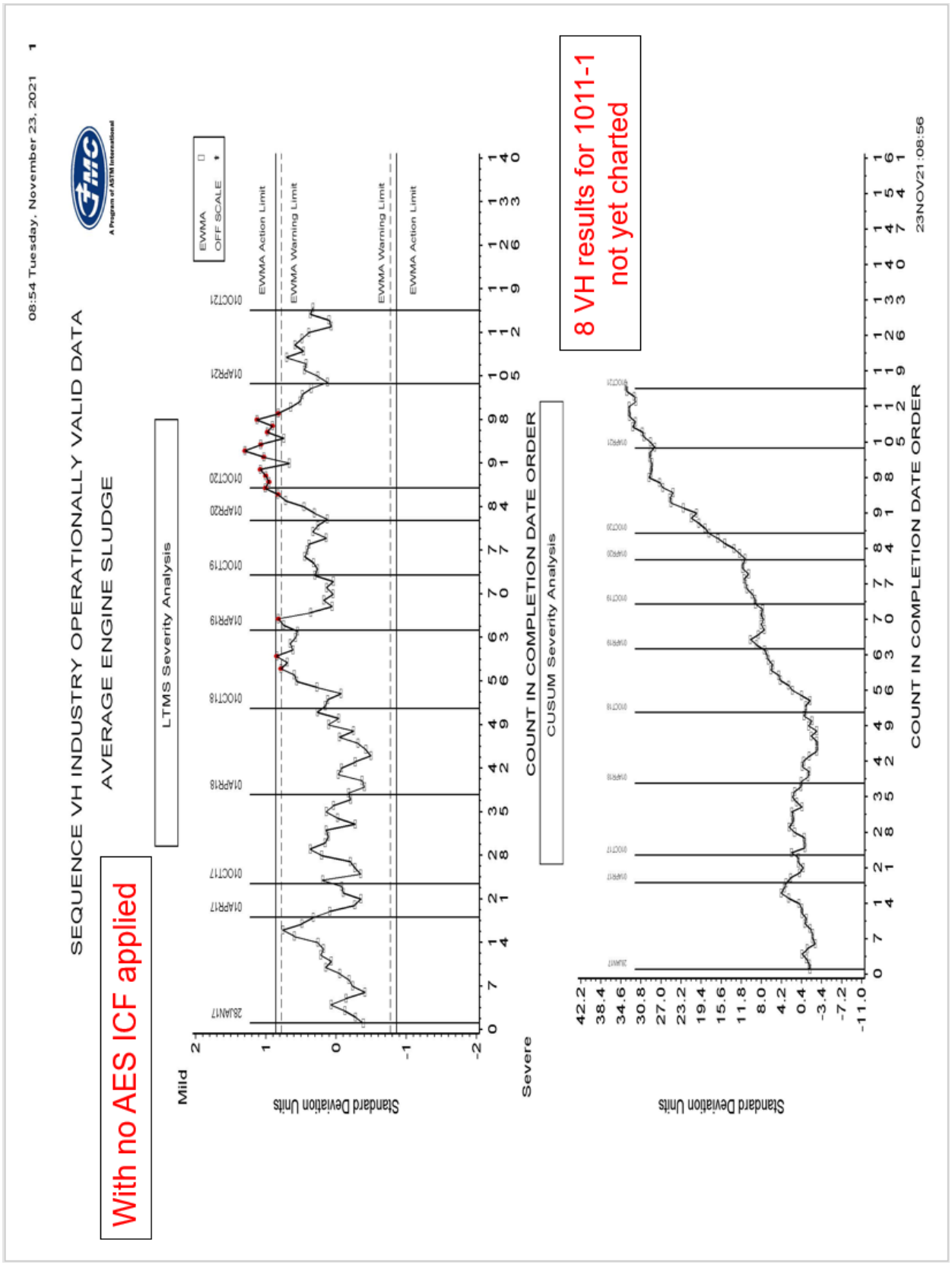
Sept 9th meeting /
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20210909ConferenceCall.pdf

Feb 25th meeting /
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20210225ConferenceCall.pdf

June 24th, 2020 meeting /
https://astmtmc.org/ftp/docs/gas/sequencev/minutes/VMinutes20200624ConferenceCall.pdf

Slide 8: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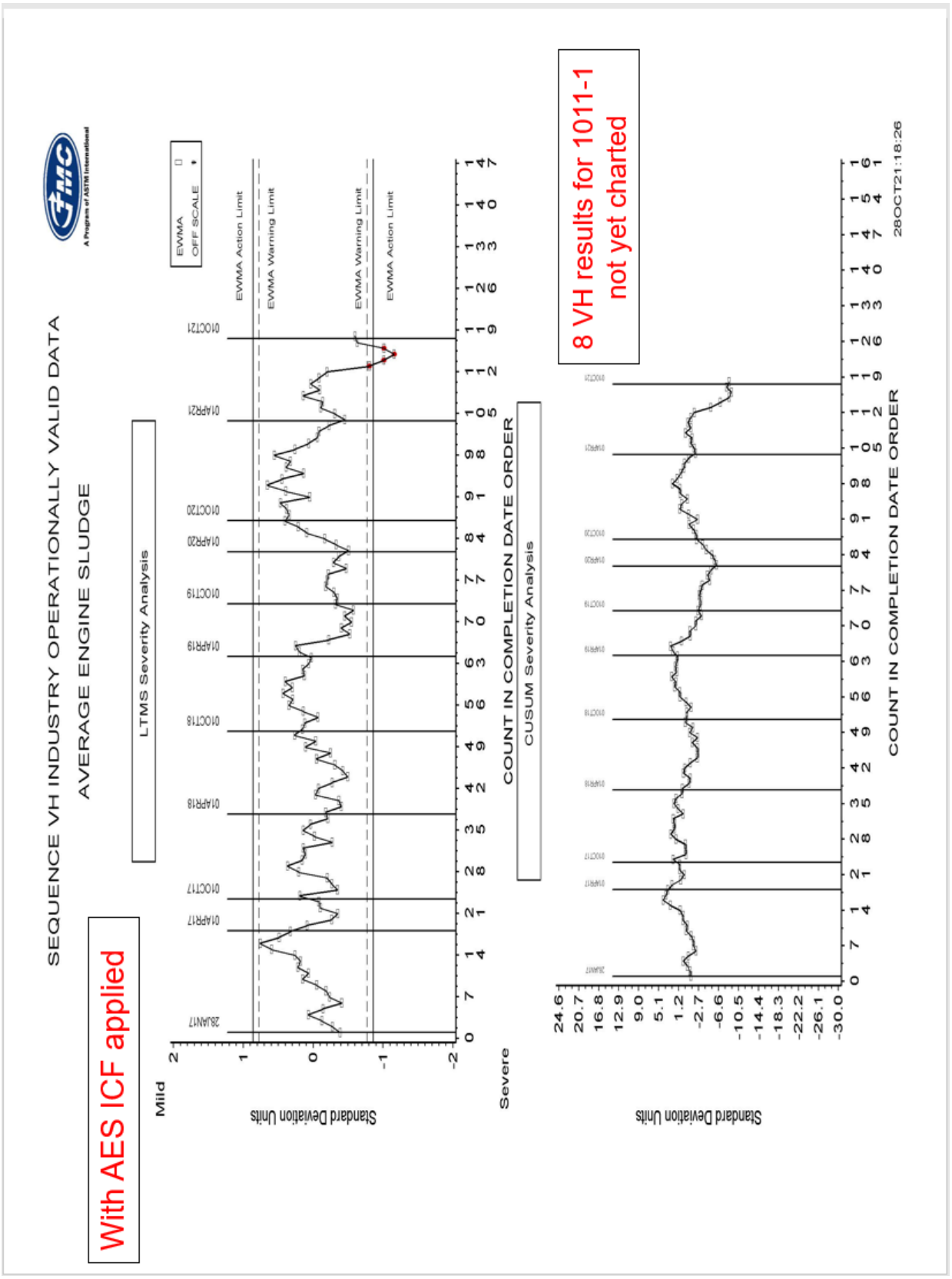
SEQUENCE VH INDUSTRY OPERATIONALLY VALID DATA
AVERAGE ENGINE SLUDGE
With no AES ICF applied
LTMS Severity Analysis
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Mild
Severe
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
8 VH results for 1011-1 not yet charted
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
23NOV21:08:56

Slide 9:


SEQUENCE VH INDUSTRY OPERATIONALLY VALID DATA
AVERAGE ENGINE SLUDGE
With AES ICF applied
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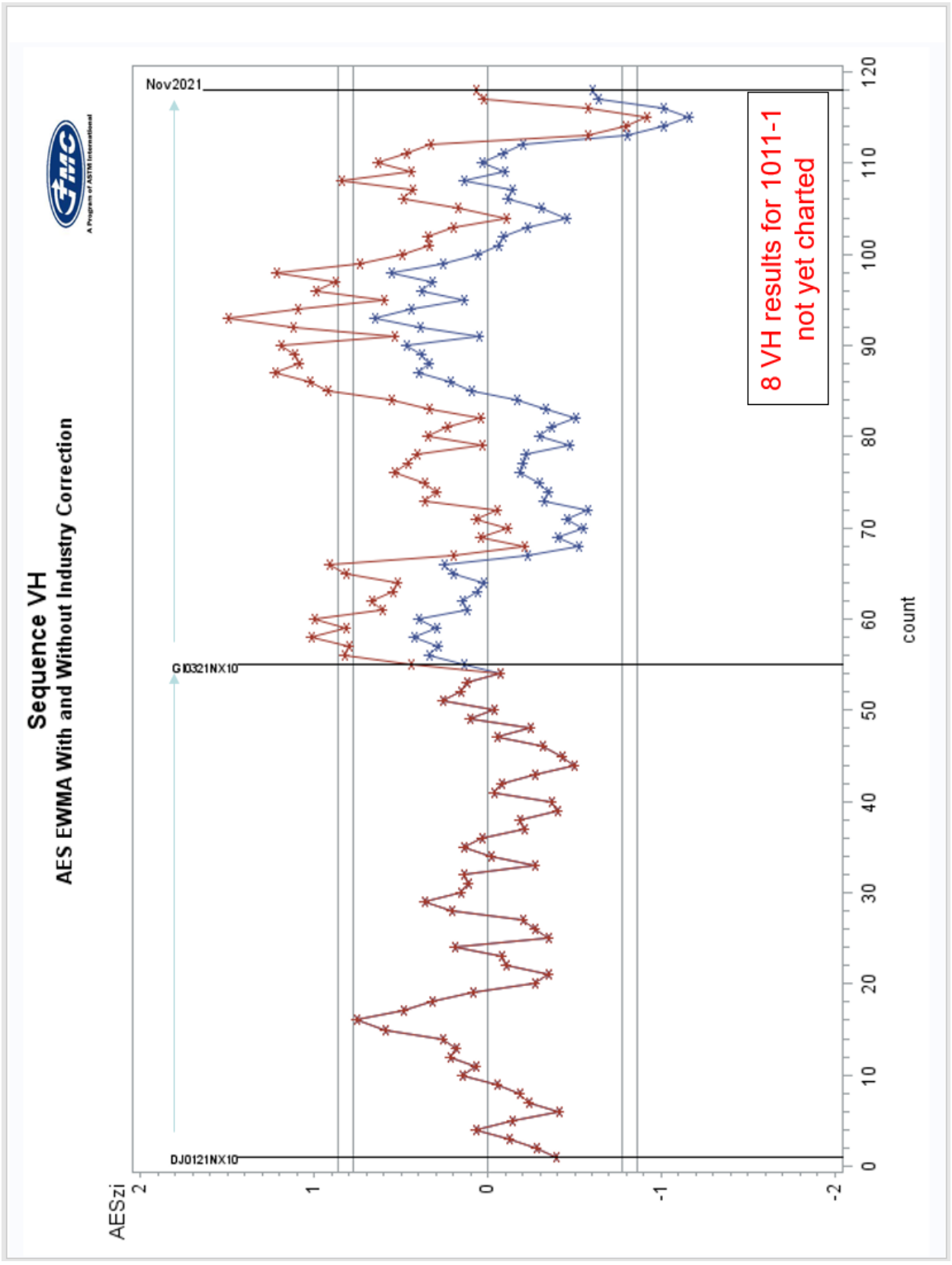
Slide 10:


Sequence VH
AES EWMA With and Without Industry Correction
Nov2021
GI0321NX10
DJ0121NX10
8 VH results for 1011-1
not yet charted
AESzi
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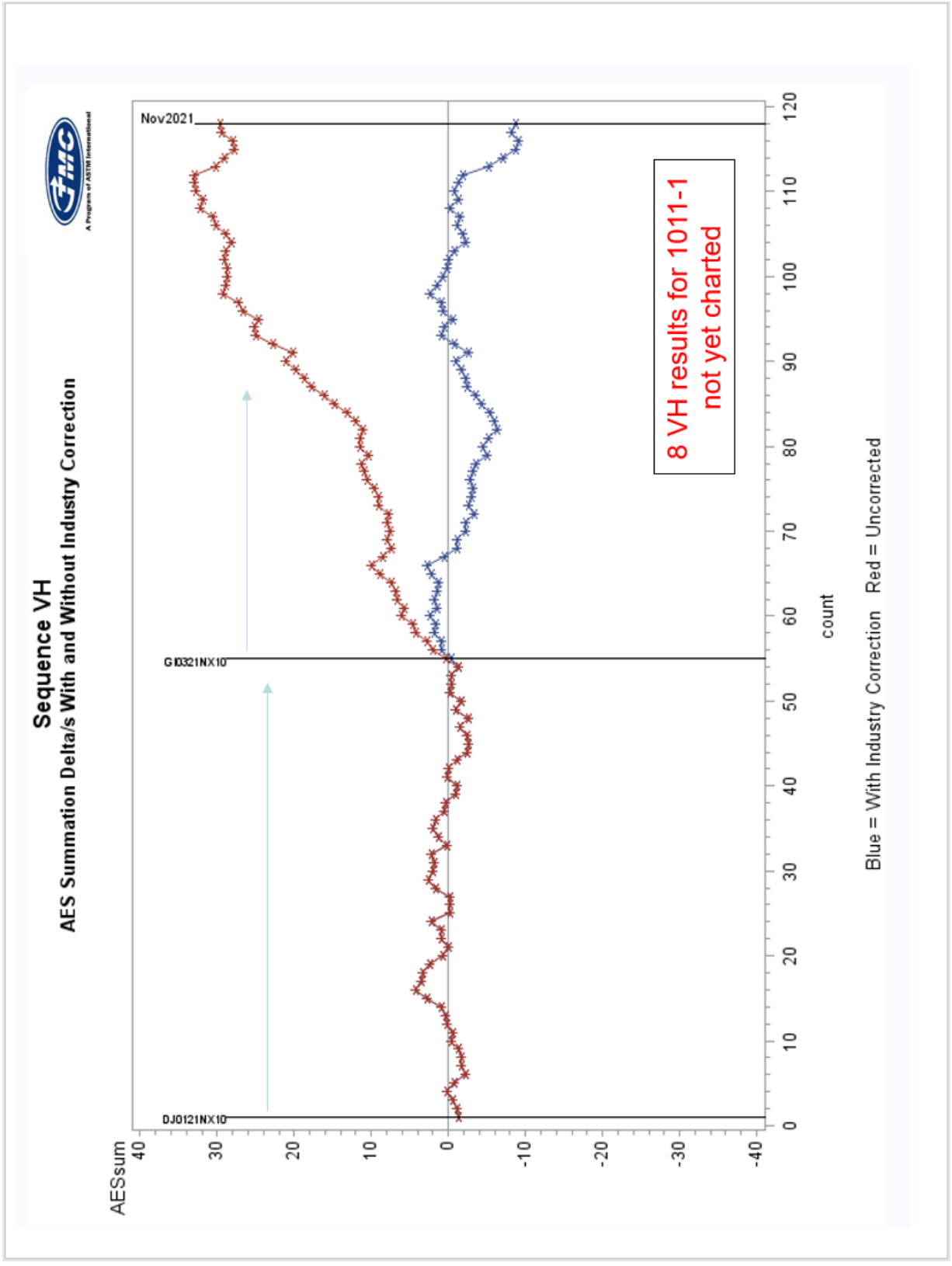
120

Slide 11: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AES Summation Delta/s With and Without Industry Correction
Nov2021
GI0321NX10
DJ0121NX10
8 VH results for 1011-1
not yet charted
AESsum
40
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10
0
-10
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-30
-40
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80
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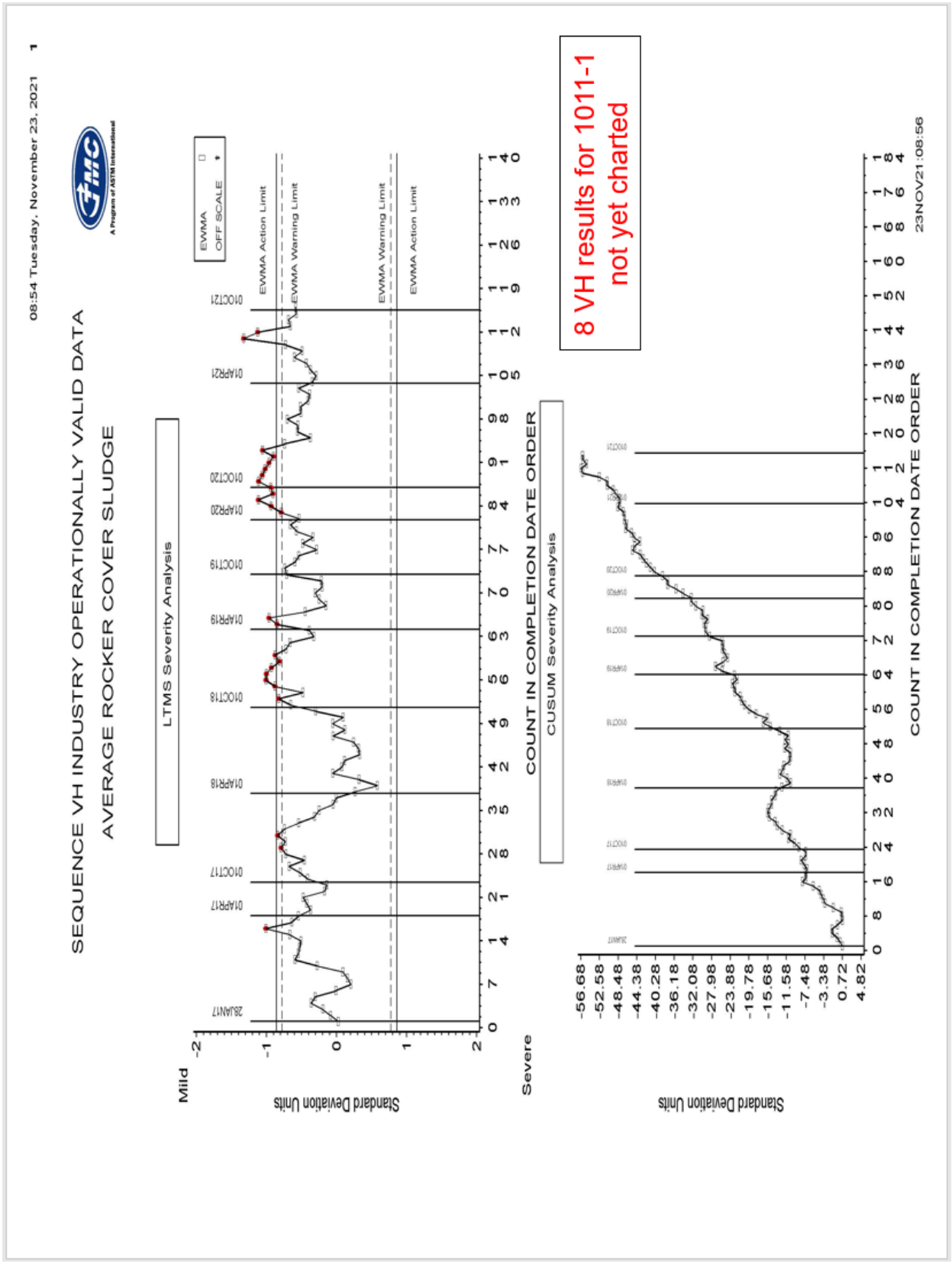
110
120
count
Blue = With Industry Correction Red = Uncorrected

Slide 12: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AVERAGE ROCKER COVER SLUDGE
A Program of ASTM International
LTMS Severity Analysis
EWMA
OFF SCALE
EWMA Action Limit
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Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
28JAN17
01APR17
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not yet charted
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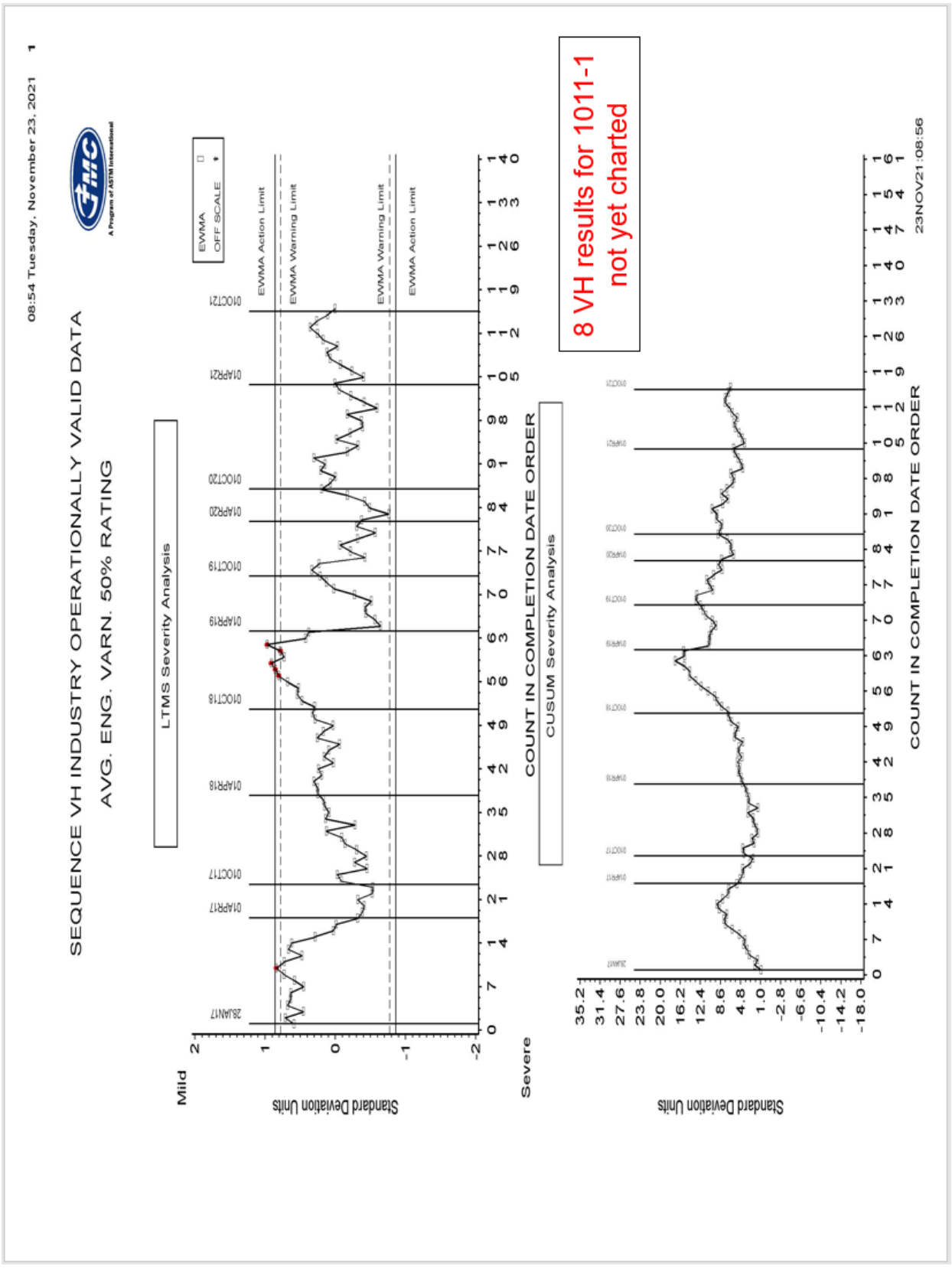
Slide 13: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SEQUENCE VH INDUSTRY OPERATIONALLY VALID DATA
AVG. ENG. VARN. 50% RATING
A Program of ASTM International
LTMS Severity Analysis
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Mild
Severe
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COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
8 VH results for 1011-1
not yet charted
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
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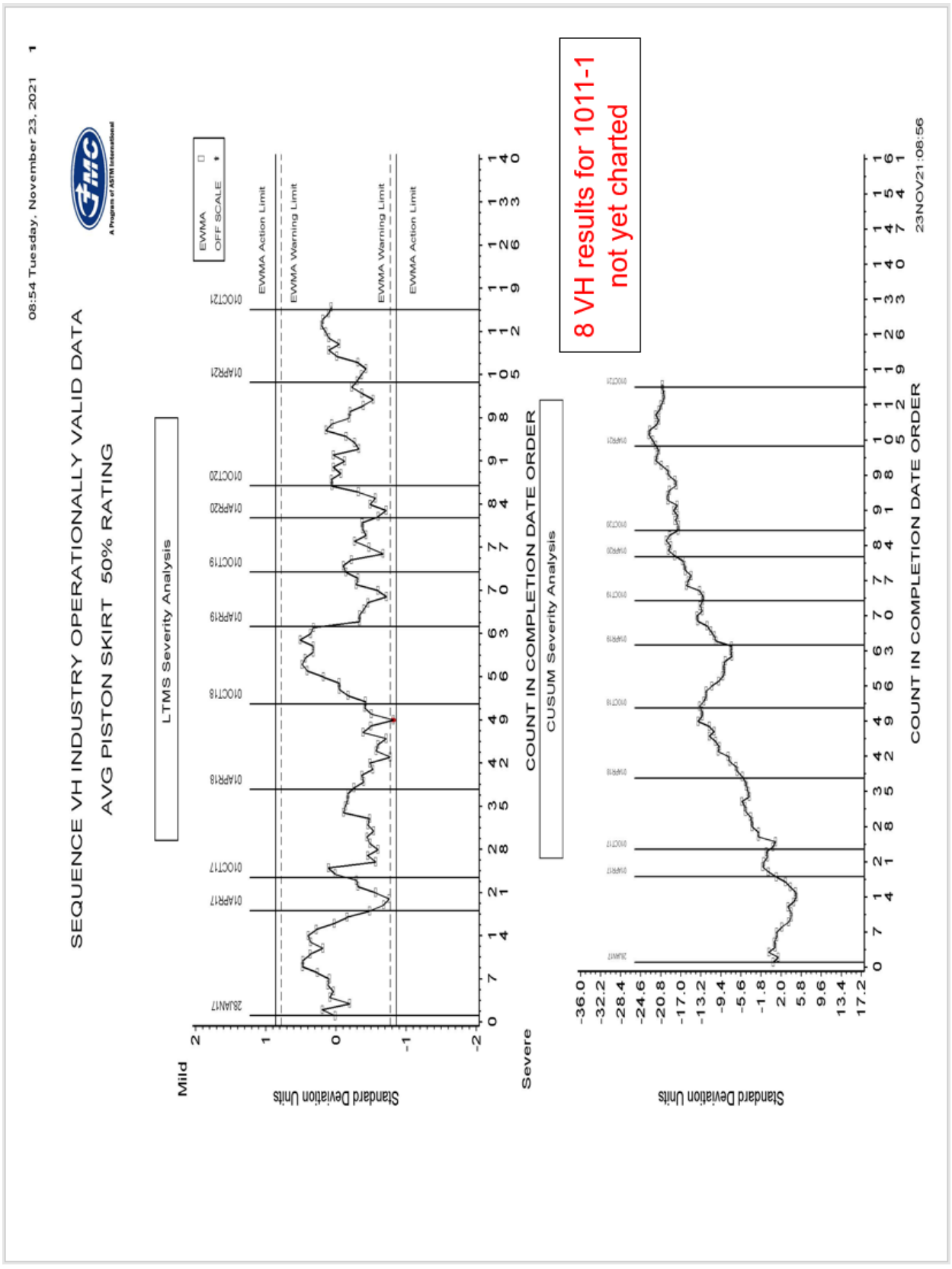
Slide 14: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AVG PISTON SKIRT 50% RATING
LTMS Severity Analysis
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Mild
Severe
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
8 VH results for 1011-1
not yet charted
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
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