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Test Monitoring Center

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ASTM D02.B2 Semi-Annual Report Heavy Duty Reference Oil Testing

Fall 2022

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Heavy Duty Testing

Executive Summary

▶ Test Issues

◦ COAT

- COAT to EOAT equivalency process ongoing.
- Reblend of COAT reference oil 833 has been received and QA testing complete. 833-2 has been approved for use by the TMC.
- Use of 832-1 suspended for reference testing use.

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Calibrated Labs and Stands*

Test	Labs	Stands
1K	2	2
1N	3	4
1M-PC	0	0
1P	1	1
1R	1	1
C13	2	2
ISB	2	2
ISM	3	4
EOAT	1	1
RFWT	1	1
T-8/E	2	2
T-11	3	4
T-12/T-12A	3/3	3/3
T-13	3	3
COAT	2	2
DD13	2	2

*As of 9/30/2022

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SCOTE 1K

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1 K Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	2
Failed Calibration Test	OC	0
Operationally Invalid	LC	1
Aborted	XC	0
Total		3

1 K Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

1 K Lost Tests*

Status	Cause	#
Invalid	Exceeded downtime limit	1
Aborted	No aborted tests	0
Total		1

*Invalid and aborted tests

1 K Test Severity

- ▶ TGF is in warning alarm in the mild direction
- ▶ BSOC is in action alarm in the mild direction
- ▶ All other parameters are in control but TLHC is close to warning alarm in the mild direction

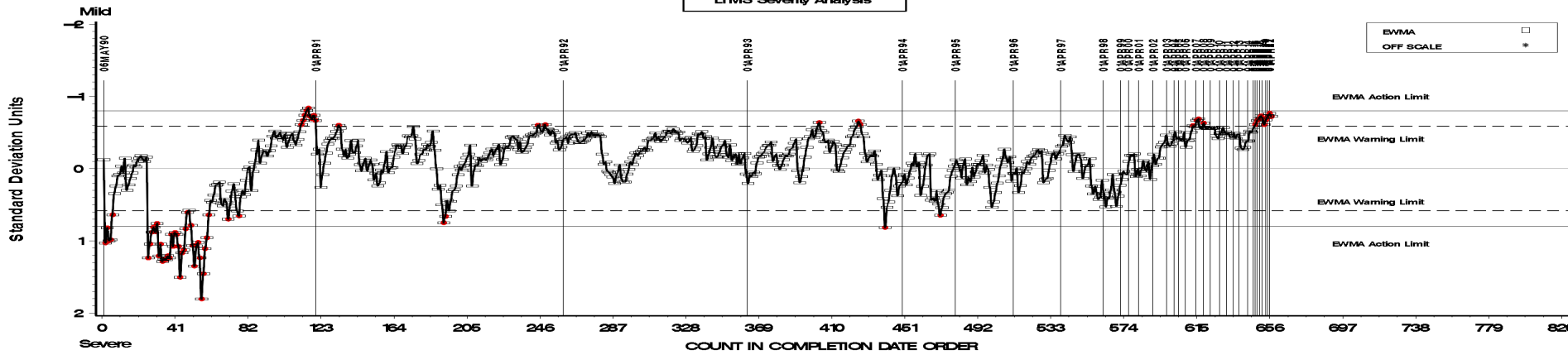
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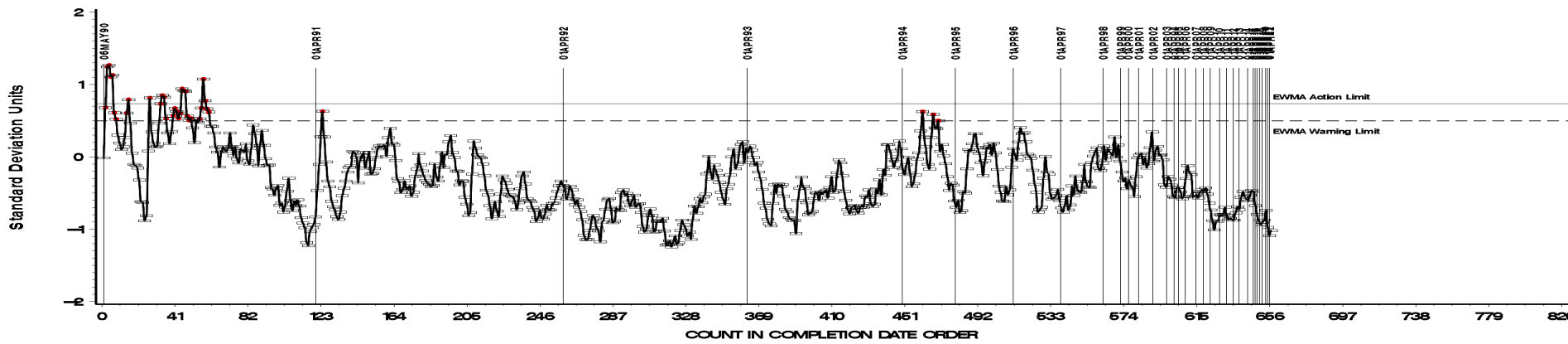
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FINAL TGF

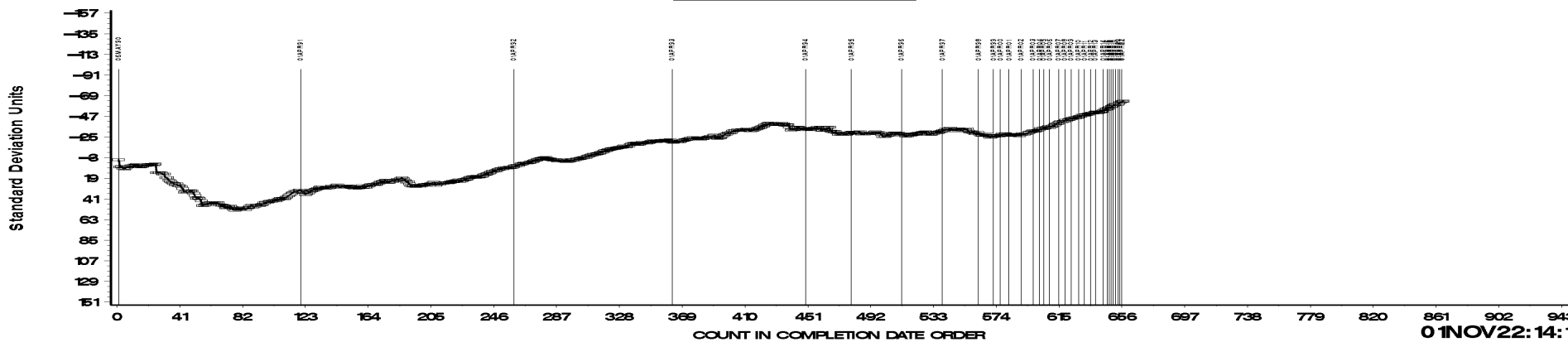
LTMS Severity Analysis



LTMS Precision Analysis



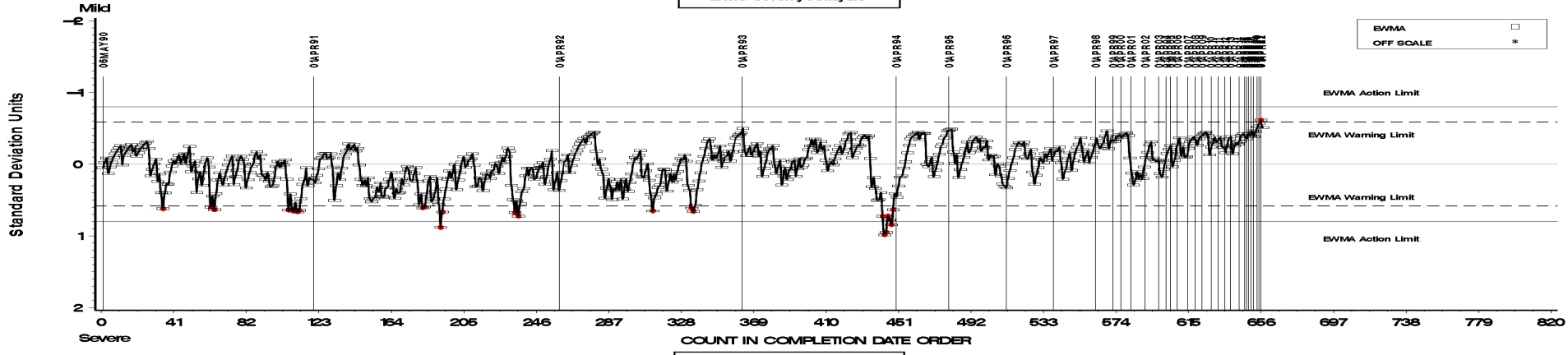
CUSUM Severity Analysis



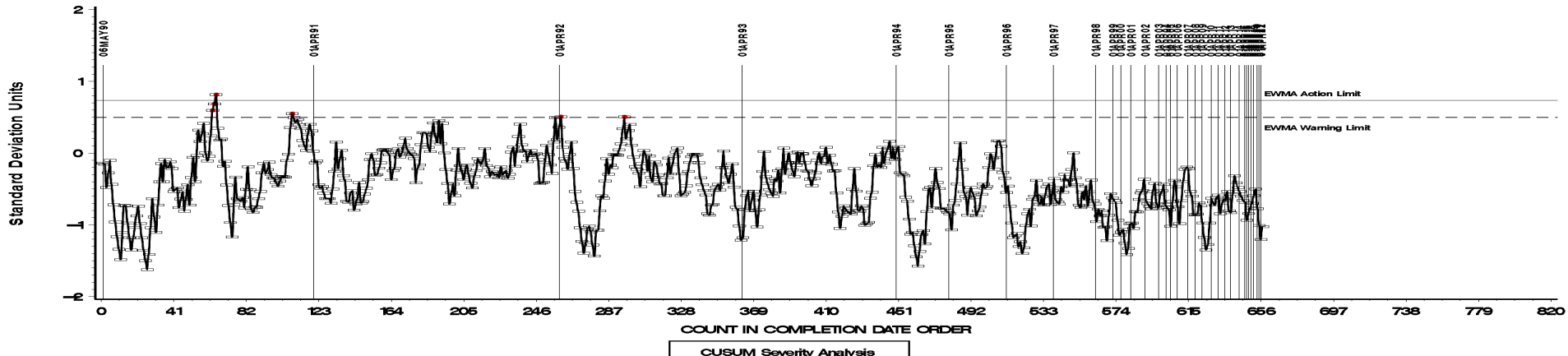


FINAL TLHC

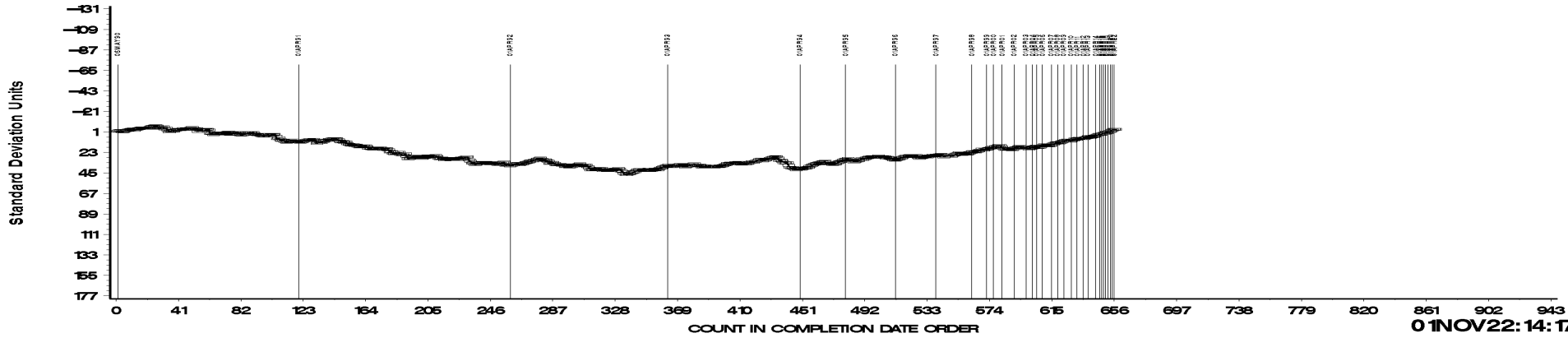
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

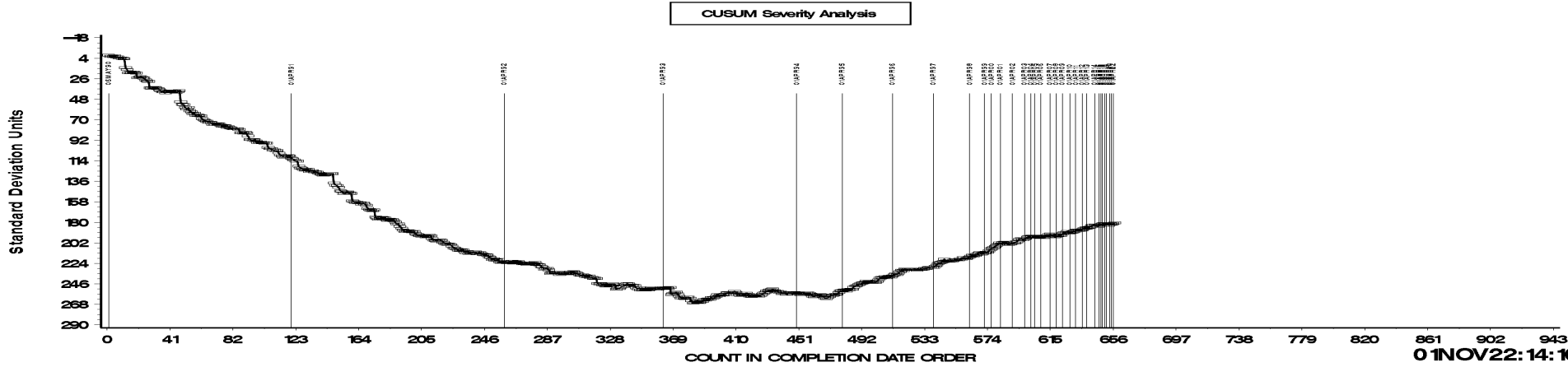
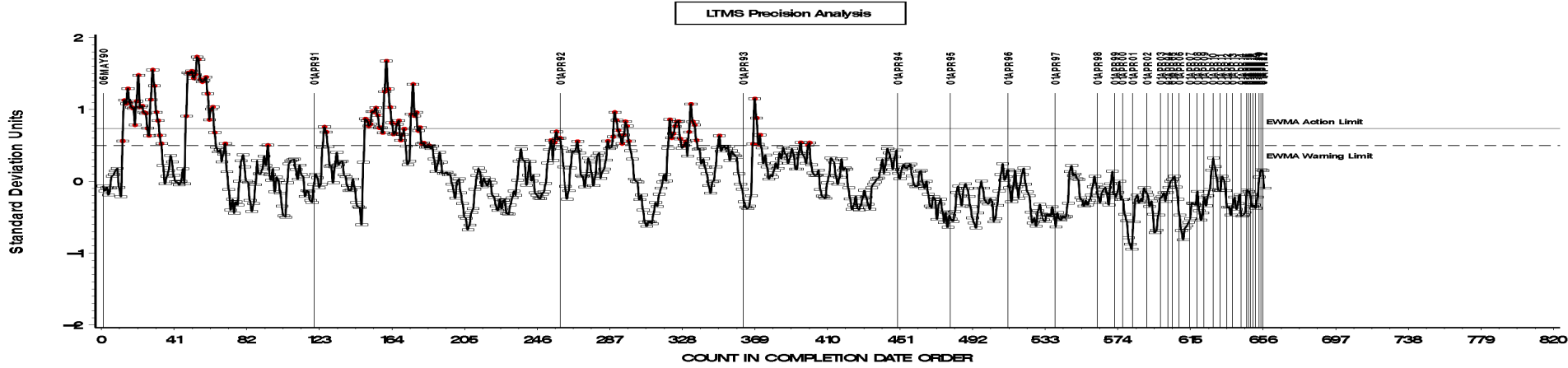
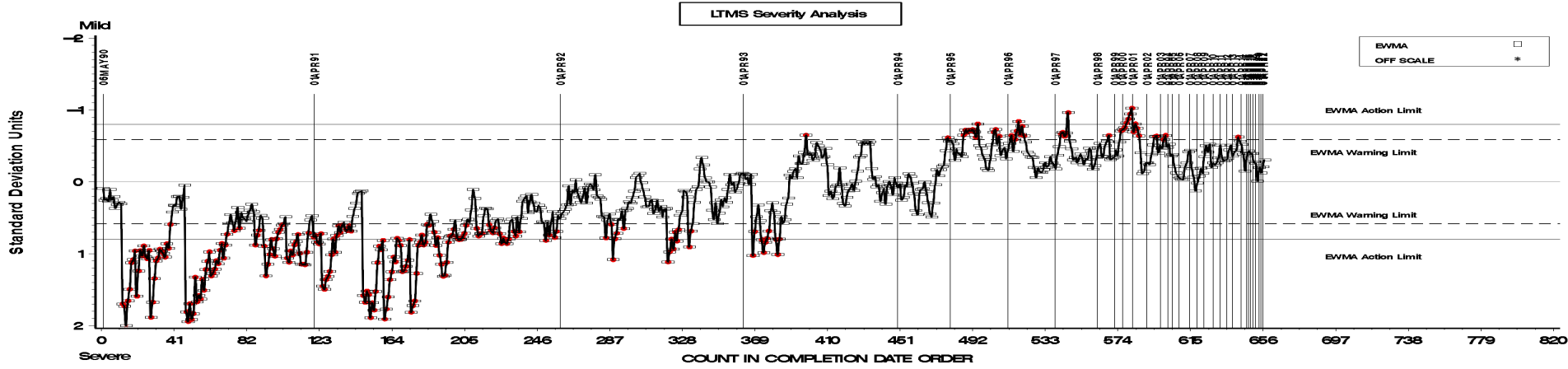


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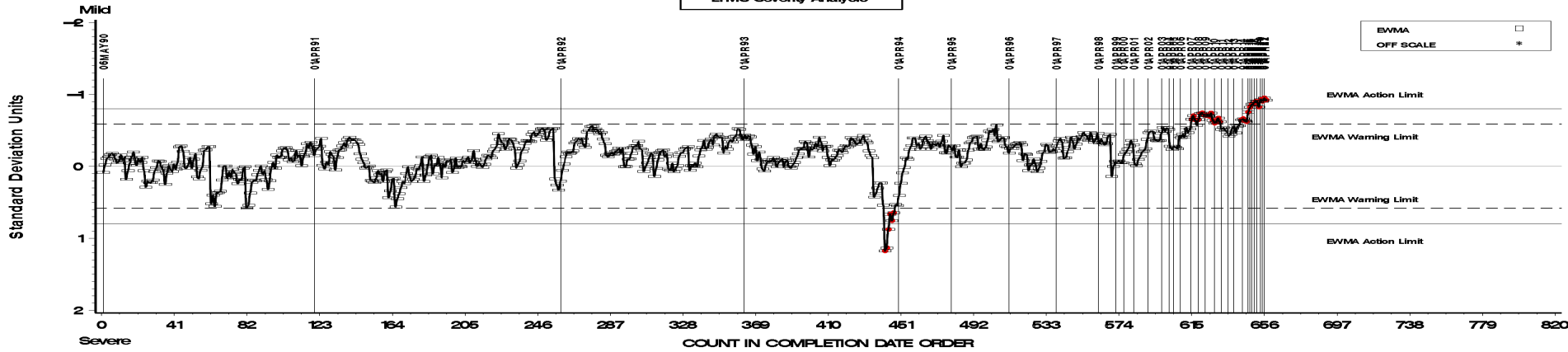
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FINAL Weighted Total Demerits

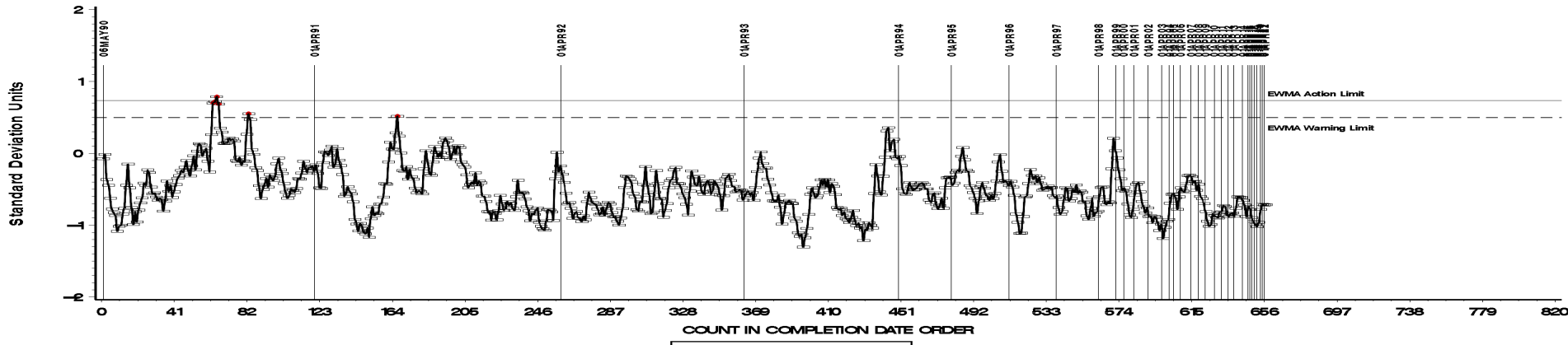


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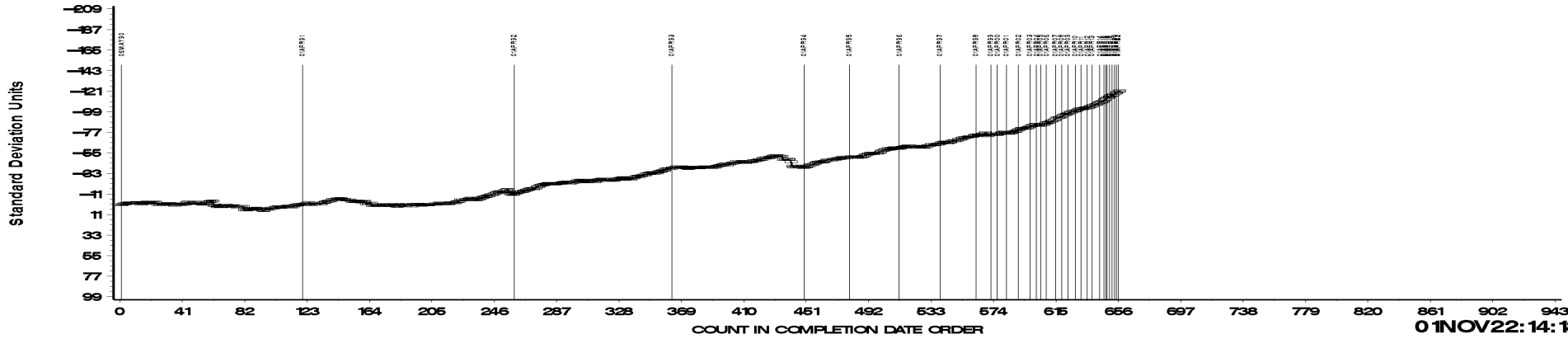
LTMS Severity Analysis



LTMS Precision Analysis

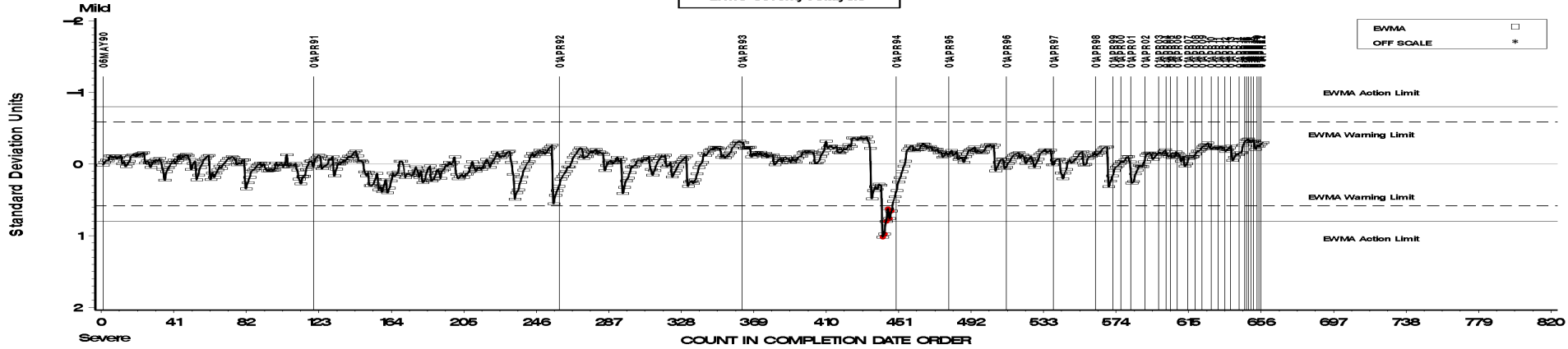


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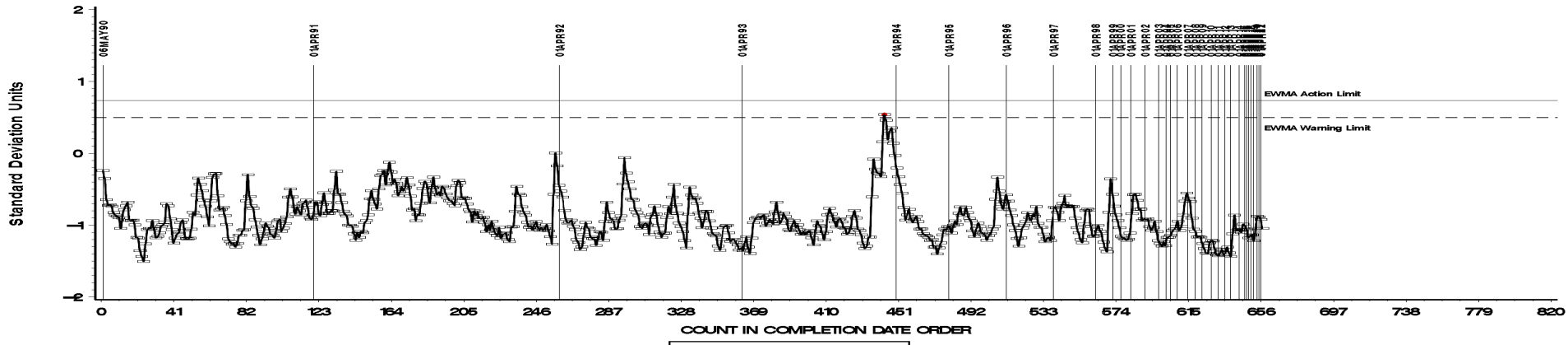


FINAL EOTC

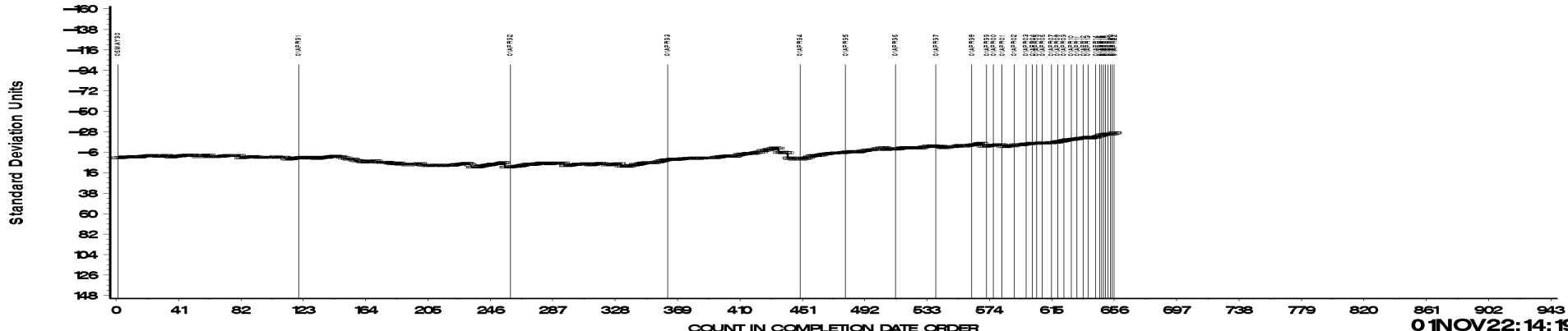
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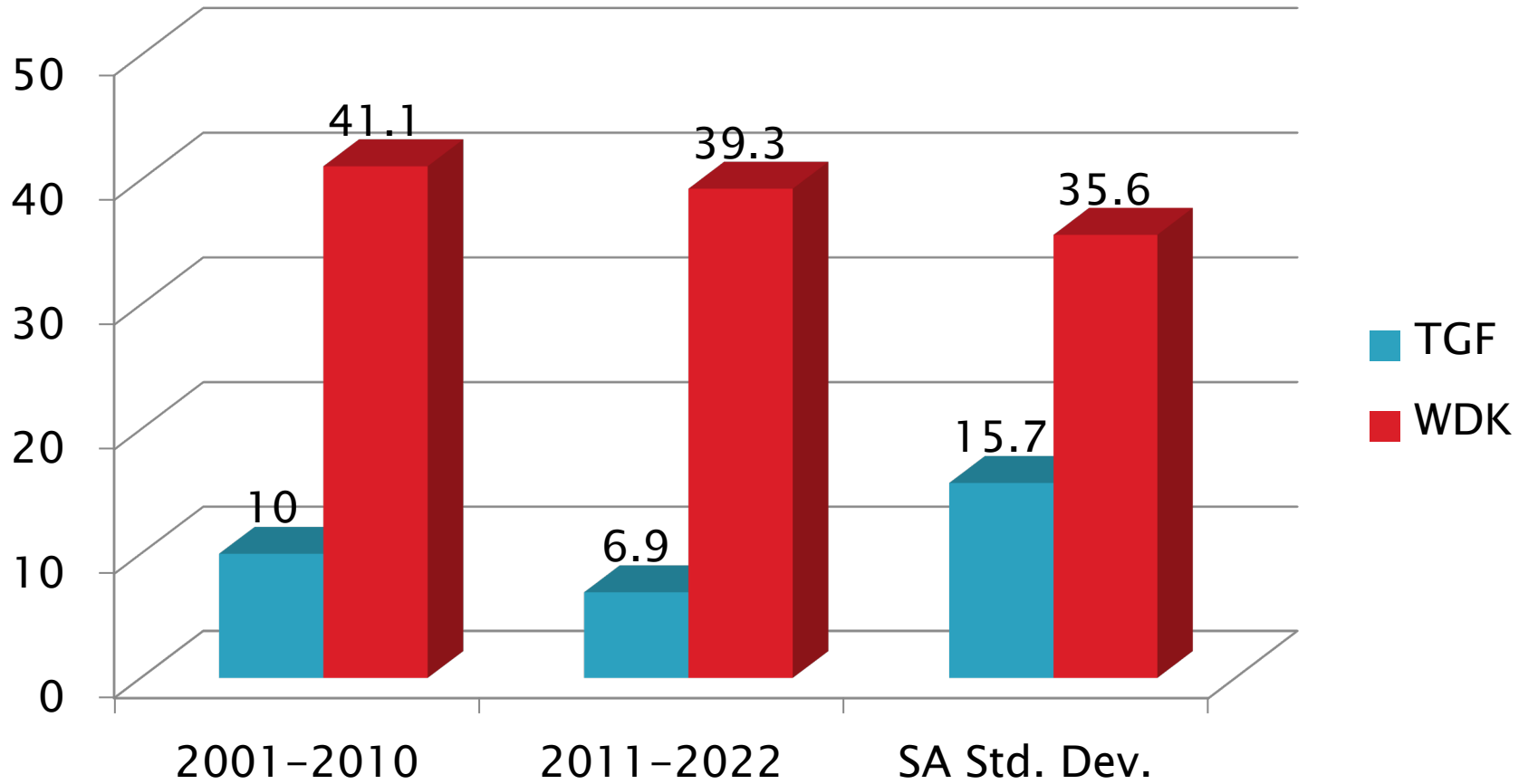
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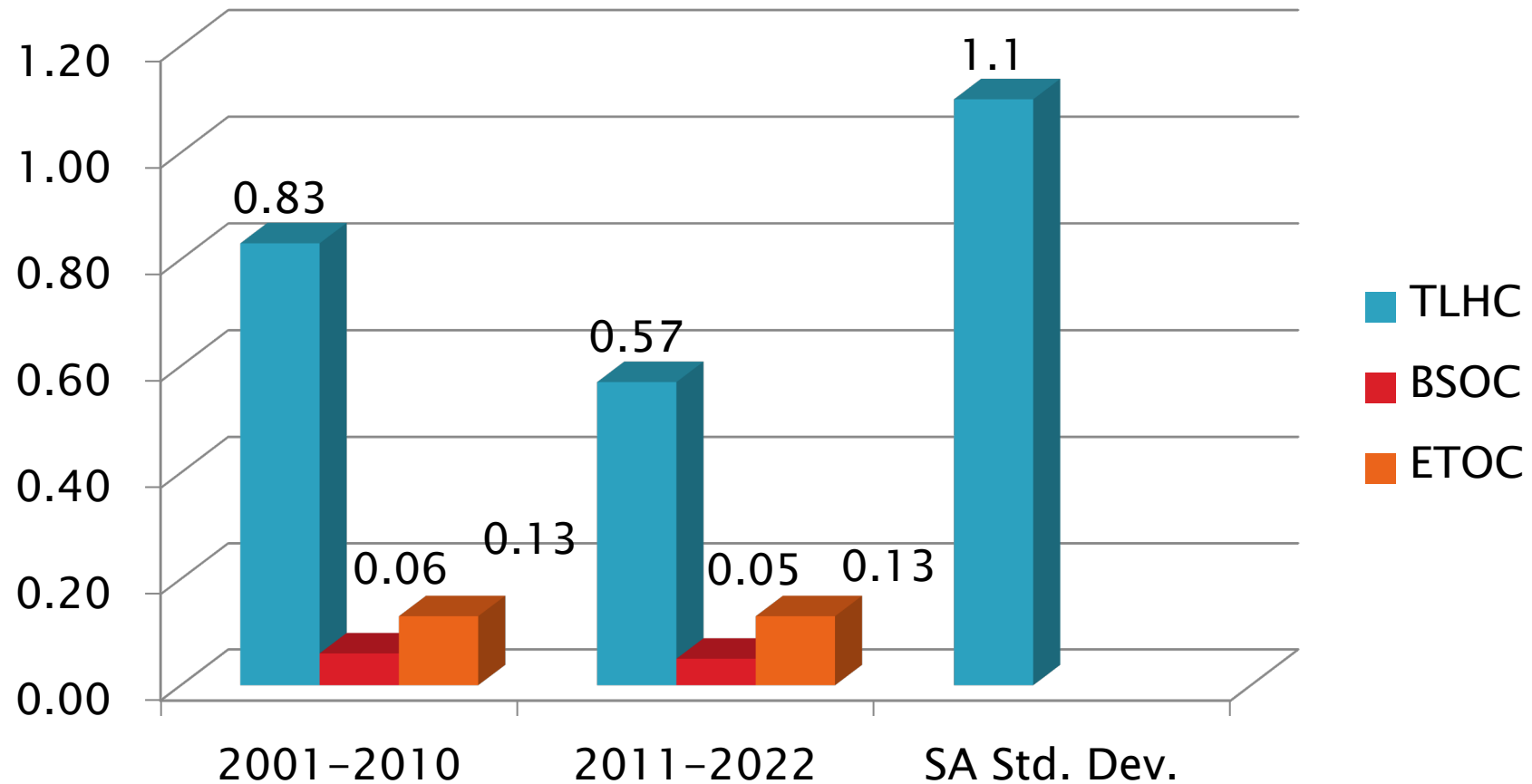
CUSUM Severity Analysis



1 K Precision Estimates



1 K Precision Estimates



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SCOTE 1N

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1 N Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	4
Failed Calibration Test	OC	1
Operationally Invalid	LC	0
Aborted	XC	0
Informational	NN	0
Total		5

1 N Failed Tests

Failed Parameter	Number of Tests
TGF Severe	1
Total	1

1 N Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

1 N Test Severity

- ▶ WDN and BSOC are in severity warning alarm
- ▶ TGF is in precision action alarm
- ▶ TLHC is in control

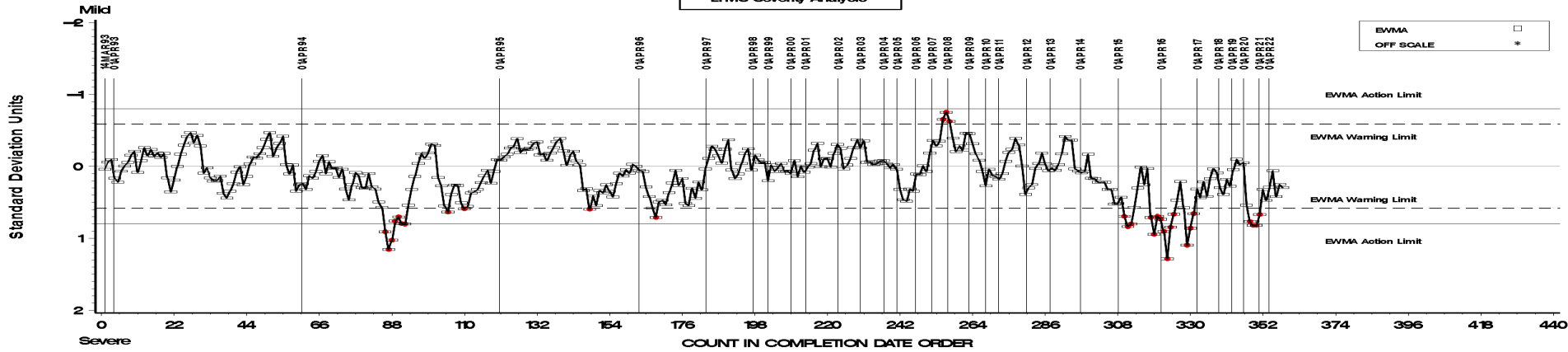
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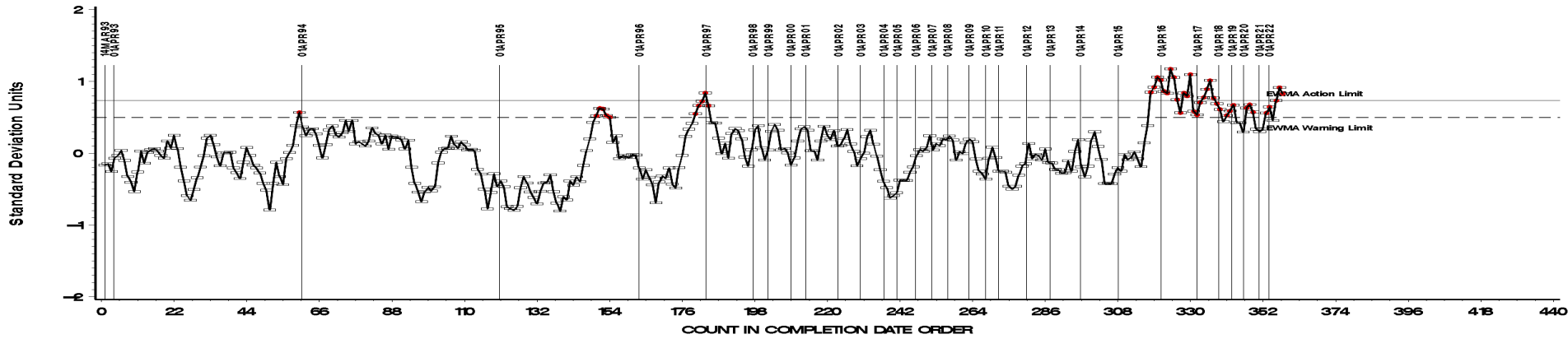
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FINAL CORRECTED TGF

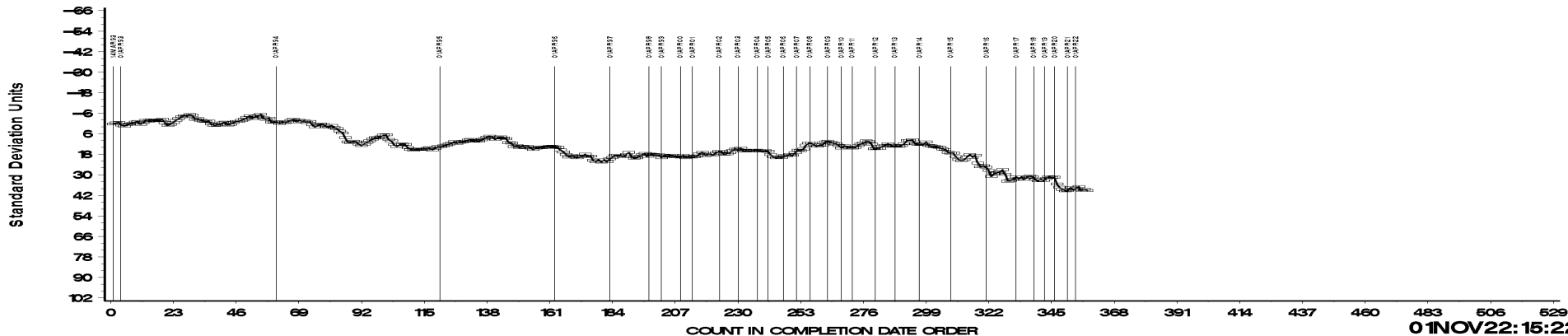
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



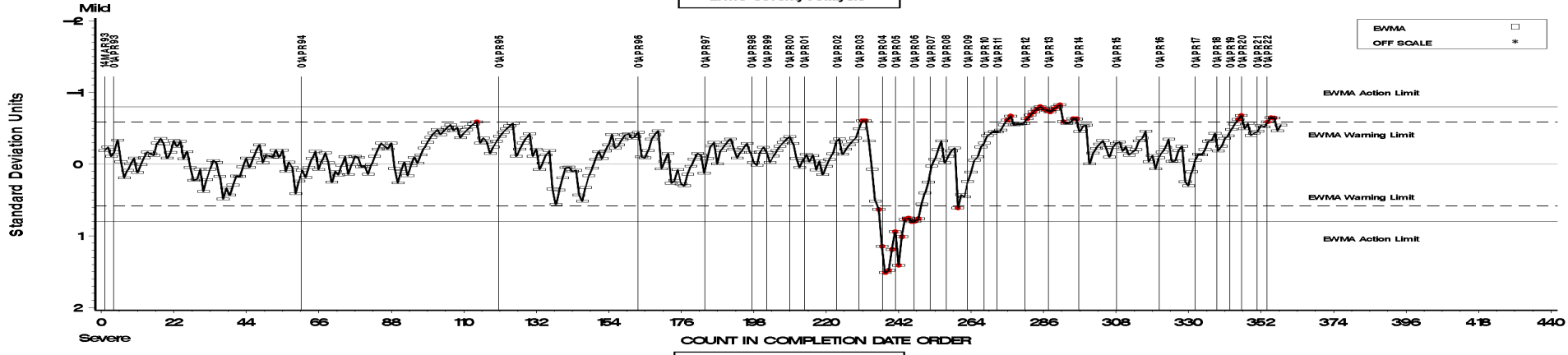
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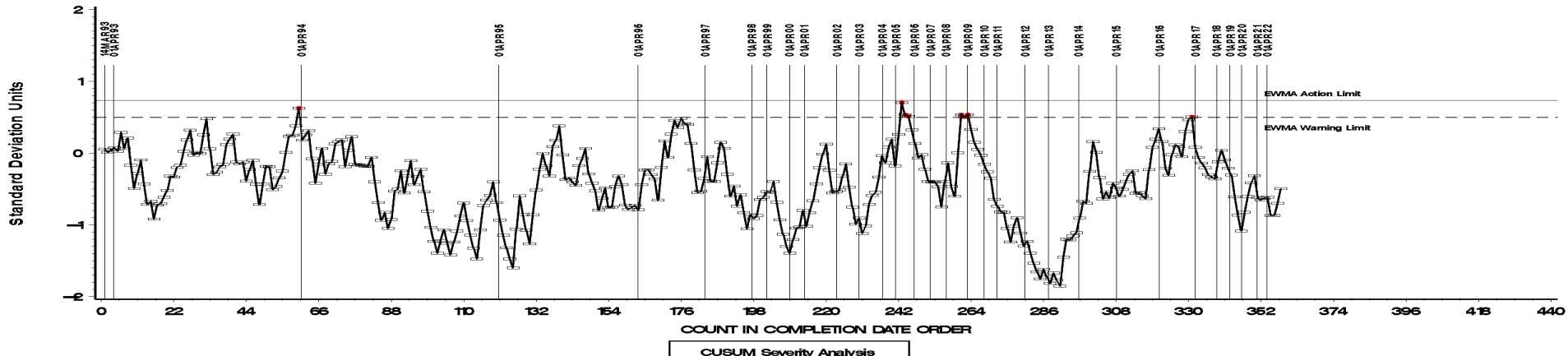
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Top Land Heavy Carbon

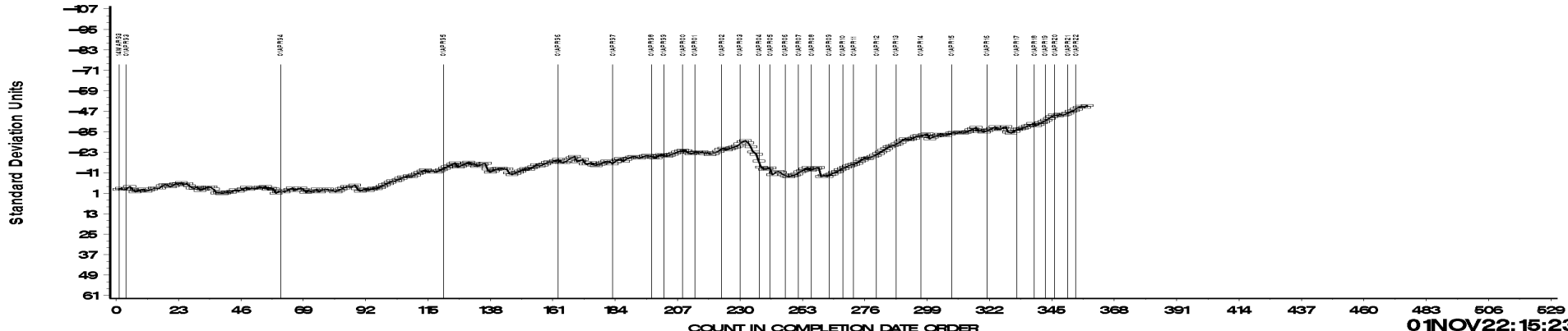
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

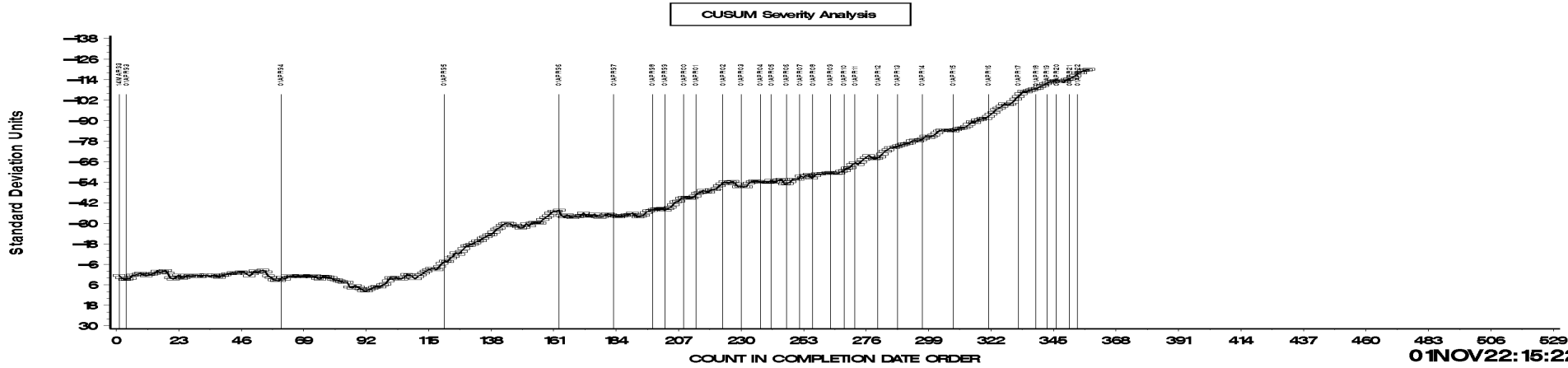
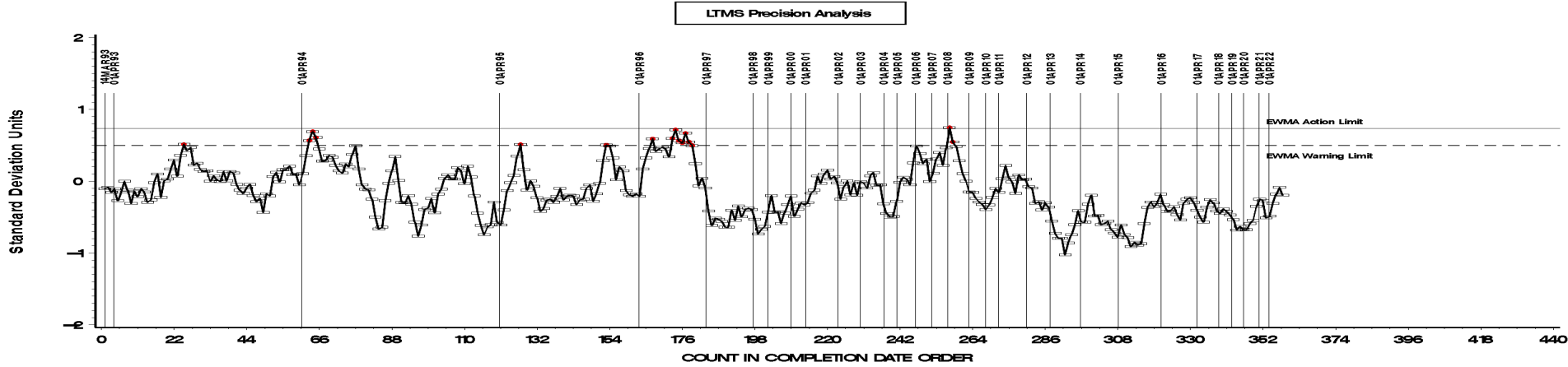
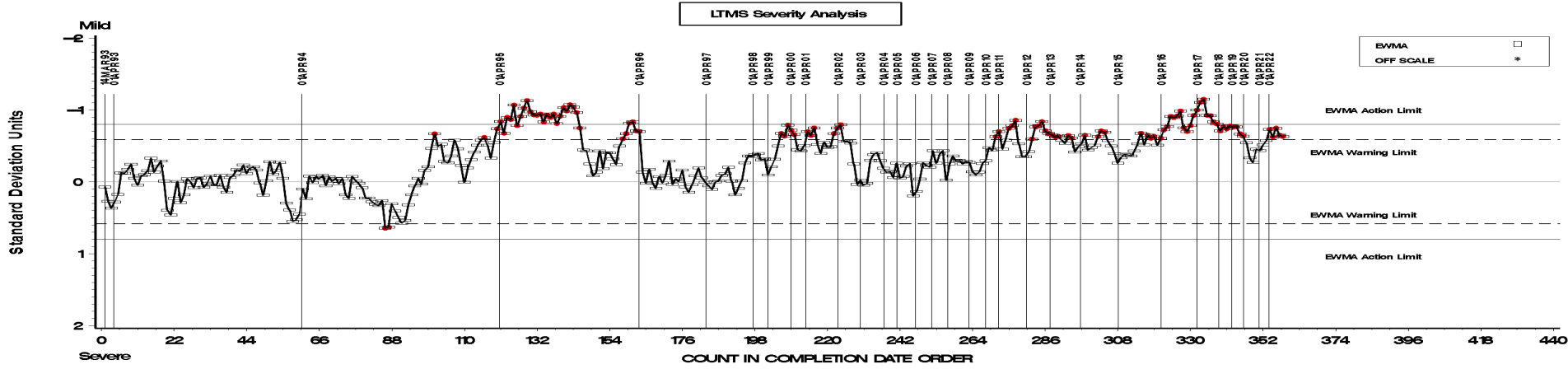


CATERPILLAR IN INDUSTRY OPERATIONALLY VALID DATA



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Weighted Total Demerits



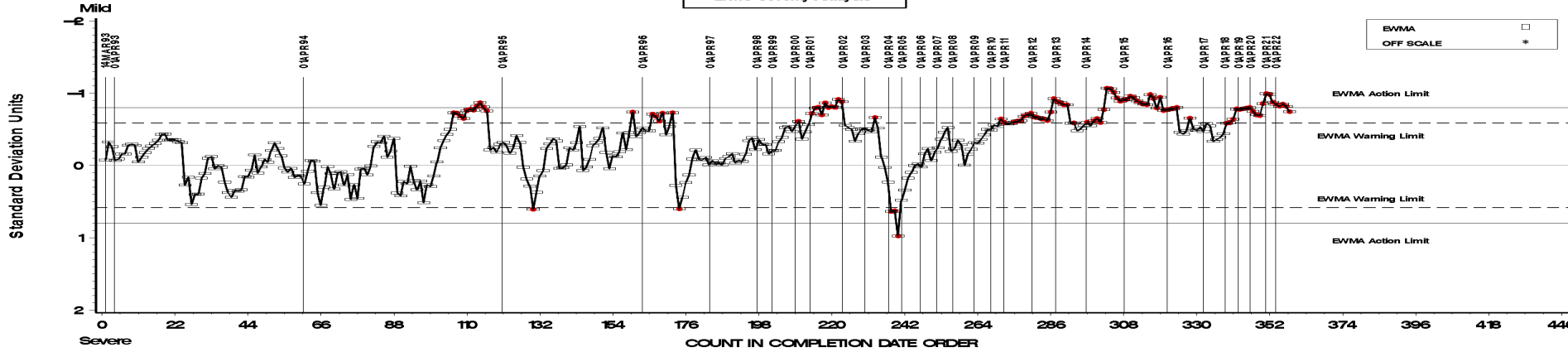
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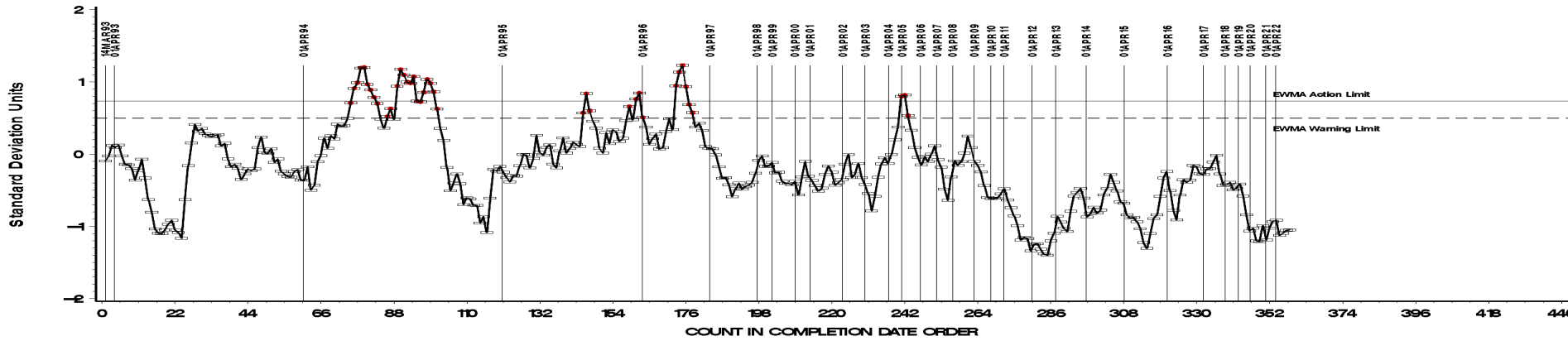
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BSOC

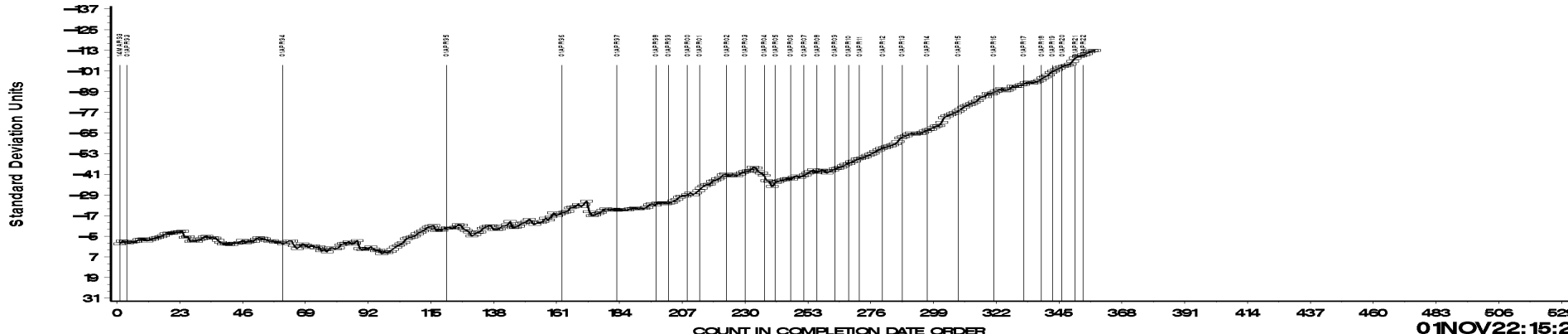
LTMS Severity Analysis



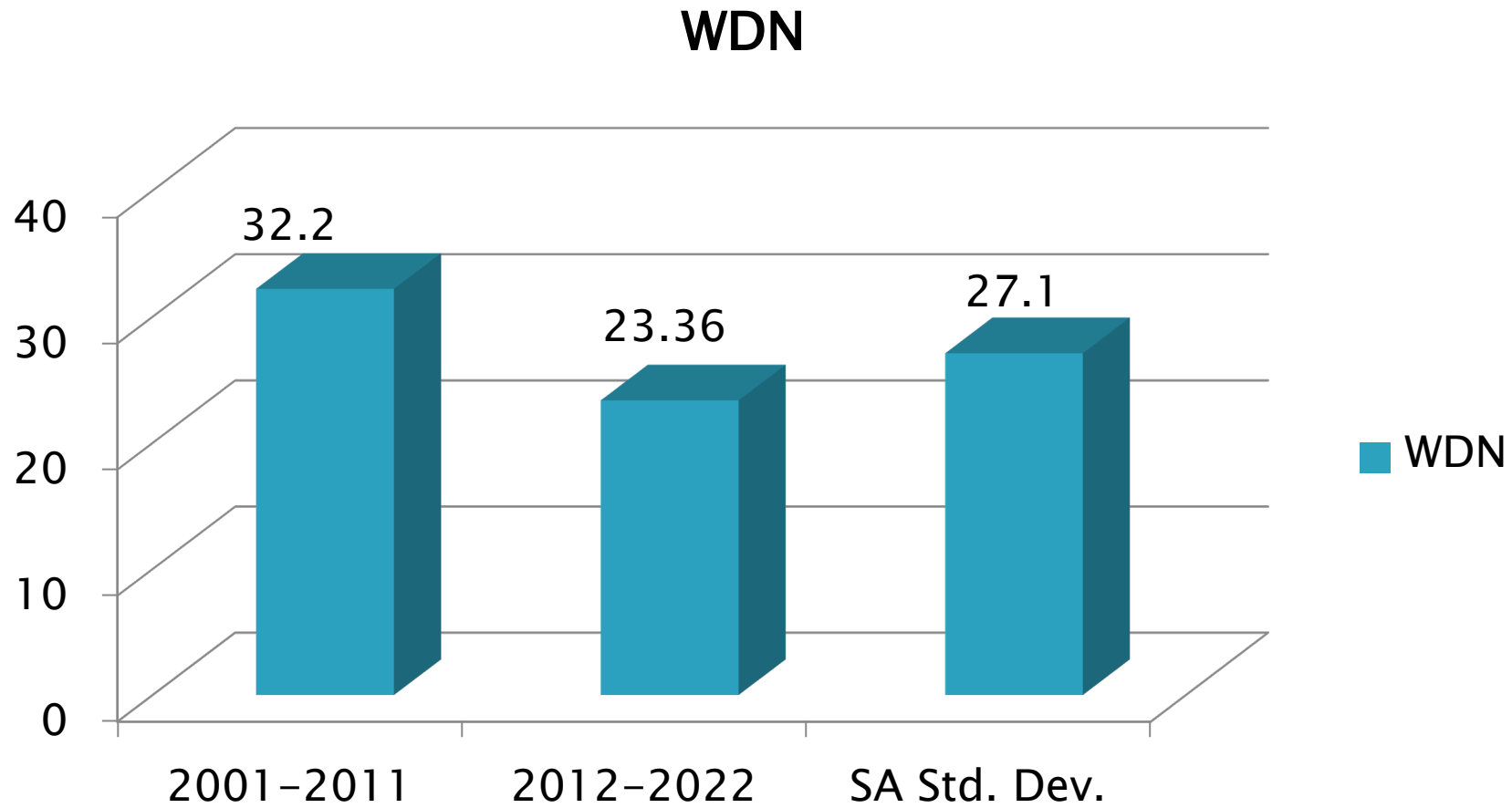
LTMS Precision Analysis



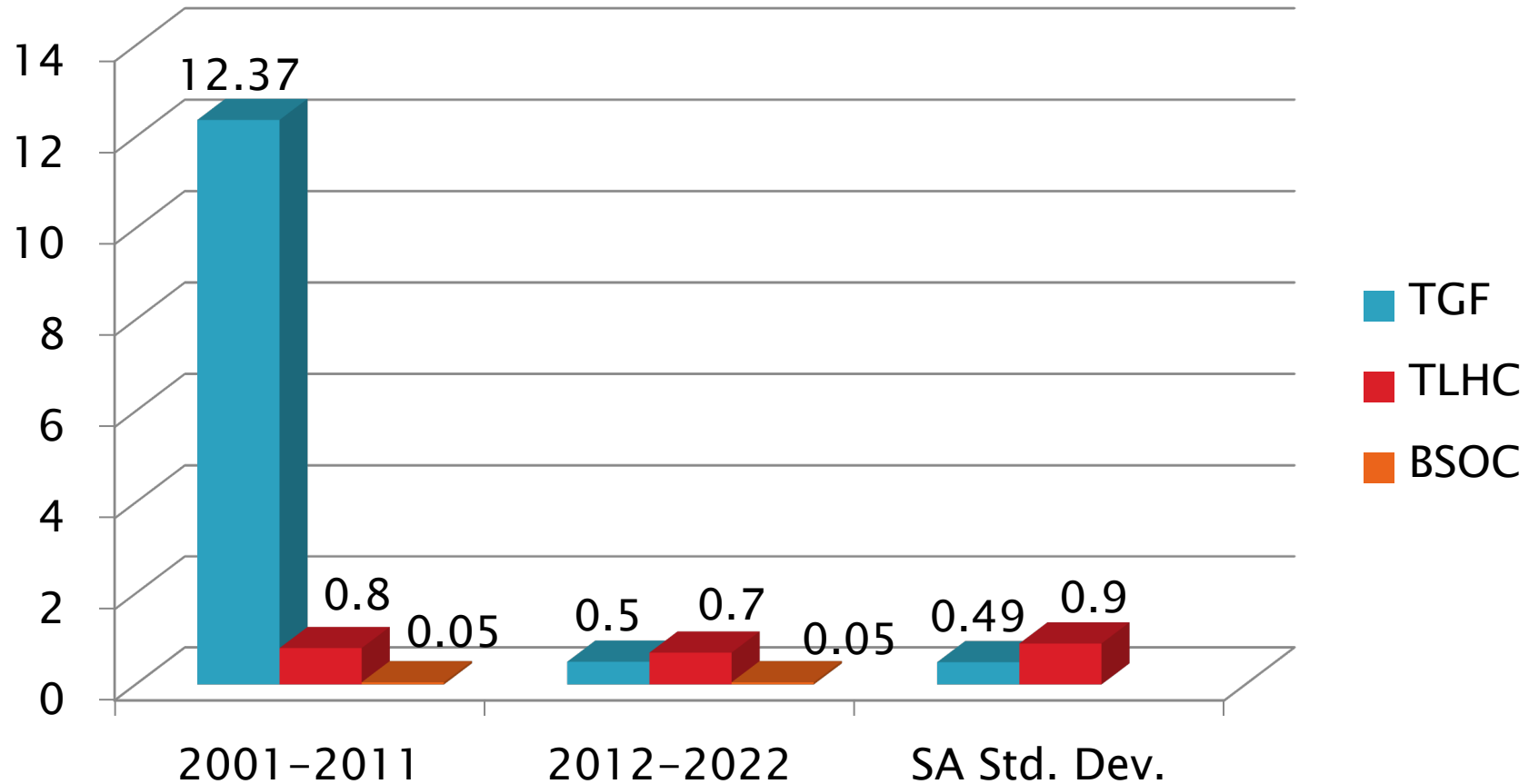
CUSUM Severity Analysis



1 N Precision Estimates



1 N Precision Estimates



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SCOTE 1 M-PC

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1 M-PC Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	0
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Total		0

1 M-PC Failed Tests

Failed Parameter	Number of Tests
No Failed Test	0
Total	0

1 M-PC Lost Tests*

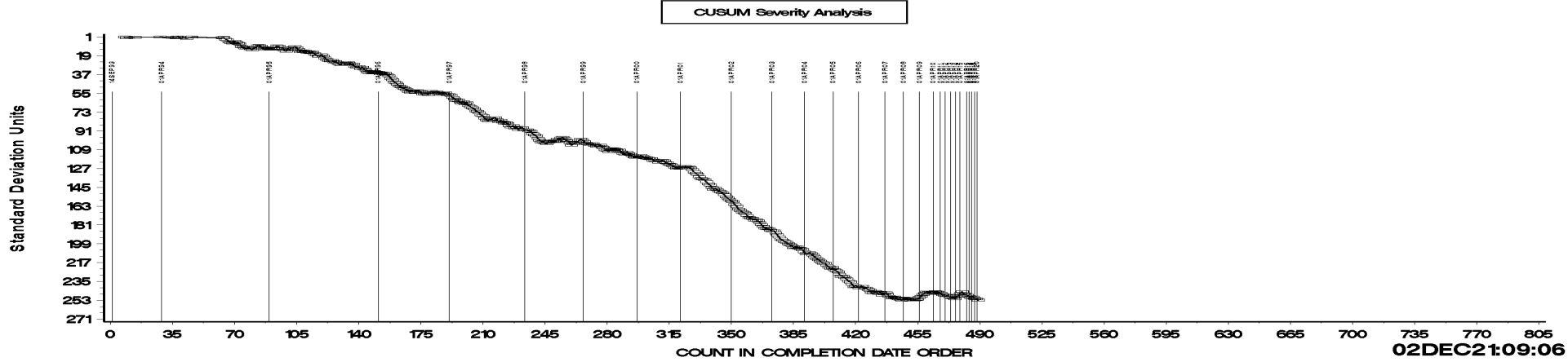
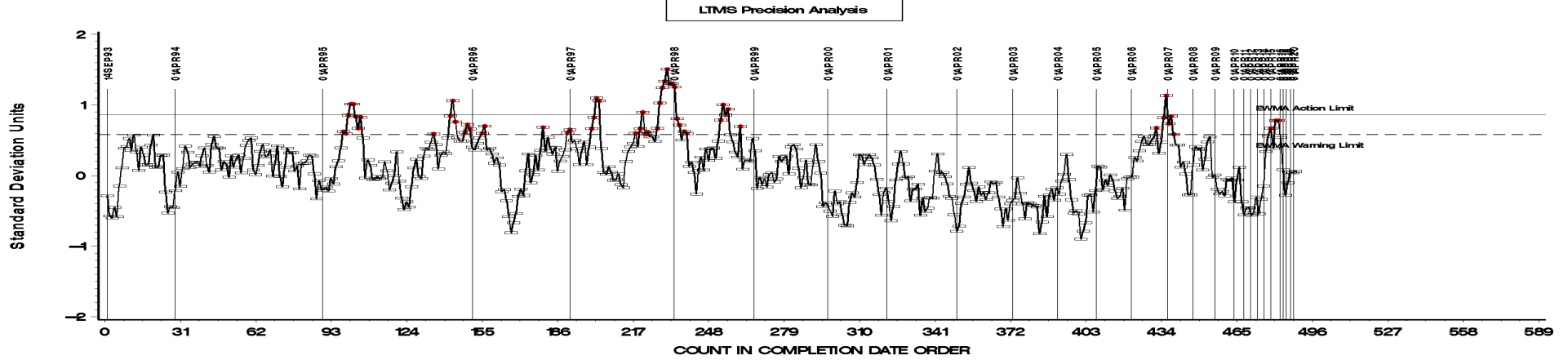
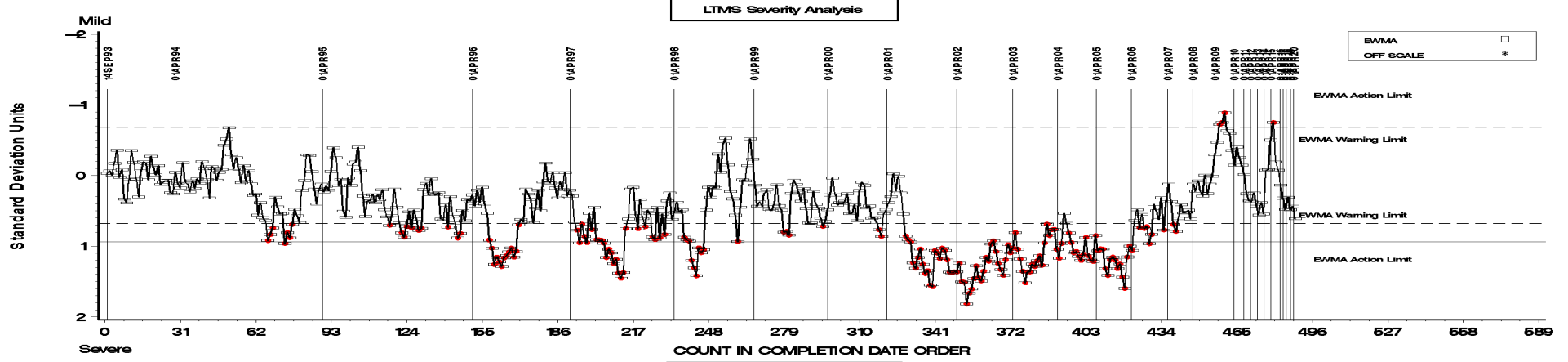
Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

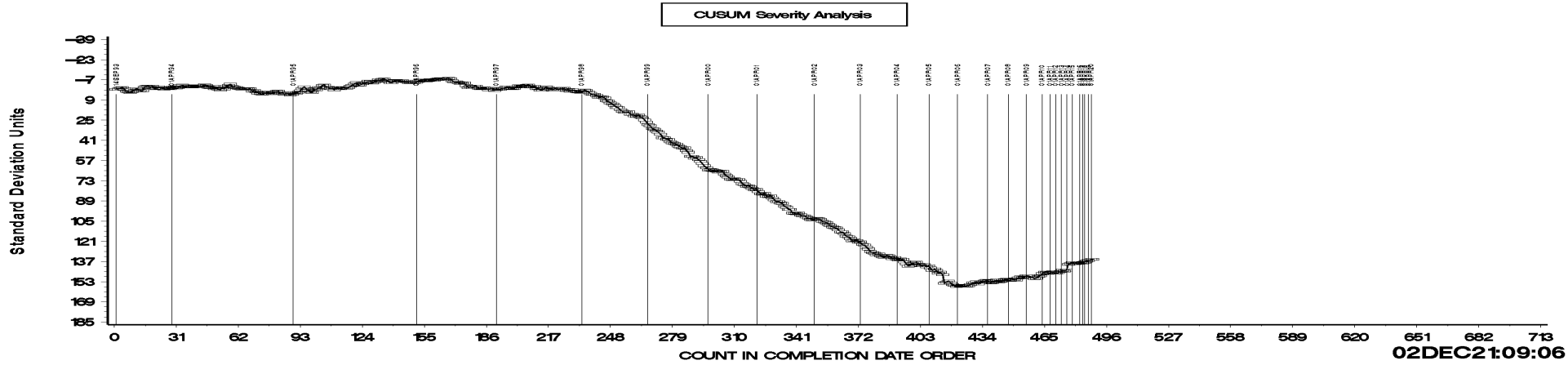
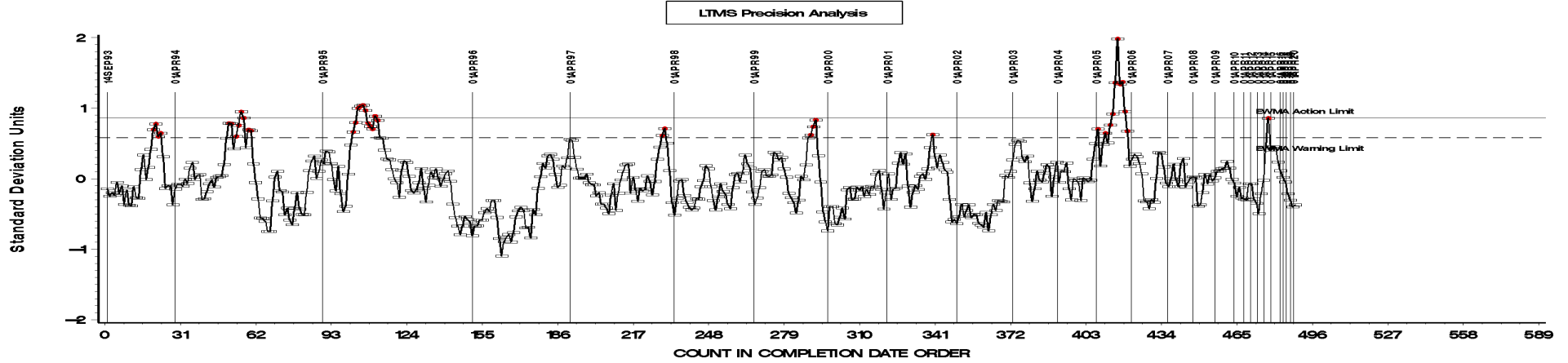
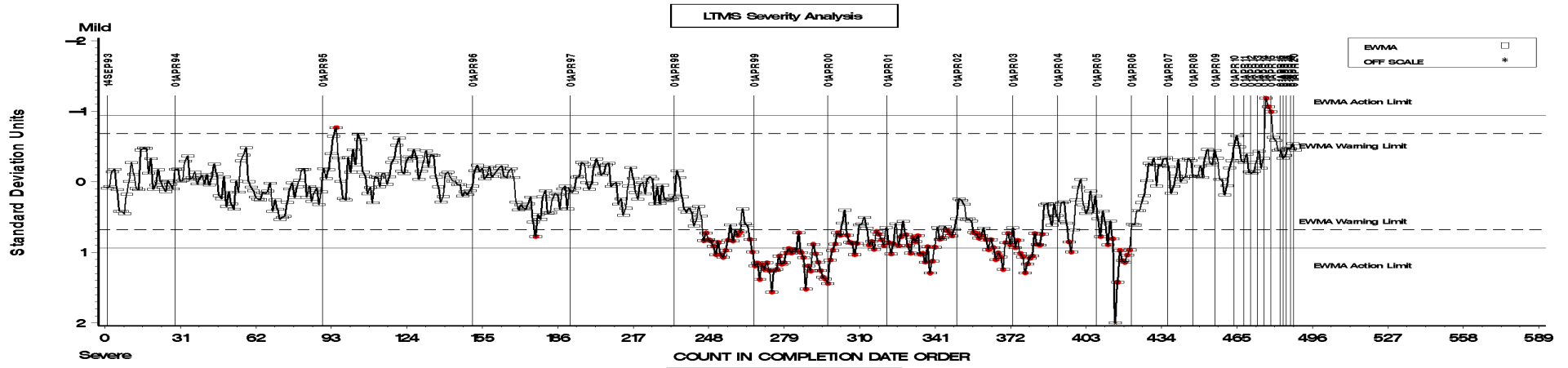
1 M-PC Test Severity

- ▶ As no 1 M-PC tests were run during this period no statement on test severity can be made.

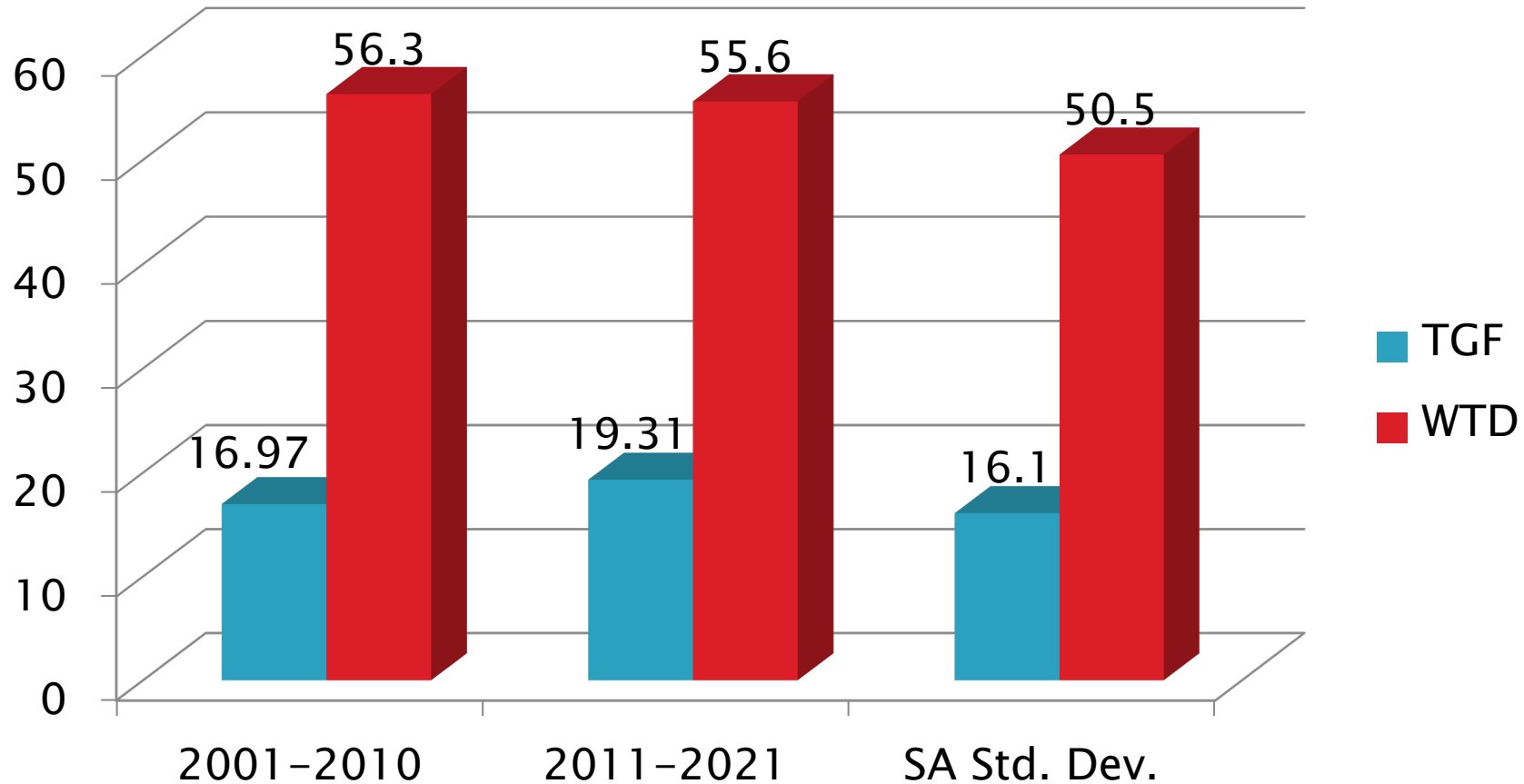
FINAL TOP GROOVE FILLING



Weighted Total Demerits



1 MPC Precision Estimates



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SCOTE 1P

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1 P Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	1
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		1

1 P Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

1P Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

1 P Test Severity

- ▶ TGC, TLC, WD and OC are in control.
- ▶ ETOC is in severity action alarm in the severe direction.

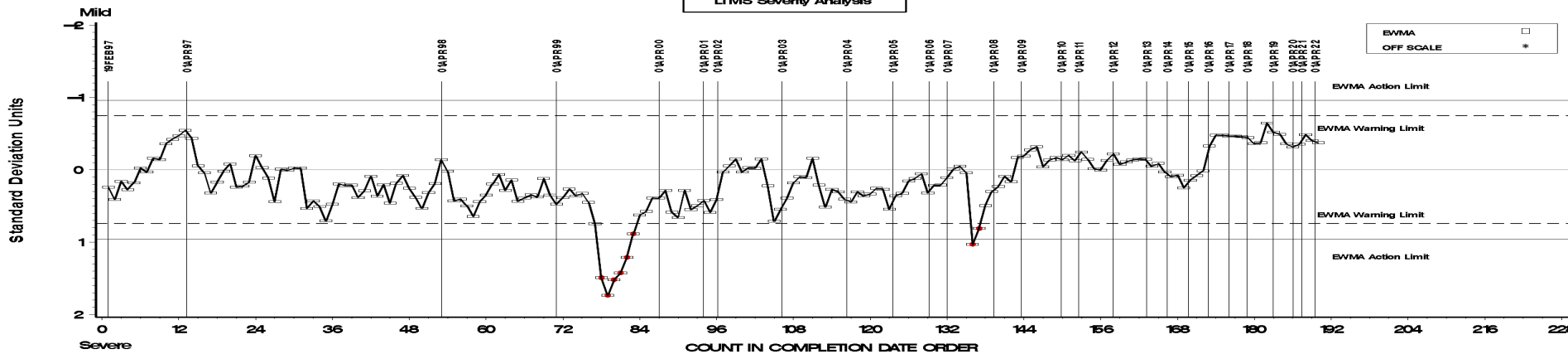
CATERPILLAR 1P INDUSTRY OPERATIONALLY VALID DATA



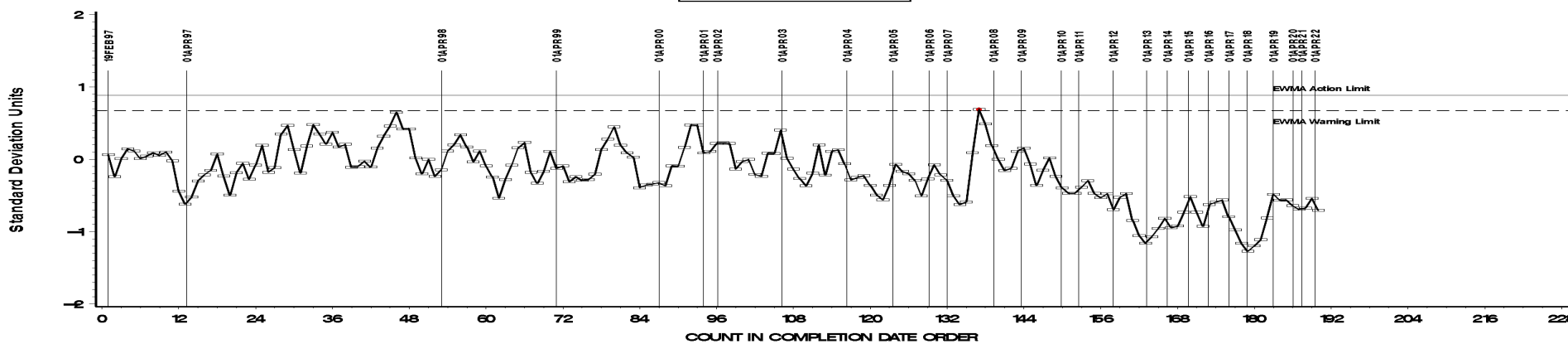
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TOP GROOVE CARBON

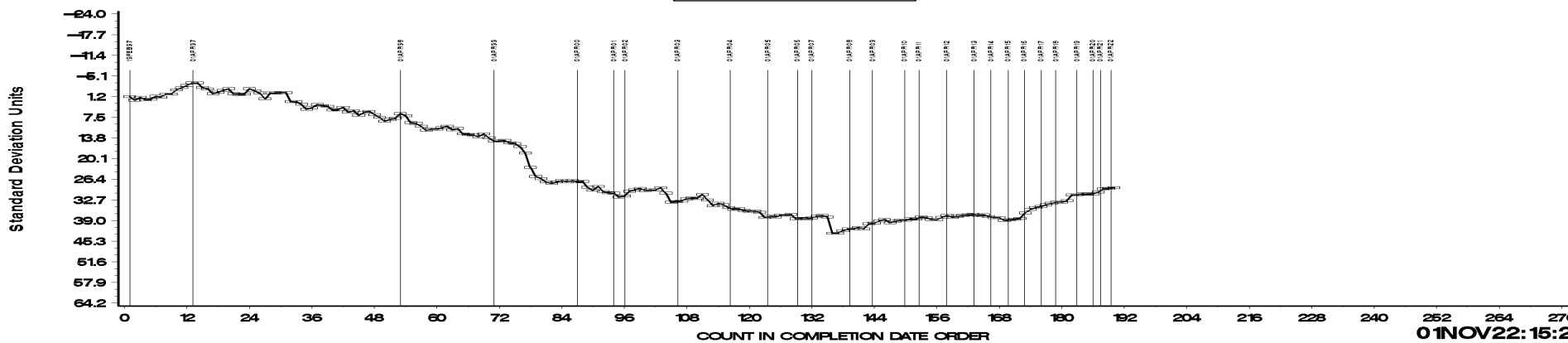
LTMS Severity Analysis



LTMS Precision Analysis

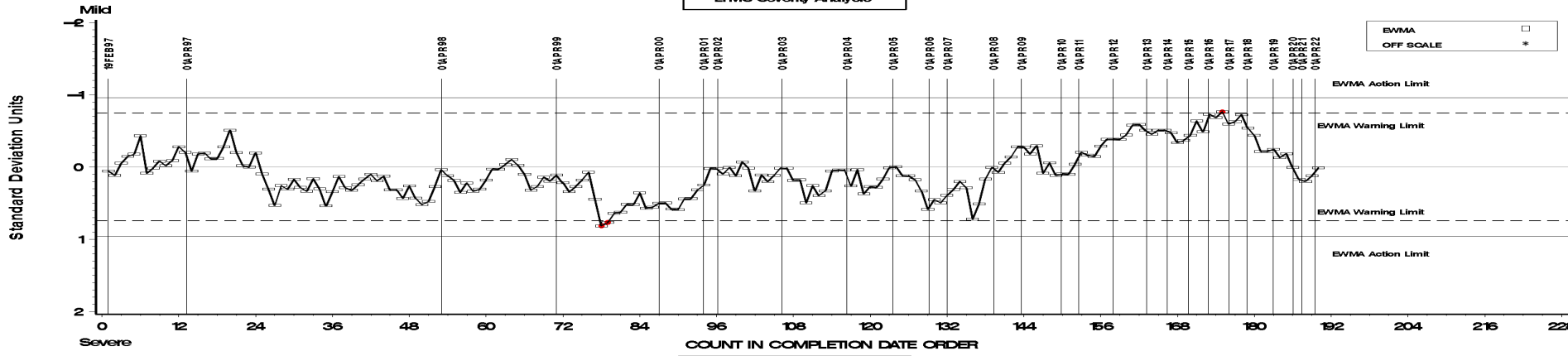


CUSUM Severity Analysis

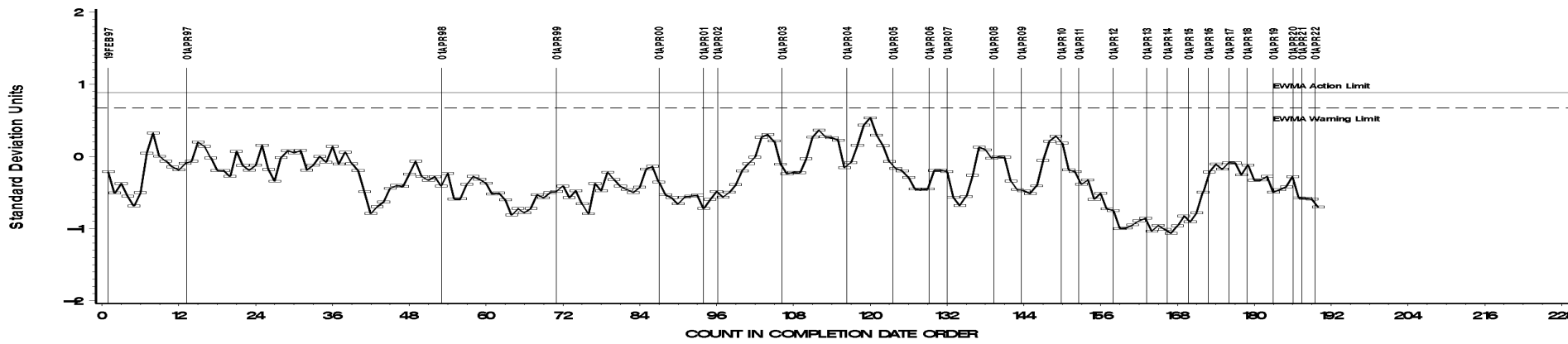


TOP LAND CARBON

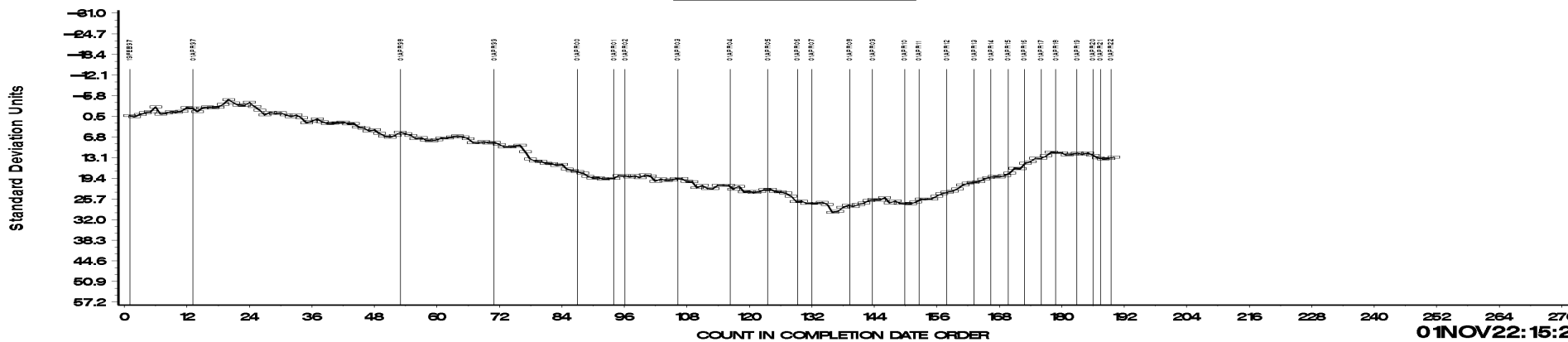
LTMS Severity Analysis



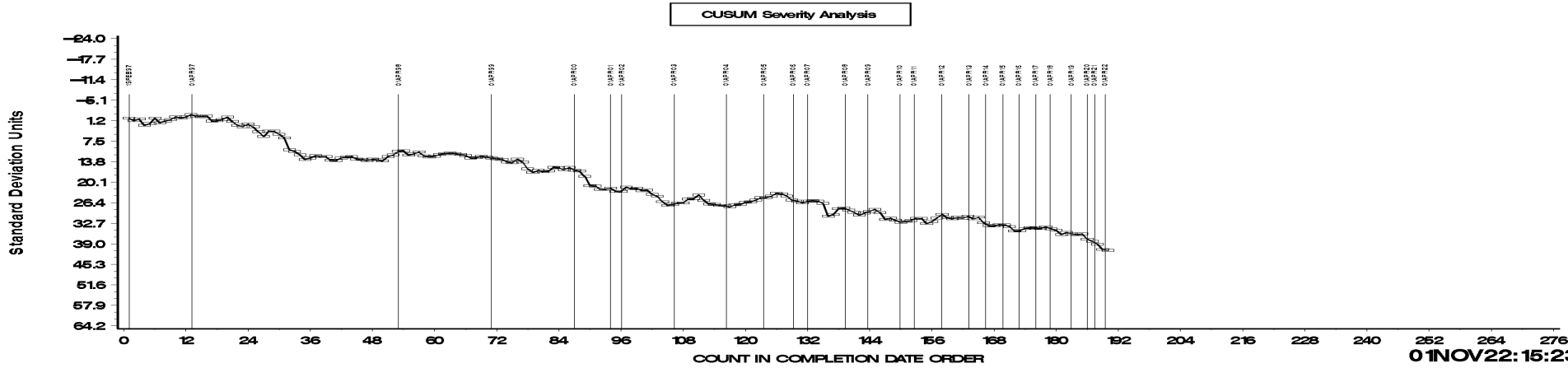
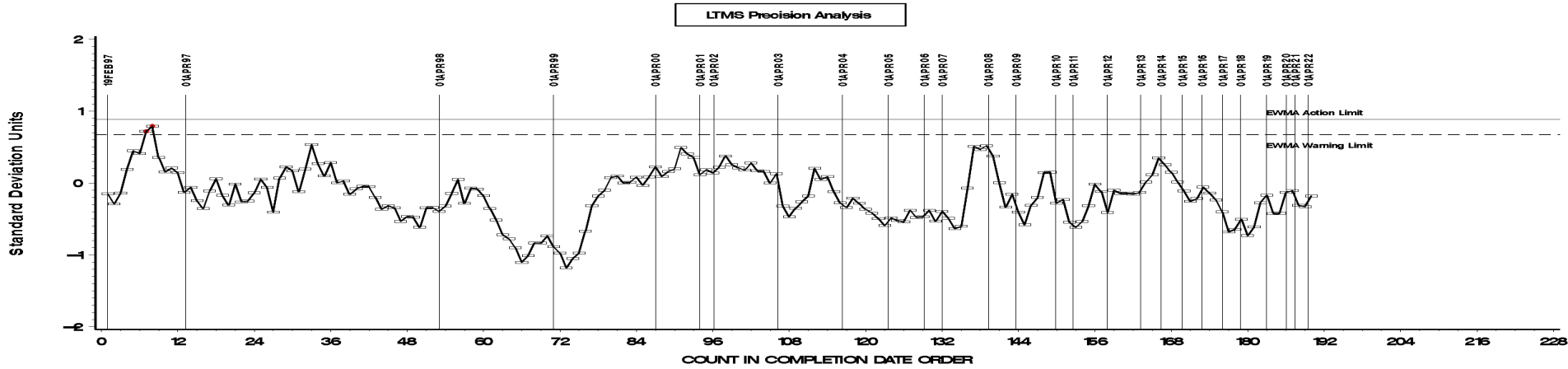
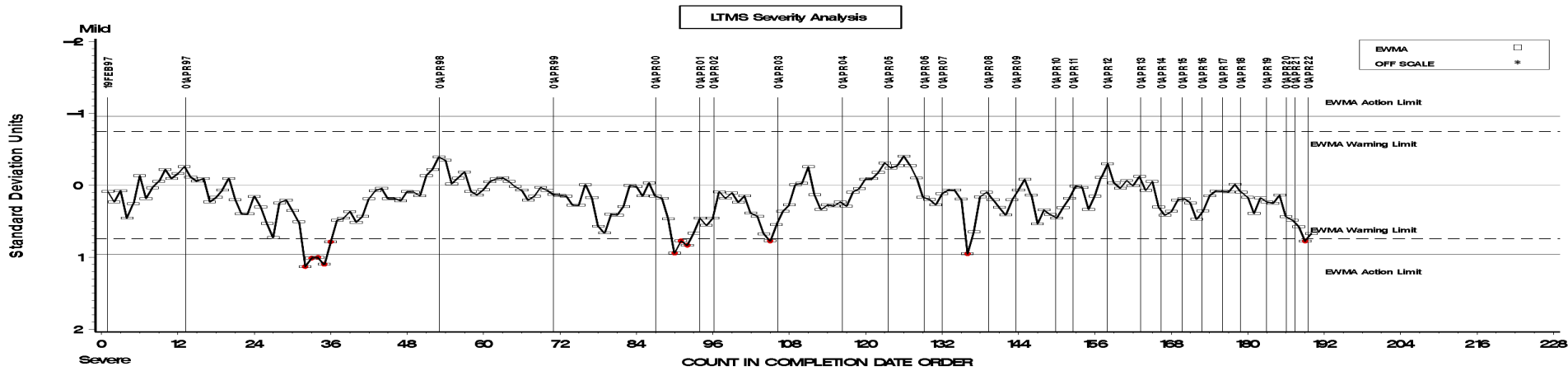
LTMS Precision Analysis



CUSUM Severity Analysis



WEIGHTED TOTAL DEMERITS



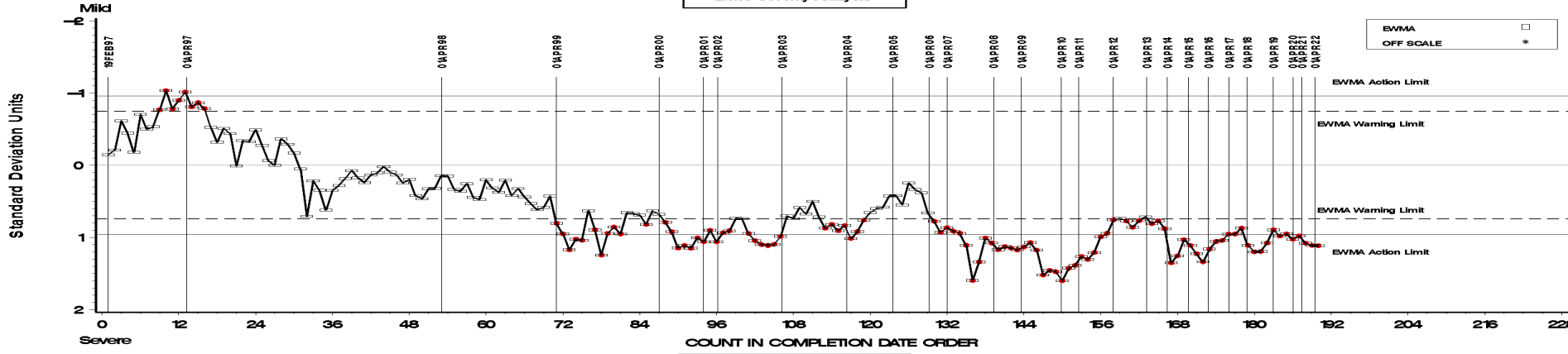
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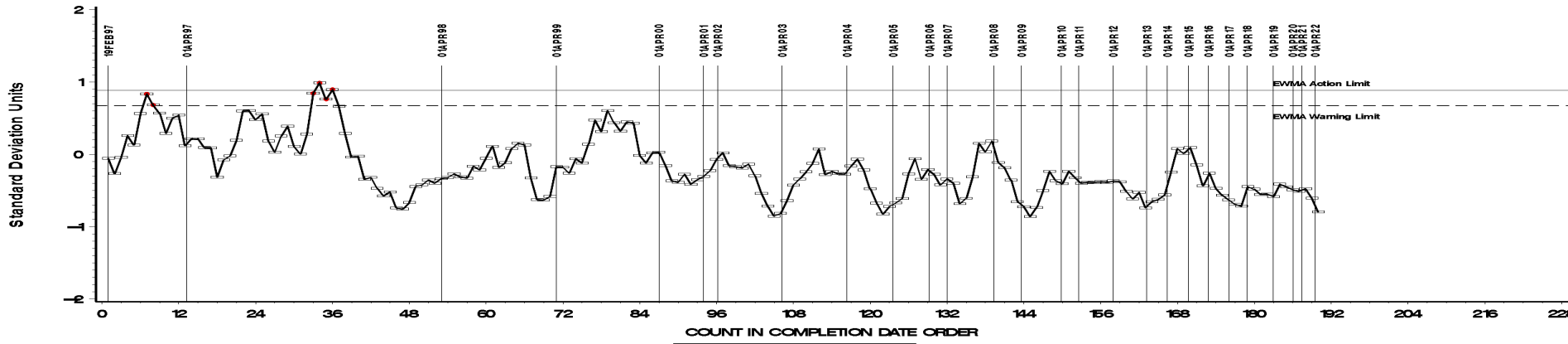
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EOTOC

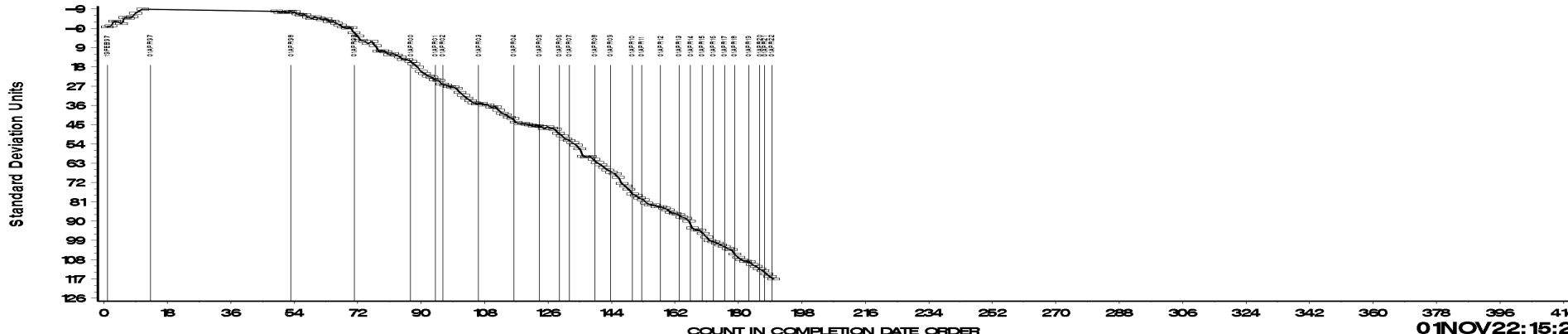
LTMS Severity Analysis



LTMS Precision Analysis

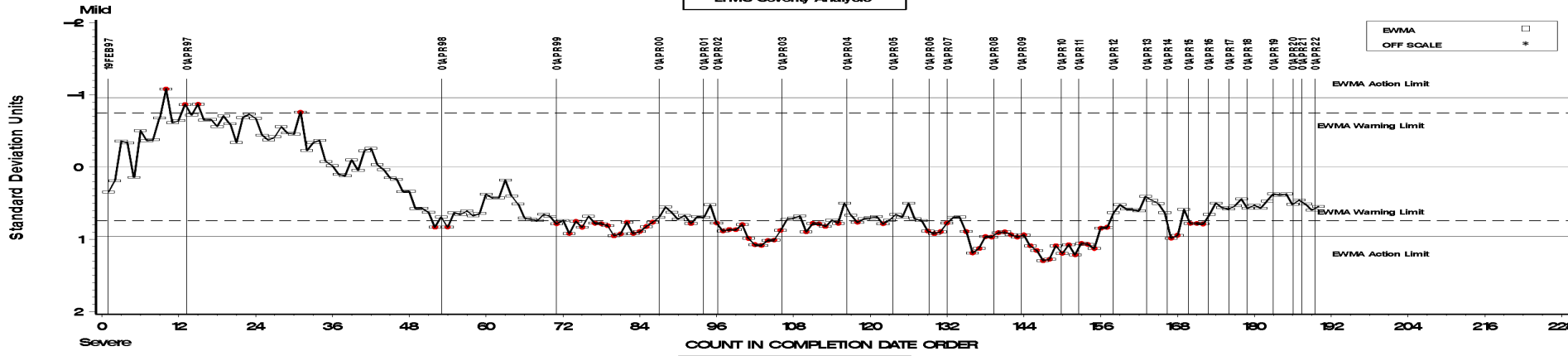


CUSUM Severity Analysis

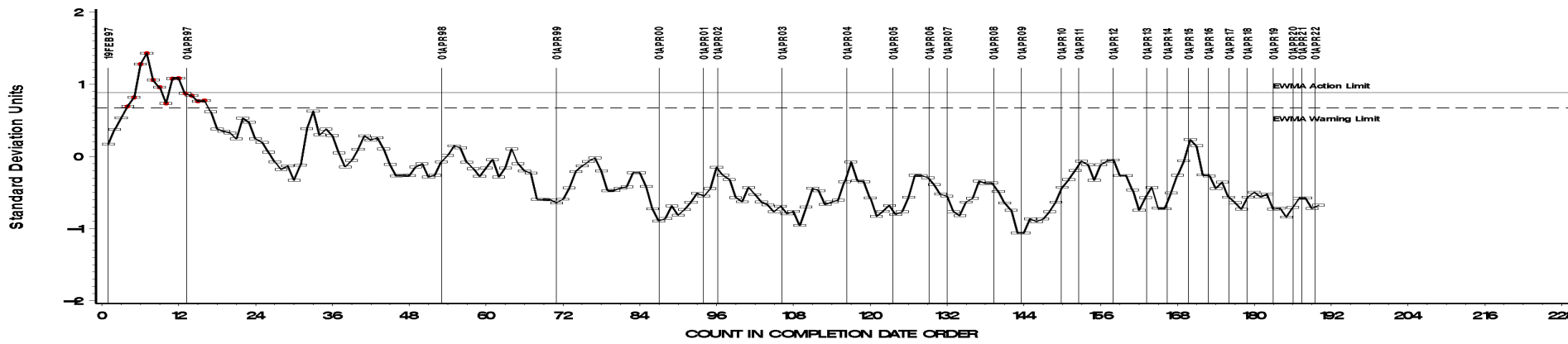


OIL CONSUMPTION

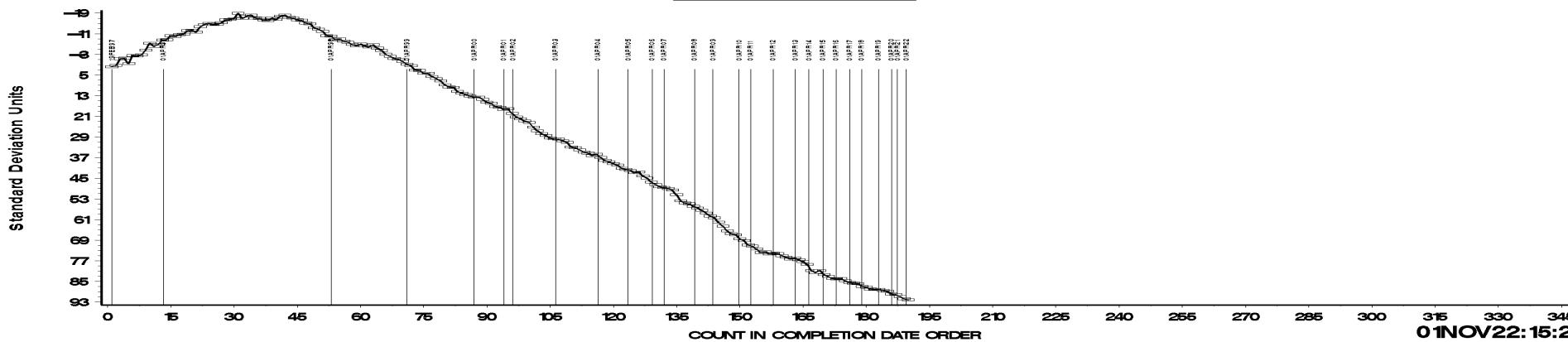
LTMS Severity Analysis



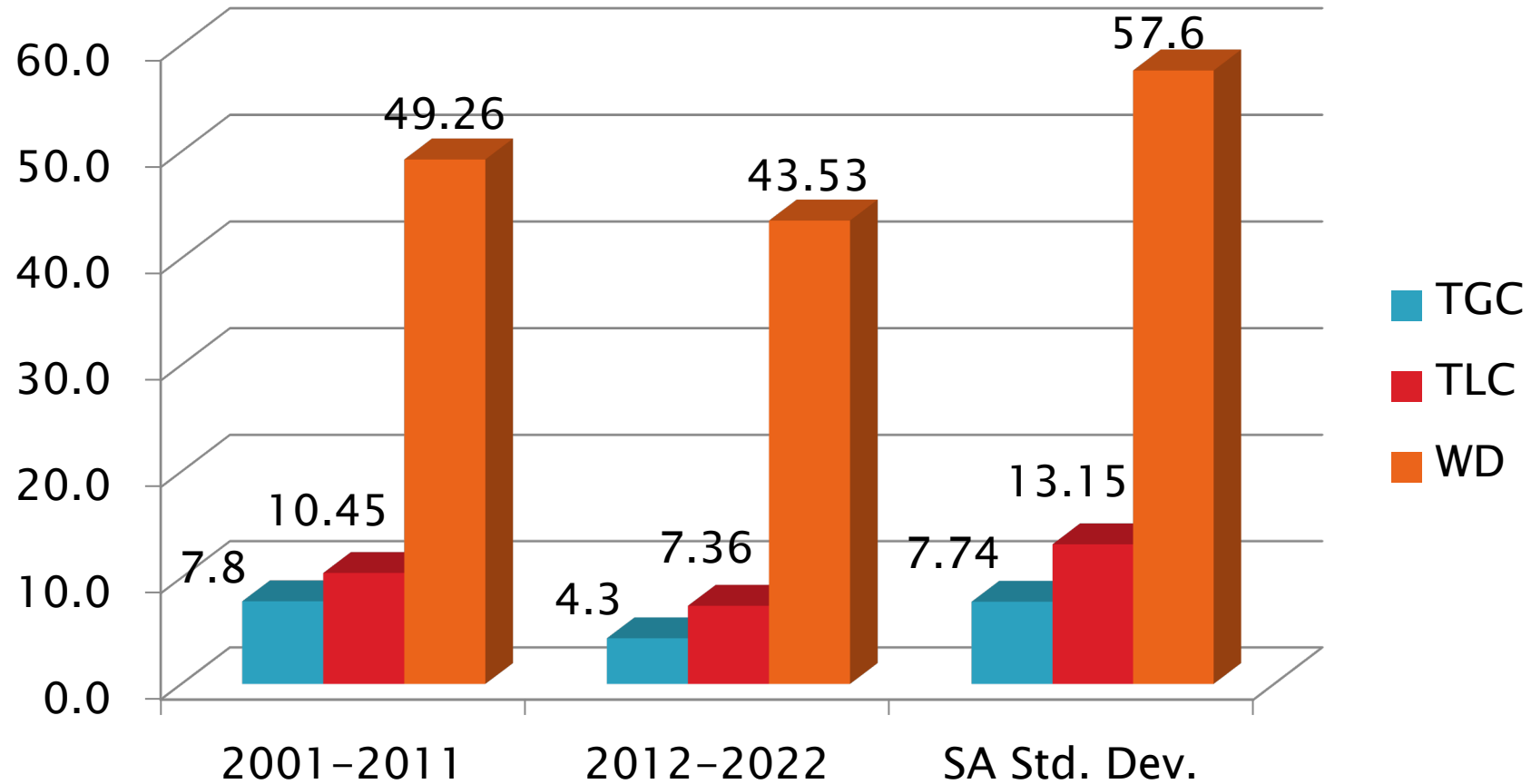
LTMS Precision Analysis



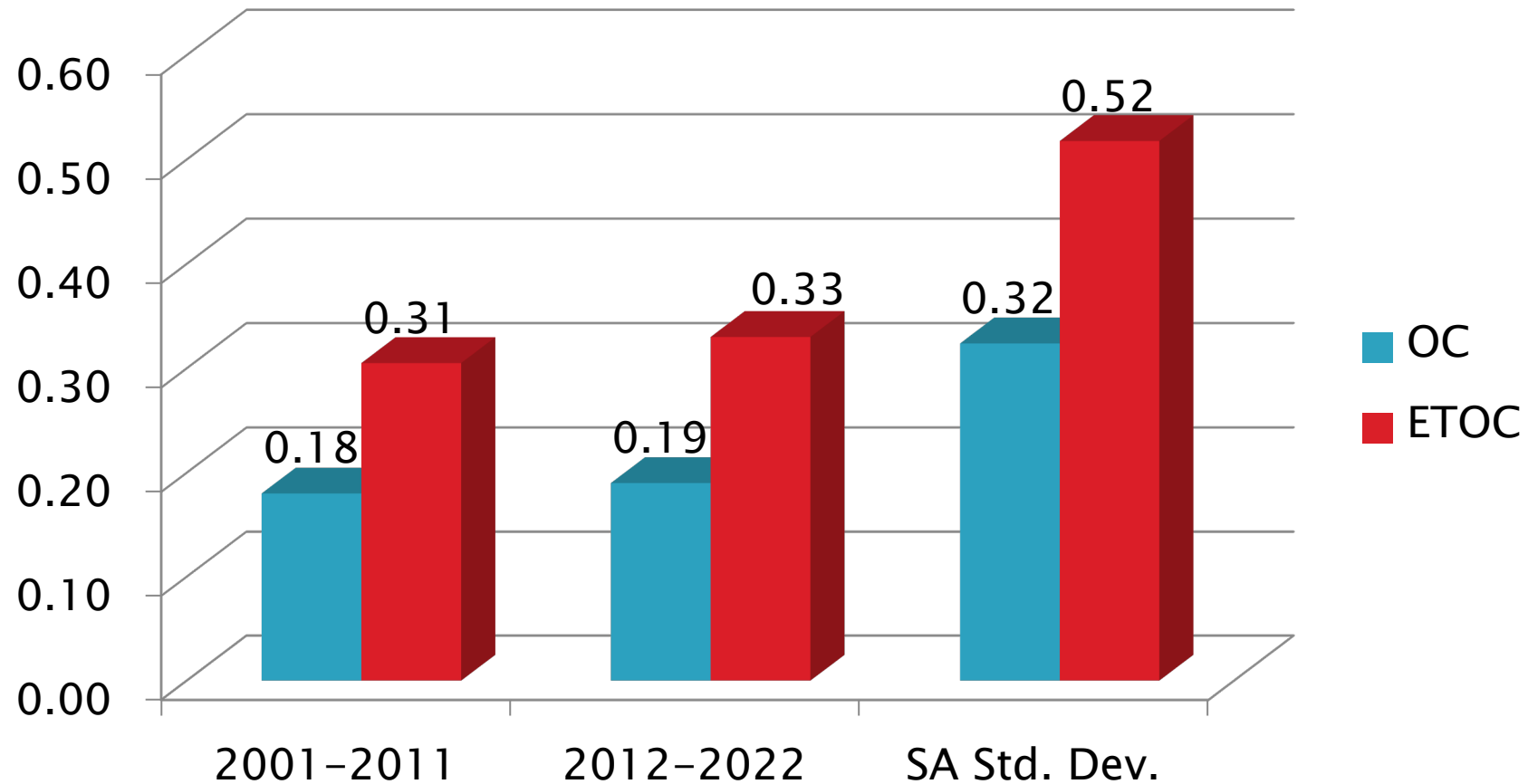
CUSUM Severity Analysis



1 P Precision Estimates



1 P Precision Estimates



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SCOTE 1 R

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1 R Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	0
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		0

1 R Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

1 R Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted test	0
Total		0

*Invalid and aborted tests

1 R Test Severity

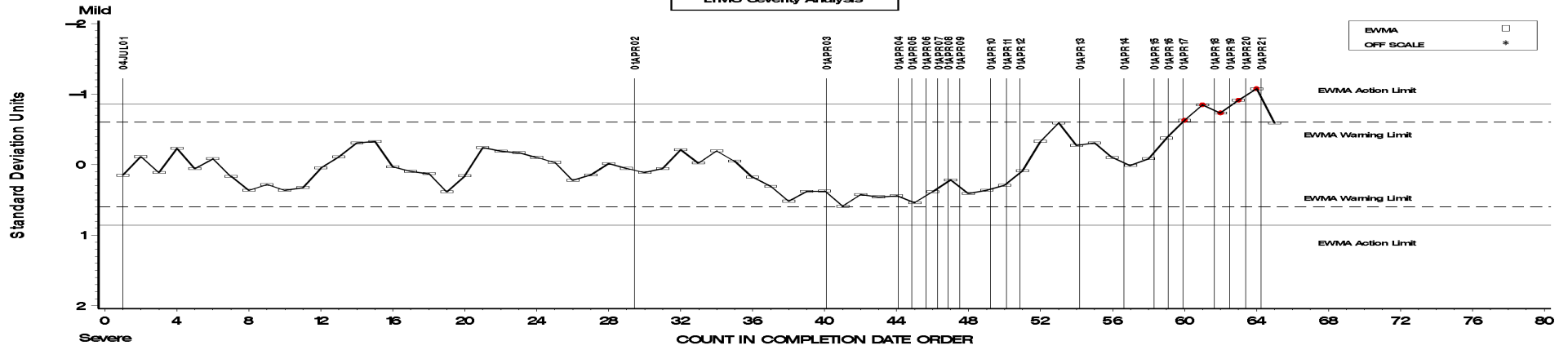
- ▶ As no 1R tests were run during this period no statement on test severity can be made.

CATERPILLAR 1R INDUSTRY OPERATIONALLY VALID DATA

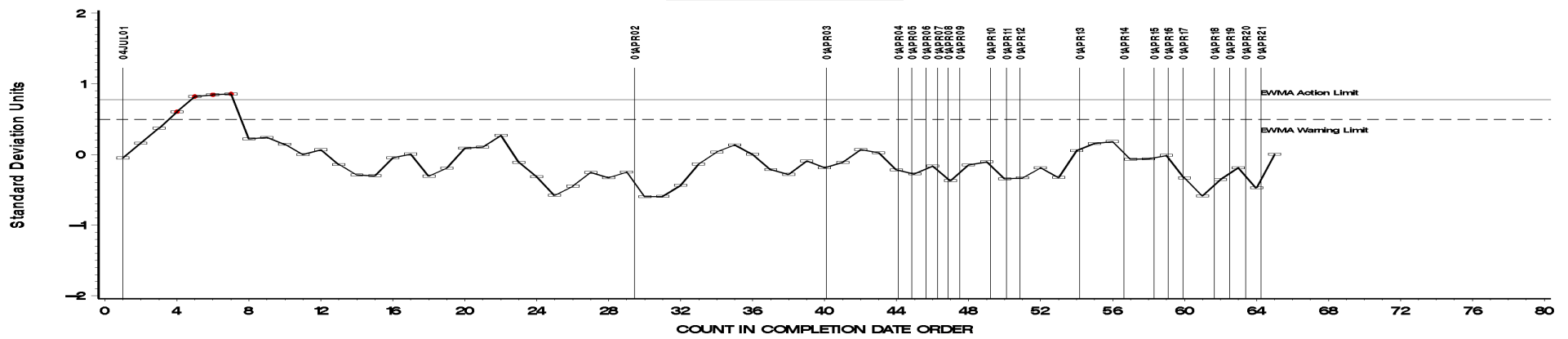


FINAL BOTOC

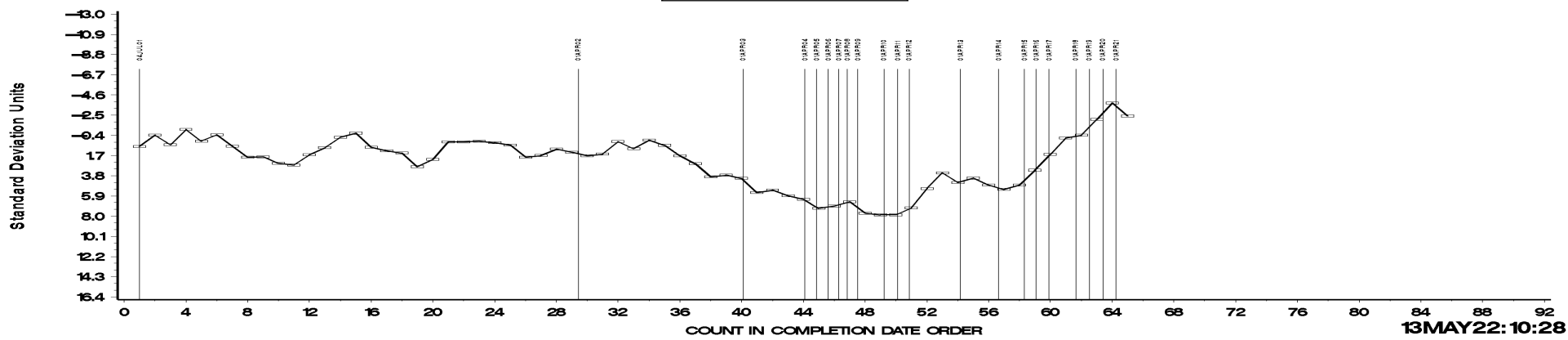
LTMS Severity Analysis



LTMS Precision Analysis



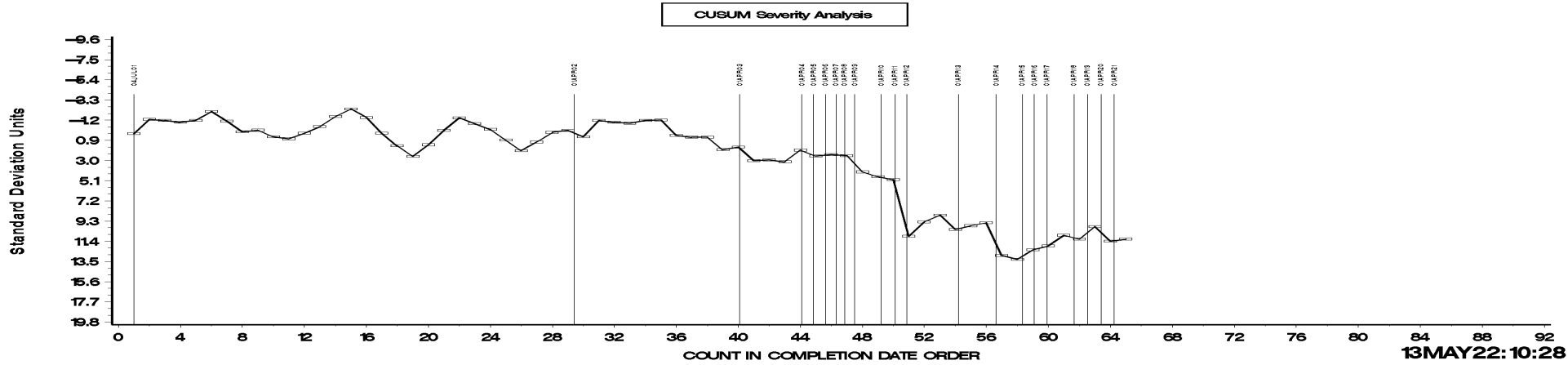
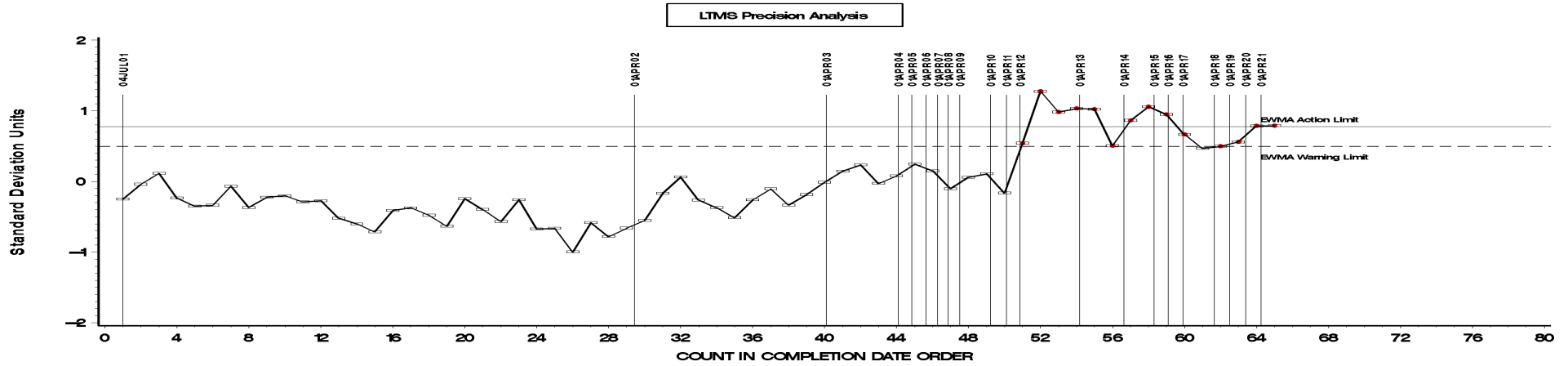
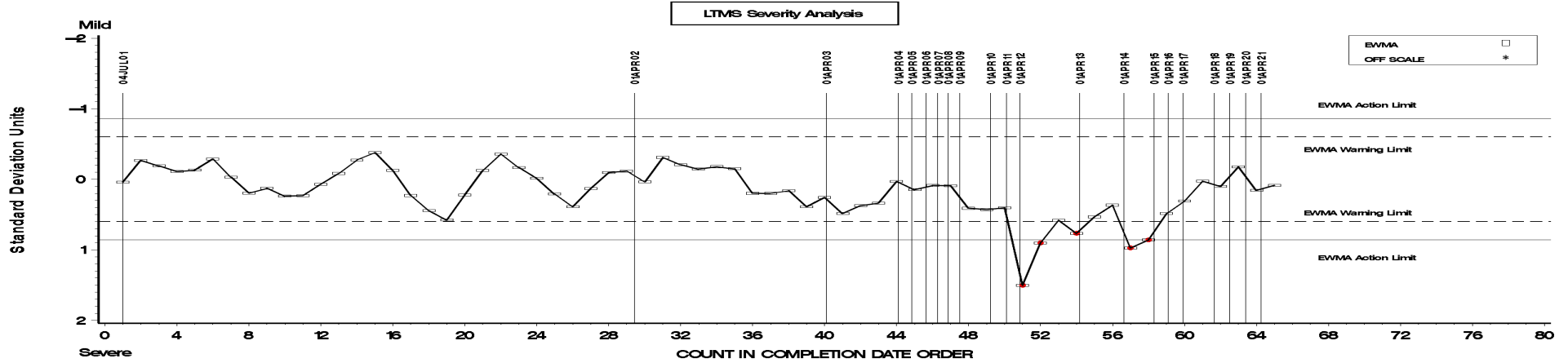
CUSUM Severity Analysis



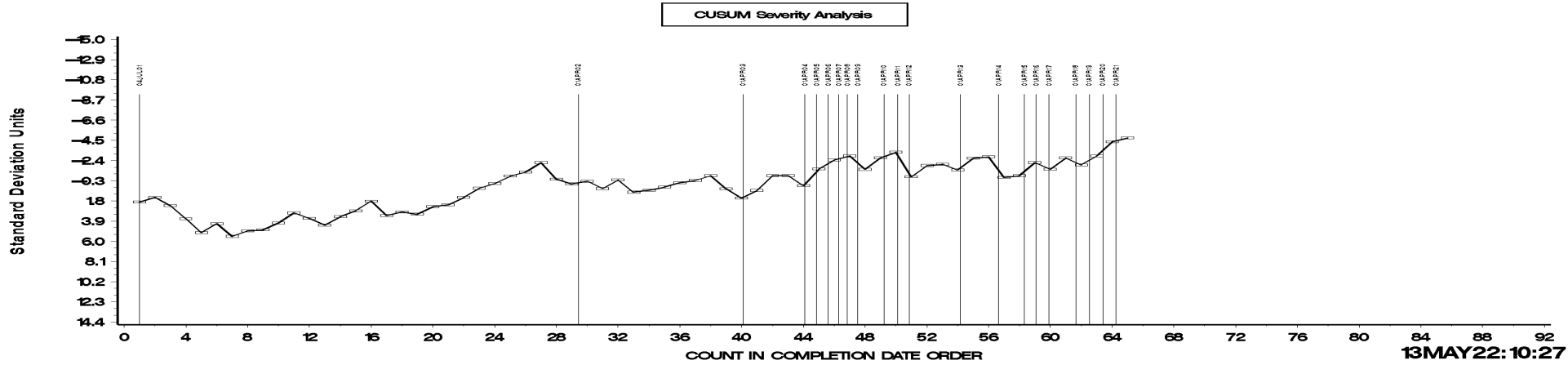
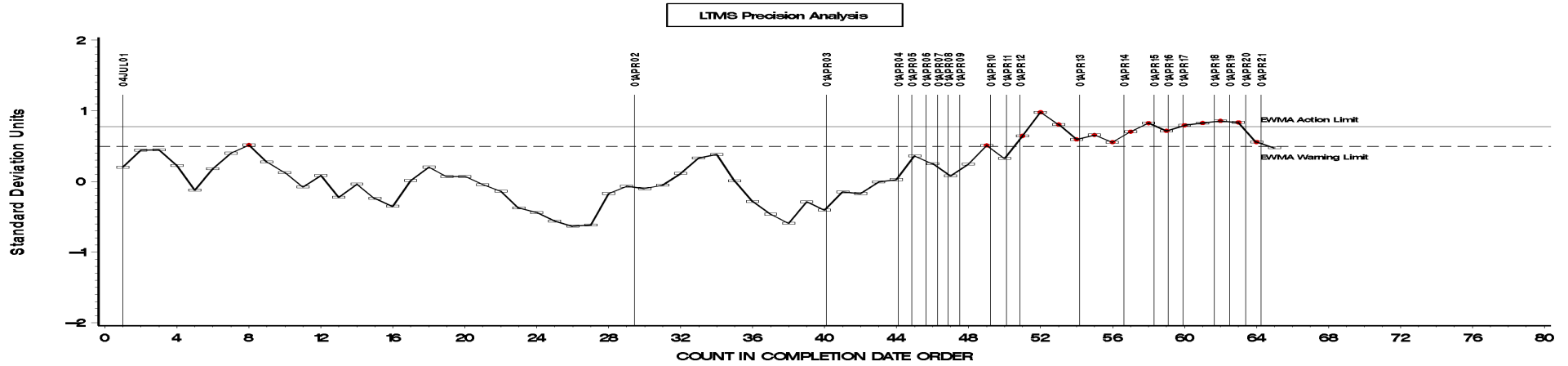
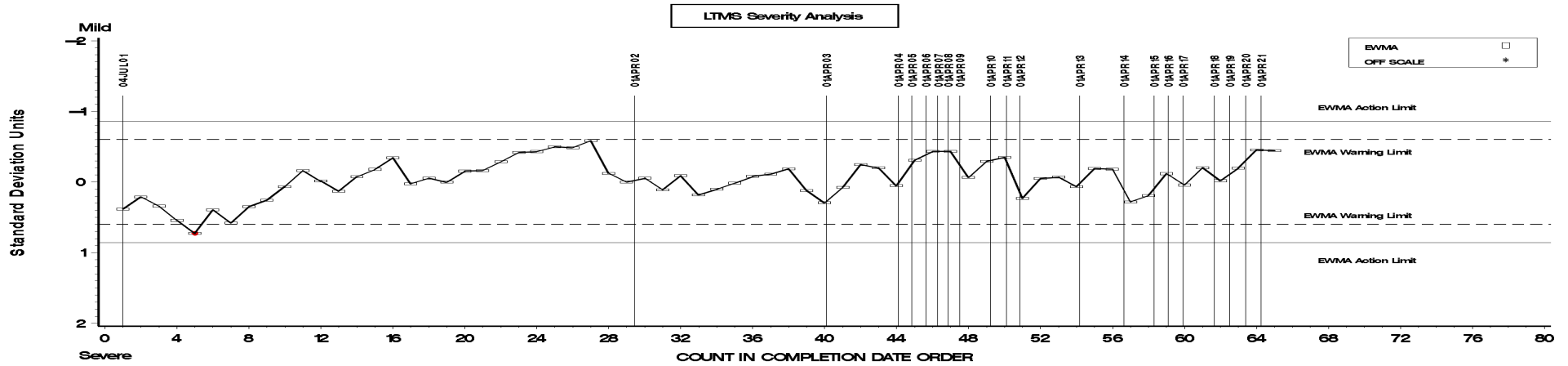
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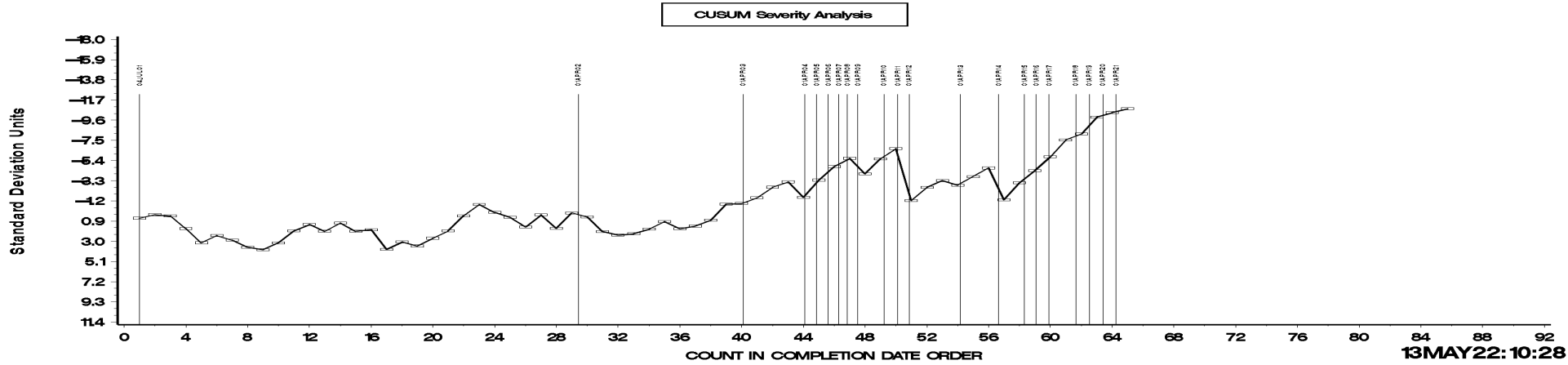
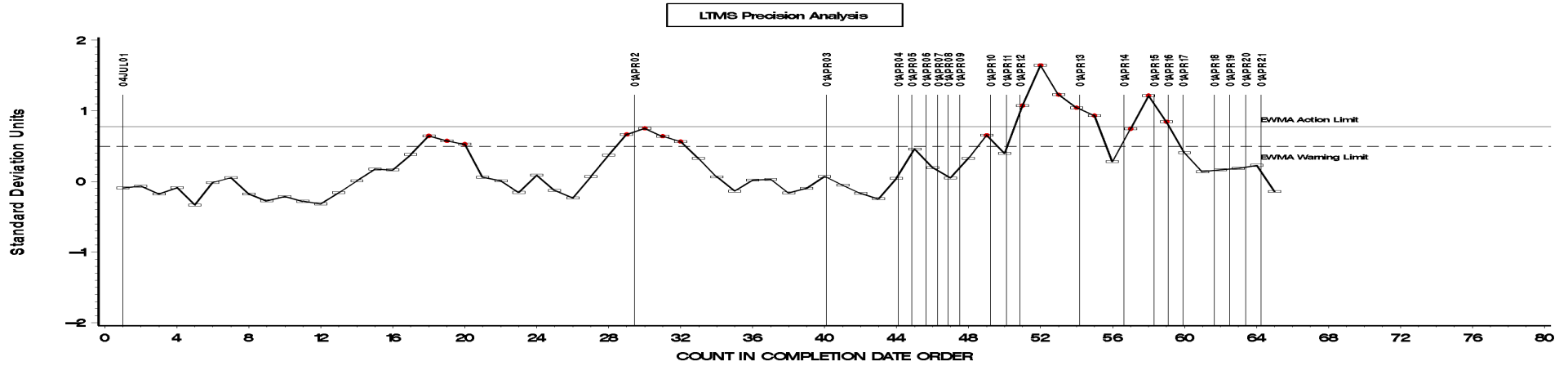
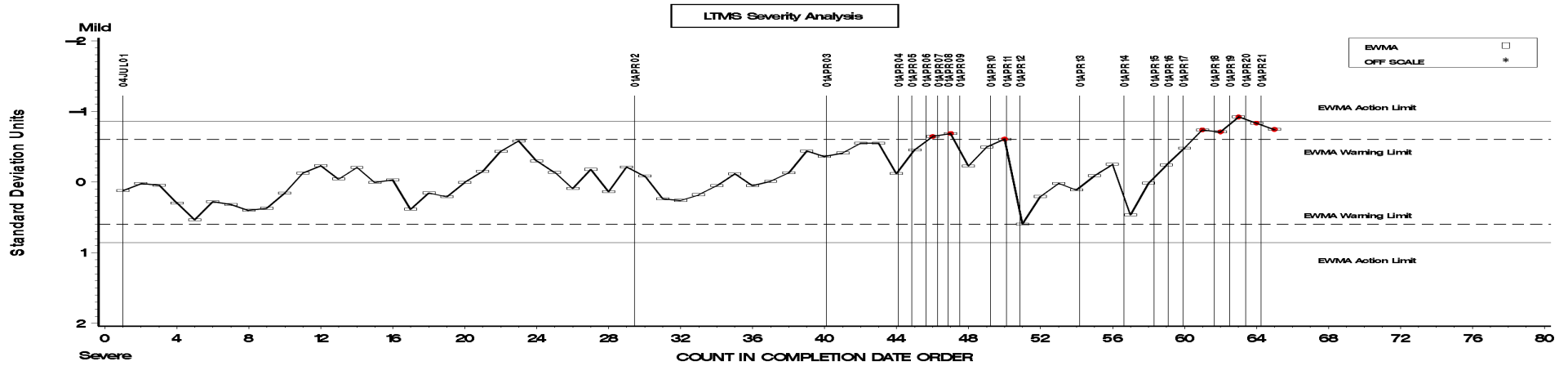
FINAL EOTOC (g/h)



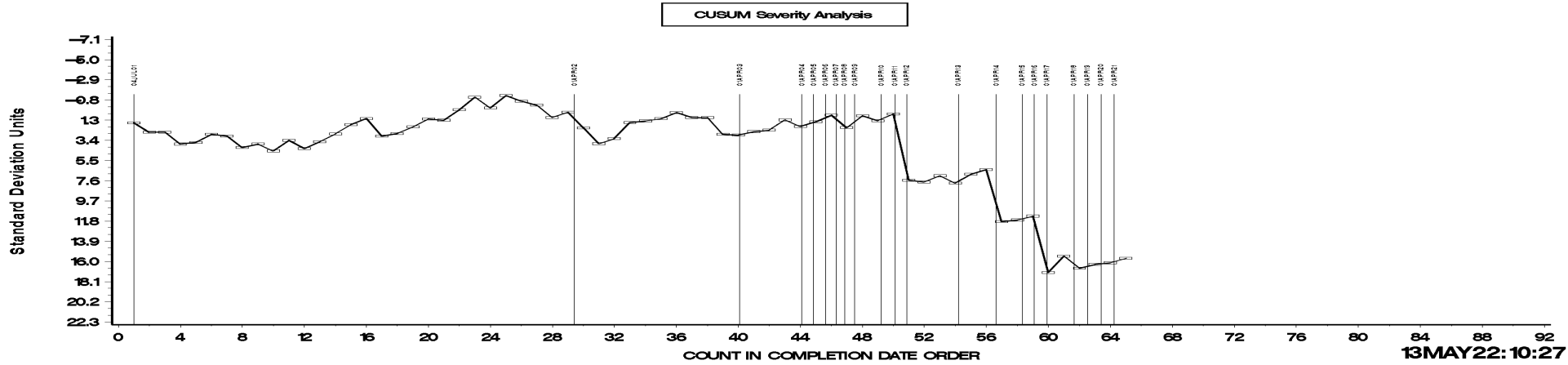
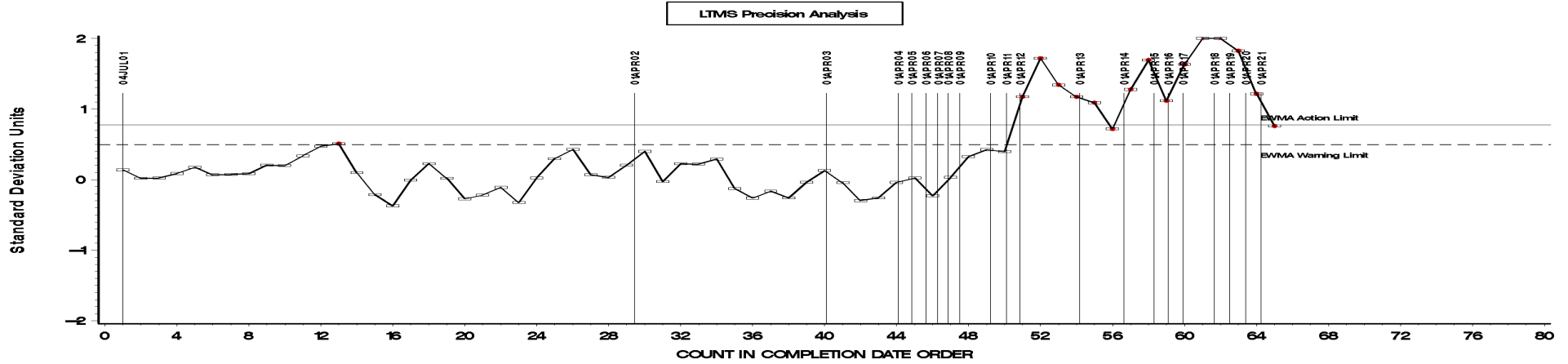
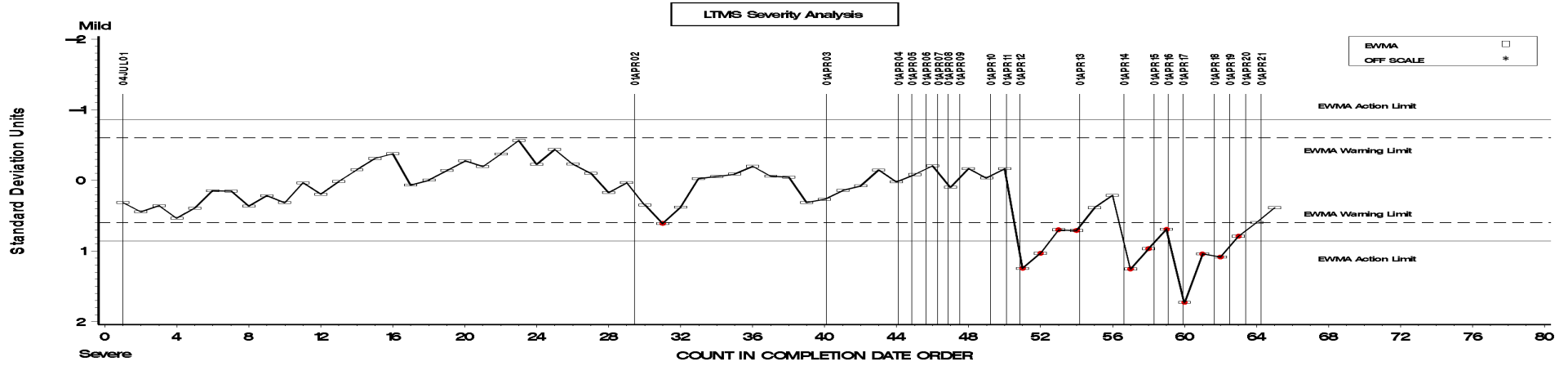
FINAL TOP GROOVE CARBON (DEMERITS)



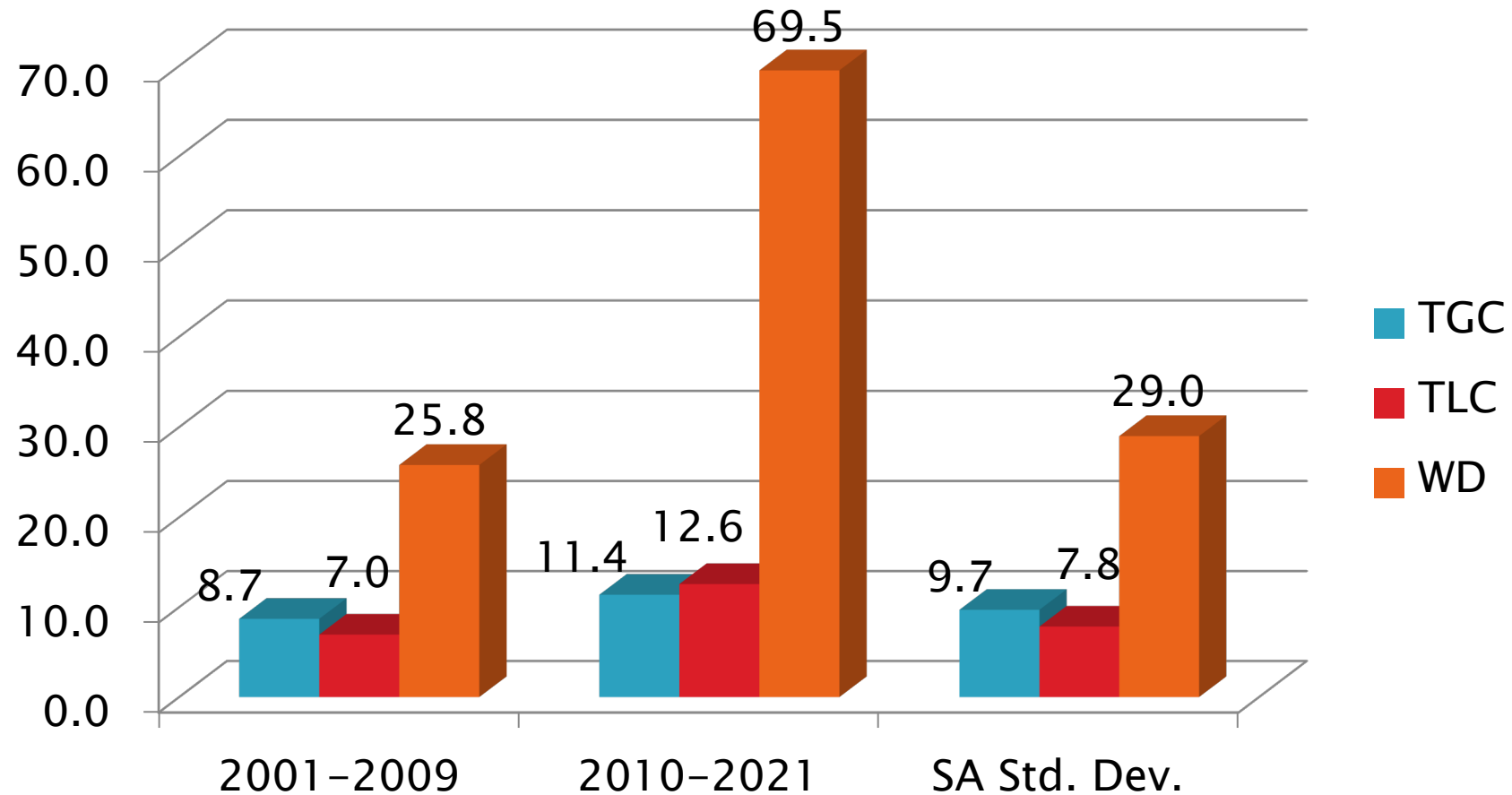
FINAL TOP LAND CARBON (DEMERITS)



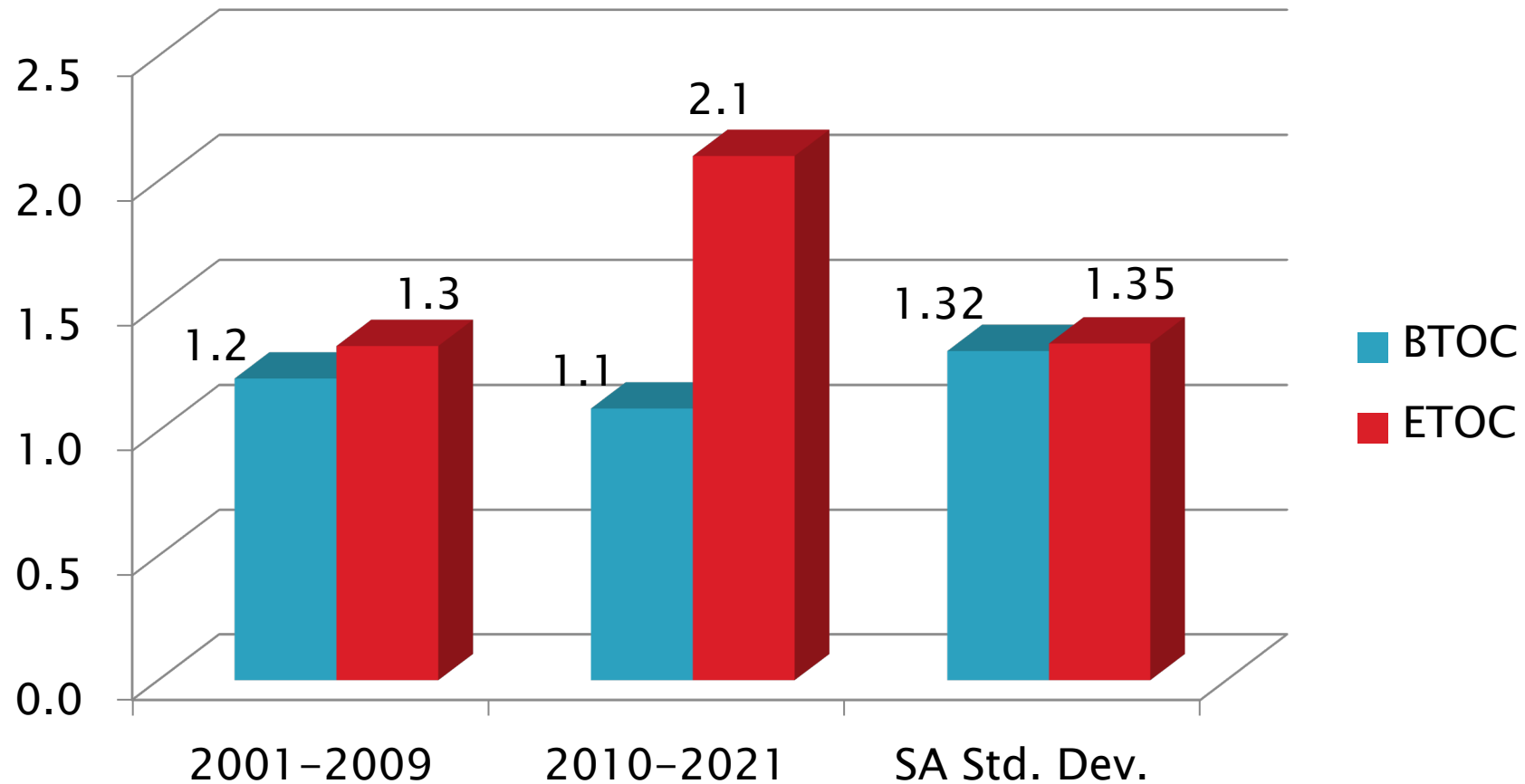
FINAL WEIGHTED TOTAL DEMERITS (DEMERITS)



1 R Precision Estimates



1 R Precision Estimates



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



CAT C13

➤➤ October 2022

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



A Program of ASTM International

C13 Test Activity

Test Status	Validity Code	C13
Acceptable Calibration Test	AC	1
Failed Calibration Test	OC	1
Operationally Invalid	LC	0
Aborted	XC	0
Total		2

C13 Failed Tests

Failed Parameter	Number of Tests
Severe OC	1
Total	1

C13 Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

C13 Test Severity

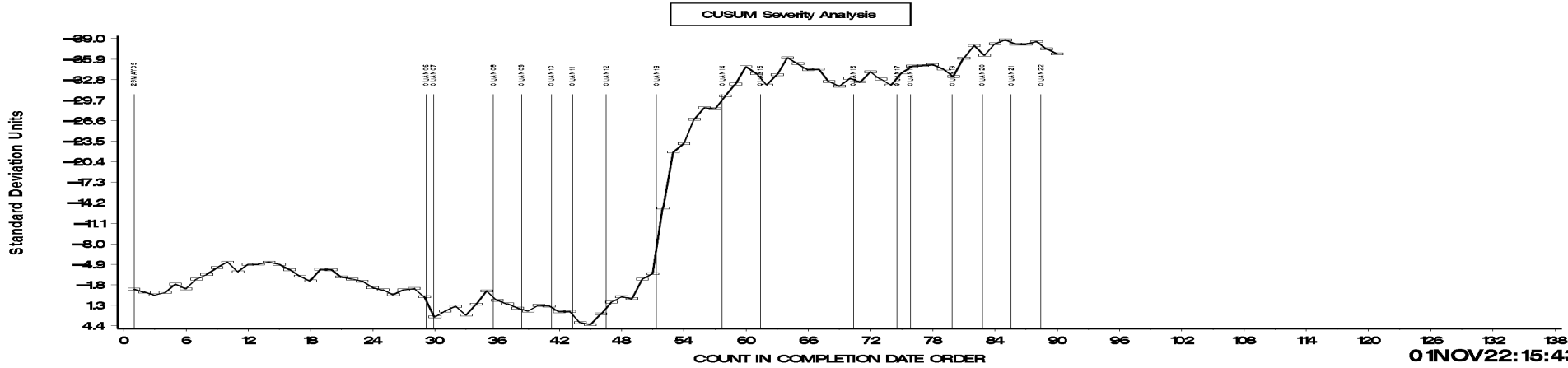
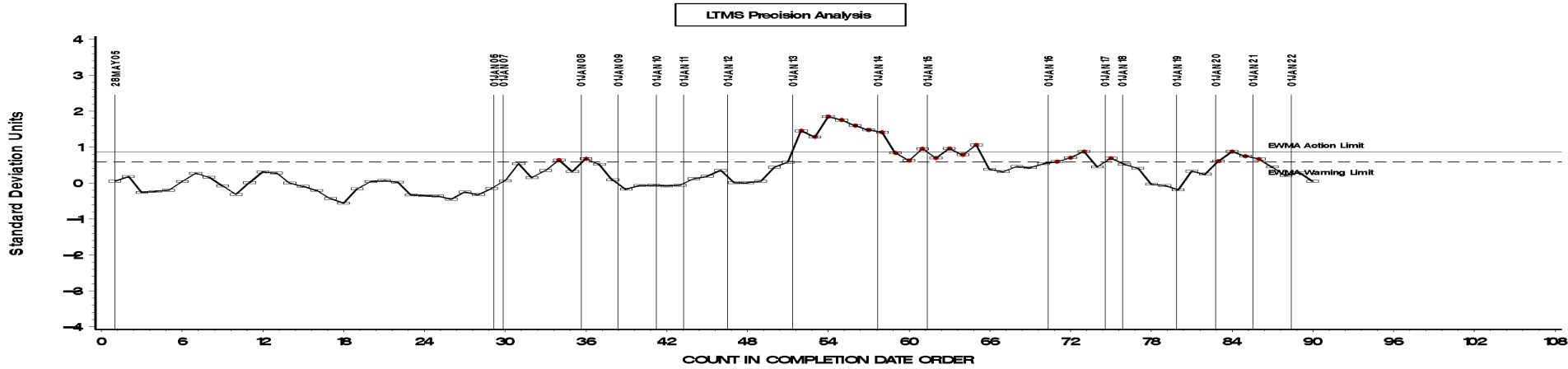
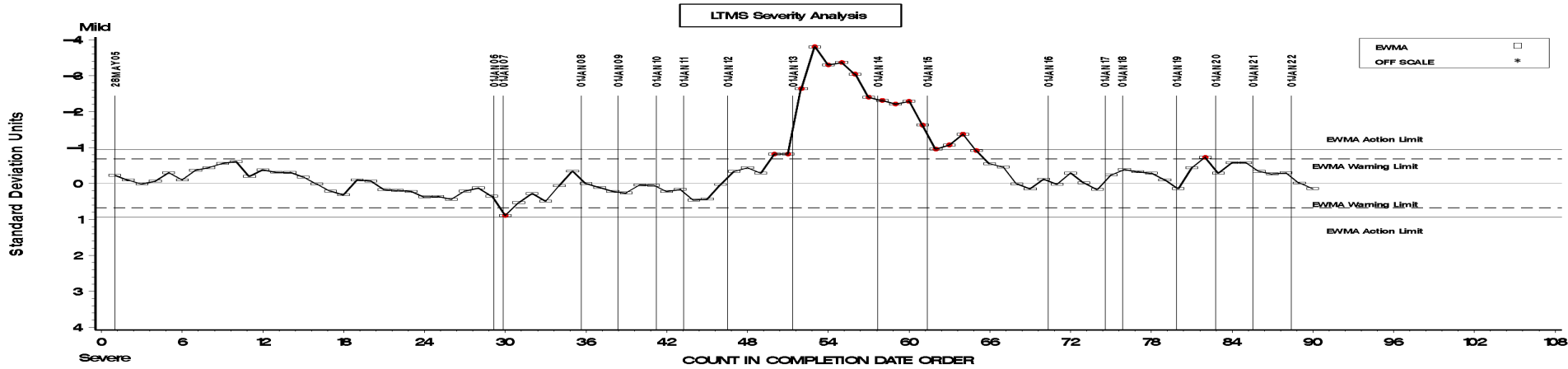
- ▶ R2TC, TGC, OC are in control
- ▶ TLC in severity warning alarm in the mild direction but very near action alarm

C13 INDUSTRY OPERATIONALLY VALID DATA



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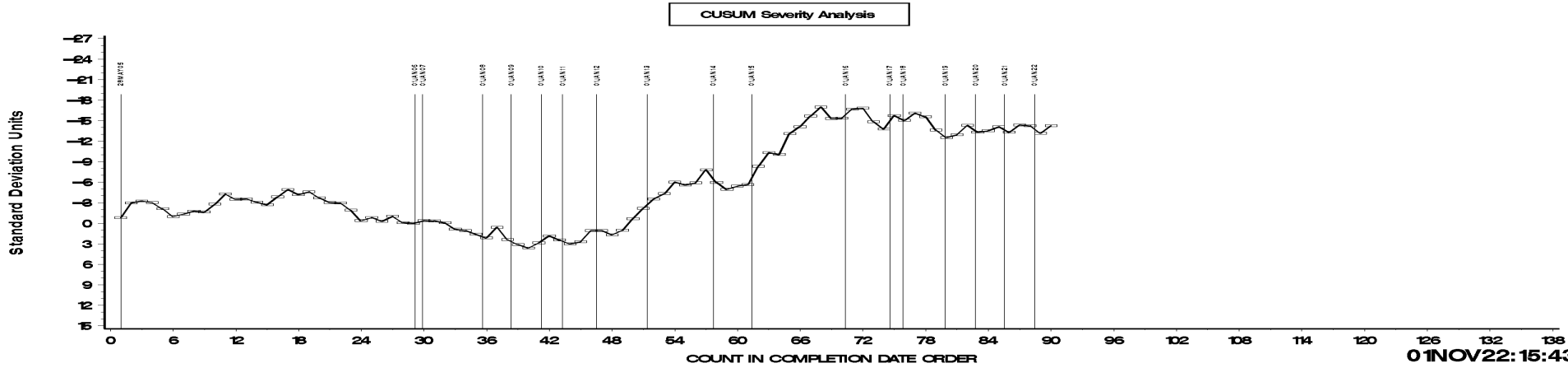
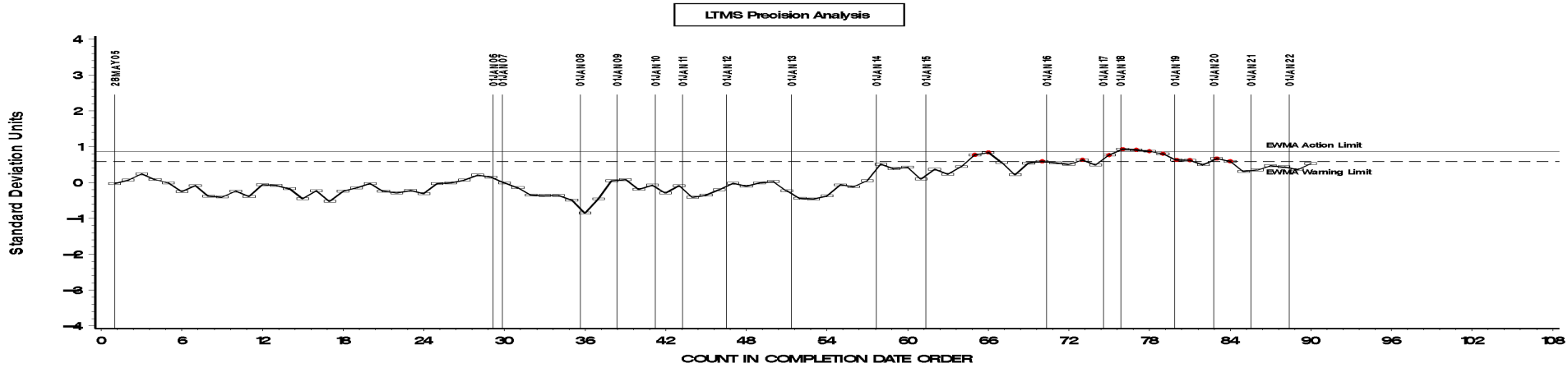
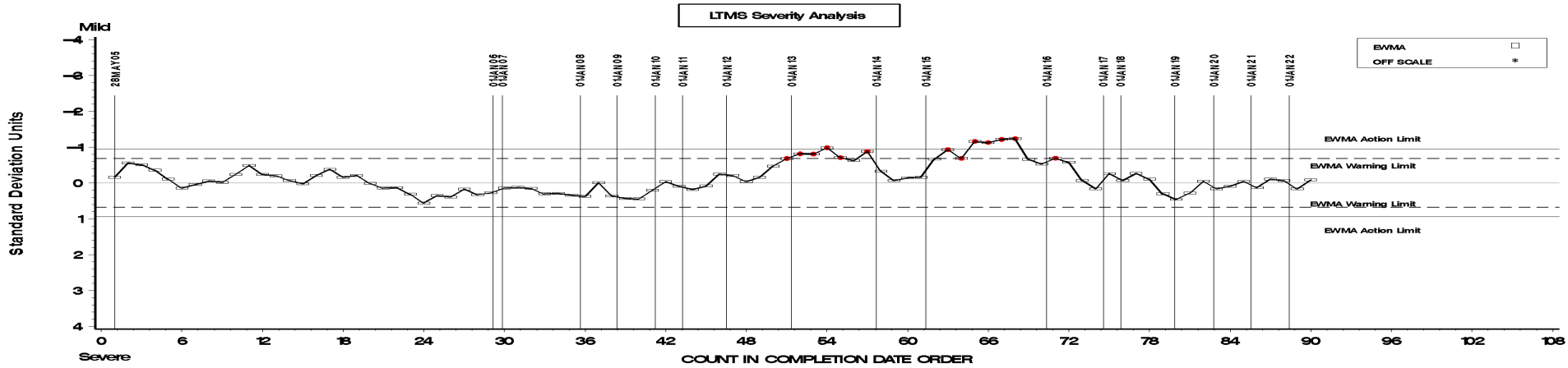
2ND RING TOP CARBON AVG. — FINAL RESULT



C13 INDUSTRY OPERATIONALLY VALID DATA



TOP GROOVE CARBON AVG — FINAL RESULT

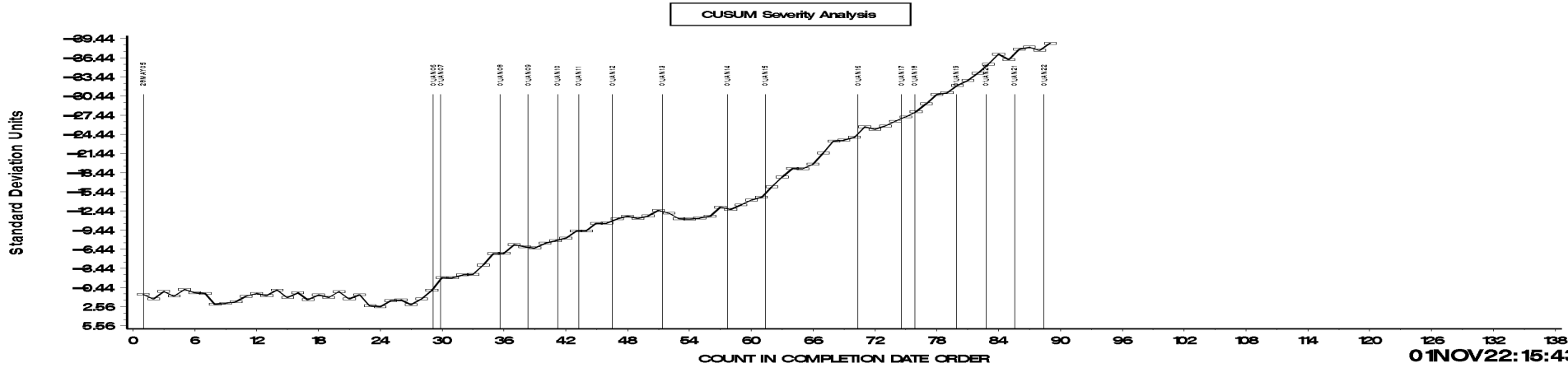
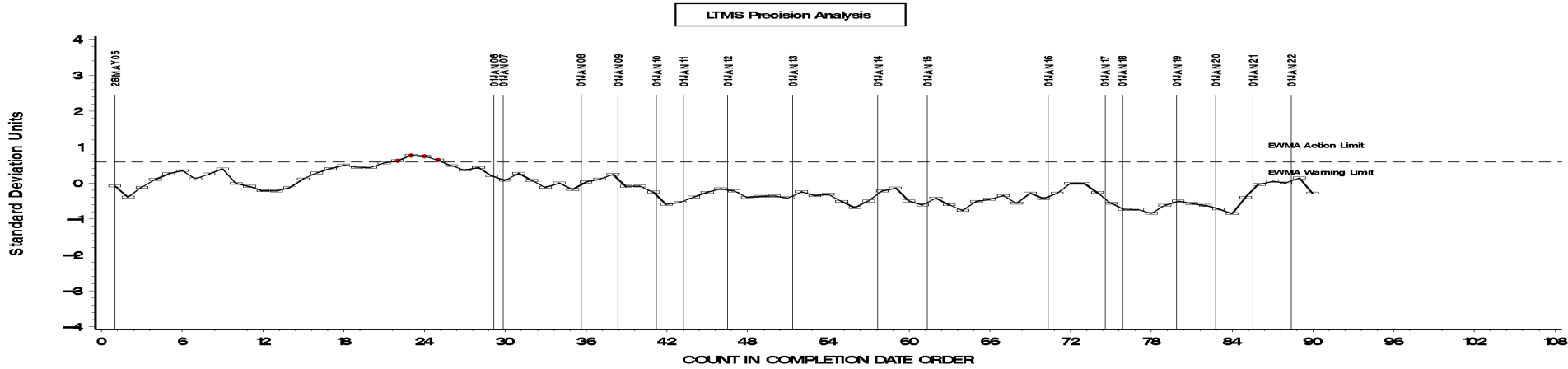
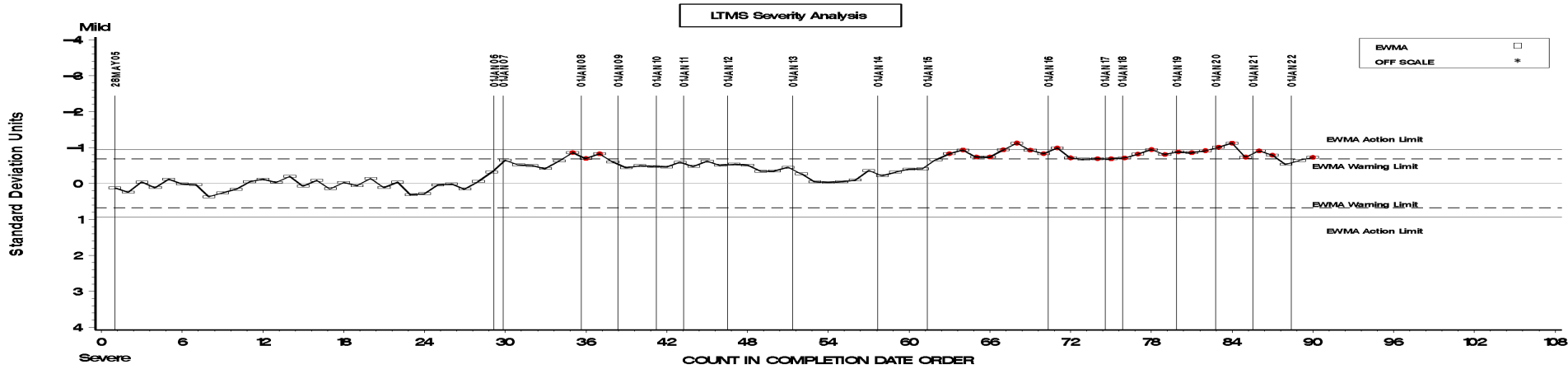


C13 INDUSTRY OPERATIONALLY VALID DATA



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TOP LAND CARBON AVG. — FINAL RESULT

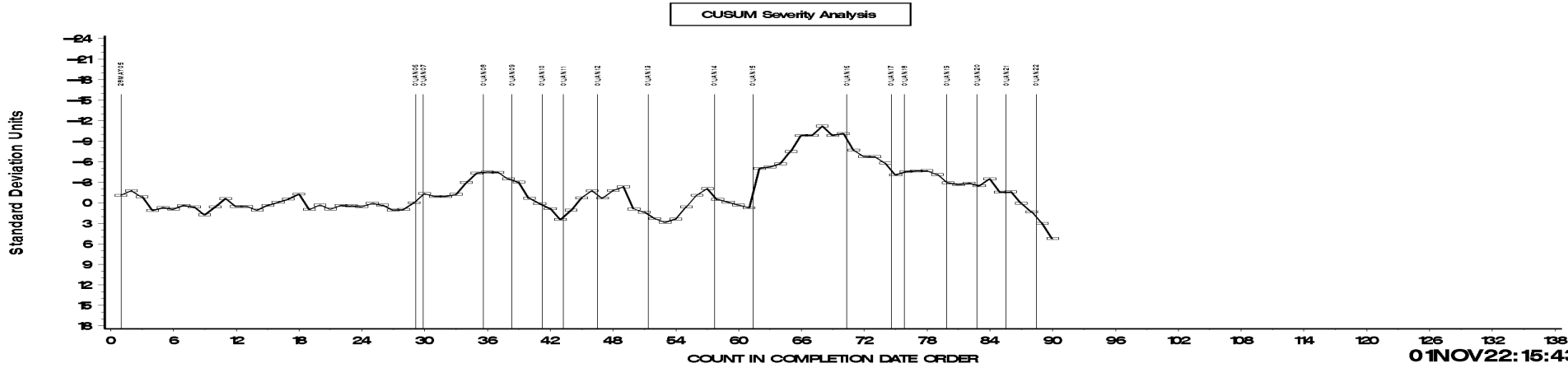
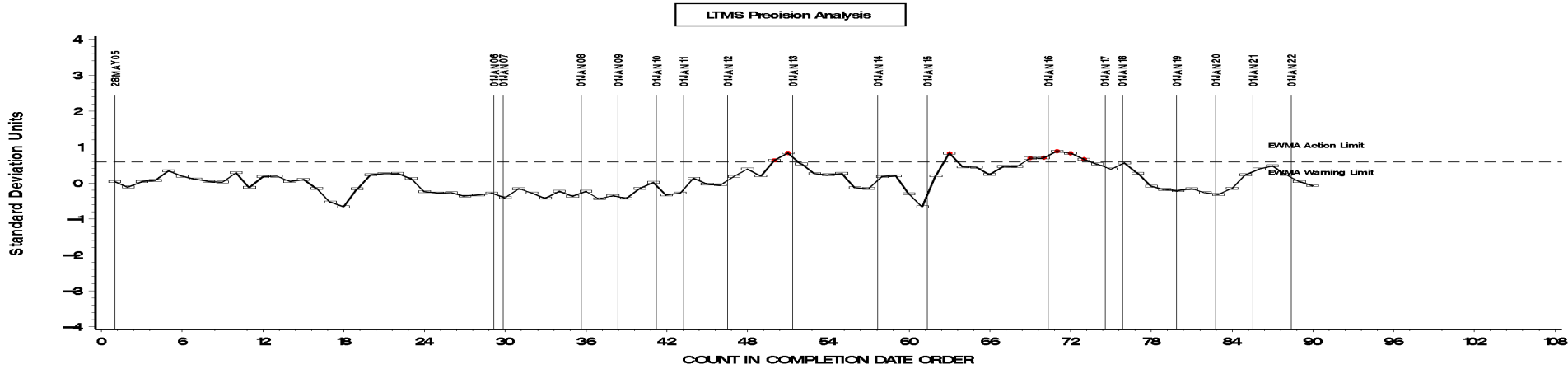
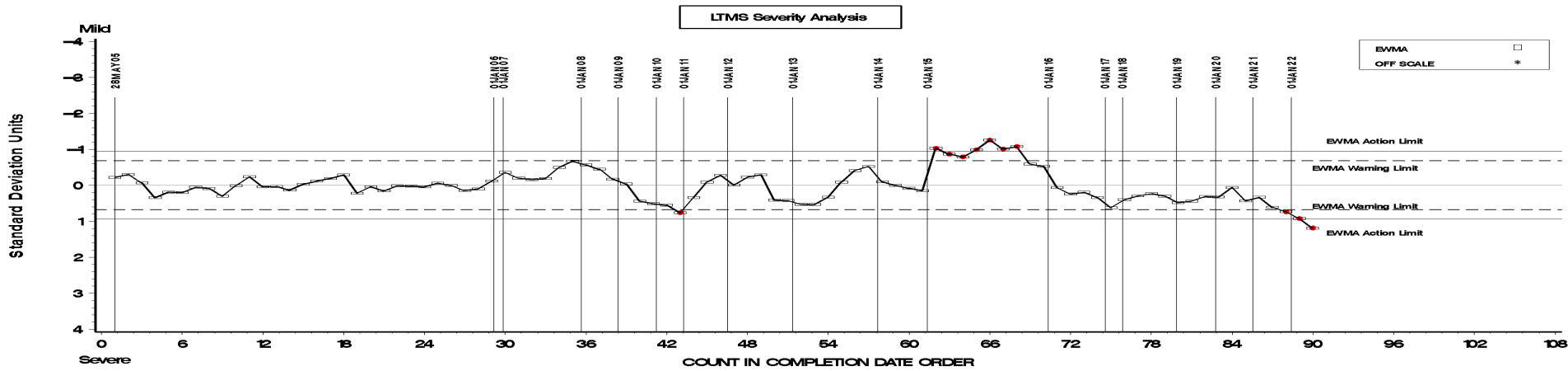


C13 INDUSTRY OPERATIONALLY VALID DATA

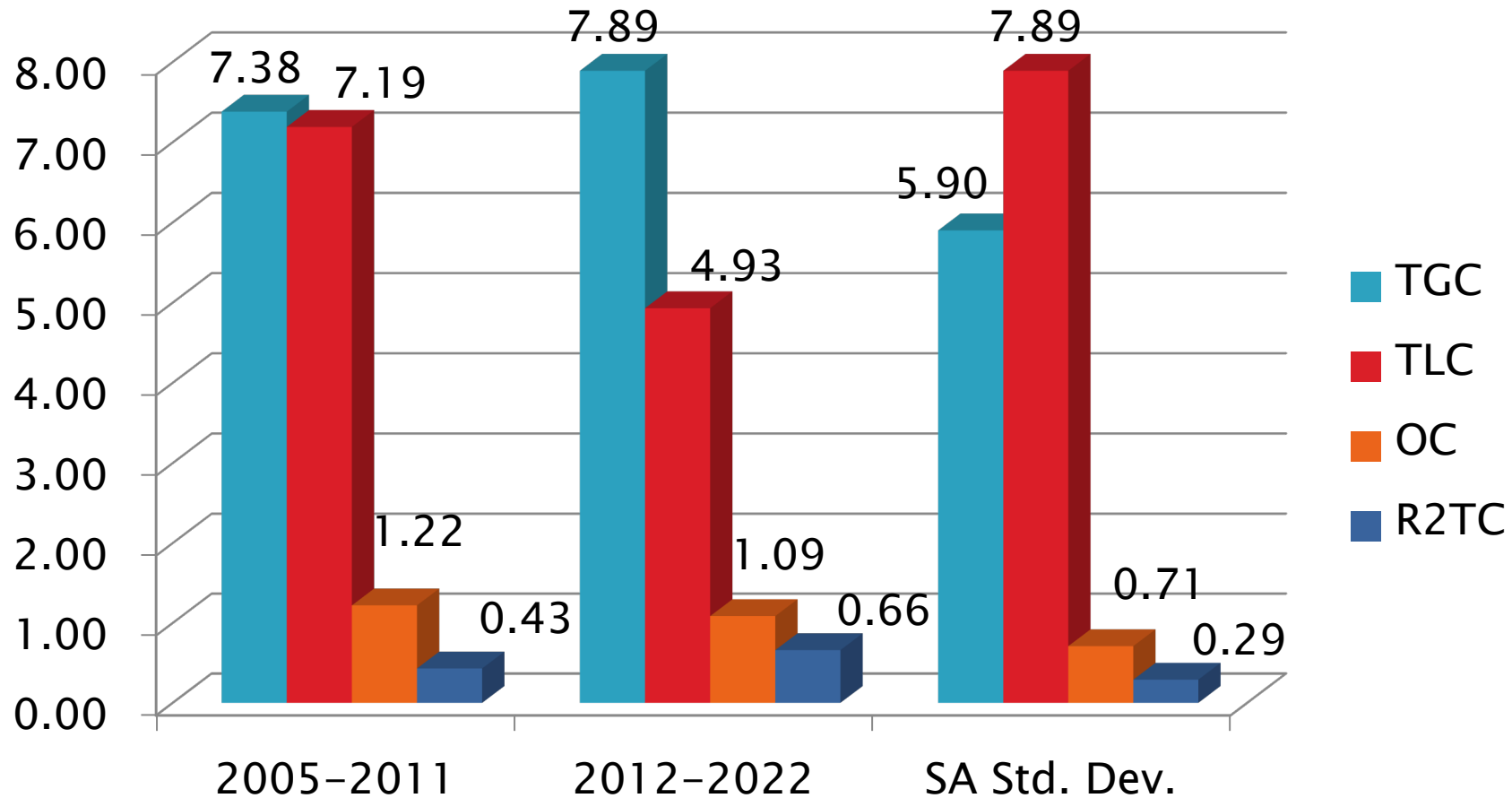


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OIL CONS. DELTA — FINAL RESULT



C13 Precision Estimates



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



C13 Oil Aeration (COAT)

➤➤ October 2022

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



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COAT Test Activity

Test Status	Validity Code	COAT
Acceptable Calibration Test	AC	4
Failed Calibration Test	OC	1
Operationally Invalid	LC	0
Aborted	XC	0
Informational Run	NN	2
Hardware Approval	NI	3
Total		10

COAT Failed Tests

Failed Parameter	Number of Tests
Average oil aeration severe	1
Total	1

COAT Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

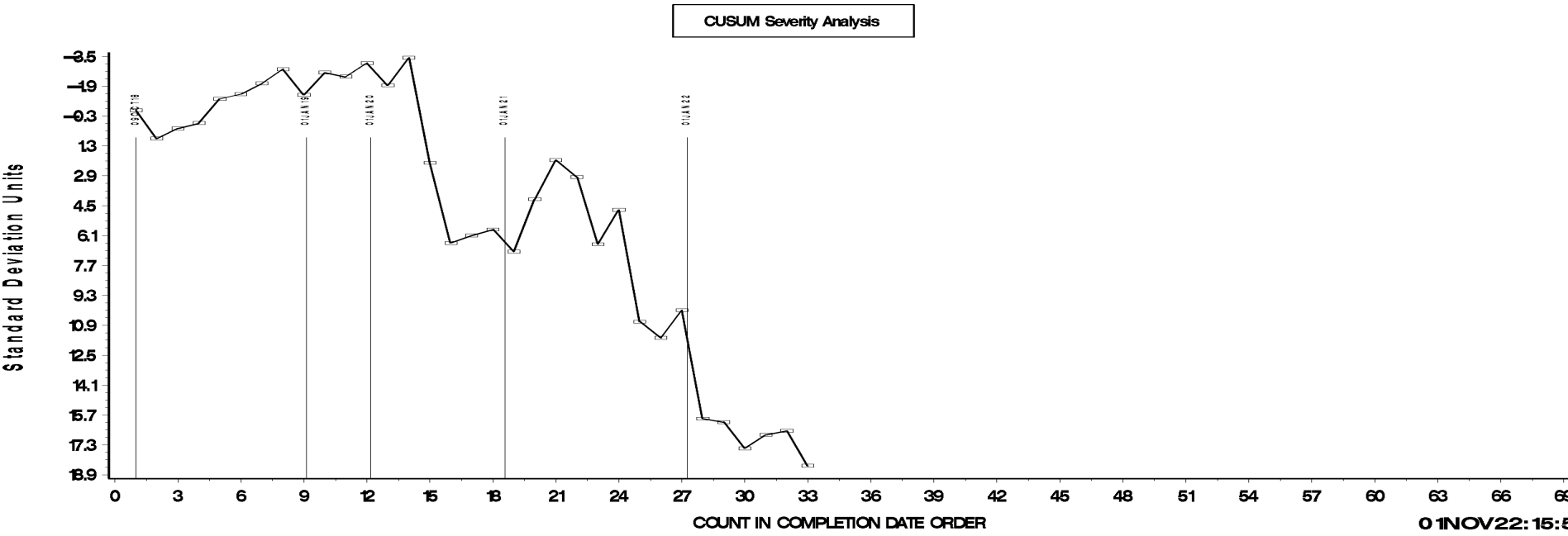
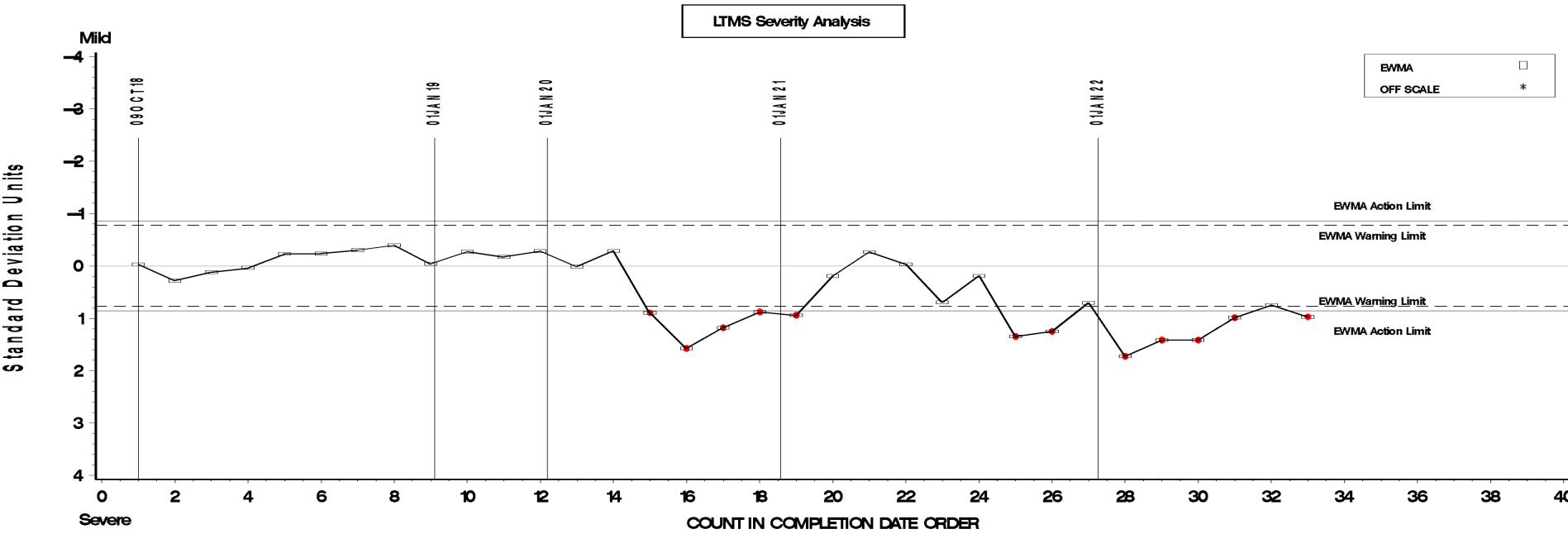
*Invalid and aborted tests

COAT Test Severity

- ▶ AAVE is in action alarm in the severe direction

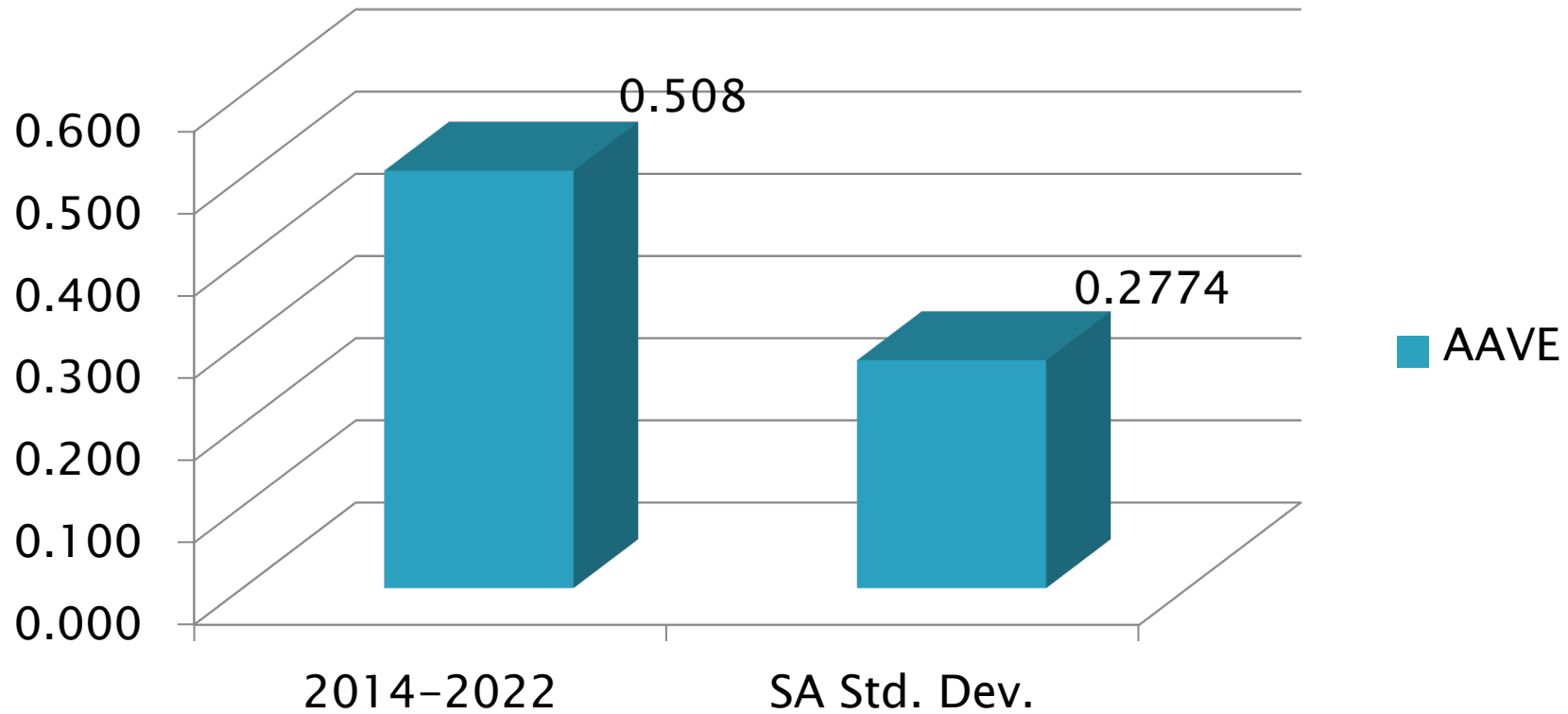


CORRECTED AVERAGE OIL AERATION OVER TEST HOURS 40 —50



COAT Precision Estimates

AAVE



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



Daimler DD13 Scuffing Test

»» October 2022

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



A Program of ASTM International

DD13 Test Activity

Test Status	Validity Code	COAT
Acceptable Calibration Test	AC	0
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		0

DD13 Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

DD13 Lost Tests*

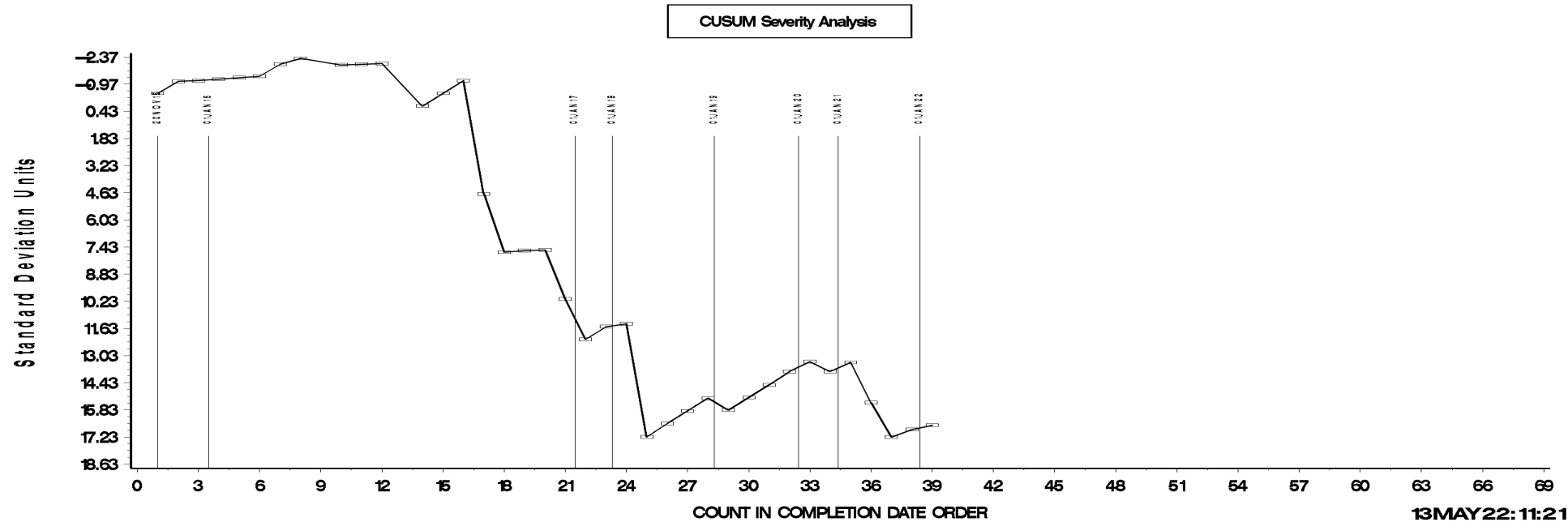
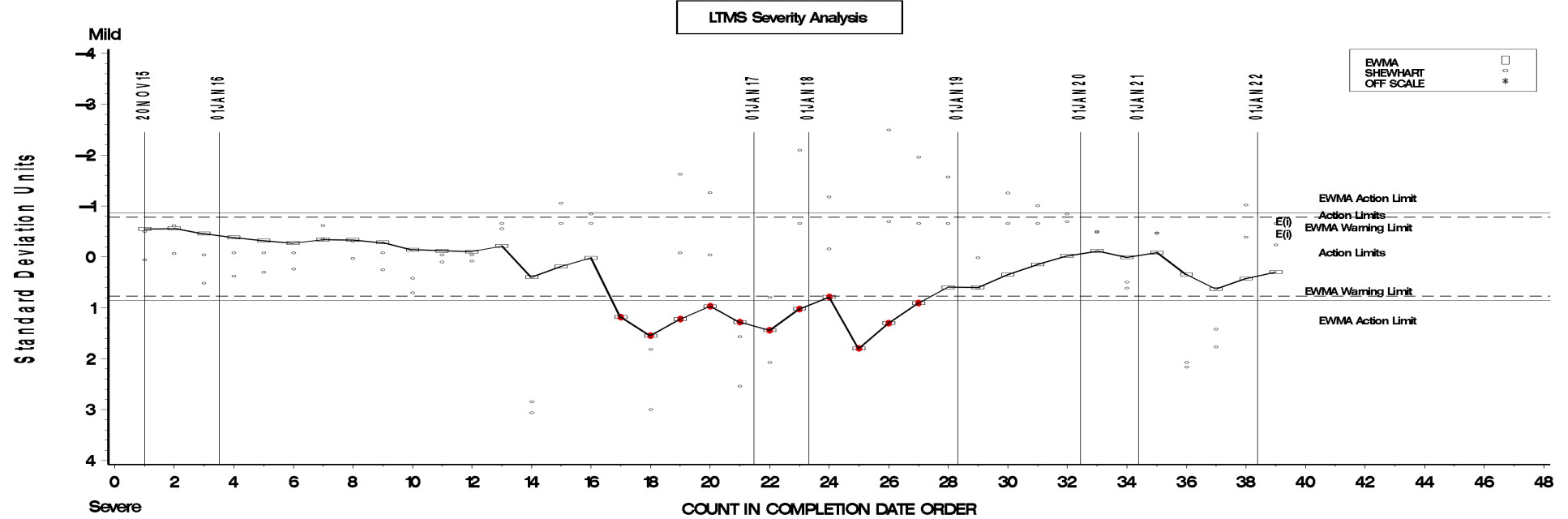
Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

DD13 Test Severity

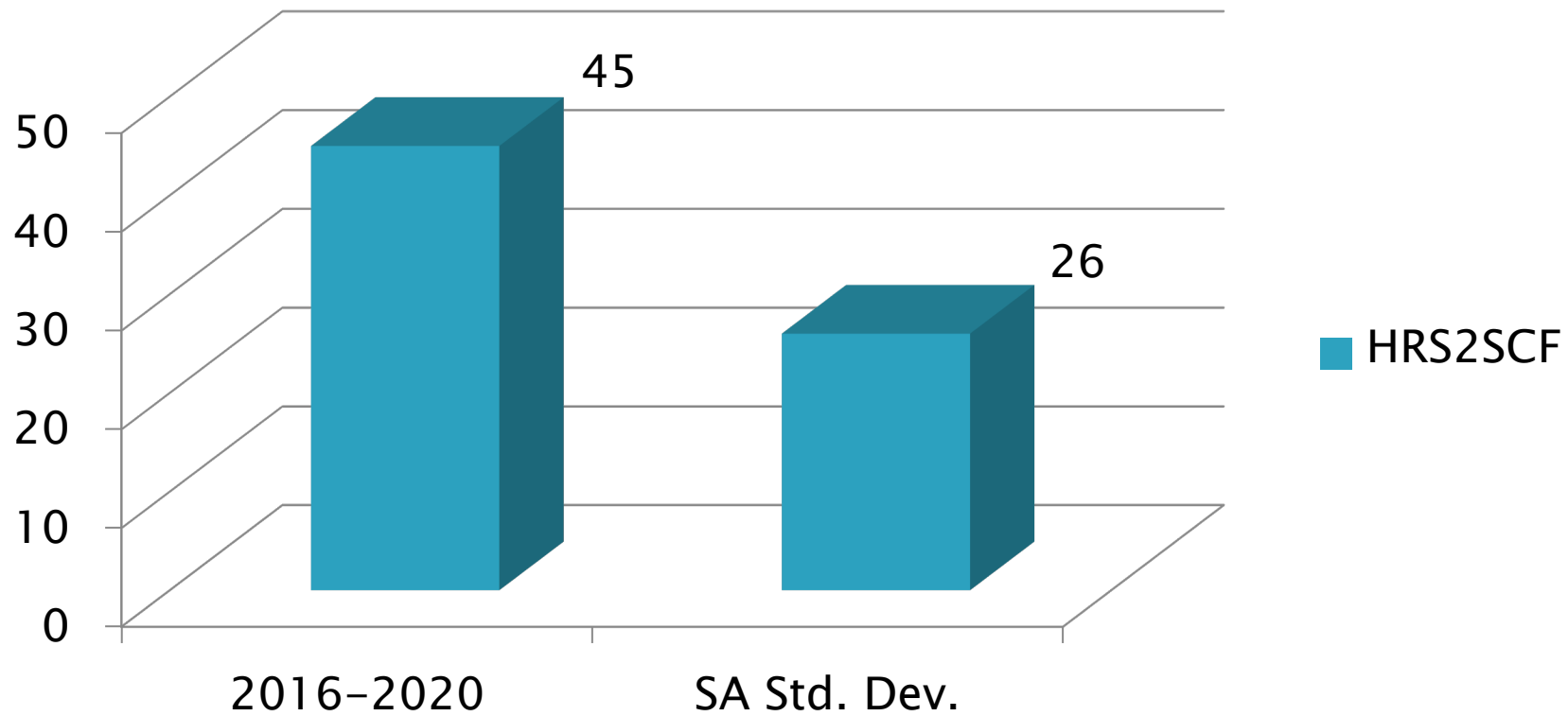
- ▶ As no DD13 tests were run during this period no statement on test severity can be made.

FNL. ORIG. UNIT HOURS TO SCUFF



DD13 Precision Estimates

HRS2SCF



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Test Monitoring Center
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Cummins ISB

➤➤ October 2022

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



A Program of ASTM International

ISB Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	1
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		1

ISB Failed Tests

Failed Parameter	Number of Tests
No failed test	0
Total	0

ISB Lost Tests*

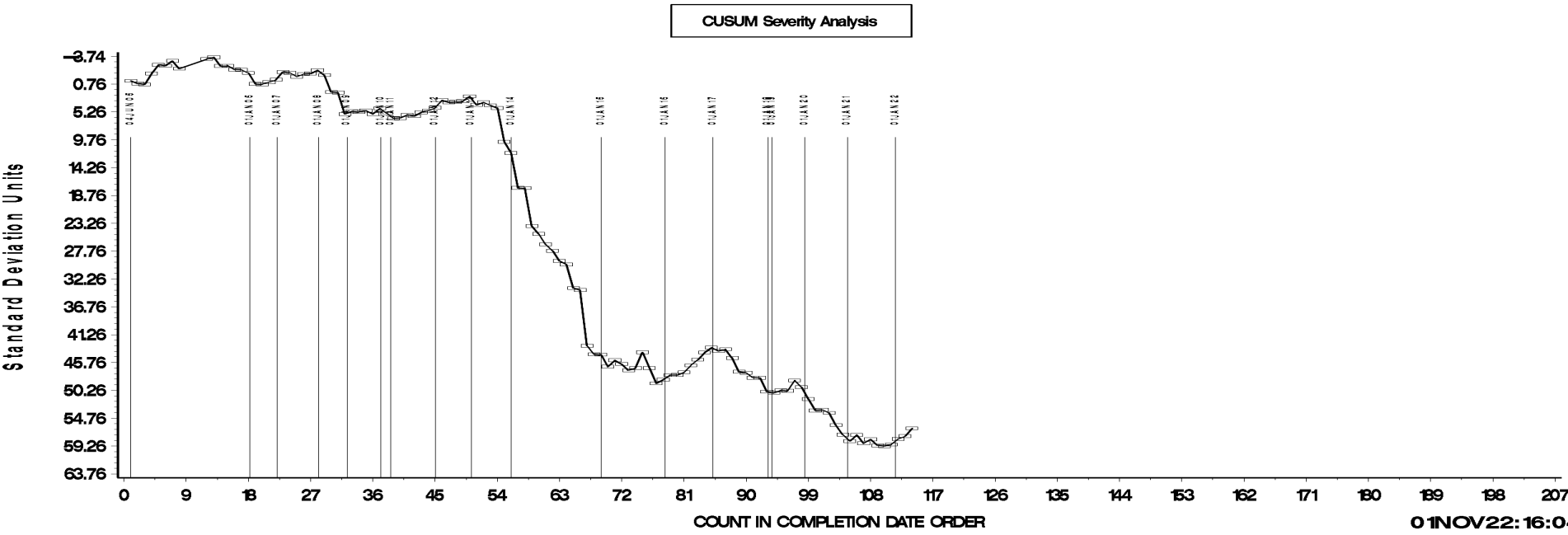
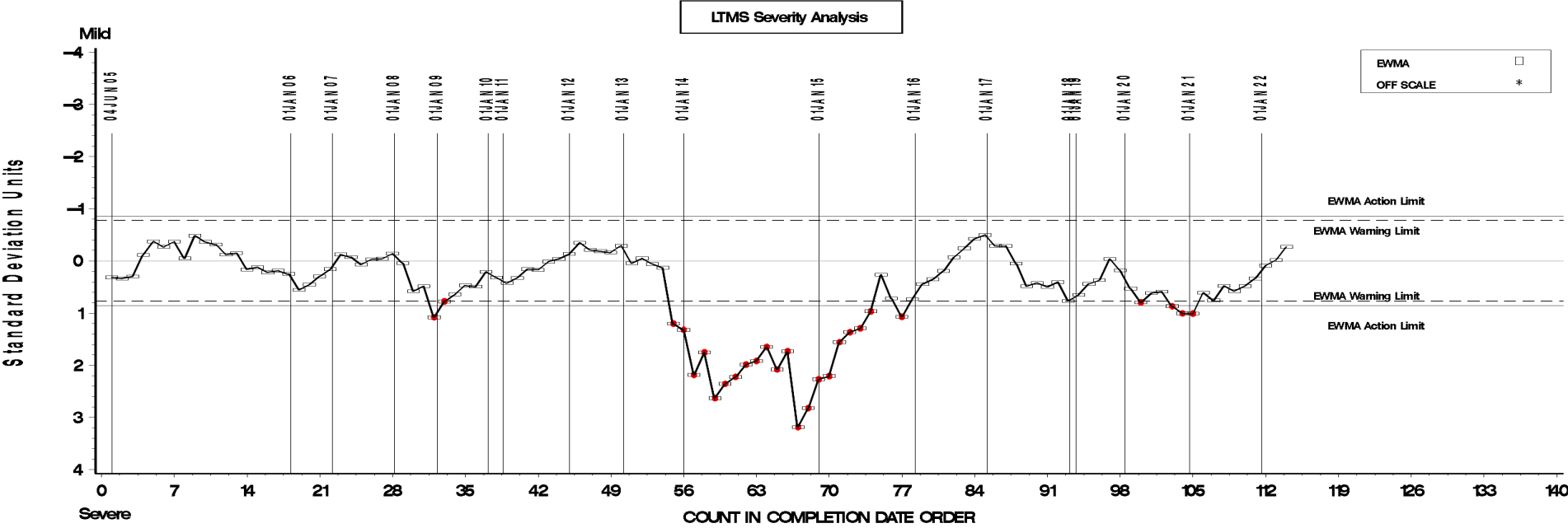
Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

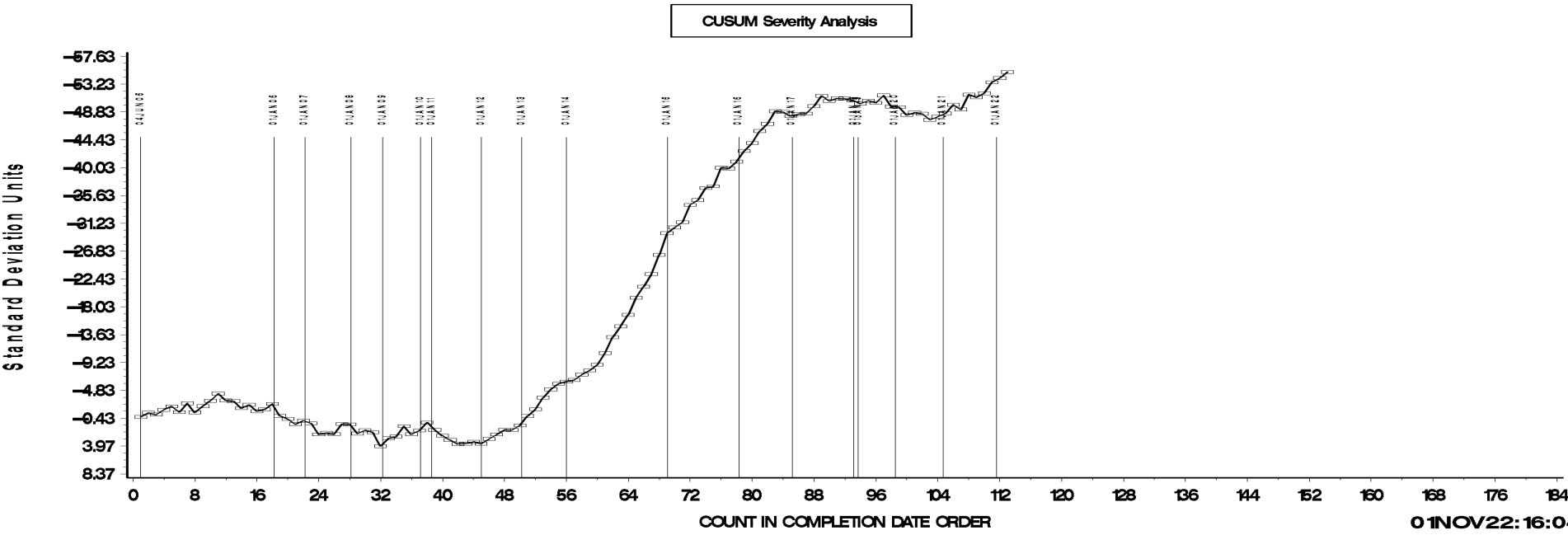
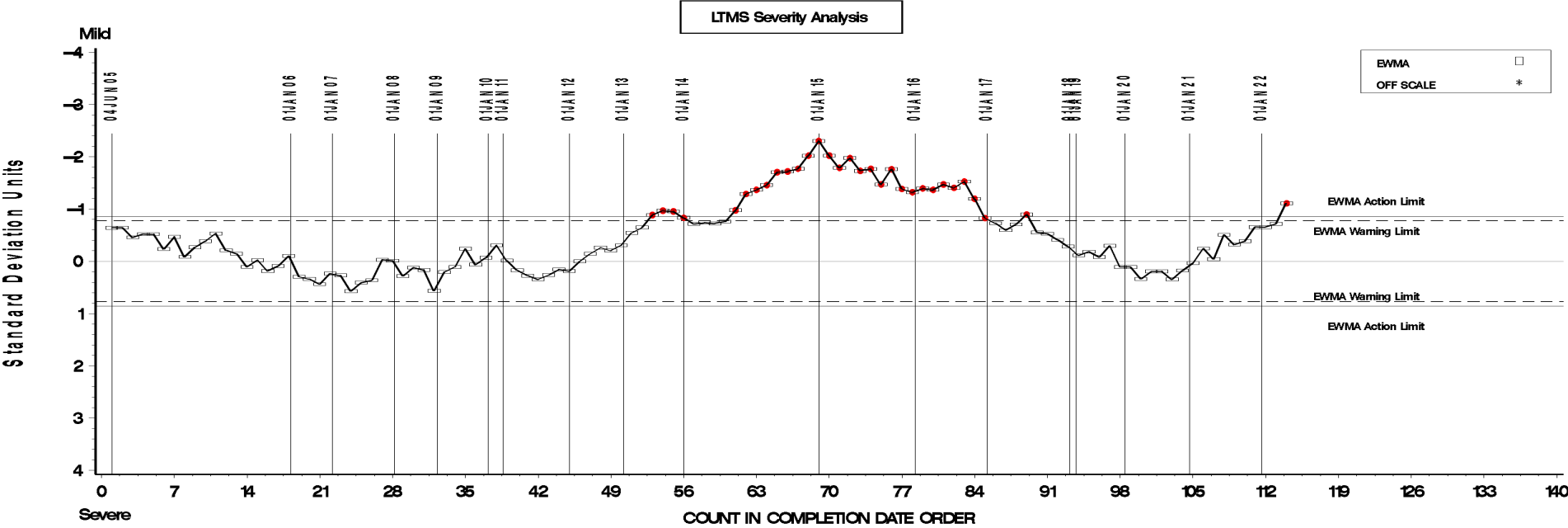
ISB Test Severity

- ▶ ATWL in level 2 Zi alarm in the mild direction
- ▶ ACSW is in control.

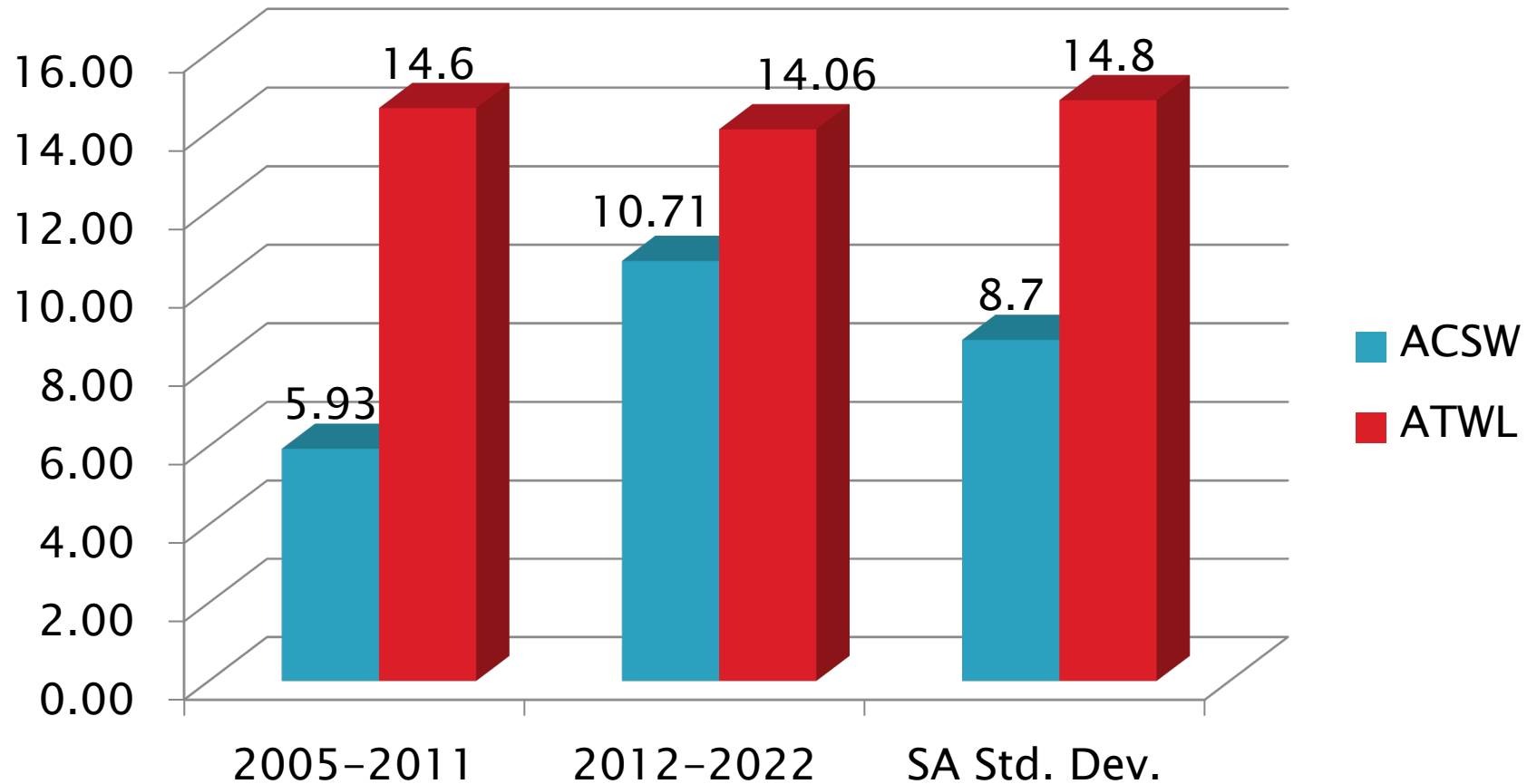
AVERAGE CAMSHAFT WEAR



AVERAGE TAPPET WEIGHT LOSS



ISB Precision Estimates



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Test Monitoring Center
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Cummins ISM

»» October 2022

Test Monitoring Center
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ISM Test Activity

Test Status	Validity Code	#
Acceptable Calibration	AC	1
Failed Calibration	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		1

ISM Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

ISM Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

ISM Test Severity

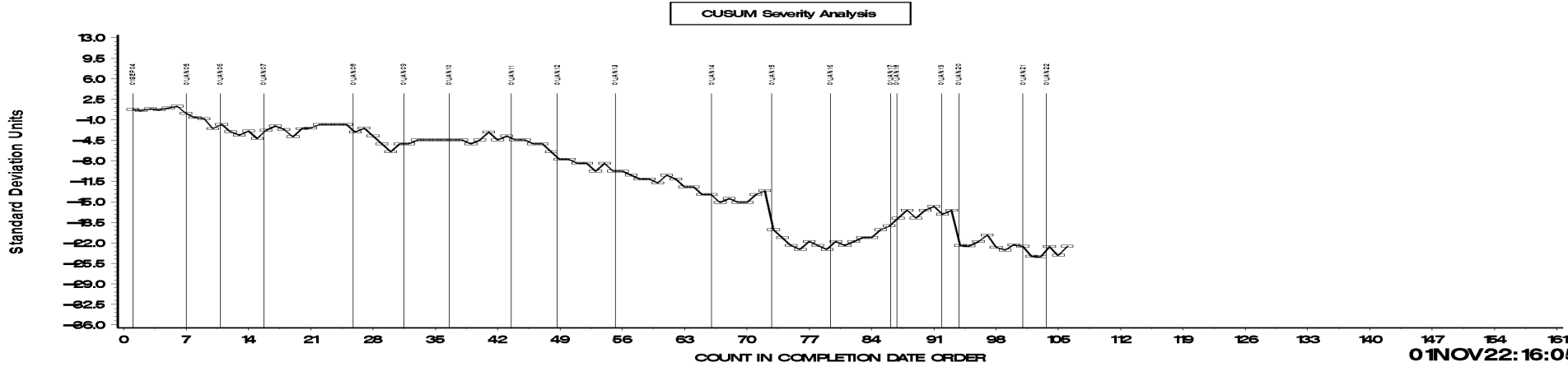
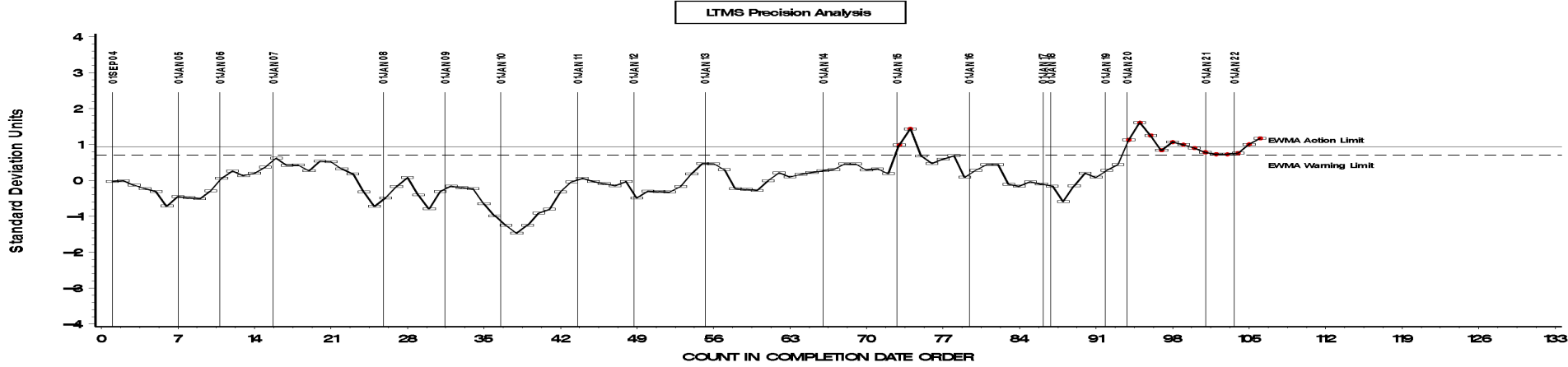
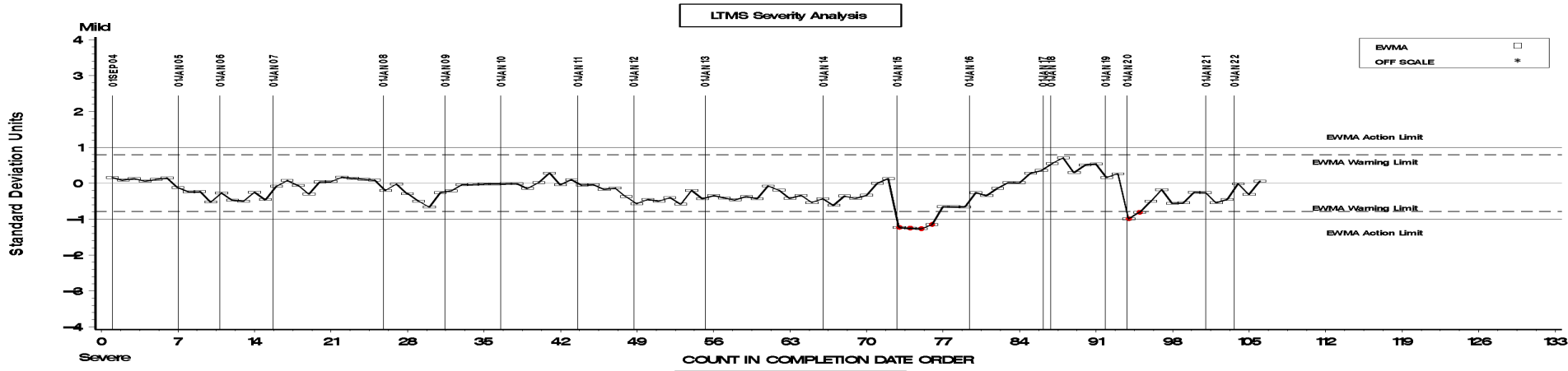
- ▶ CWL is in severity warning alarm in mild direction
- ▶ IAS is in a severity action alarm in the severe direction
- ▶ FPD is in precision warning alarm
- ▶ ASR and IAS are in a precision action alarm

ISM INDUSTRY OPERATIONALLY VALID DATA



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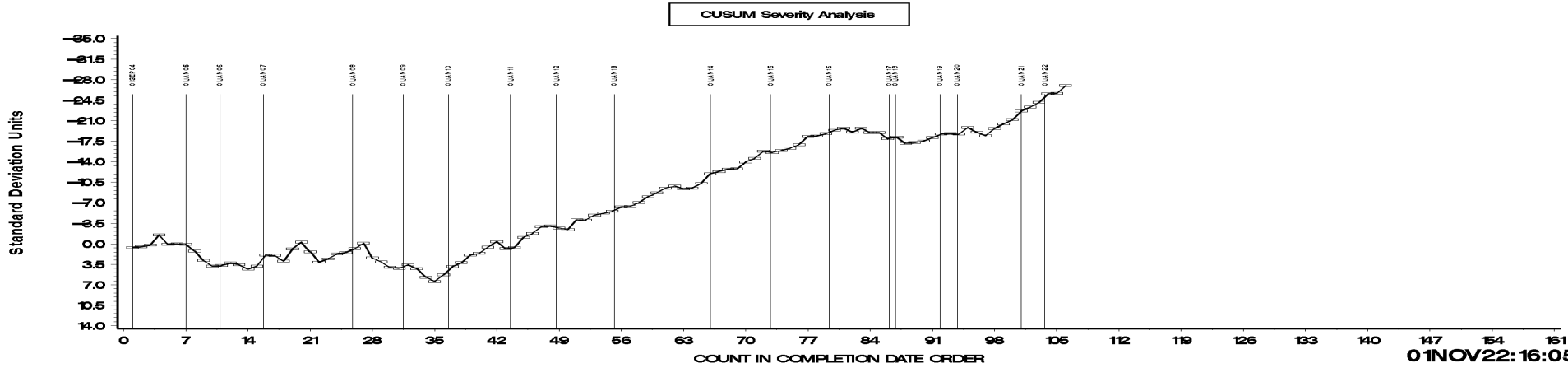
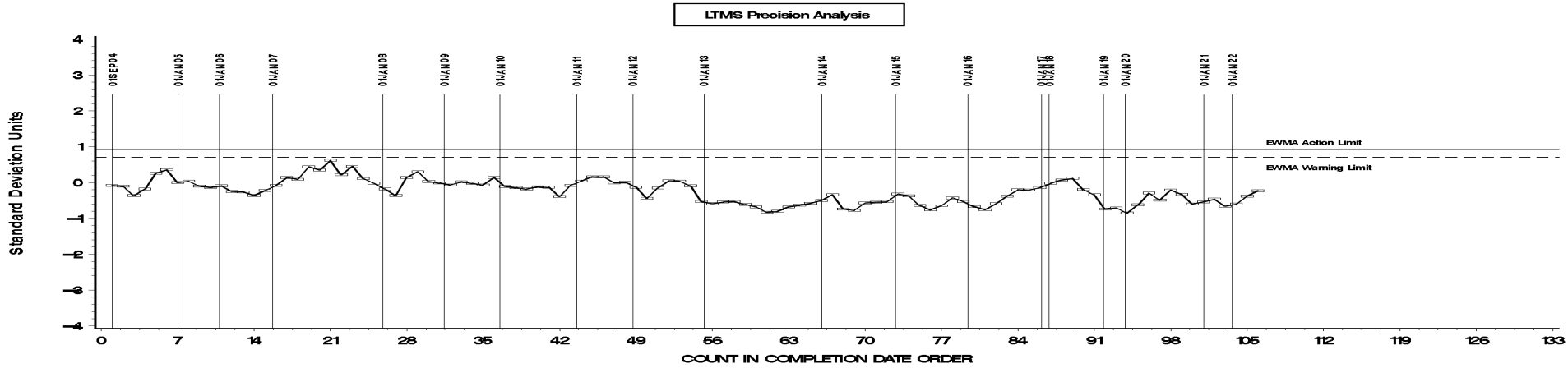
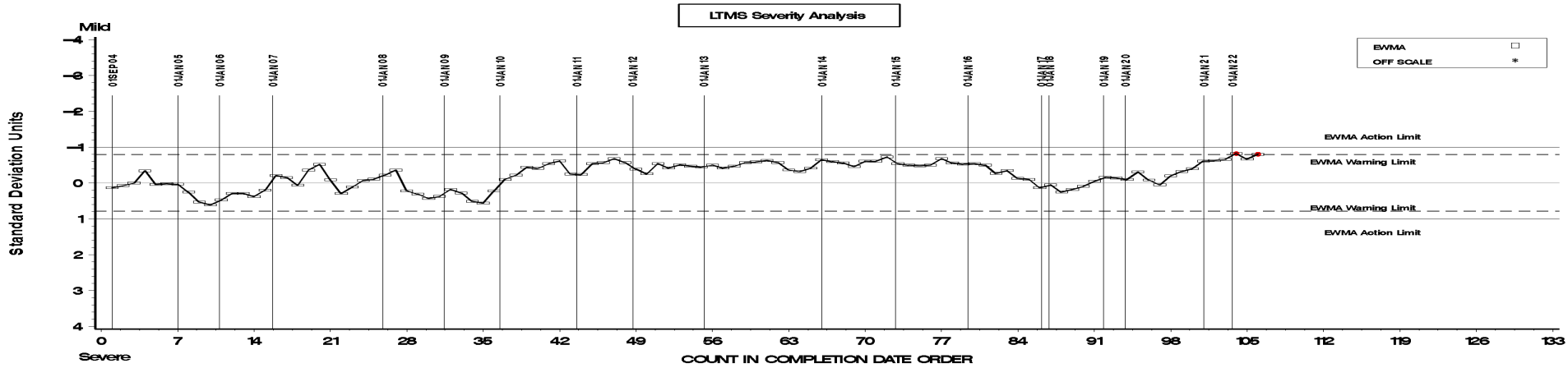
AVERAGE SLUDGE RATING



ISM INDUSTRY OPERATIONALLY VALID DATA



CROSSHEAD WEIGHT LOSS ADJUSTED TO 3.9 % SOOT

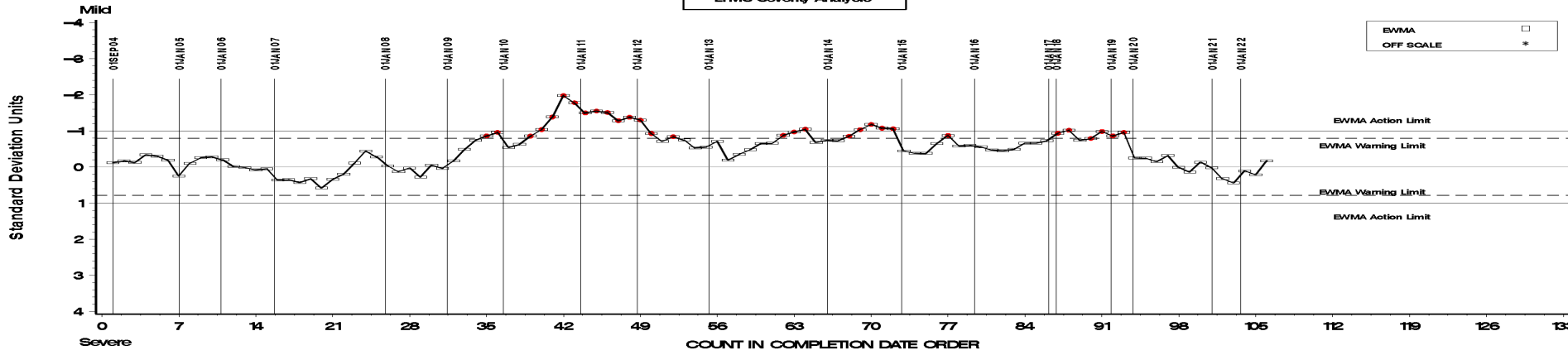


ISM INDUSTRY OPERATIONALLY VALID DATA

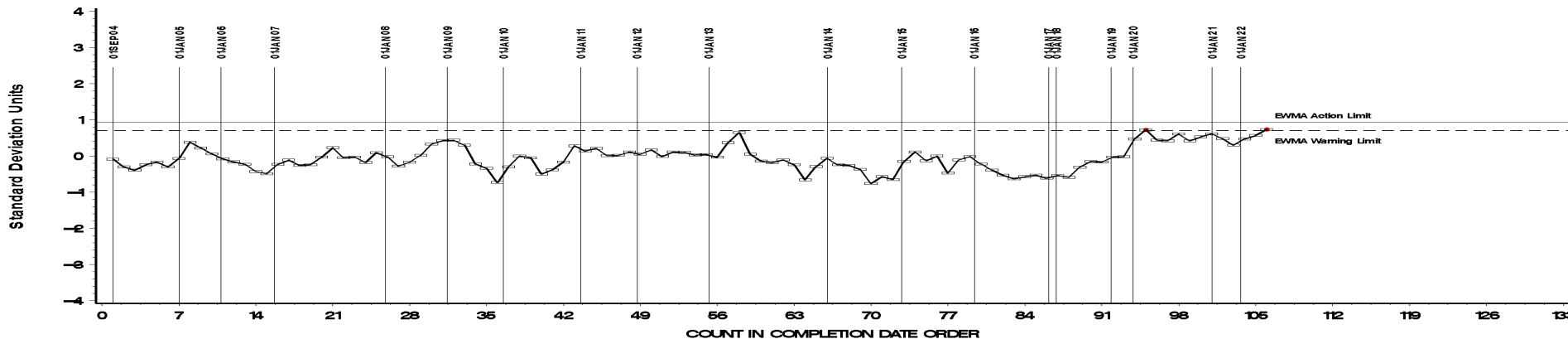


OIL FILTER DELTA PRESSURE

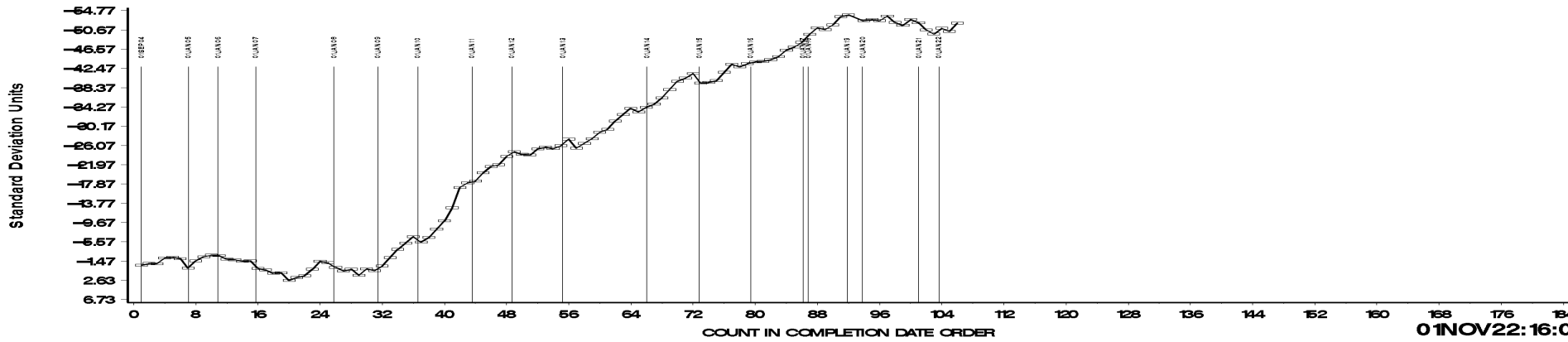
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

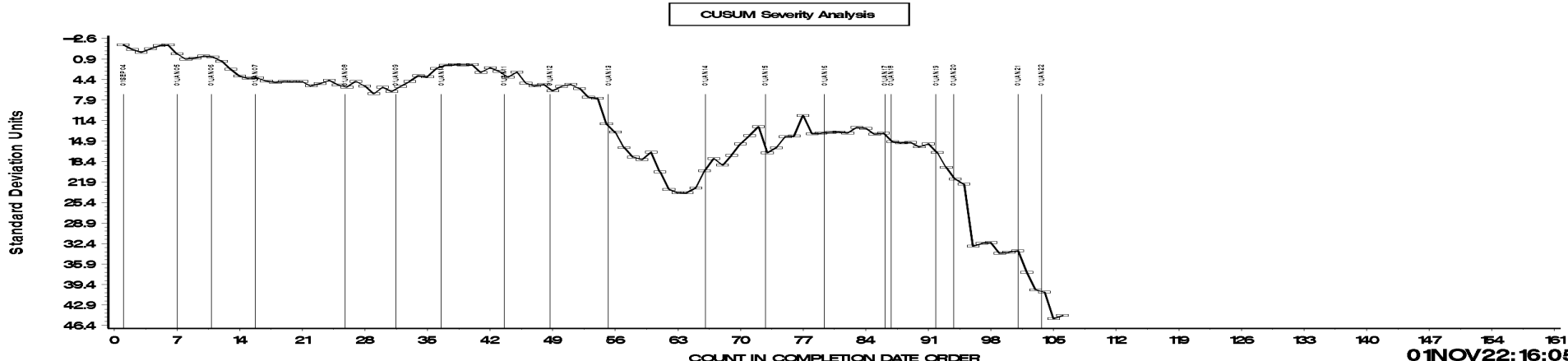
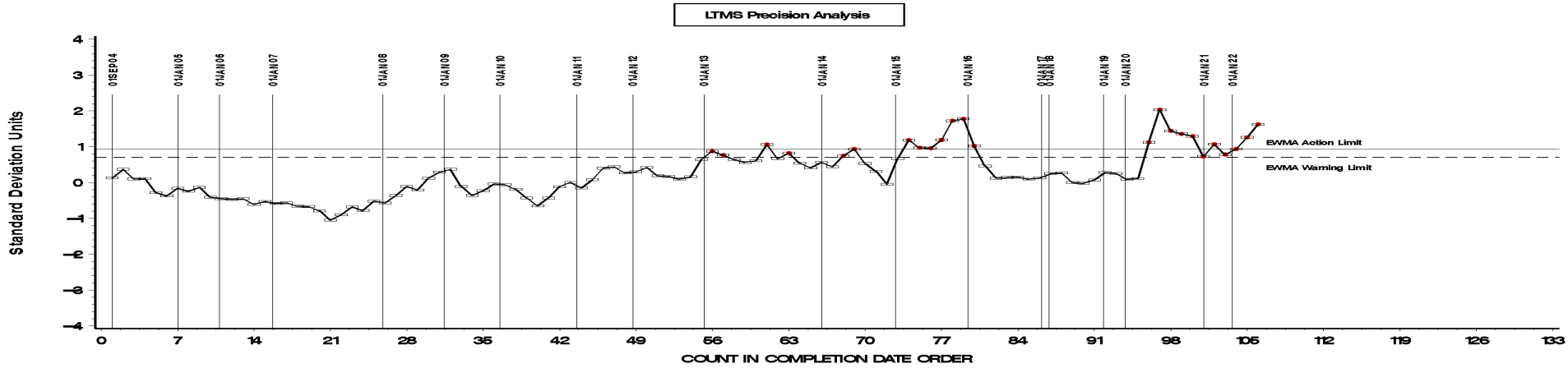
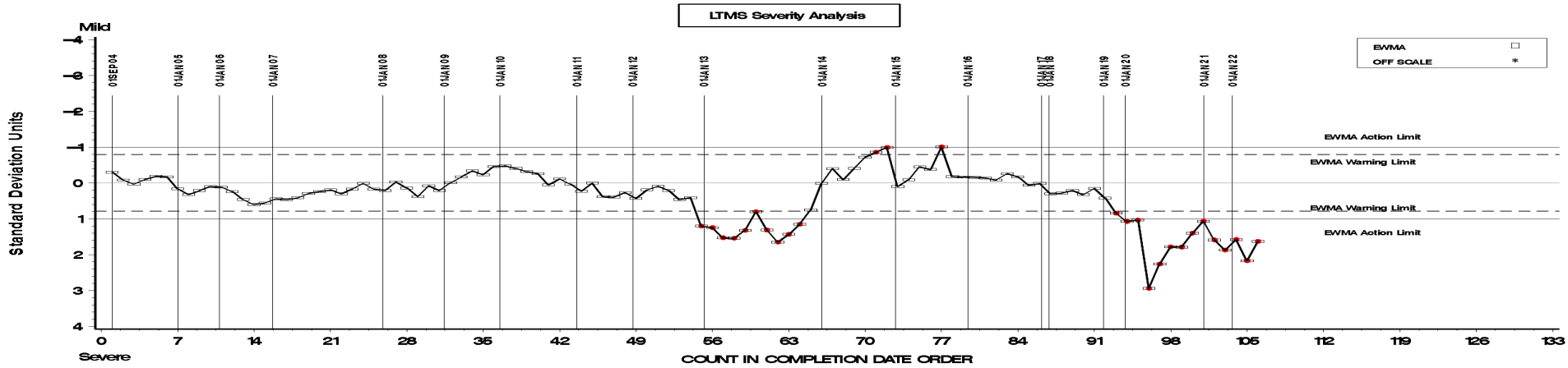


ISM INDUSTRY OPERATIONALLY VALID DATA

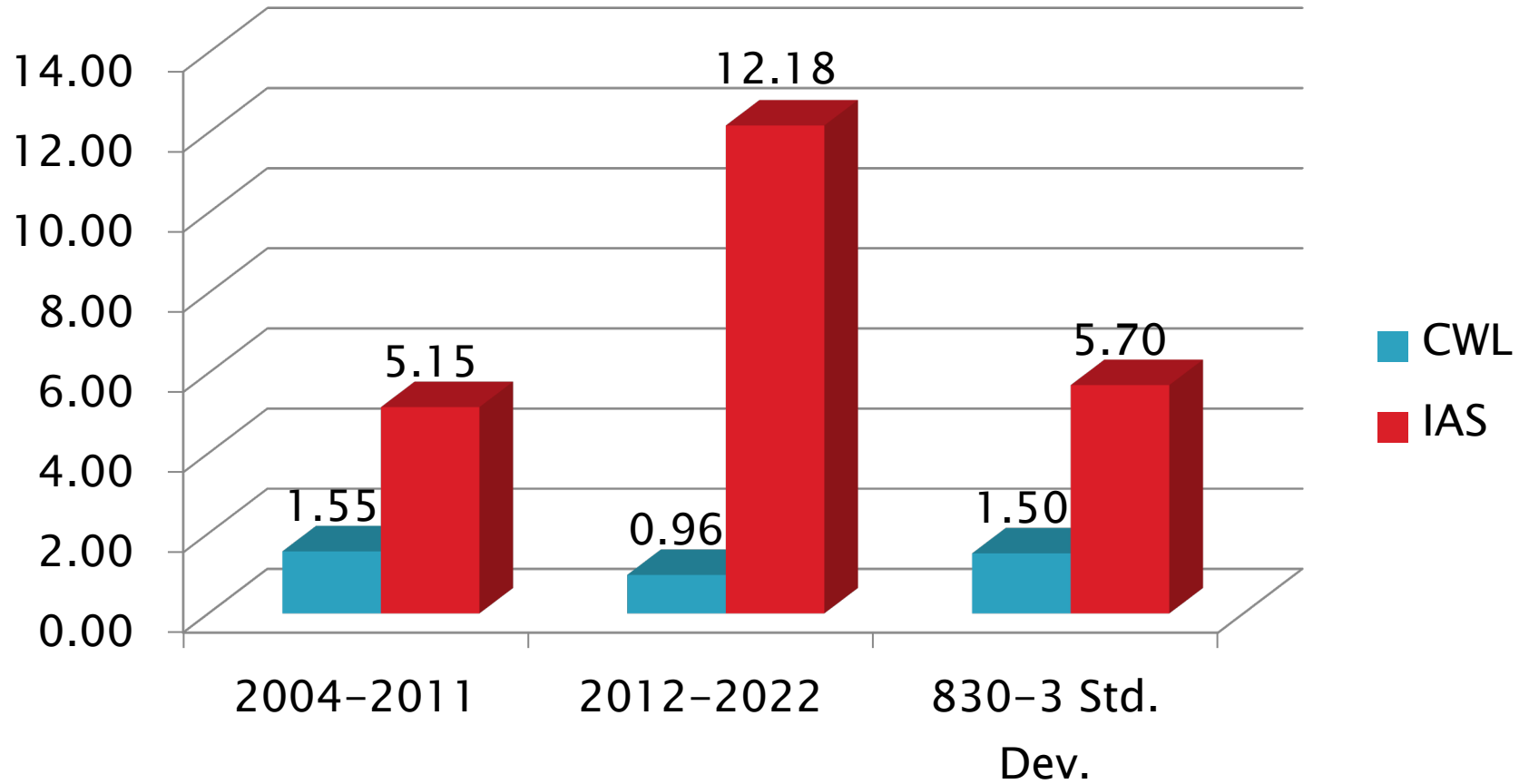


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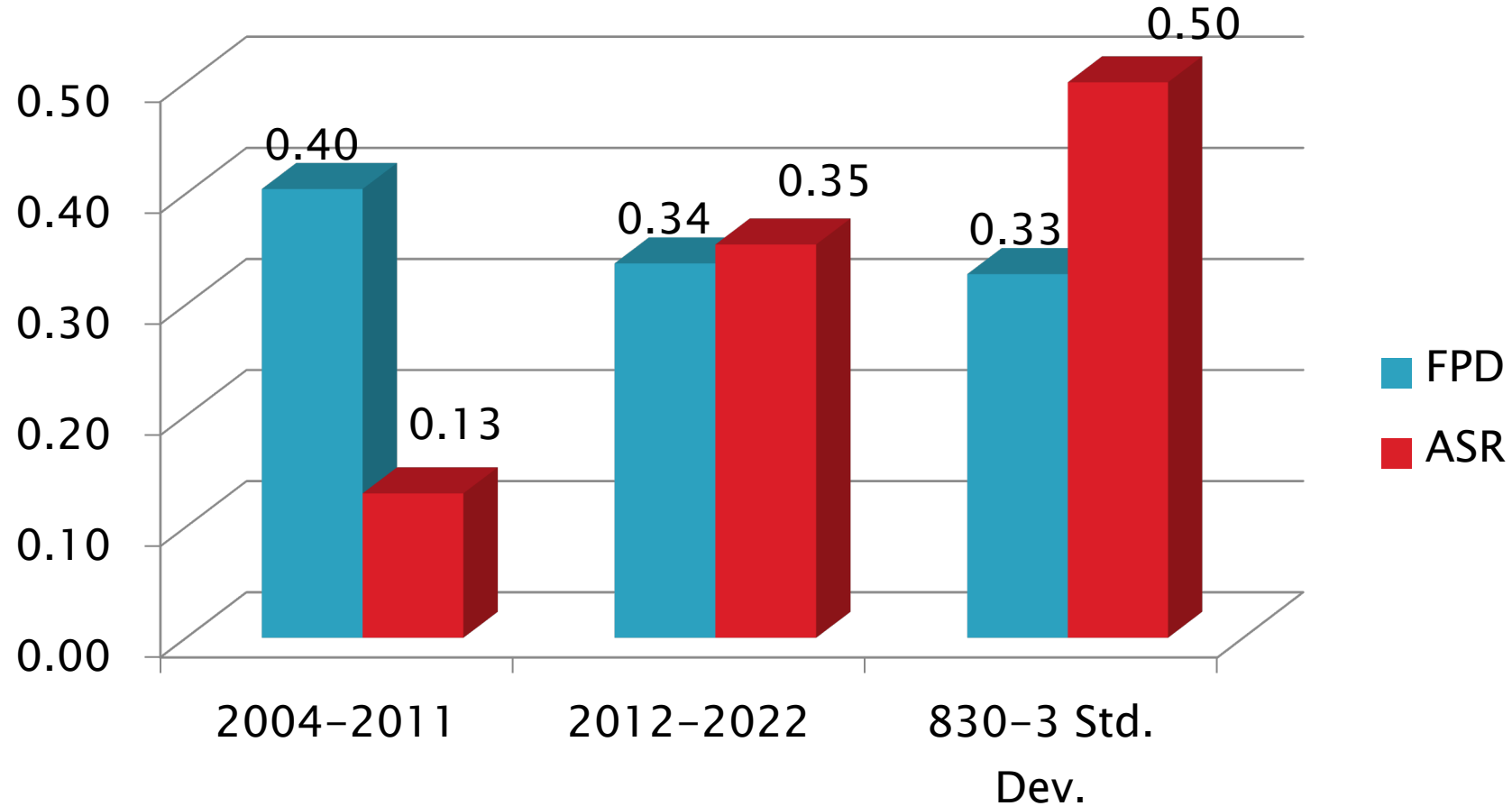
INJECTOR SCREW WEIGHT LOSS ADJUSTED TO 3.9% SOOT



ISM Precision Estimates



ISM Precision Estimates



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



EOAT

➤➤ October 2022

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



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EOAT Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	0
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		0

EOAT Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

EOAT Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

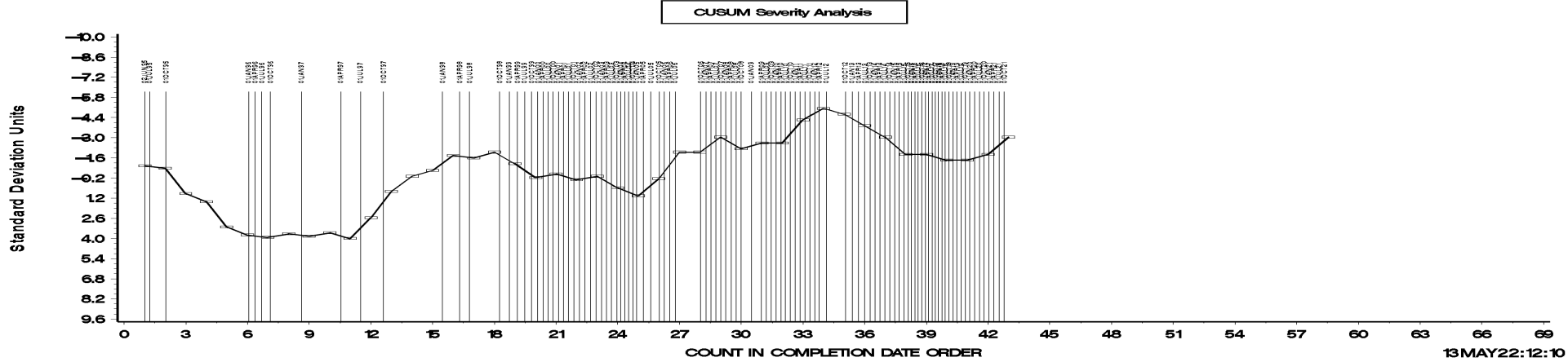
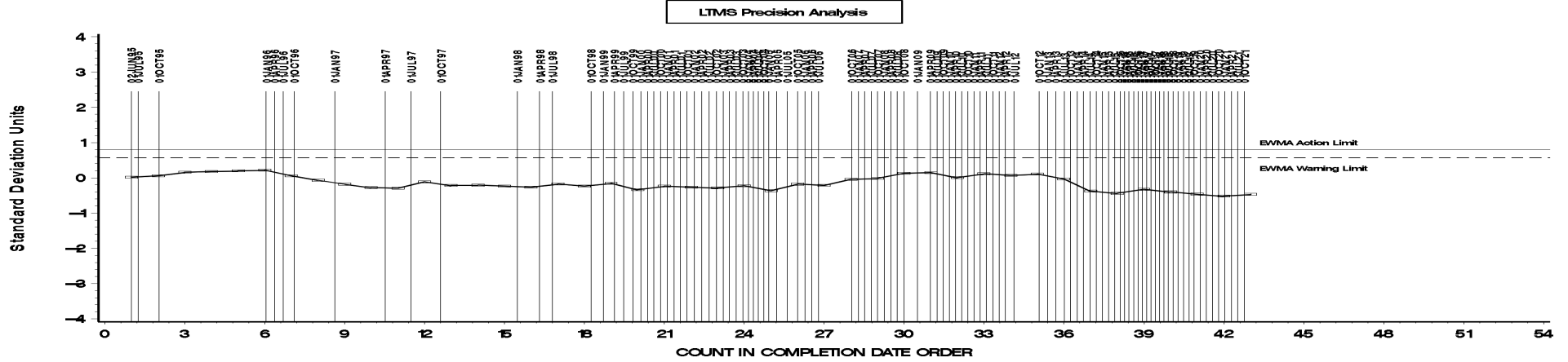
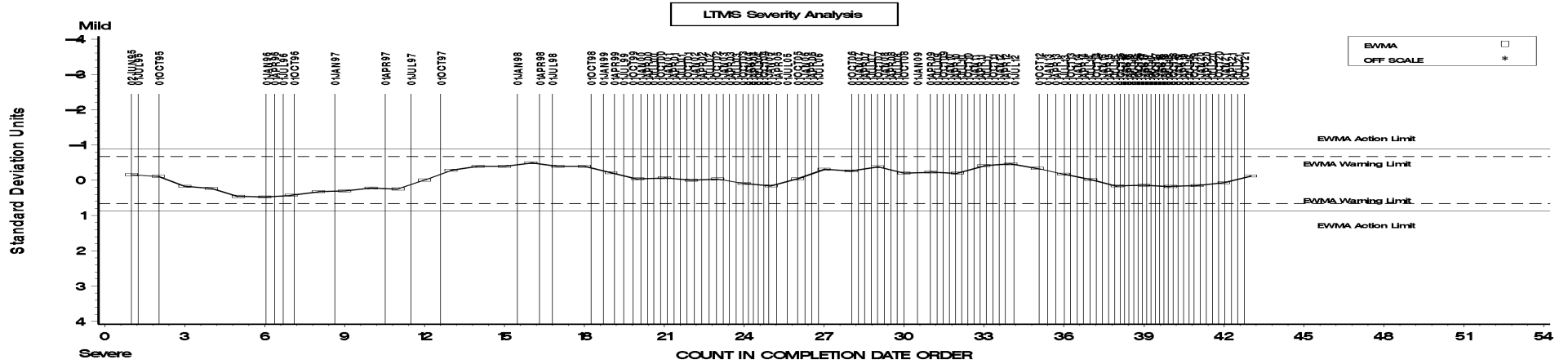
EOAT Test Severity

- ▶ As no EOAT tests were run during this period no statement on test severity can be made.

EOAT INDUSTRY OPERATIONAL VALID DATA

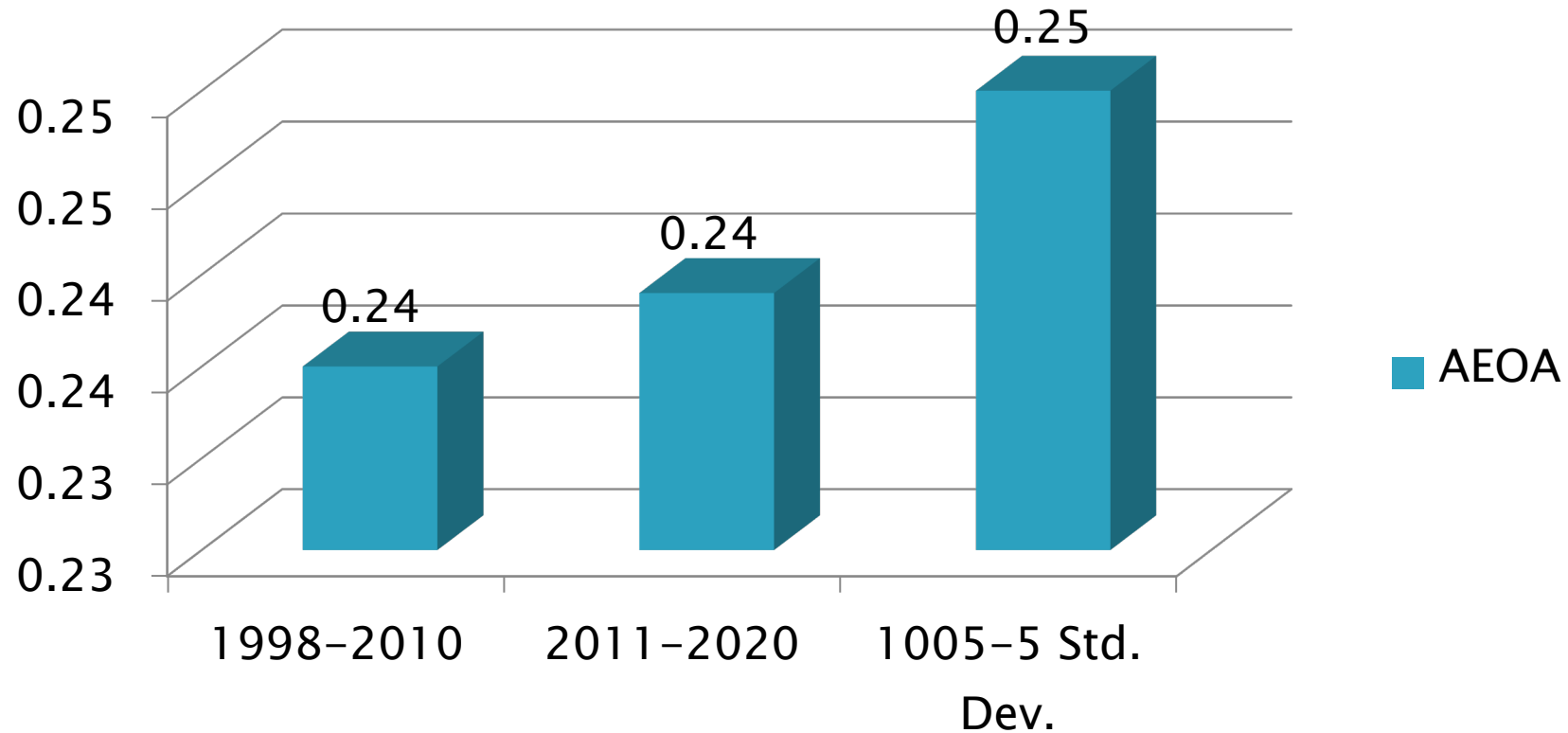


ENGINE OIL AERATION



EOAT Precision Estimates

AEOA



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



RFWT

➤➤ October 2022

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



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RFWT Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	1
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		1

RFWT Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

RFWT Lost Tests*

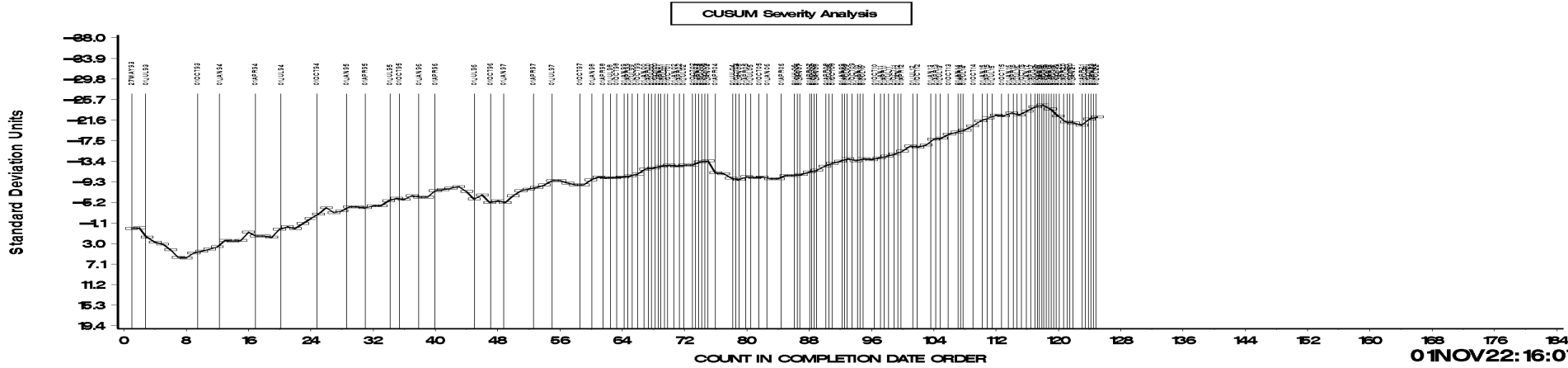
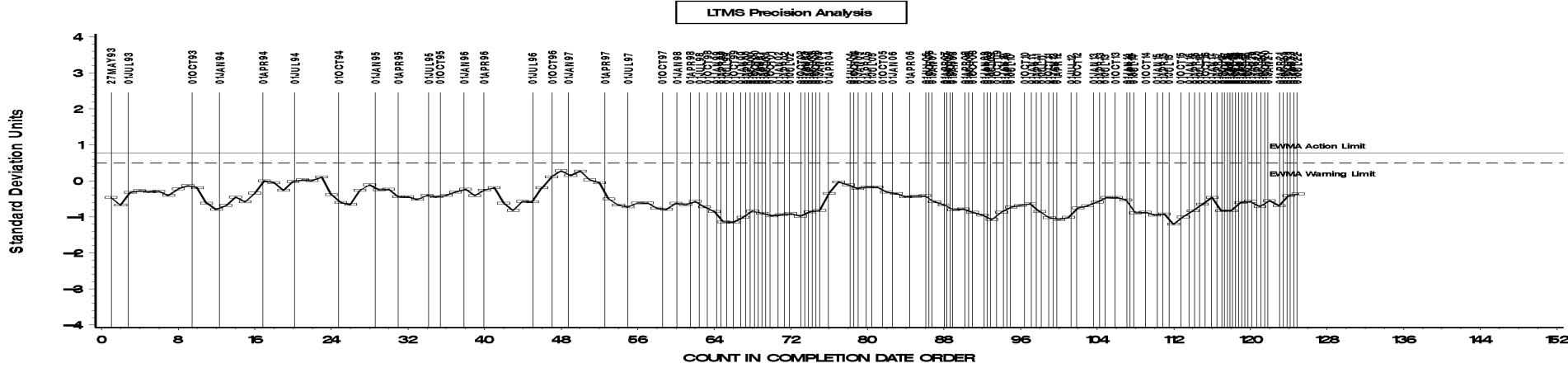
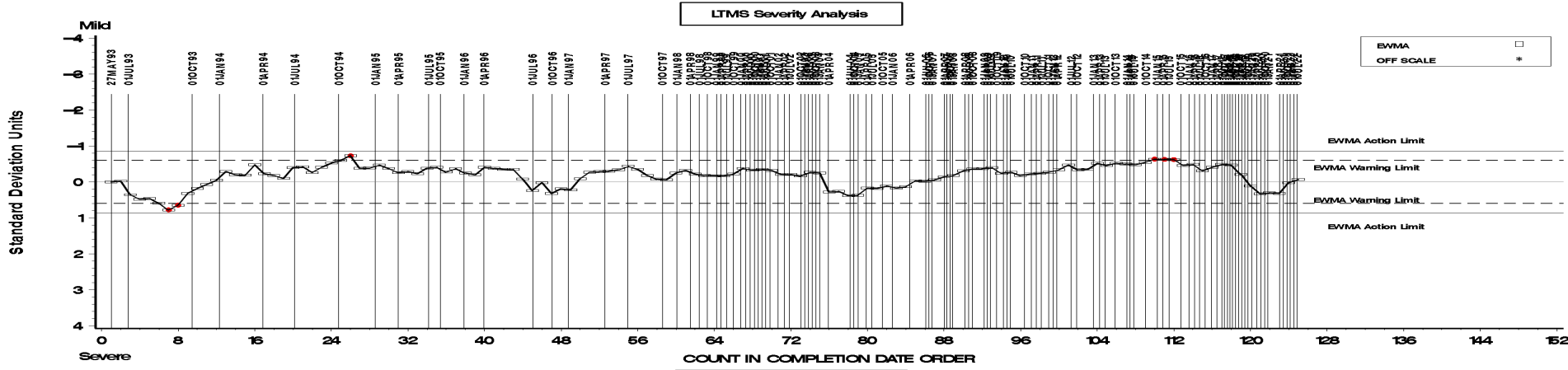
Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

RFWT Test Severity

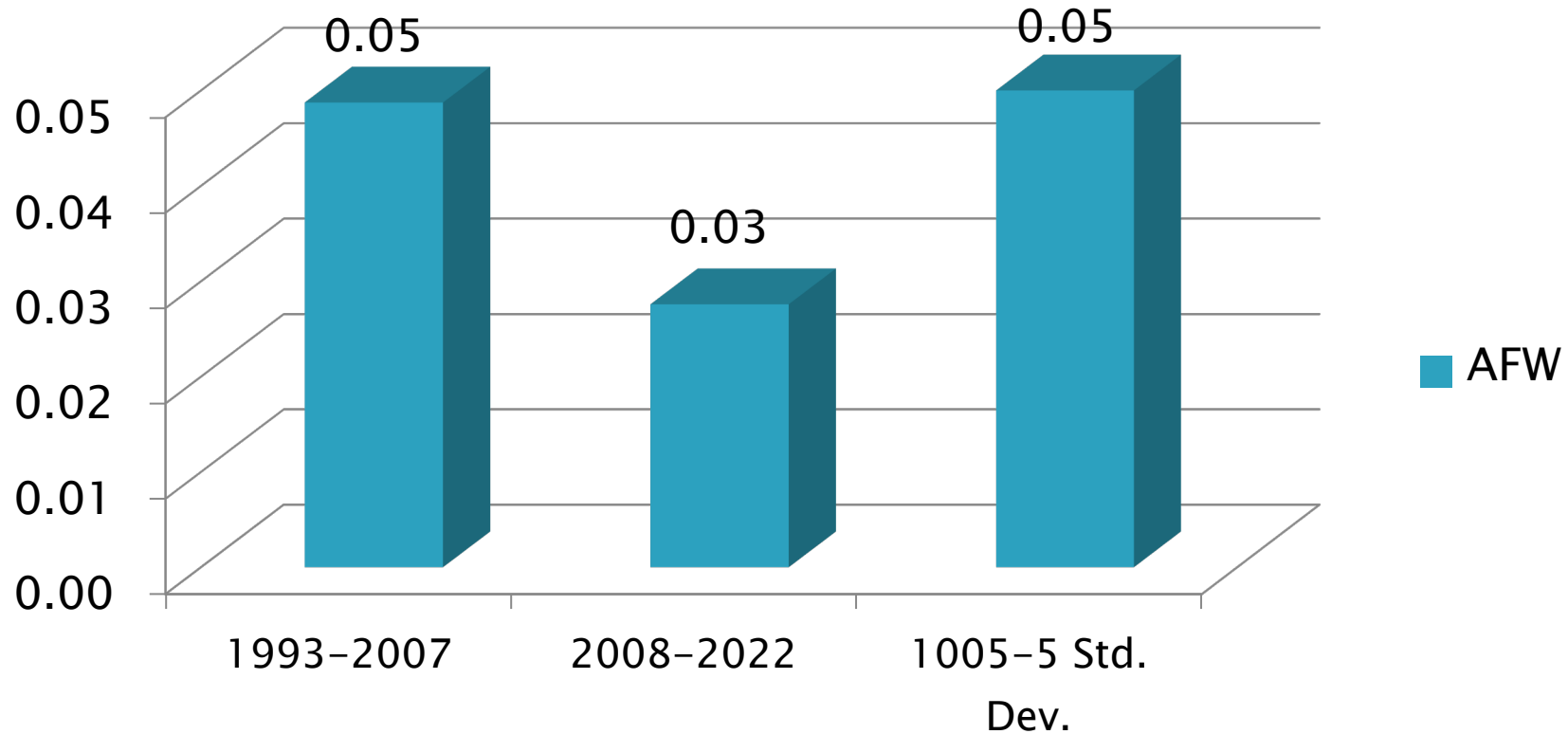
- ▶ AFW is in control.

Average Follower Wear



RFWT Precision Estimates

AFW



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Mack T-8/T-8E

➤➤ October 2022

Test Monitoring Center
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T-8/T-8E Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	2
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	1
Total		3

T-8/T8-E Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

T-8/T8-E Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	Missed soot window	1
Total		1

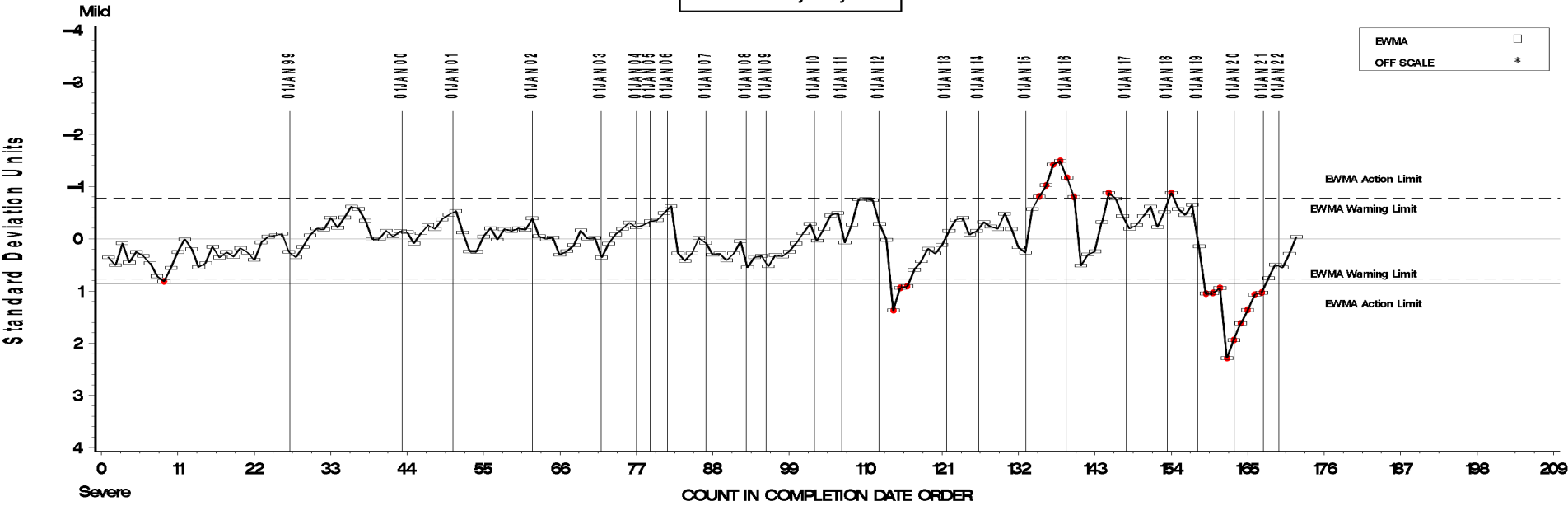
*Invalid and aborted tests

T-8/T-8E Test Severity

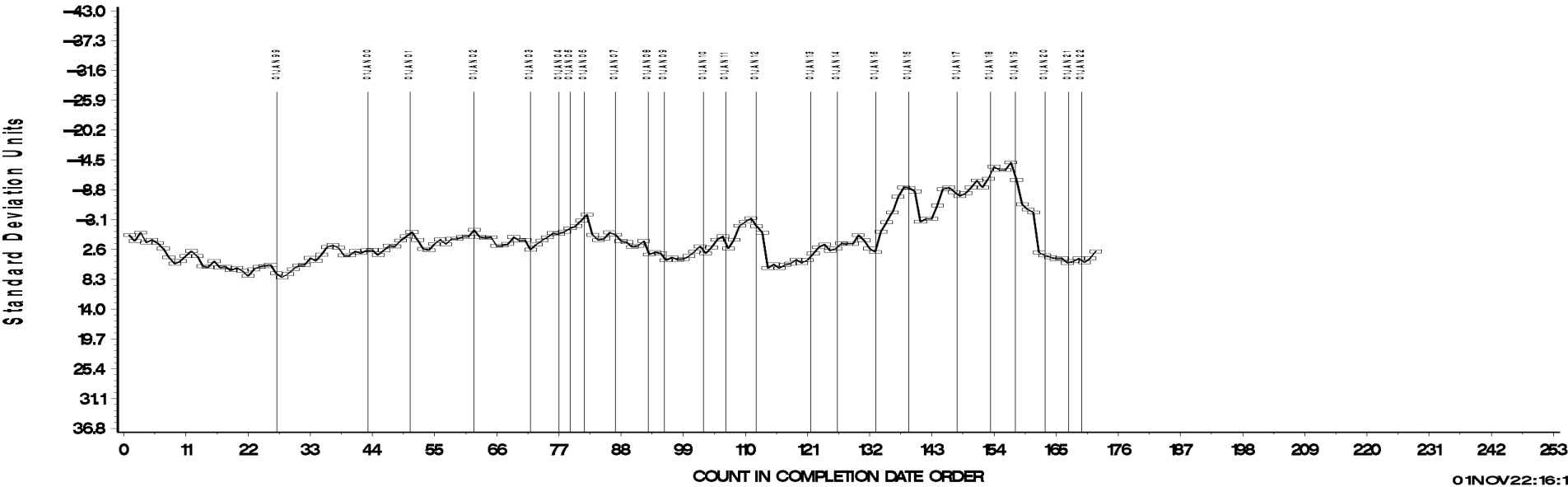
- ▶ VI38 is in level 2 Zi alarm in mild direction
- ▶ RV48 and RV2 are in control

RELATIVE VISCOSITY @ 4.8% (100% LOSS)

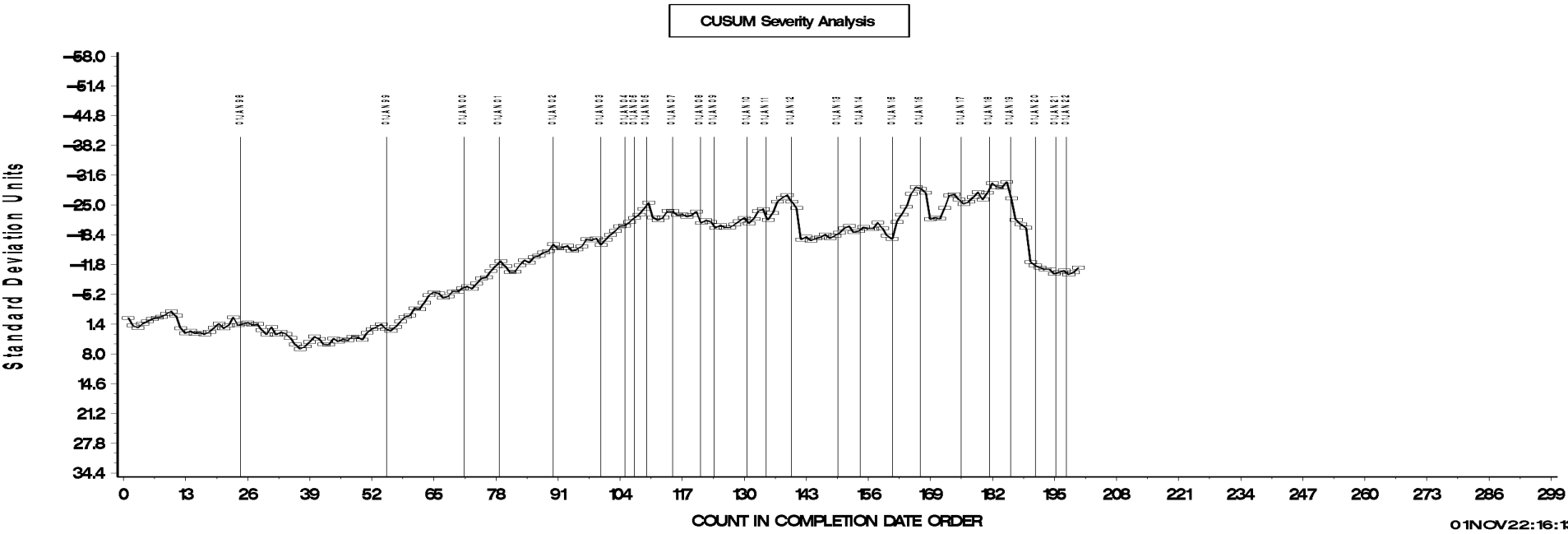
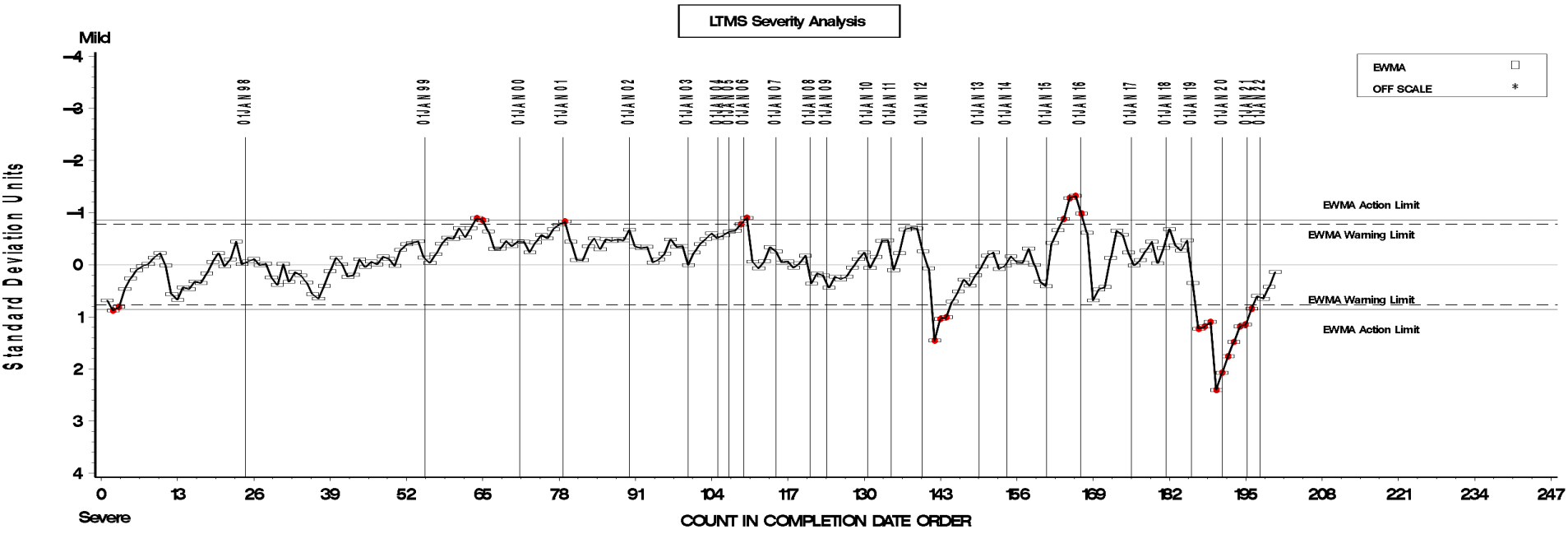
LTMS Severity Analysis



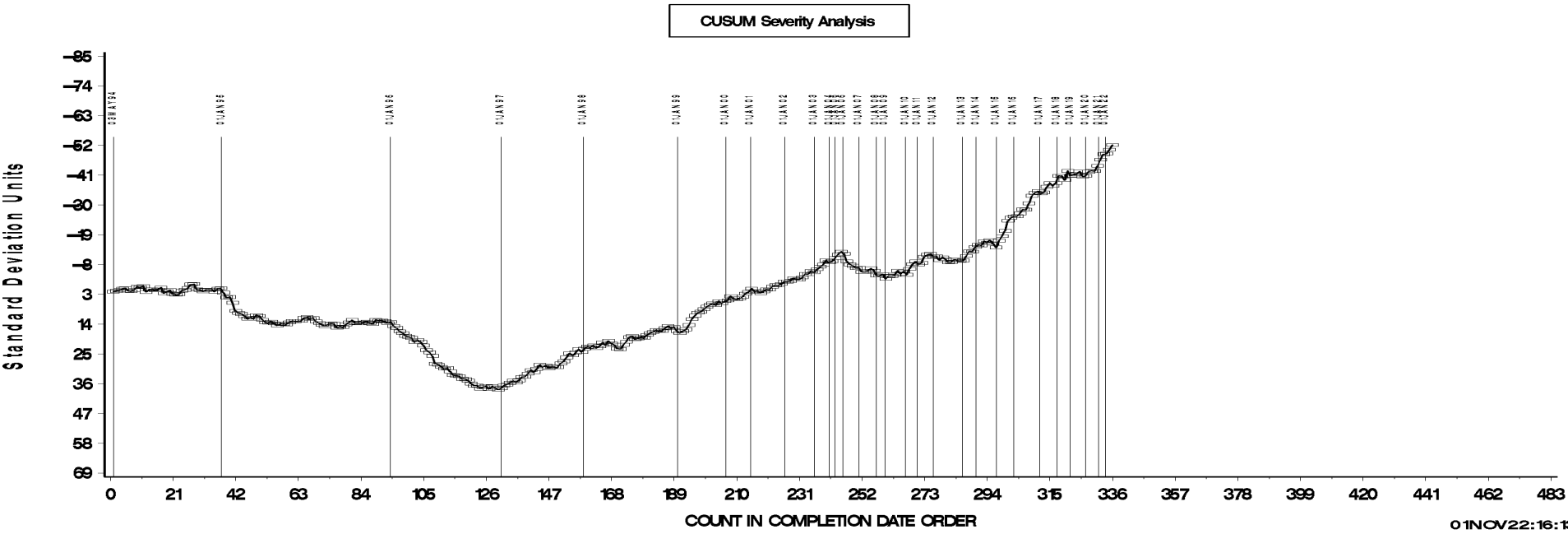
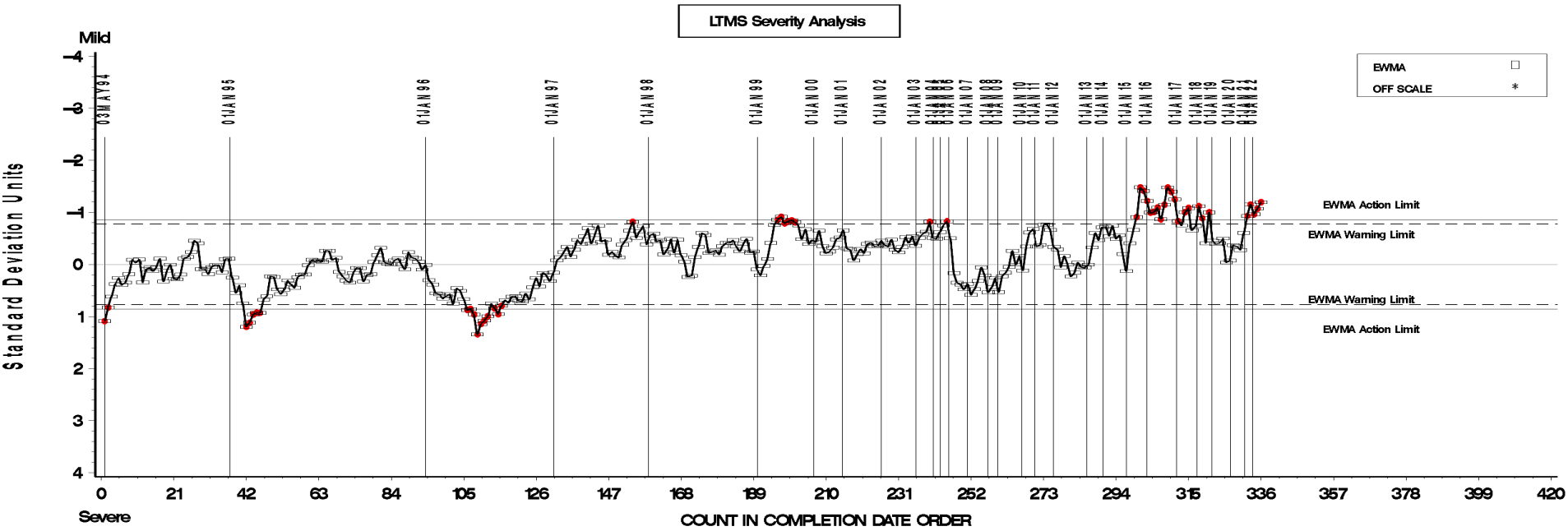
CUSUM Severity Analysis



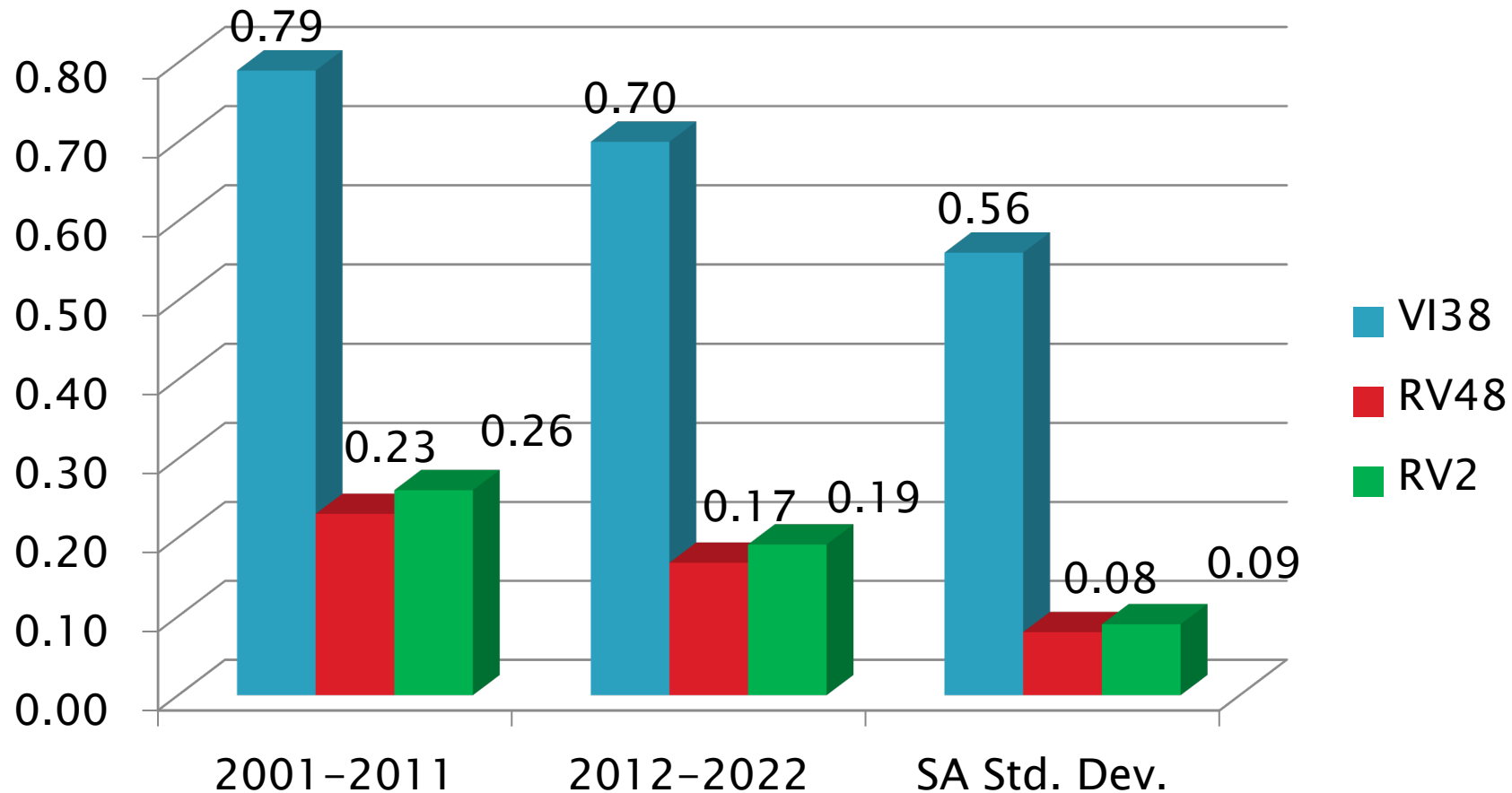
RELATIVE VISCOSITY @ 4.8% (50% LOSS)



VISCOSITY INCR @ 3.8% SOOT



T-8/E Precision Estimates



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



Mack T-11

»» October 2022

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



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T-11 Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	3
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		3

T-11 Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

T-11 Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

T-11 Test Severity

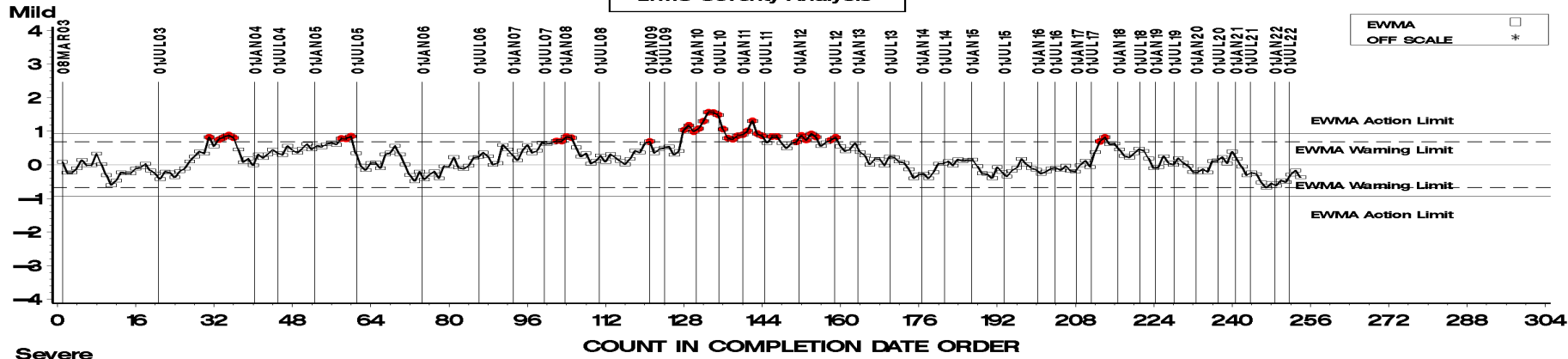
- ▶ SOOT, SOOT5 and MRV are in control.
- ▶ SOOT4 is in severity action alarm in the severe direction.

T-11 INDUSTRY OPERATIONALLY VALID DATA

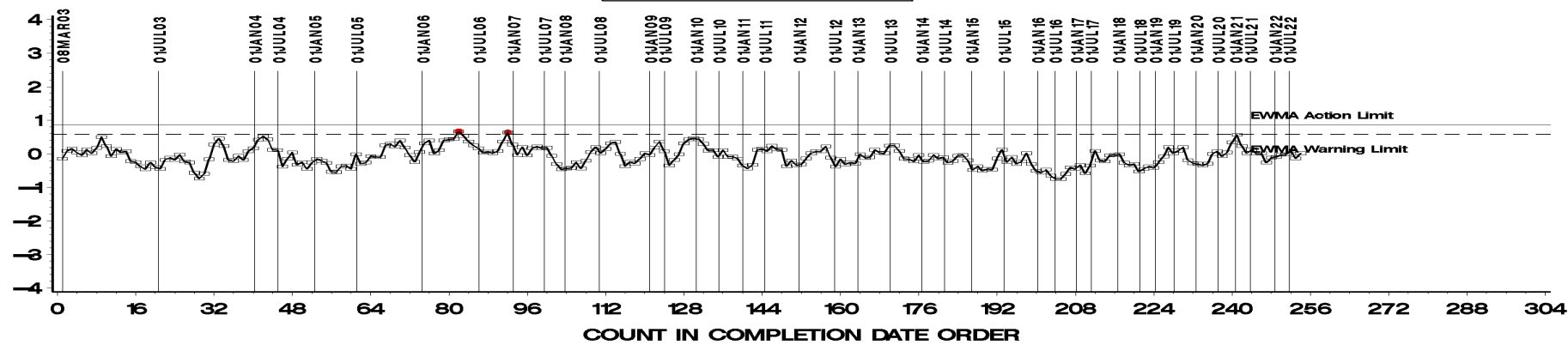


SOOT AT 12 cSt

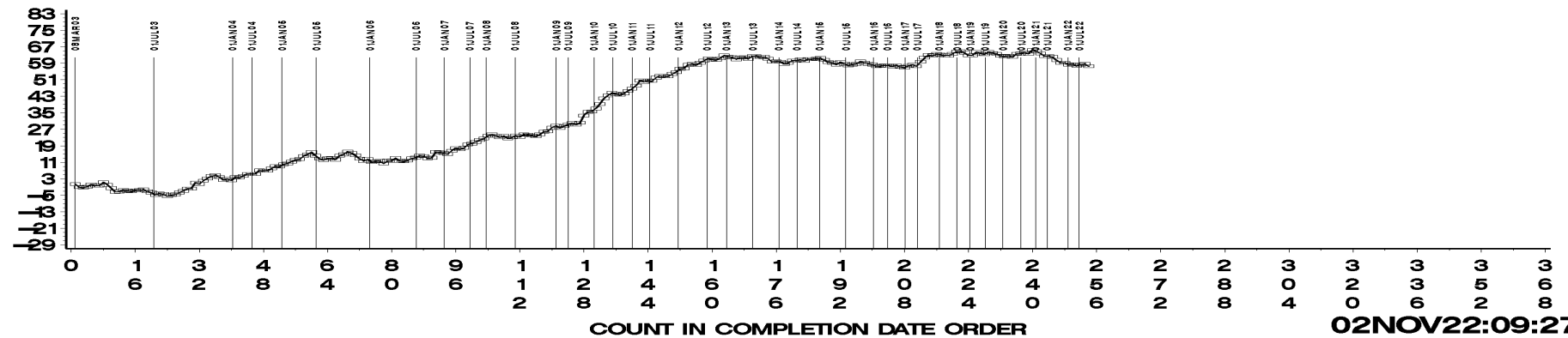
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

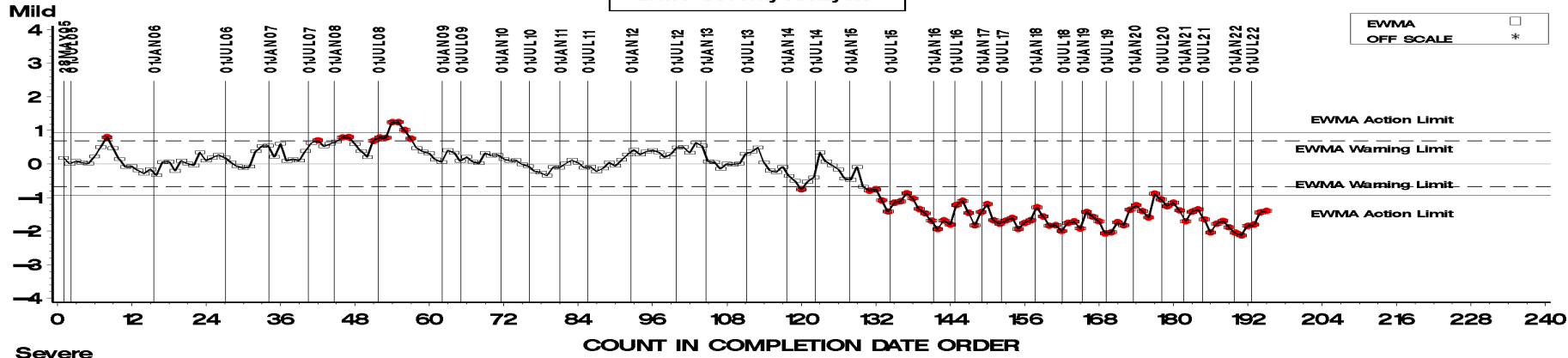


T-11 INDUSTRY OPERATIONALLY VALID DATA

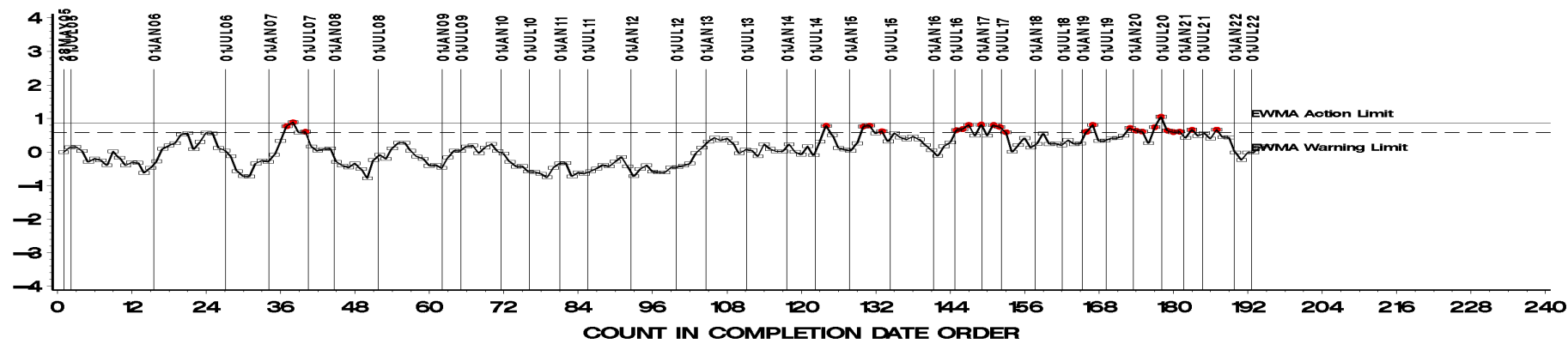


SOOT @ 4 CSI - FINAL RESULT

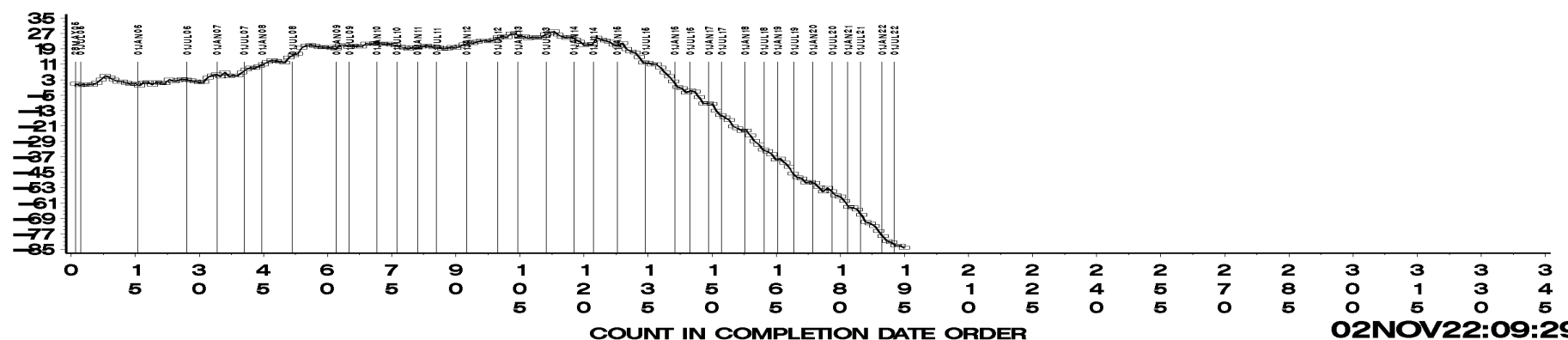
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



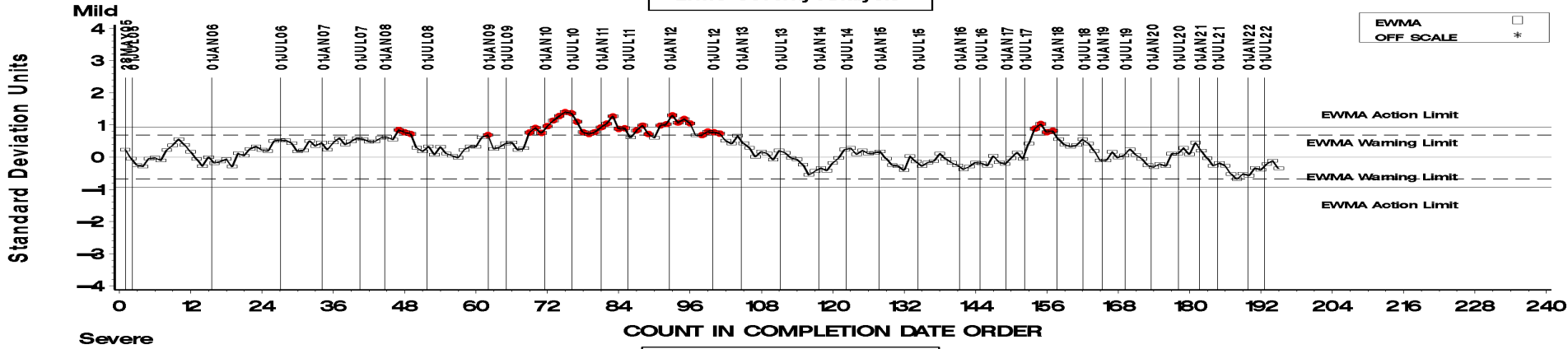
T-11 INDUSTRY OPERATIONALLY VALID DATA



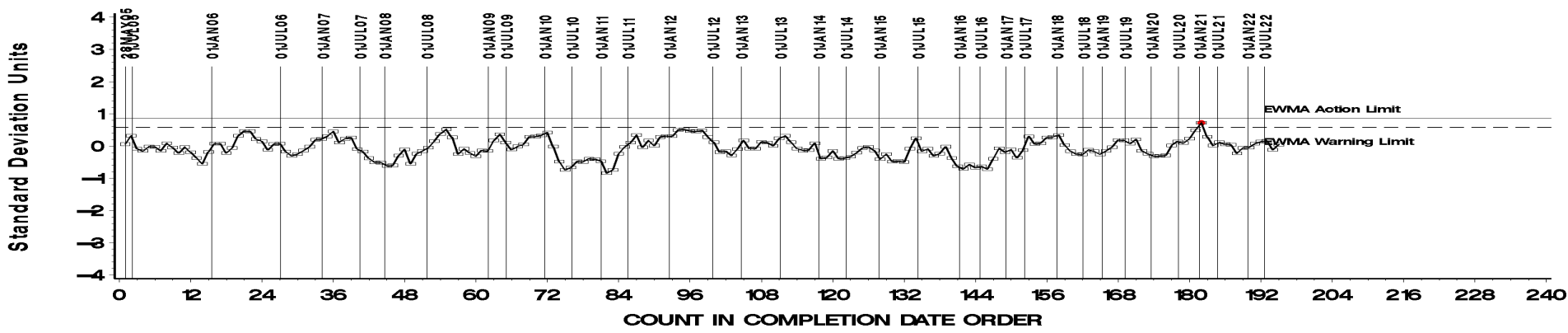
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SOOT @ 15 cSt — FINAL RESULT

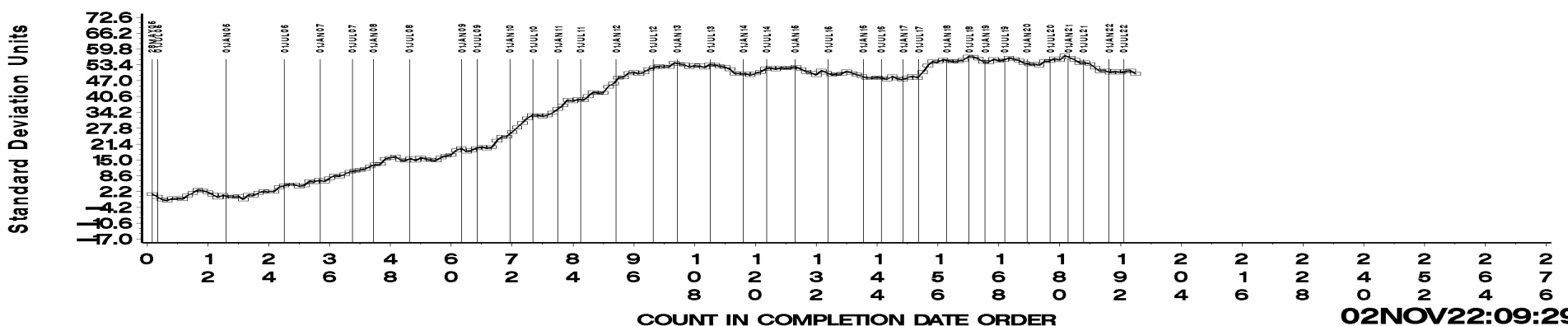
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



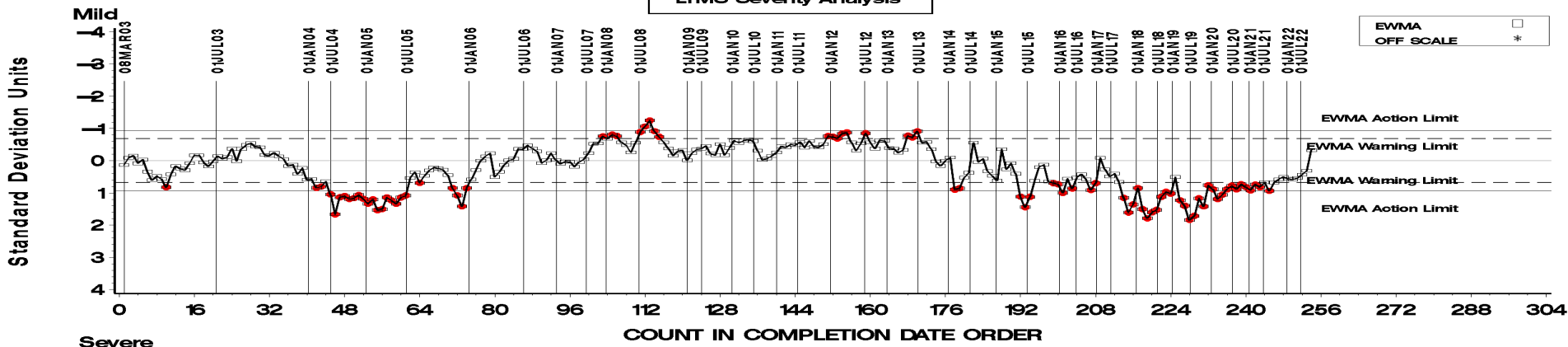
T-11 INDUSTRY OPERATIONALLY VALID DATA



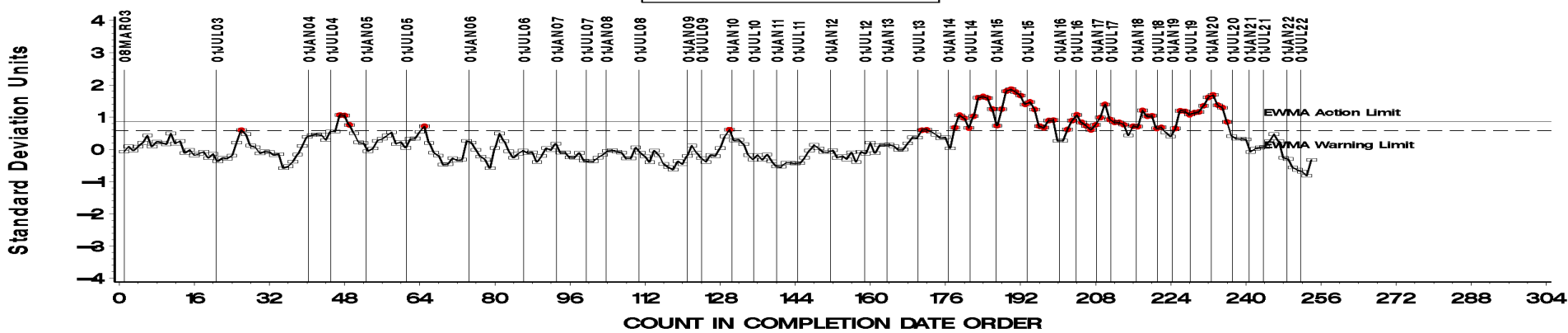
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MEV VISCOSITY

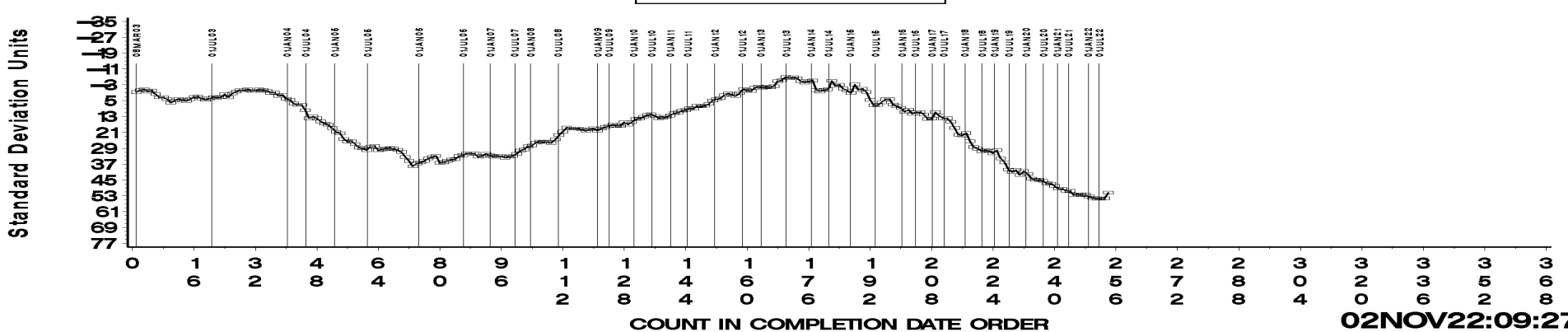
LTMS Severity Analysis



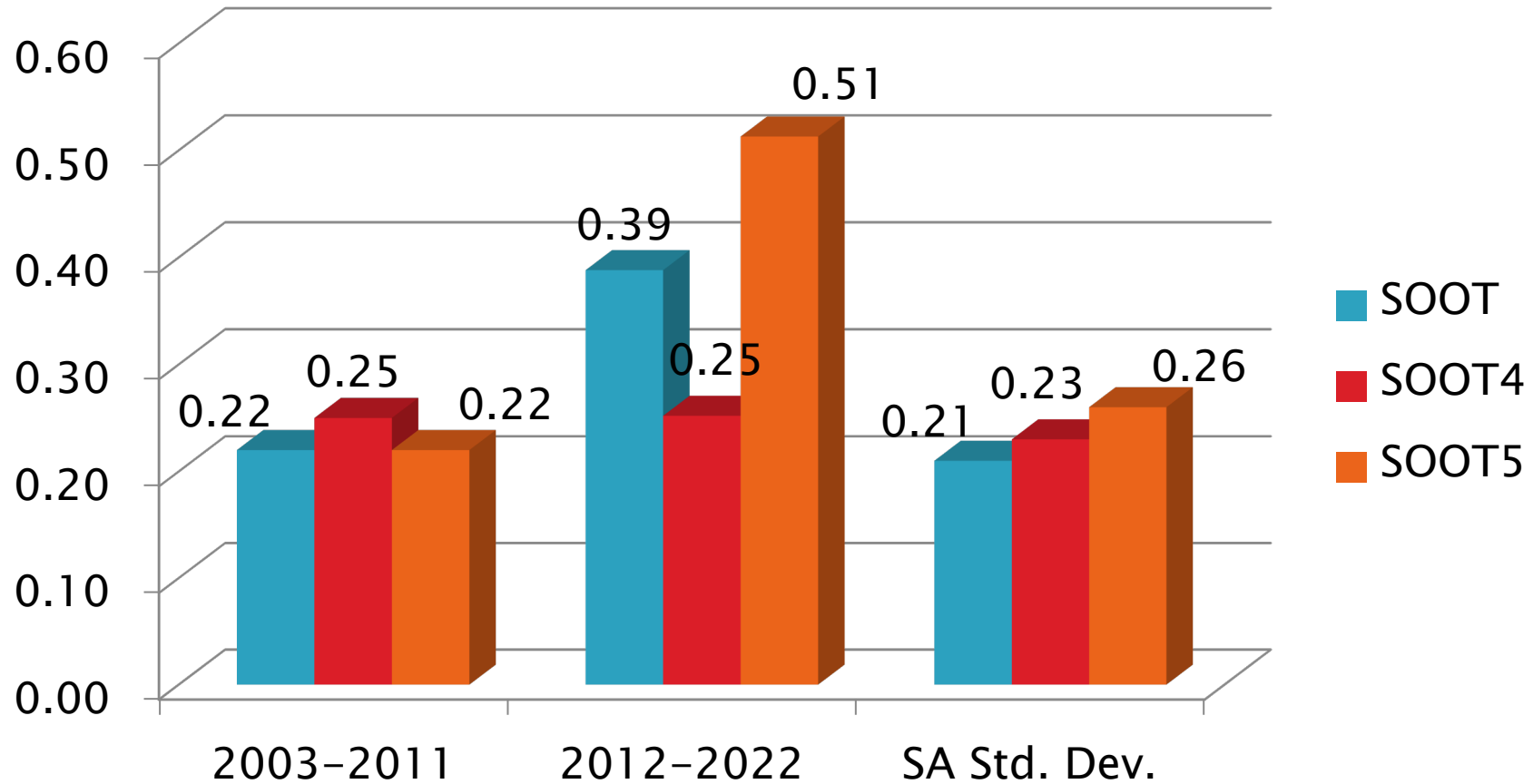
LTMS Precision Analysis



CUSUM Severity Analysis

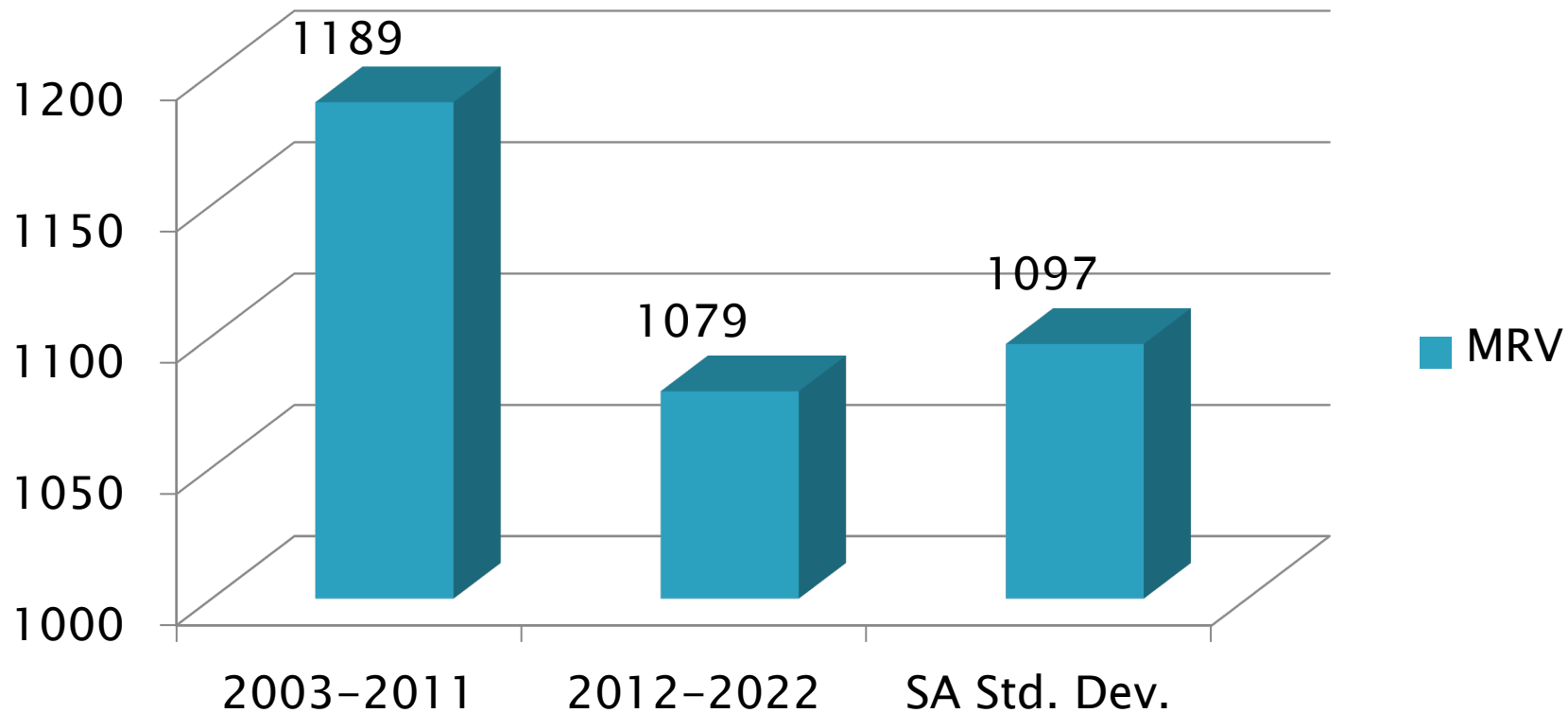


T-11 Precision Estimates



T-11 Precision Estimates

MRV



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Mack T-12

➤➤ October 2022

T-12 Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	3
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Total		3

T-12 Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

T-12 Lost Tests*

Status	Cause	#
Invalid	No invalid tests	0
Aborted	No aborted tests	0
Total		0

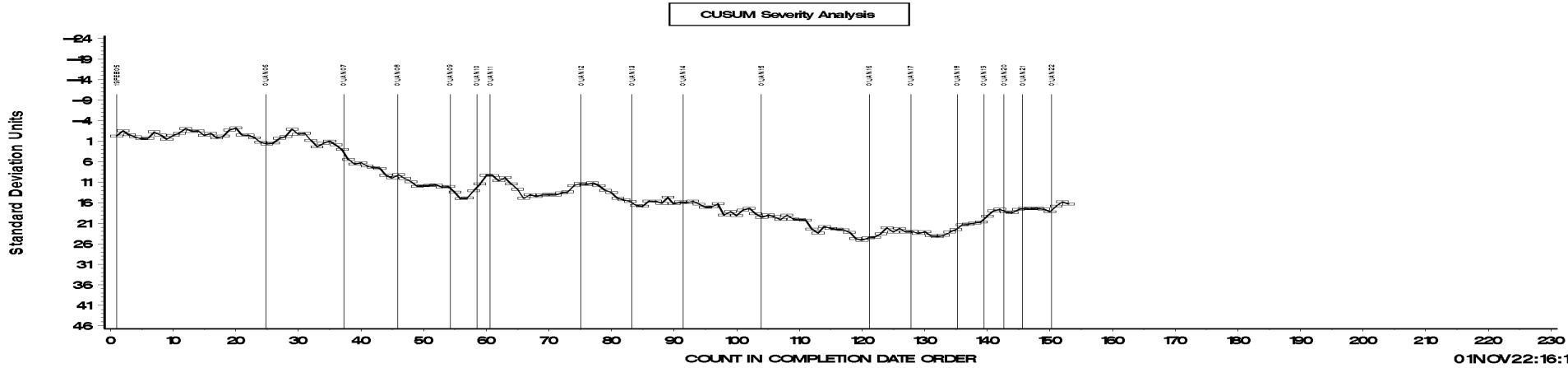
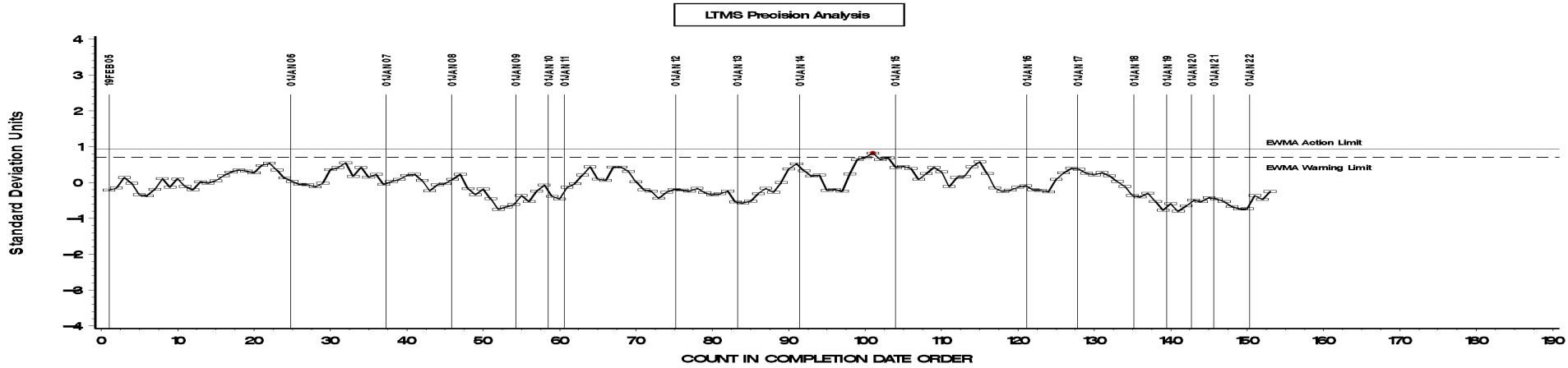
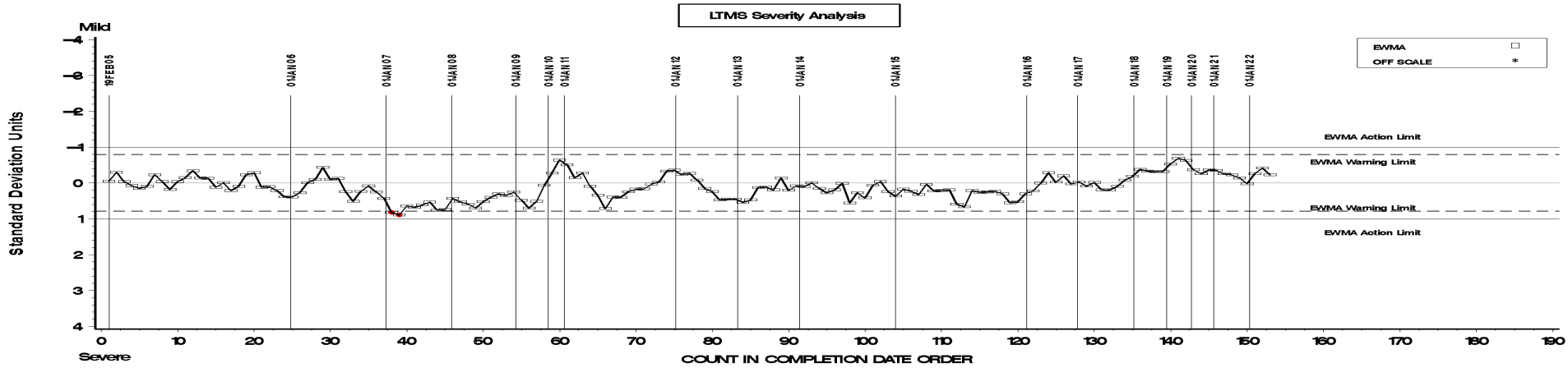
*Invalid and aborted tests

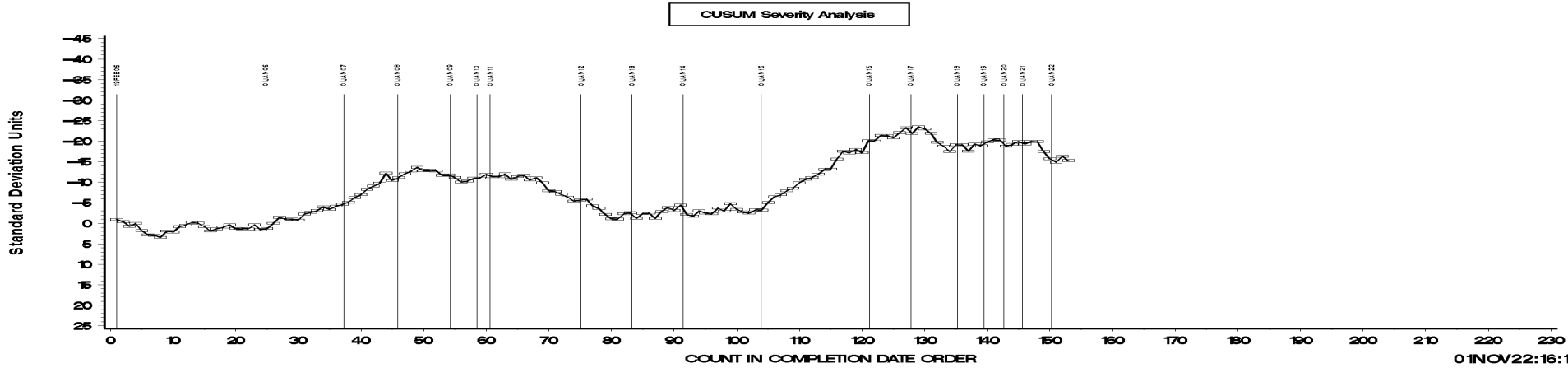
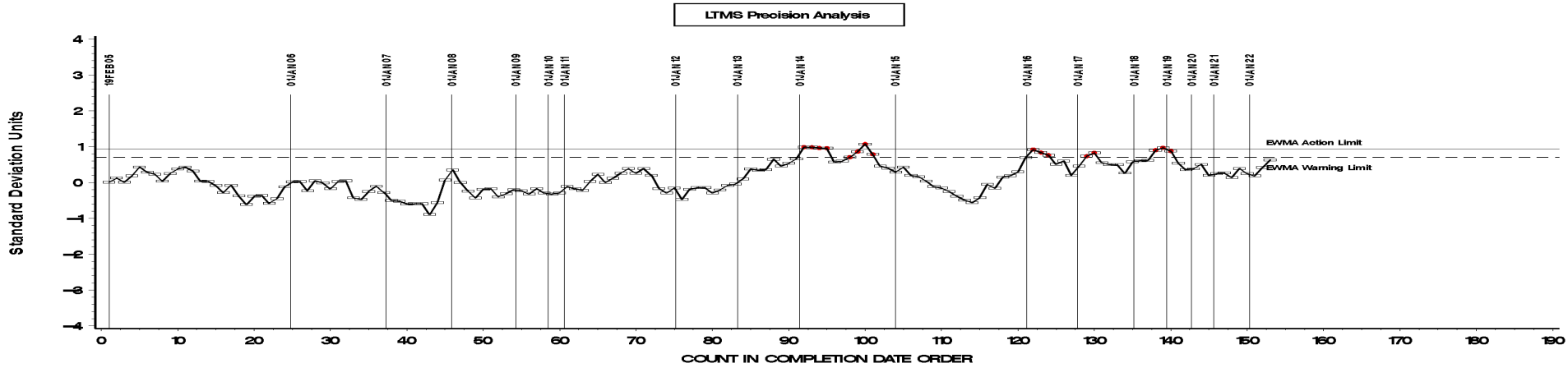
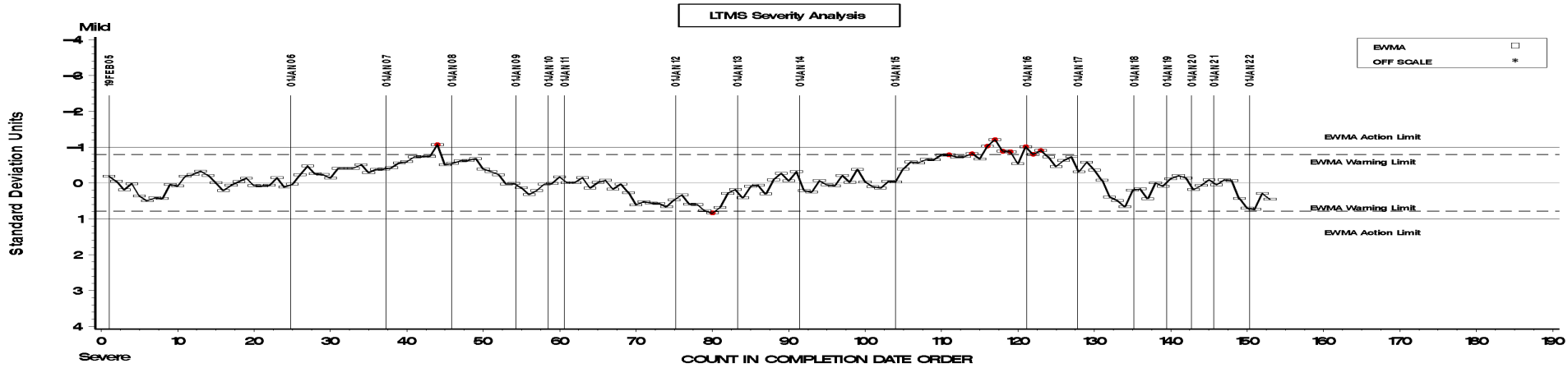
T-12 Test Severity

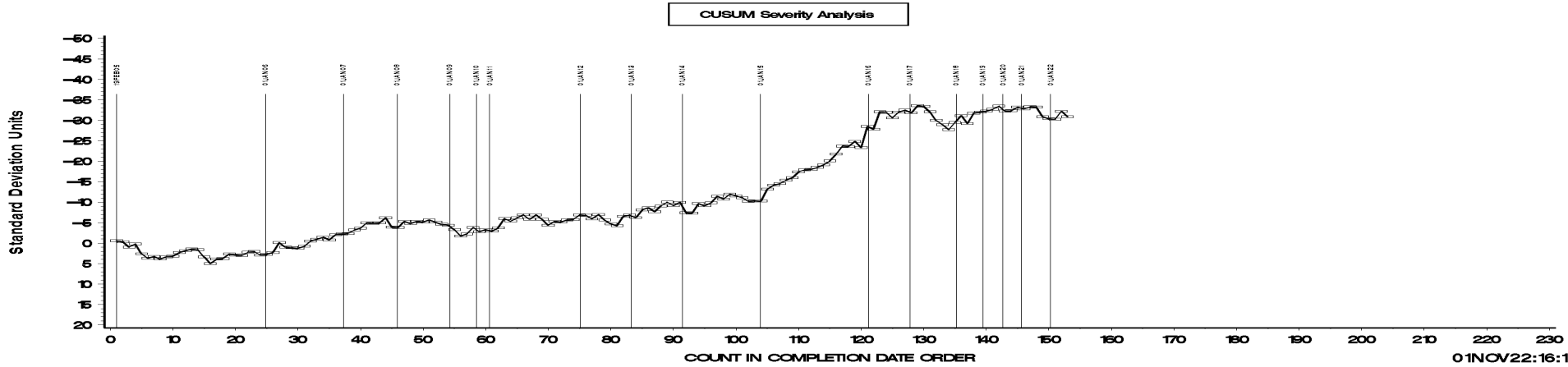
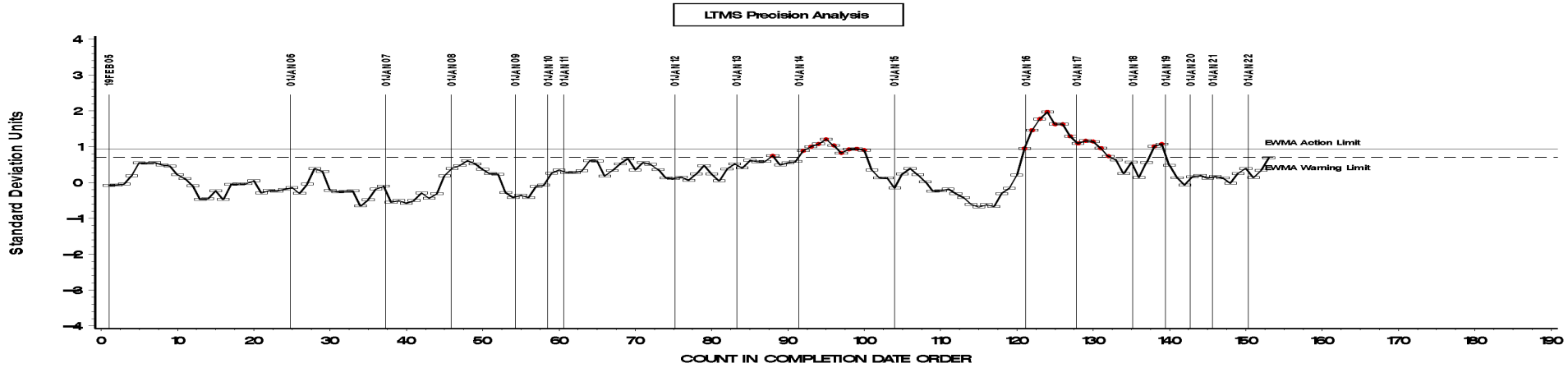
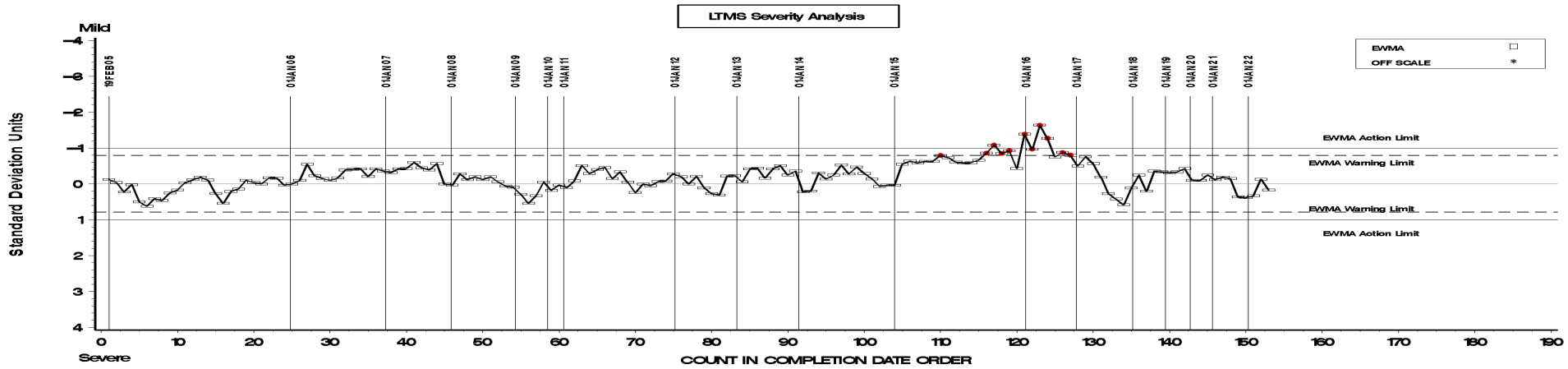
- ▶ All parameters are in control
- ▶ PB and PB2 are close to precision warning alarm

MACK T-22 INDUSTRY OPERATION VALID DATA

AVG. CYLINDER LINER WEAR (CLW)

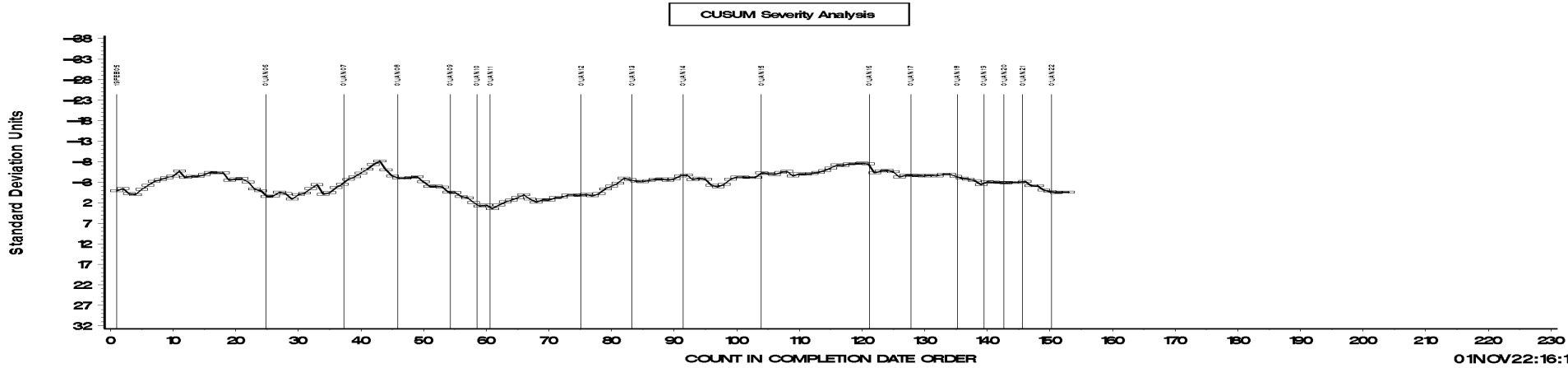
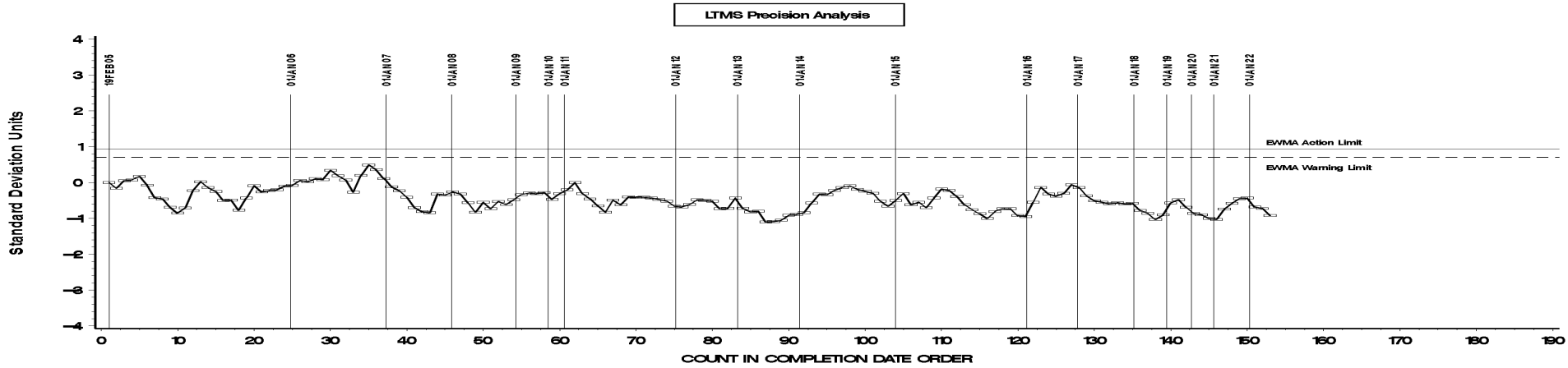
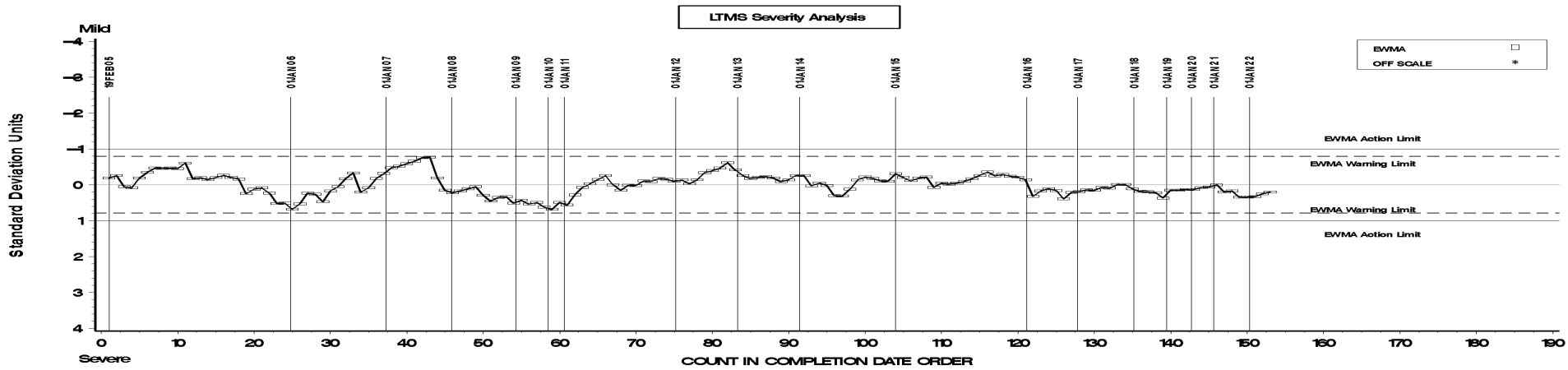


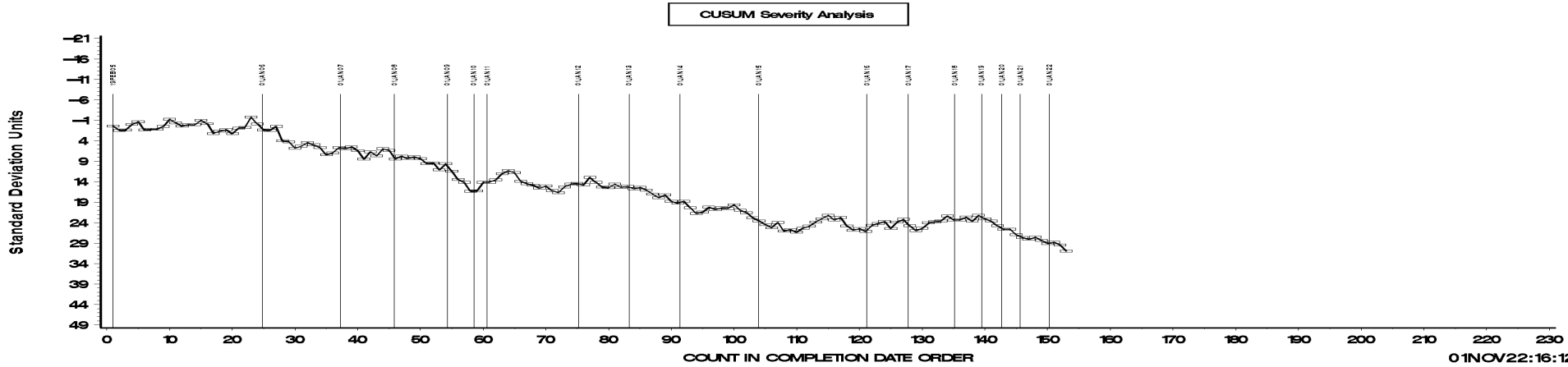
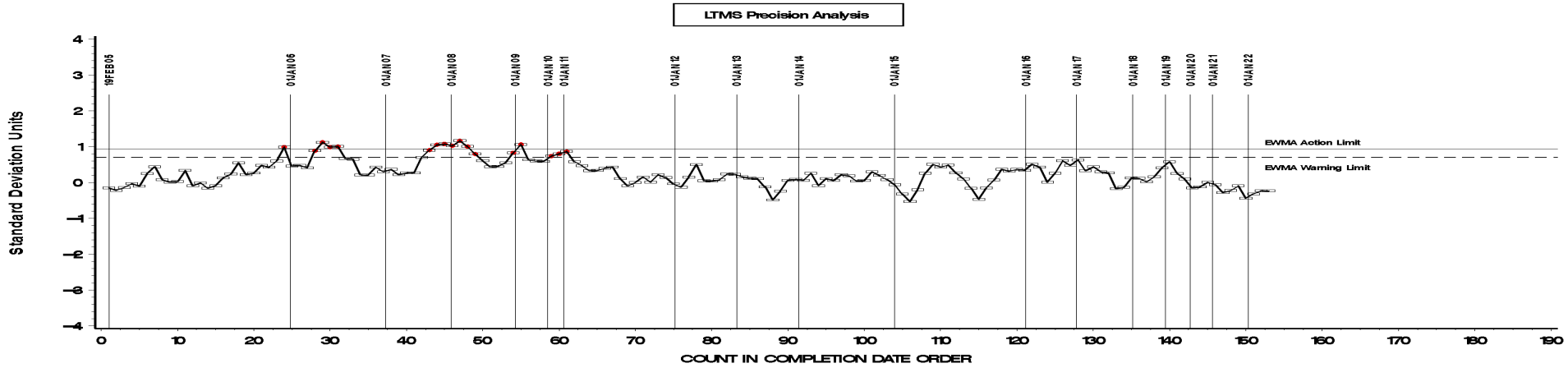
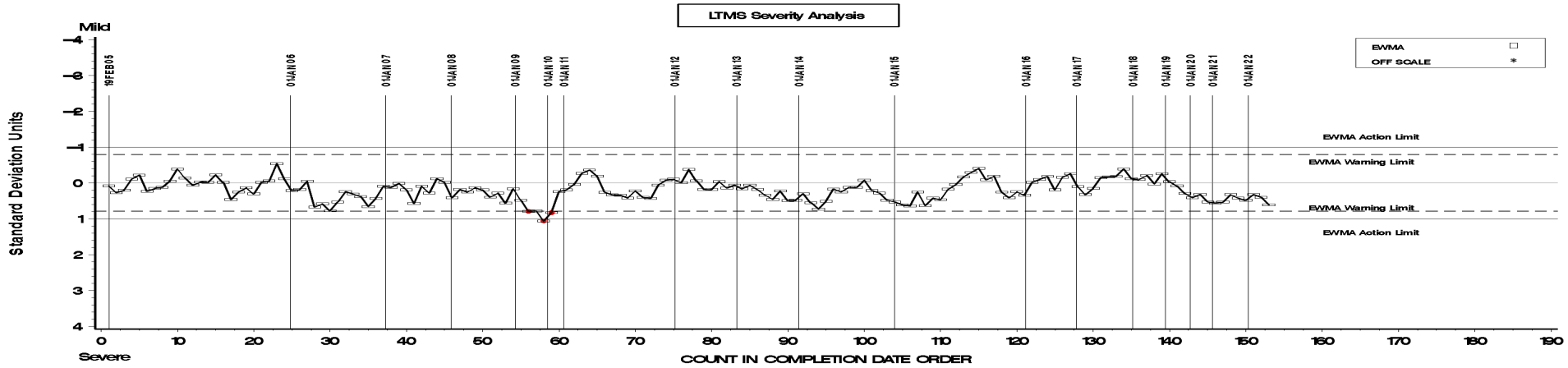




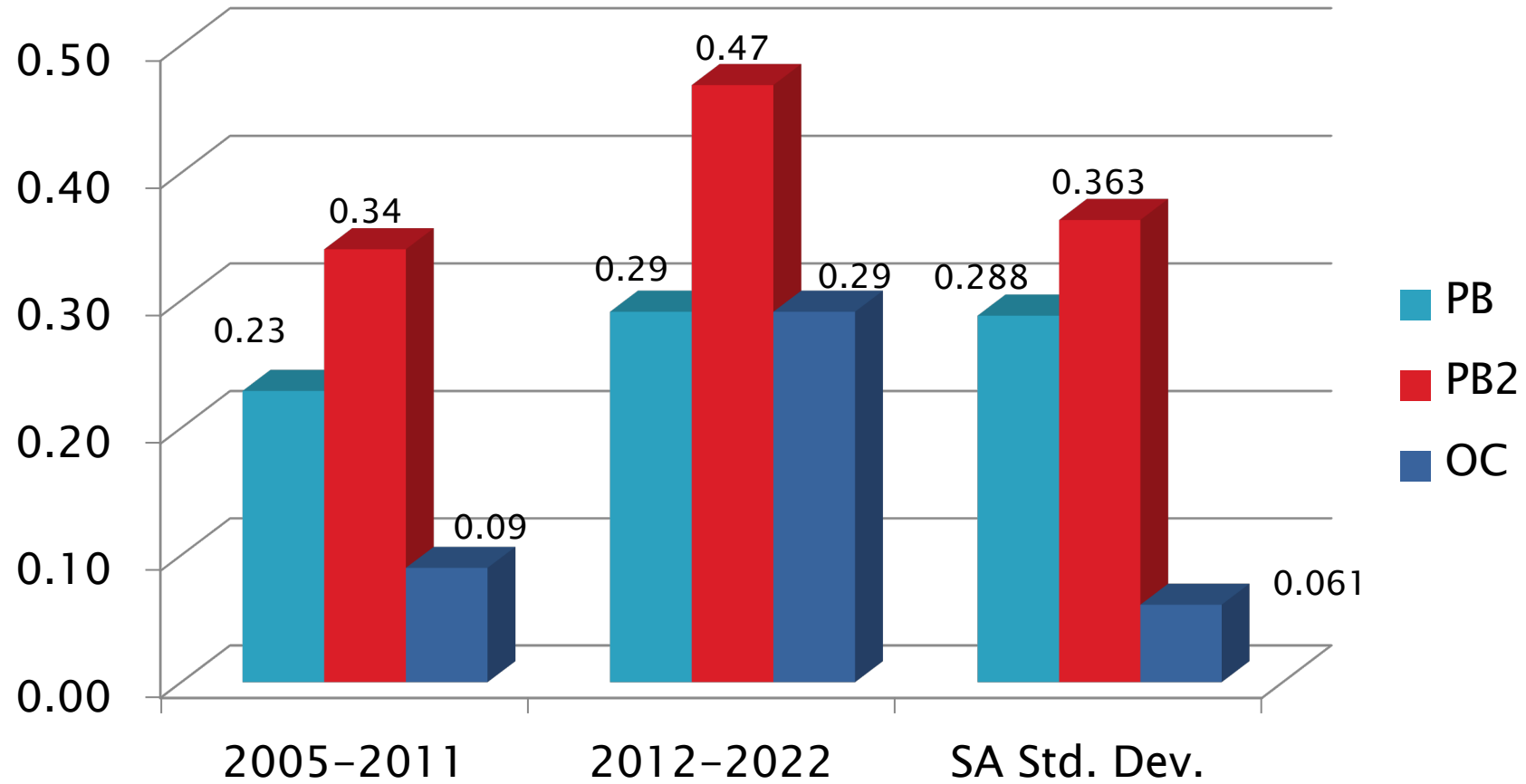
MACK T-42 INDUSTRY OPERATIONAL VALID DATA

AVG. TOP RING WEIGHT LOSS (TRWL)

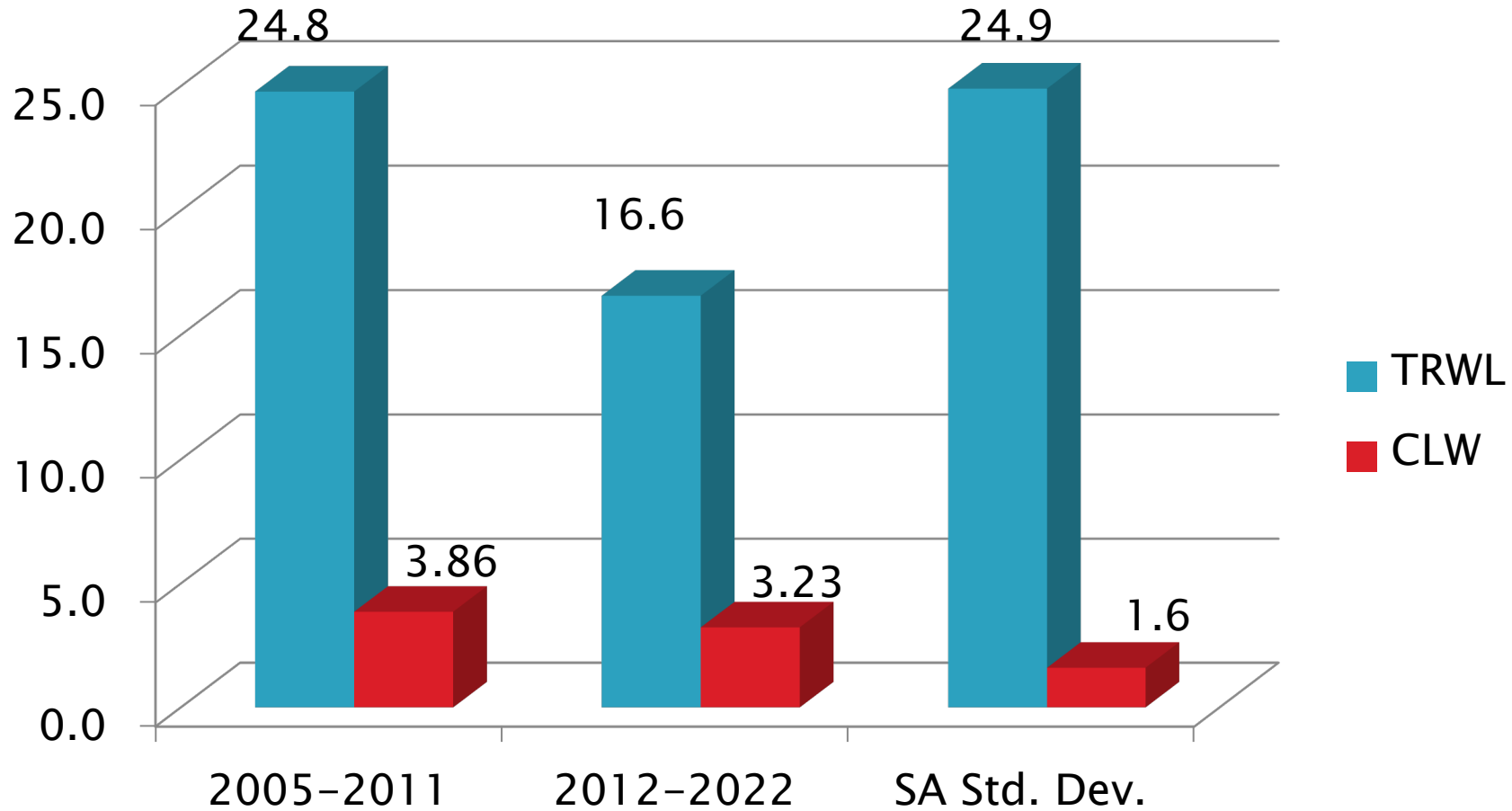




T-12 Precision Estimates



T-12 Precision Estimates



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Mack T-12A

➤➤ October 2022

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T-12A Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	3
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Total		3

T-12A Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

T-12A Lost Tests*

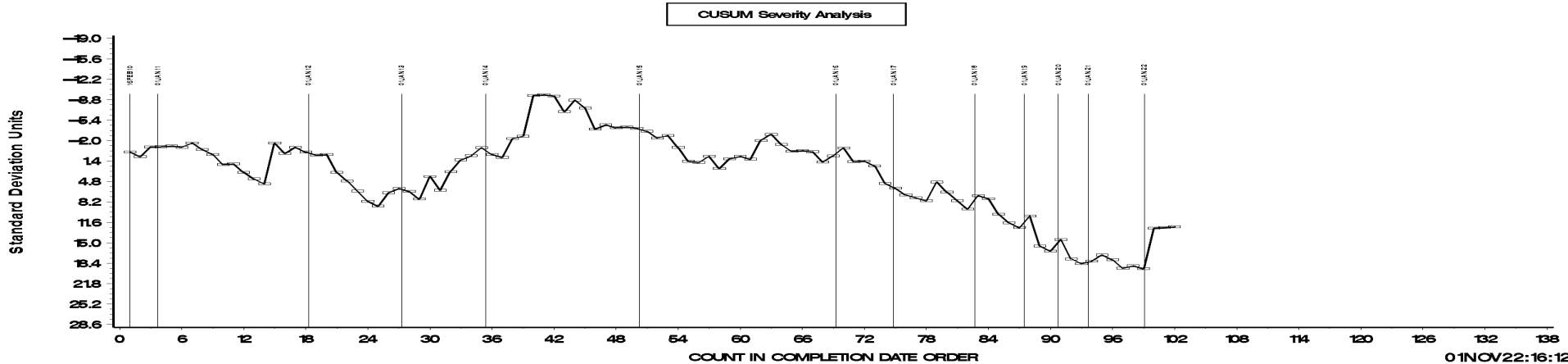
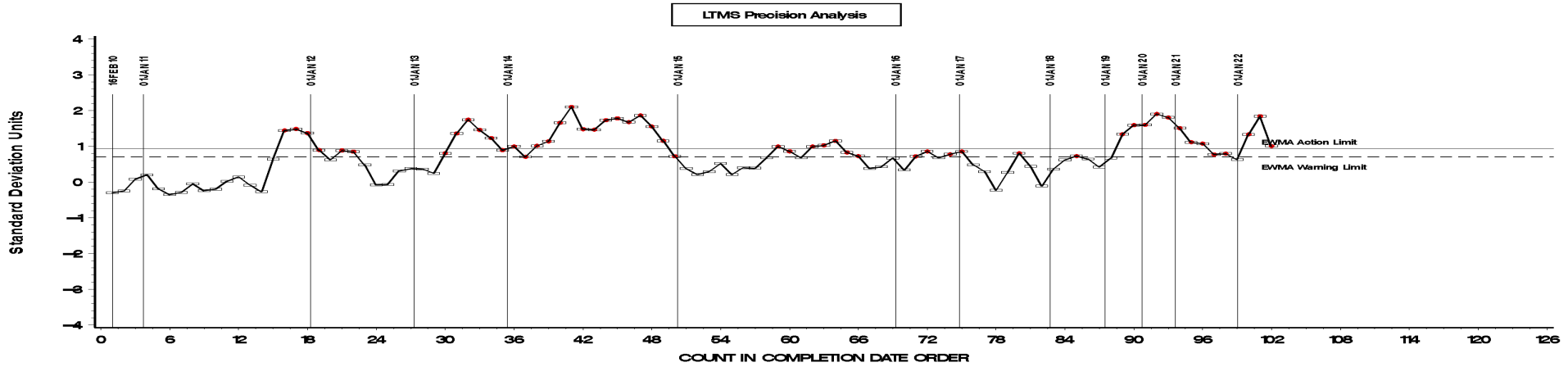
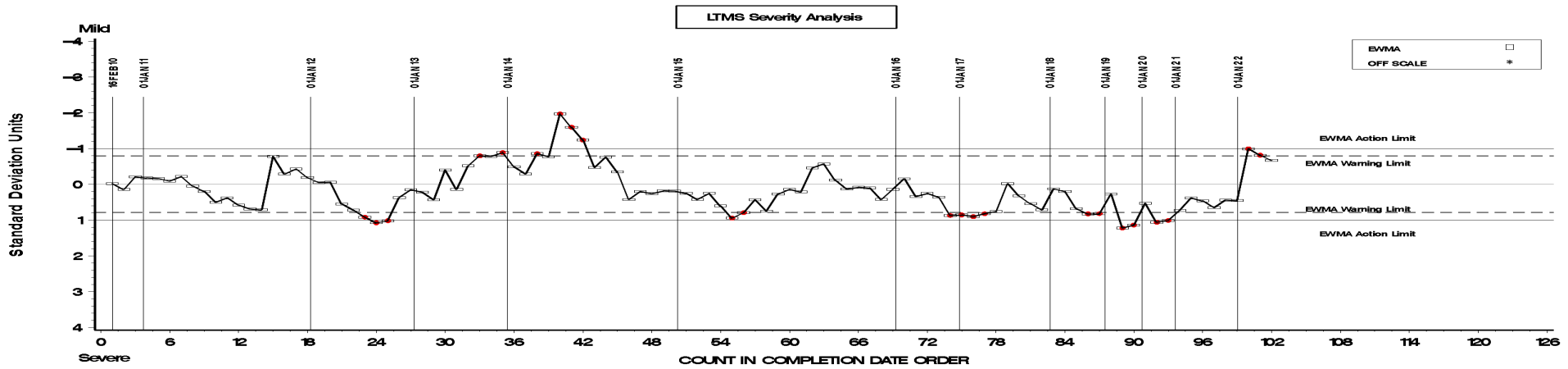
Status	Cause	#
Invalid	Missed soot window	0
Aborted	No aborted tests	0
Total		0

*Invalid and aborted tests

T-12A Test Severity

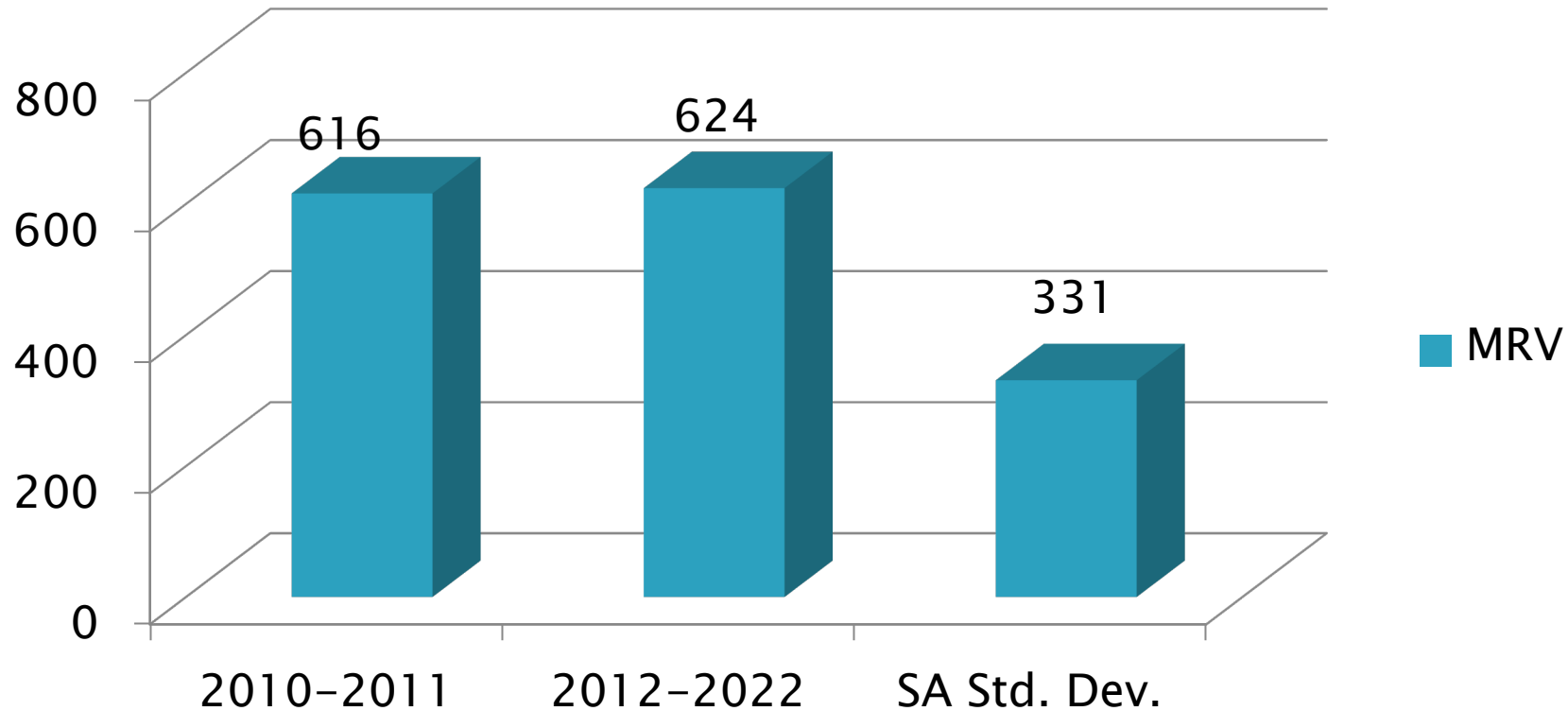
- ▶ MRV is in a severity warning alarm in the mild direction
- ▶ MRV is in a precision action alarm

MACK T-42A INDUSTRY OPERATIONAL VALID DATA
 FINAL ORIGINAL UNIT MRV VISCOSITY [NM, SOLID, FROZEN, <, >]



T-12A Precision Estimates

MRV



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Mack T-13

➤➤ October 2022

T-13 Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	3
Failed Calibration Test	OC	0
Operationally Invalid	LC	2
Aborted	XC	0
Total		5

T-13 Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

T-13 Lost Tests*

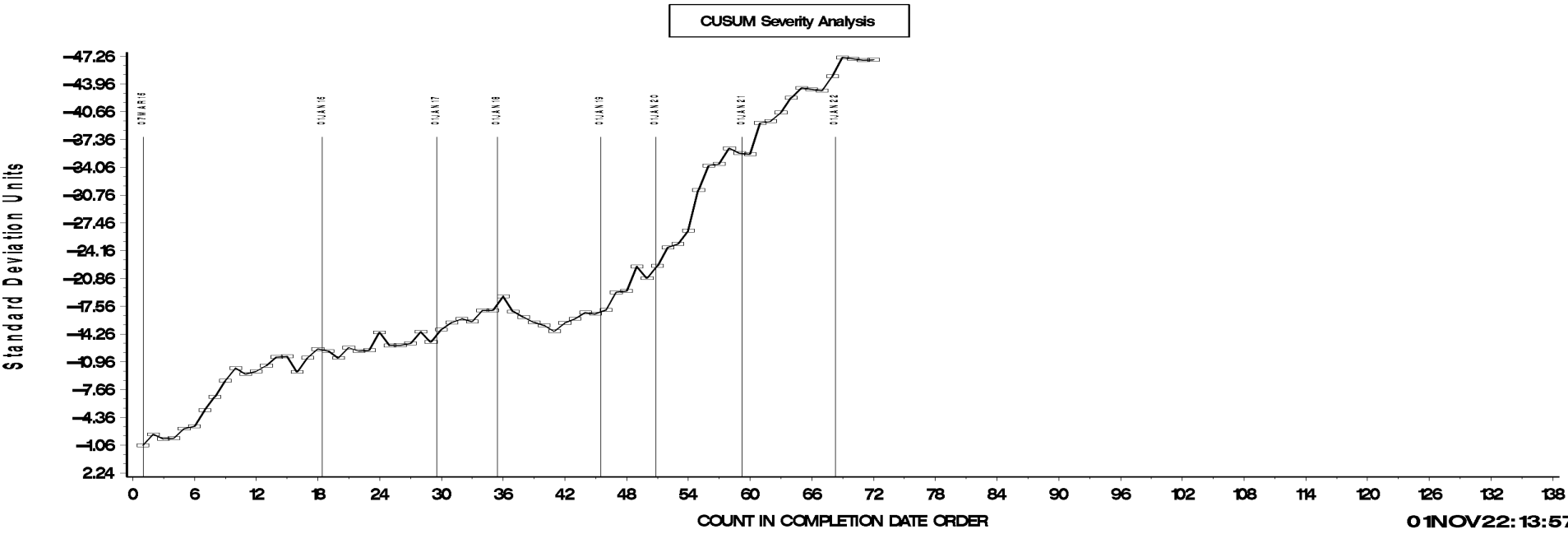
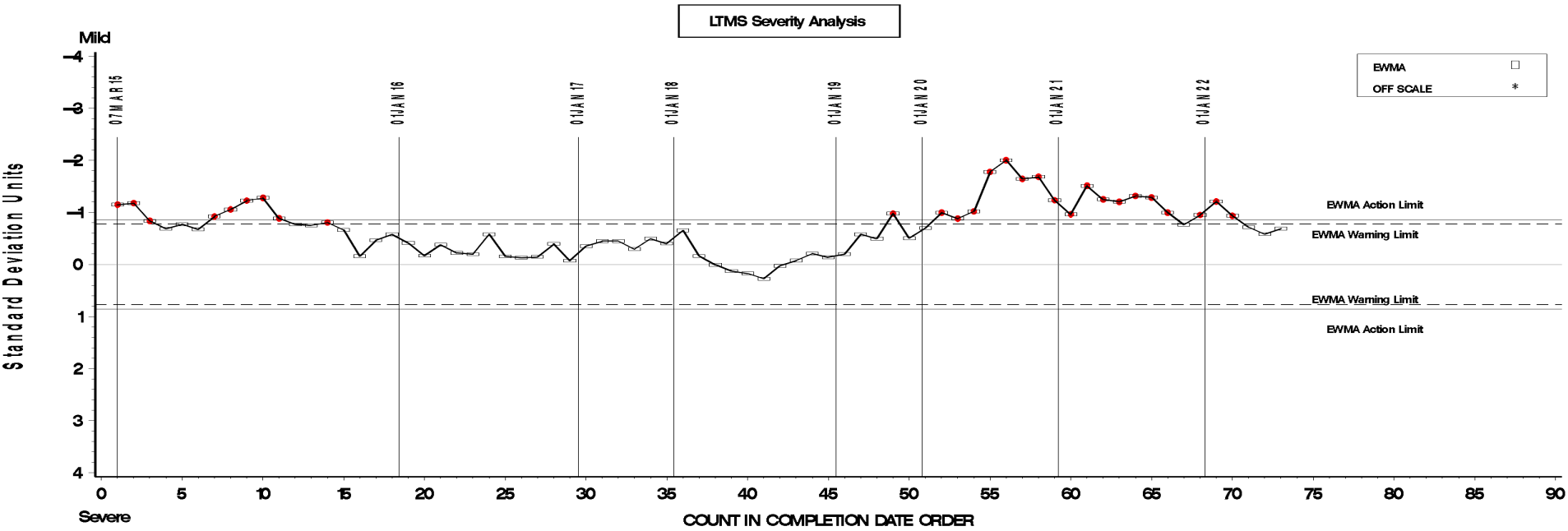
Status	Cause	#
Invalid	External oil pump motor failure	1
Invalid	Incorrect oil add at 252 hours	1
Aborted	No aborted tests	0
Total		2

*Invalid and aborted tests

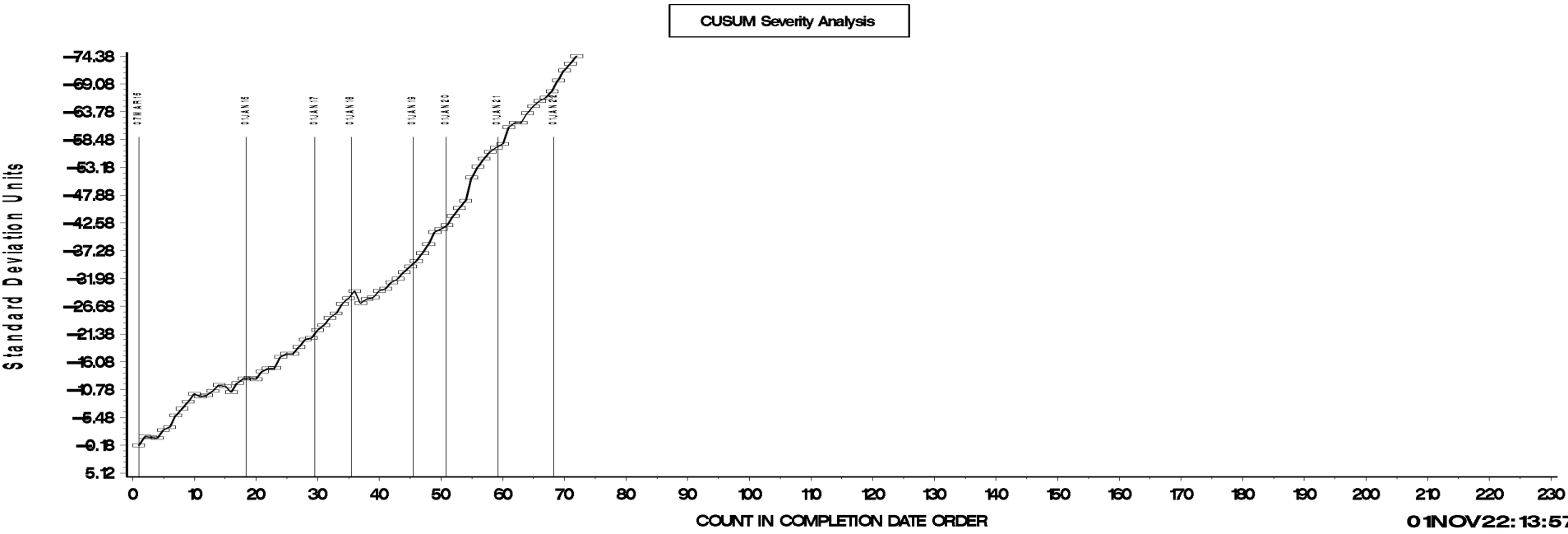
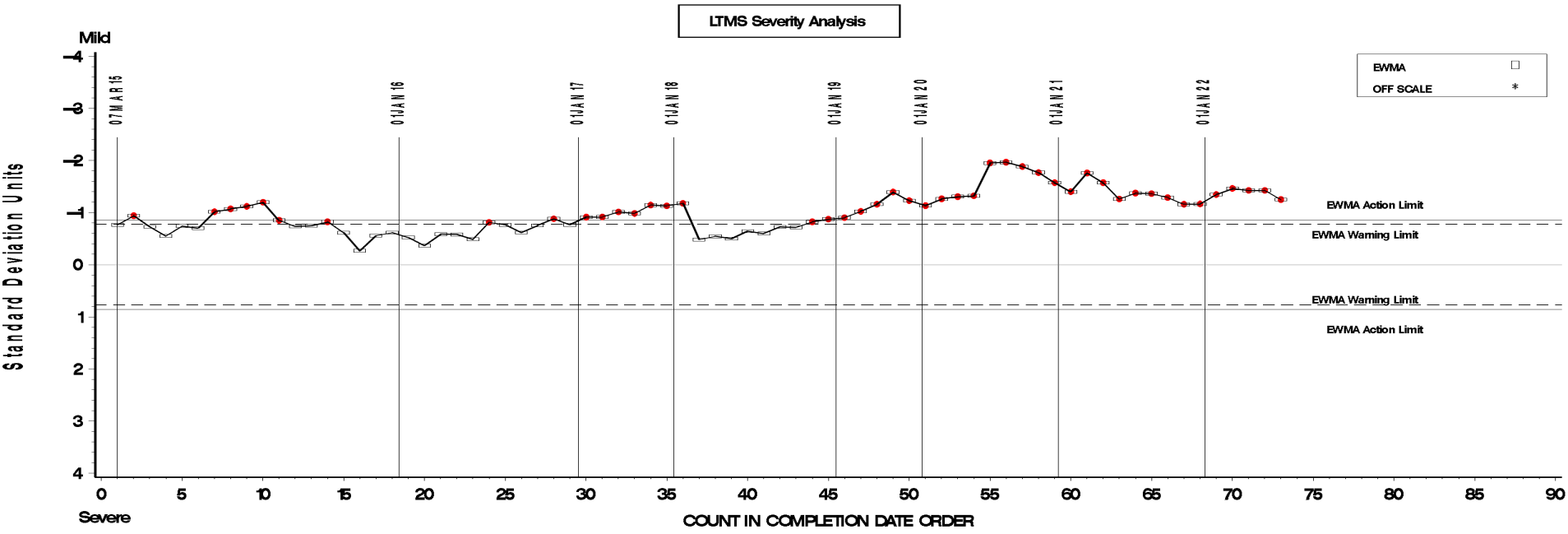
T-13 Test Severity

- ▶ IRPH is in control
- ▶ KV40 is in level 2 Zi alarm in the mild direction

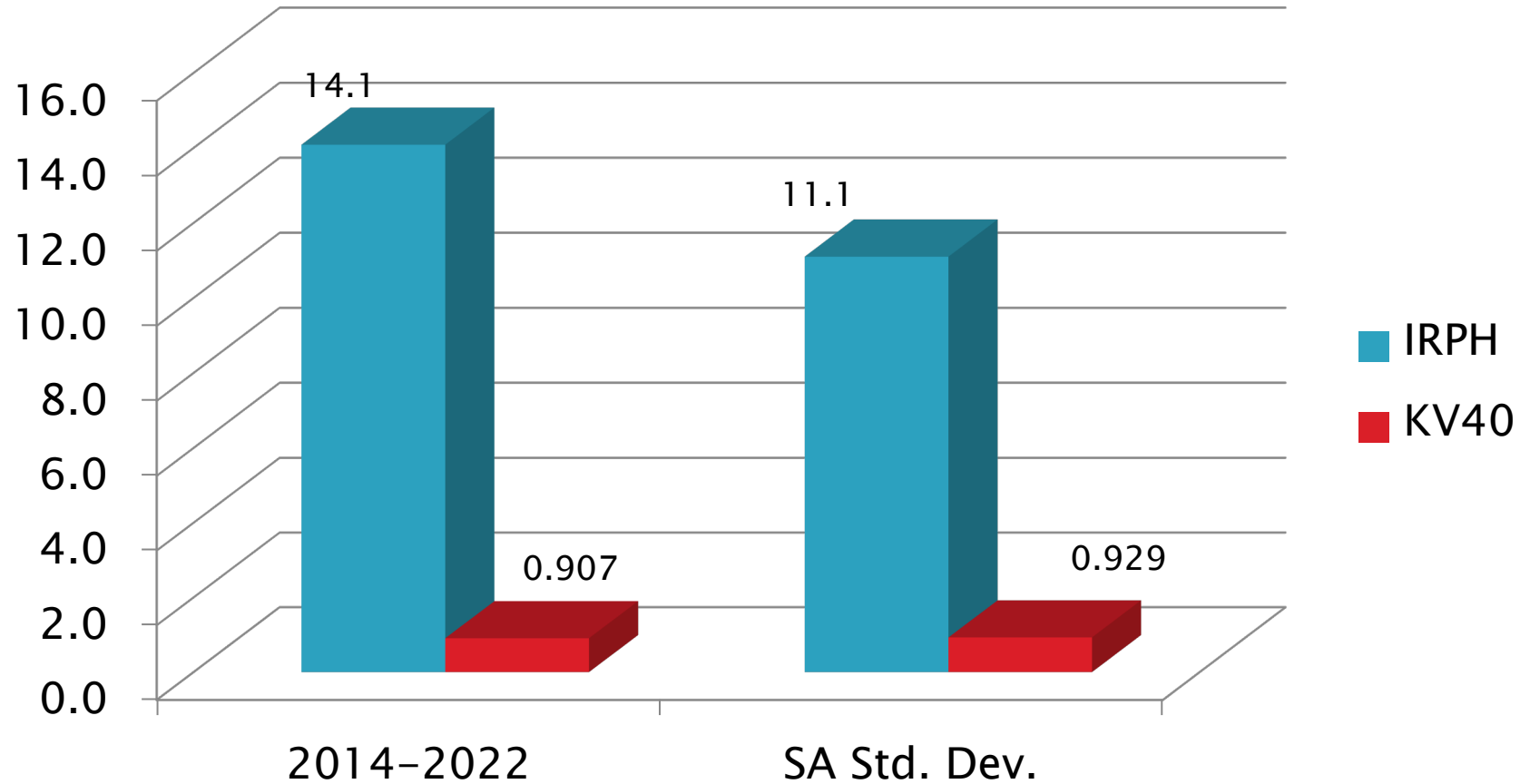
FINAL ORIGINAL PEAK HEIGHT IR AT EOT



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



T-13 Precision Estimates



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Information Letters

➤➤ April 1, 2022–September 30, 2022

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Information Letters*

Test	Date	IL	Topic
N/A	N/A	N/A	No information letters were issued during this period

*Available from TMC Website

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Memos

➤➤ April 1, 2022–September 30, 2022

Memos*

Date	Number	Topic
N/A	N/A	No memos were issued during the period

*Available from TMC Website

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Reference Oil Inventory



Actions, Re-blends, Inventories
and Estimated Life

Reference Oil Reblends

- ▶ No reference oil re-blends were received during the reporting period.

Reference Oil Inventory Estimated Life

Oil	Tests	Original Blend Amount	Quantity Shipped in last 6 months	TMC Inventory	Lab Inventory	Estimated Life
809-1	1K, 1N	9134	70	1876	116	5+ years
811-2	1K, 1N	1732	40	760	40	5+ years
821-4	T-12	4495	25	2198	100	5+ years
822-2	1R, T-11	4386	252	1692	196	2.5 years
823	T-13	1796	160	65	120	<1 year
823-1	T-13	1421	0	1421	0	5+ years
830-3	ISM	2891	25	2360	150	5+ years
831-4	C13, ISB	1699	245	596	220	2 years

Reference Oil Inventory Estimated Life

Oil	Tests	Original Blend Amount	Quantity Shipped in last 6 months	TMC Inventory	Lab Inventory	Estimated Life
832-1	COAT	1951	112	1384	28	4+ years
833-1	COAT	1248	476	280	140	< 1 year
833-2	COAT	1078	0	1078	0	5+ years
864-1	DD13	1576	50	513	150	1.5 years
873-2	1M-PC	1650	0	3.5	10	1 year
1005-5	1P, 1R, EOAT, RFWT, T-8/E	3826	142	897	179	1 year

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LTMS Deviations

»» April 1, 2022–September 30, 2022

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LTMS Deviations

- No LTMS Deviations in Current Period

Historical Count of HD LTMS Deviations

Test	LTMS Deviations
1M-PC	2
1N	2
T-8/E	2
T-10A	1
T-12	1

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Quality Index Deviations

»» April 1, 2022–September 30, 2022

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Quality Index Deviations

- ▶ No quality index deviations during this period.

Quality Index Deviations

Historical Count of HD Quality Index Deviations

Test	Qi Deviations
1P	15
1R	1
ISM	3
C13	2
T-10A	1
T-11	3
T-12	8
T-13	3
COAT	4

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TMC Laboratory Visits

➤➤ April 1, 2022–September 30, 2022

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TMC Lab Visits

- ▶ A lab visit was conducted to review COAT stand setup and operation at Lab G. A brass fitting was found in the external oil system sampling circuit. All other areas of test setup and operations were found to be in compliance.

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Test Area Timelines

➤➤ April 1, 2022–September 30, 2022

Test Area Timeline Additions*

Test	Date	IL/Memo	Topic
N/A	N/A	N/A	No test area timeline additions this period

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*As of 9/30/2022

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Rating Workshop Data



2022 Heavy Duty Workshop

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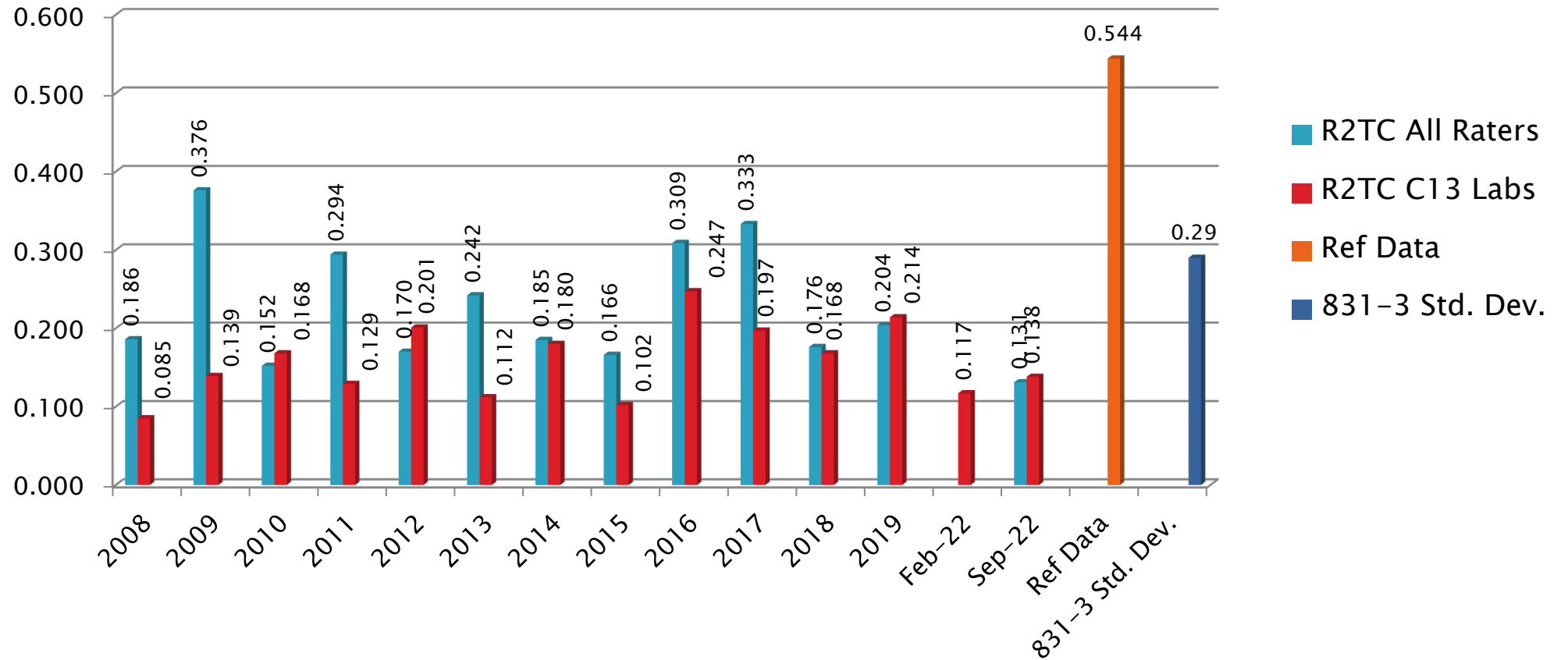


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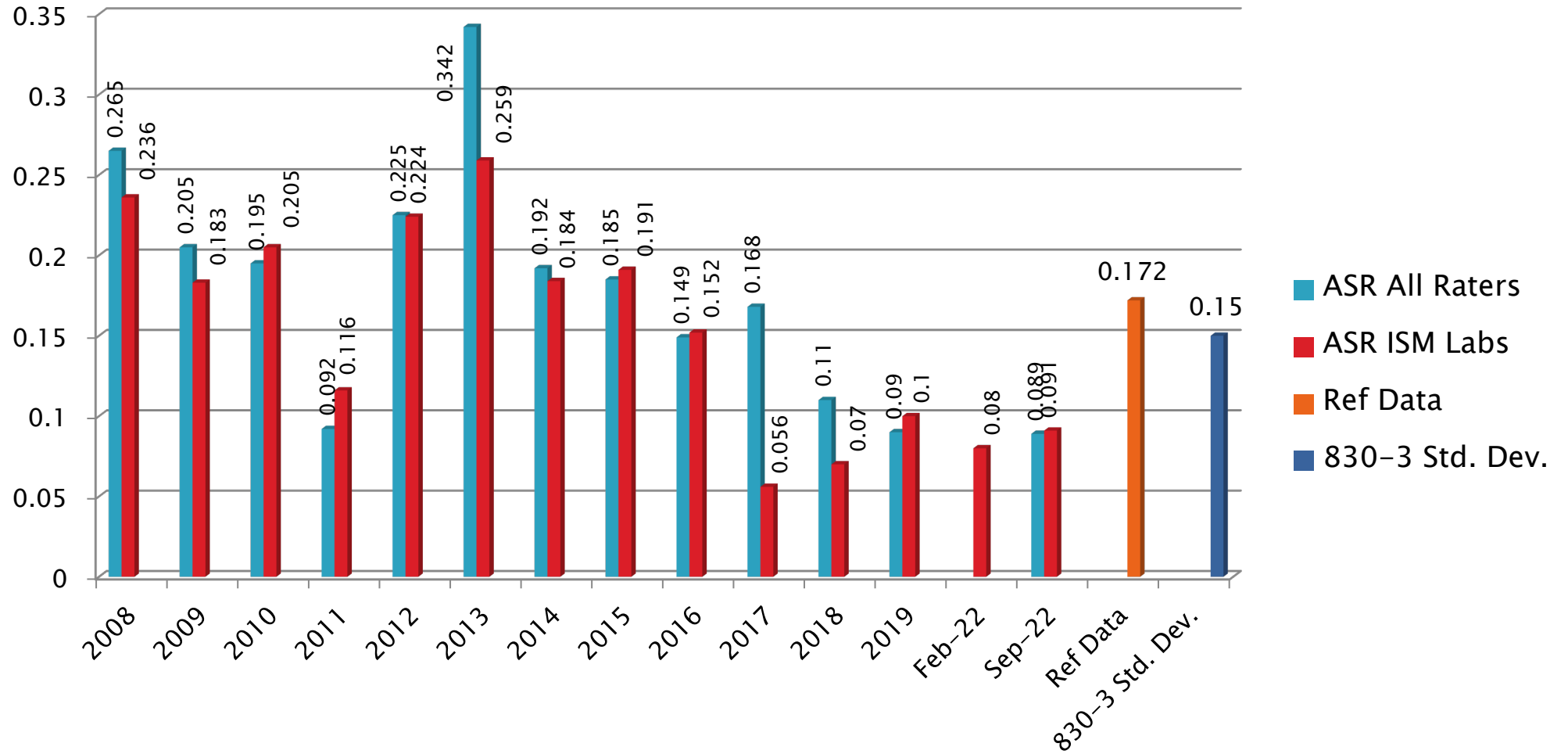
Rating Workshop Data

- ▶ The 2022 HD Rating Workshop was held in September 2022 in San Antonio.

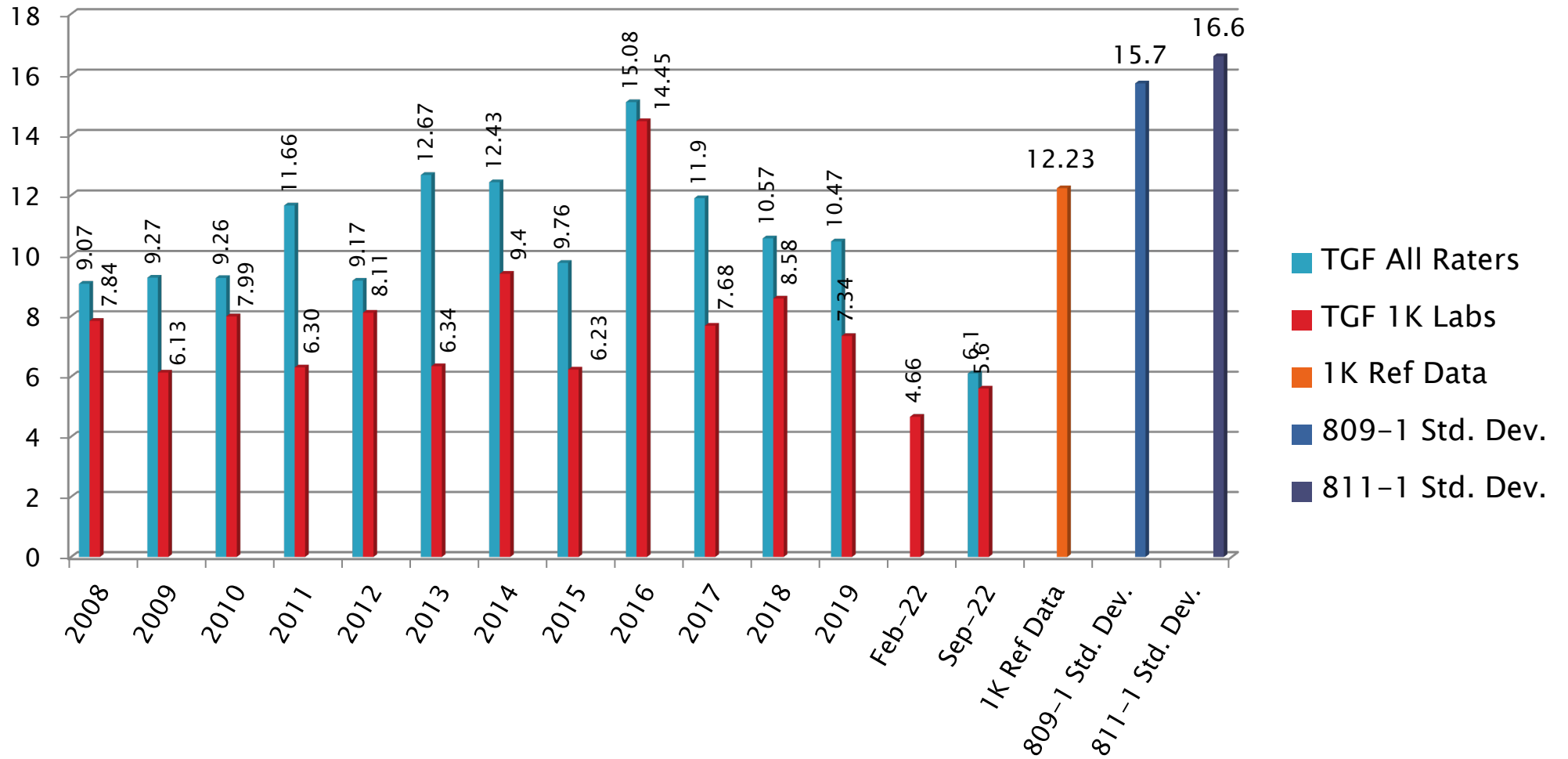
C13 2nd Ring Carbon Precision – Rating Workshop Data



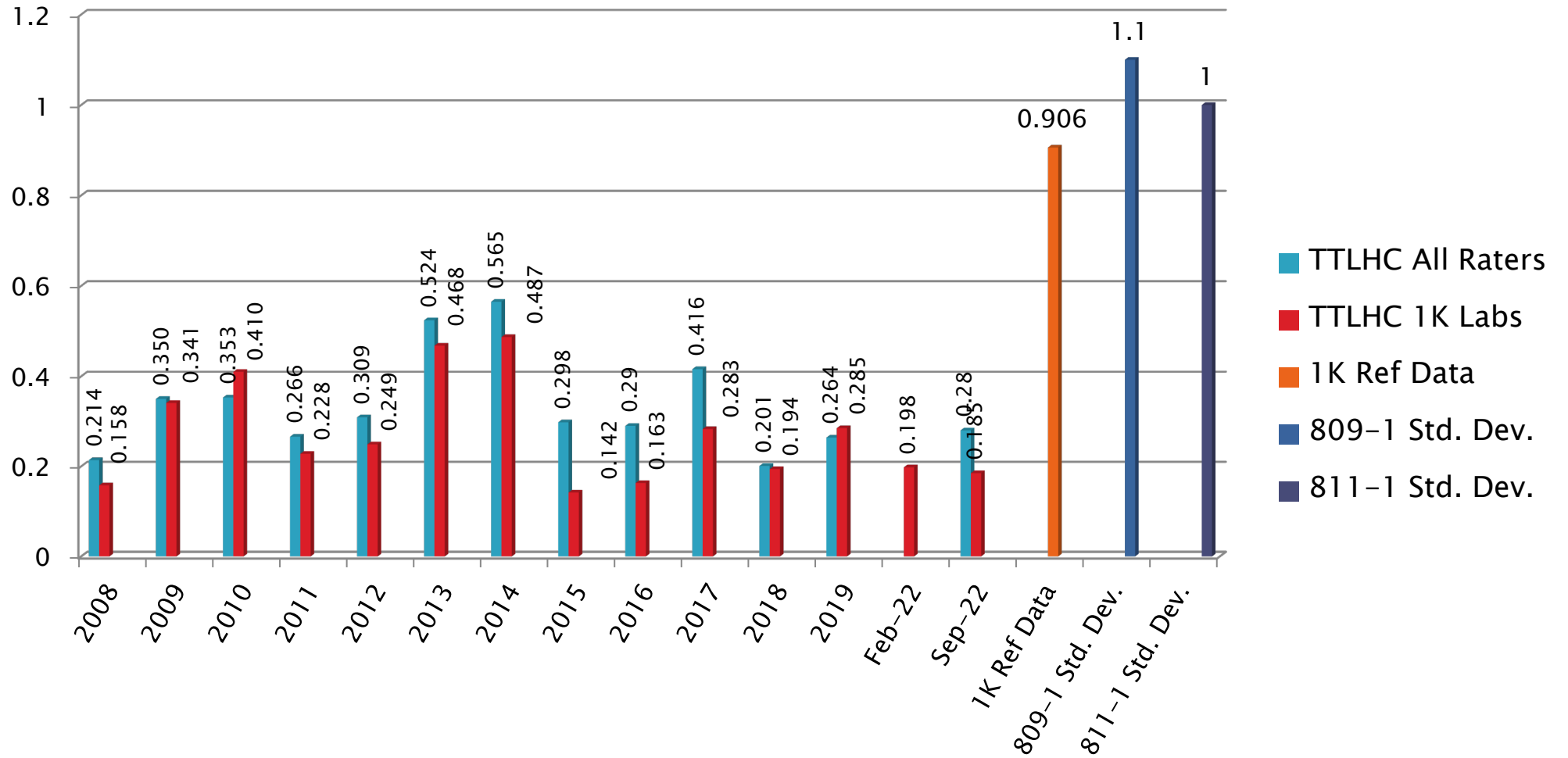
ISM Sludge Rating Precision - Rating Workshop Data



Deposit Rating Precision - Rating Workshop Data



Deposit Rating Precision - Rating Workshop Data



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Miscellaneous Information

- ▶ Available on TMC Website:
 - Oil Assignment Request and Test File Upload
 - Live Reference Test Data Bases
 - Surveillance Panel Meeting Minutes
 - Test Area Alarm Logs
 - Complete Test Area Timelines
 - LTMS Manual

- ▶ <https://www.astmtmc.org>

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