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Test Monitoring Center

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

October 2018

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Heavy Duty Testing

Executive Summary

- ▶ Reference Oils
 - 832
 - Re-blend complete and available for testing.
- ▶ Test Issues
 - COAT test improvements ongoing. Matrix testing in progress to evaluate.

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Calibrated Labs and Stands*

Test	Labs	Stands
1K	1	1
1N	3	5
1M-PC	0	0
1P	3	3
1R	1	1
C13	4	4
ISB	2	2
ISM	4	4
EOAT	1	1
RFWT	1	1
T-8/E	2	2
T-11	4	5
T-12/T-12A	4/4	4/4
T-13	4	9
COAT	0	0
DD13	3	4

*As of 09/30/2018

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SCOTE 1K

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1 K 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 K Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

1 K Lost Tests*

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

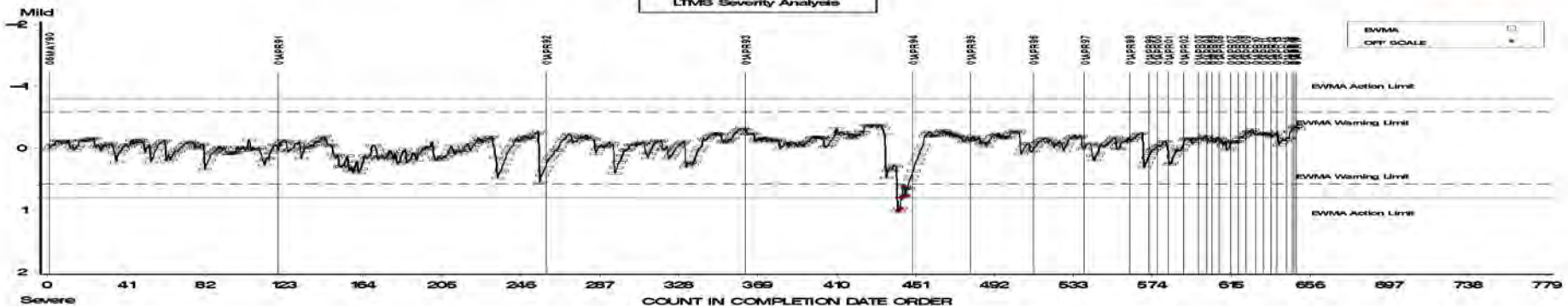
*Invalid and aborted tests

1 K Test Severity

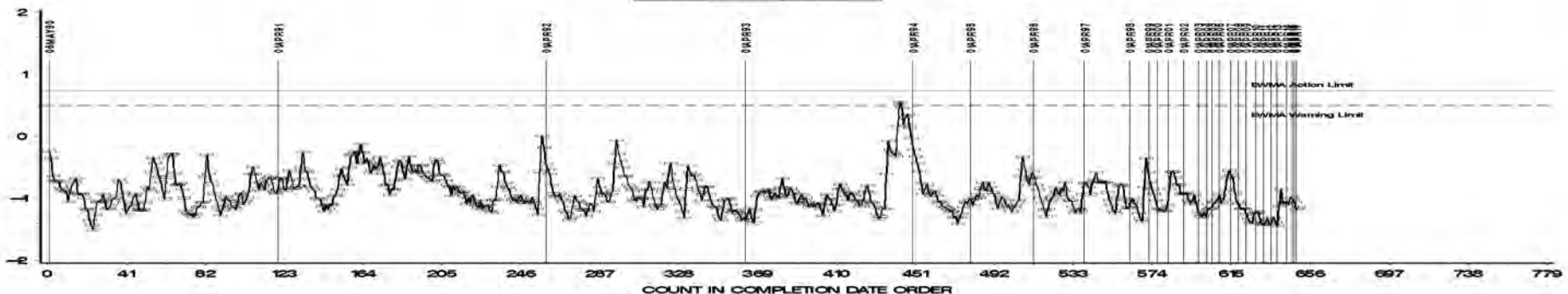
- ▶ As no 1K tests were run during this period no statement about test severity can be made.

FINAL EOTOC

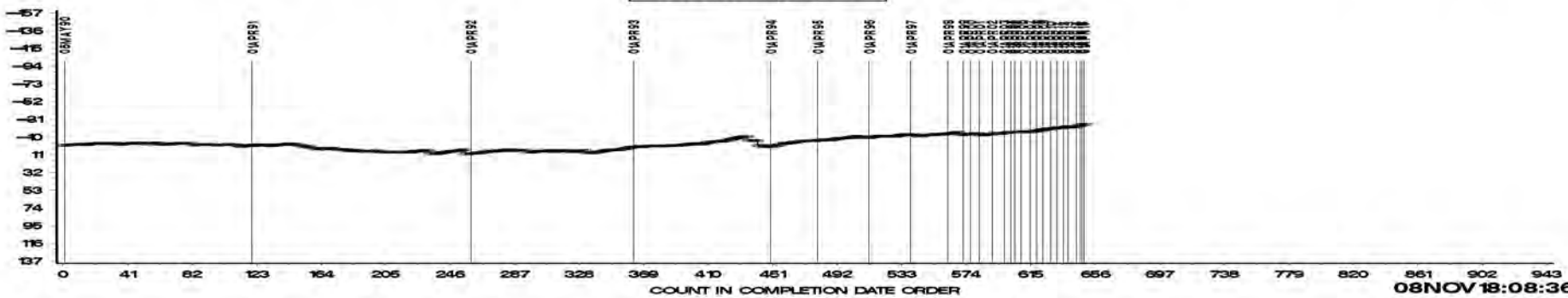
LTMS Severity Analysis



LTMS Precision Analysis

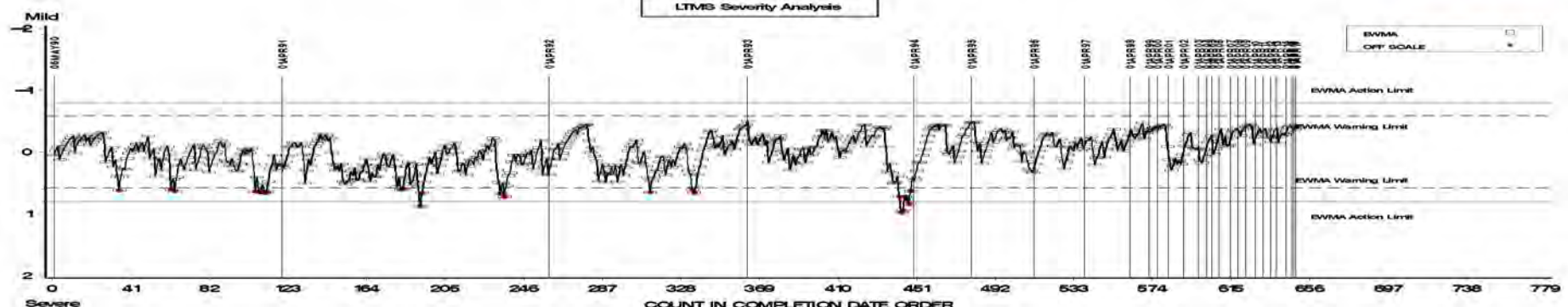


CUSUM Severity Analysis

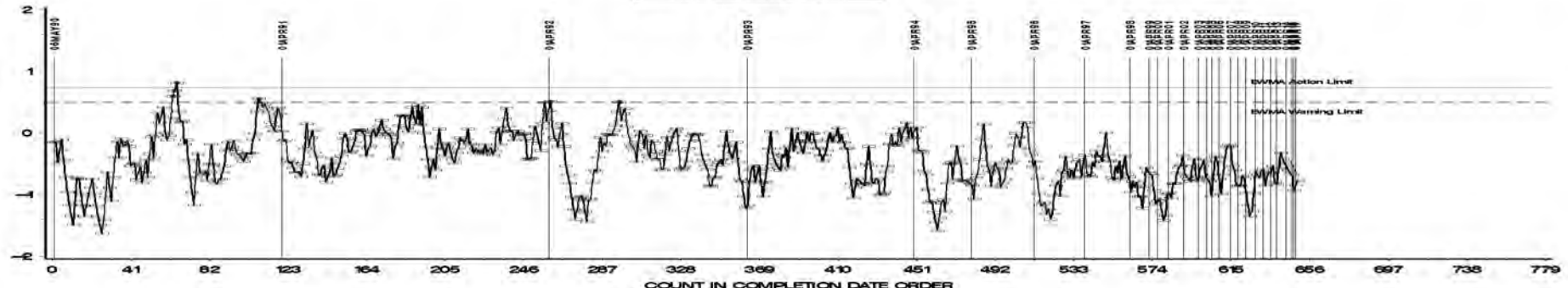


FINAL TLHC

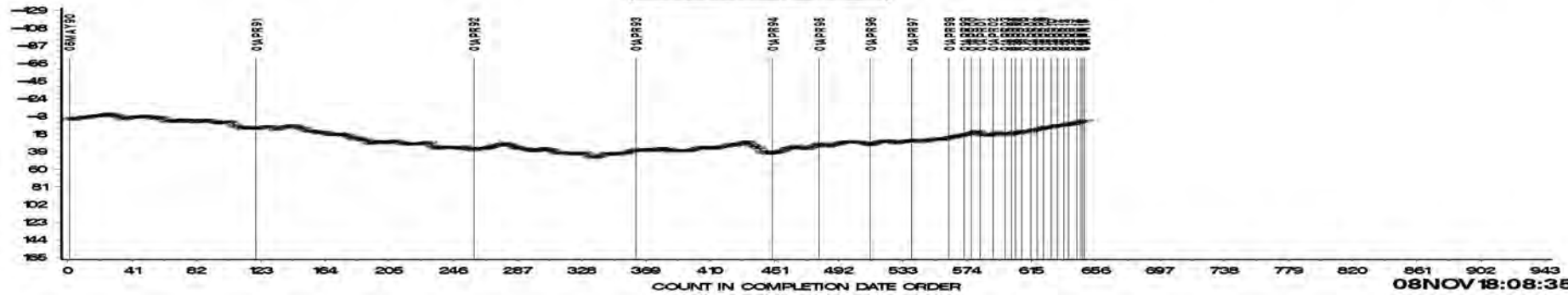
LTMS Severity Analysis



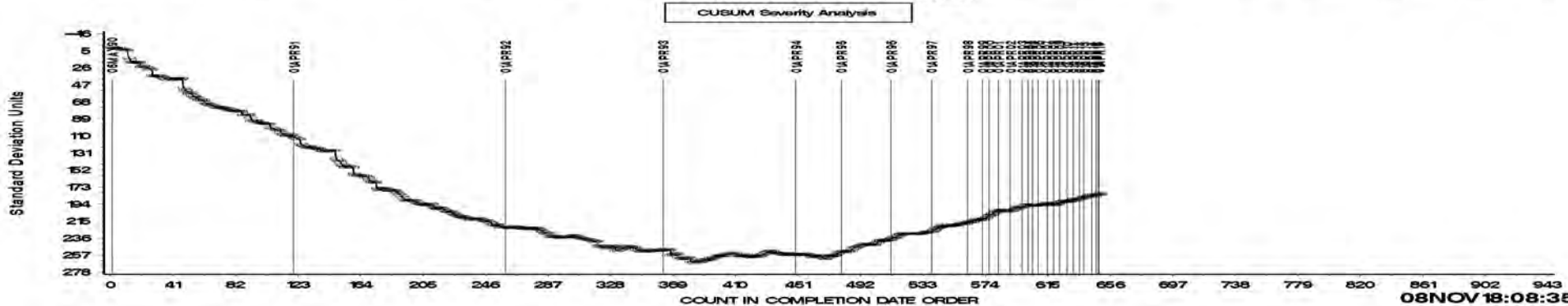
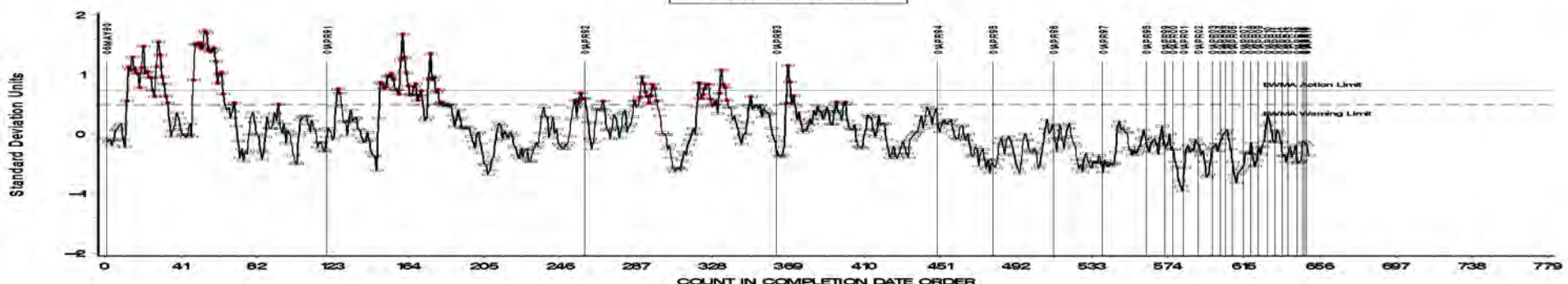
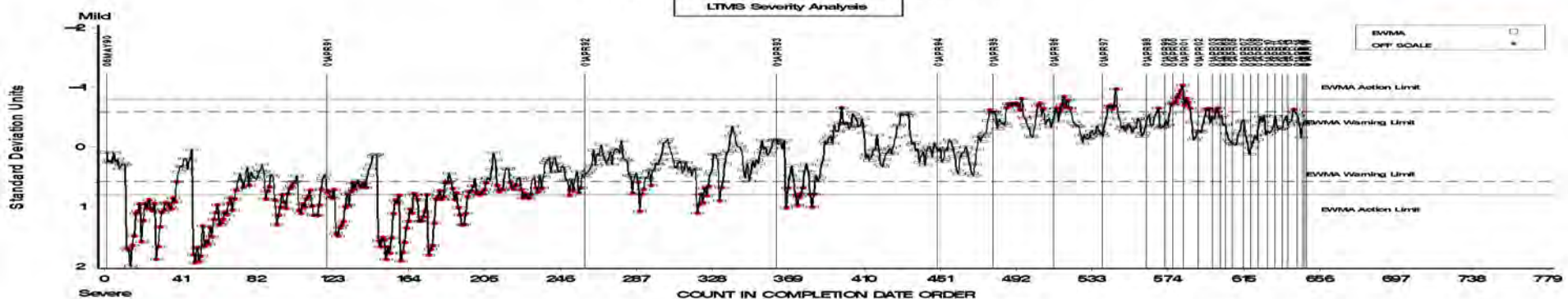
LTMS Precision Analysis



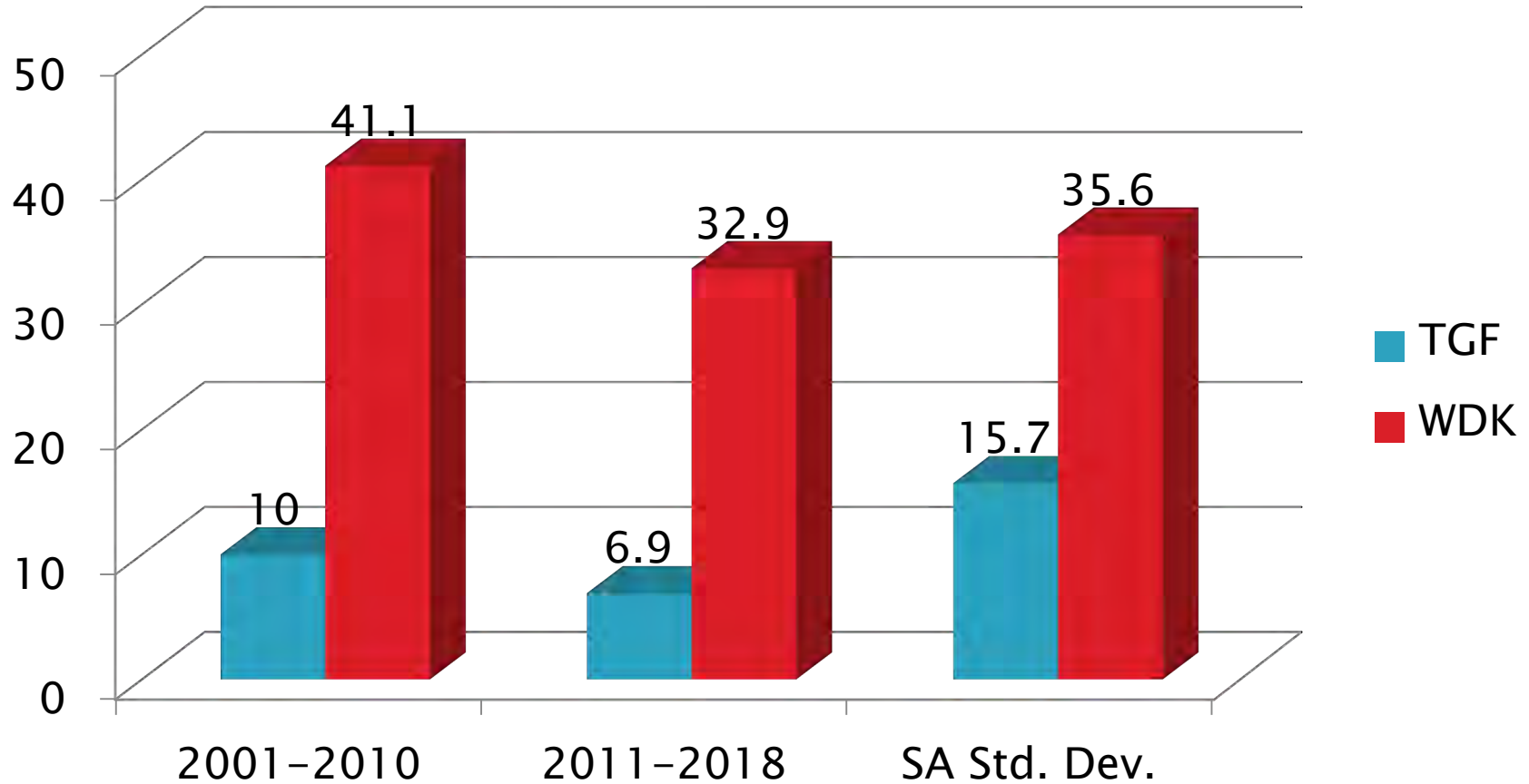
CUSUM Severity Analysis



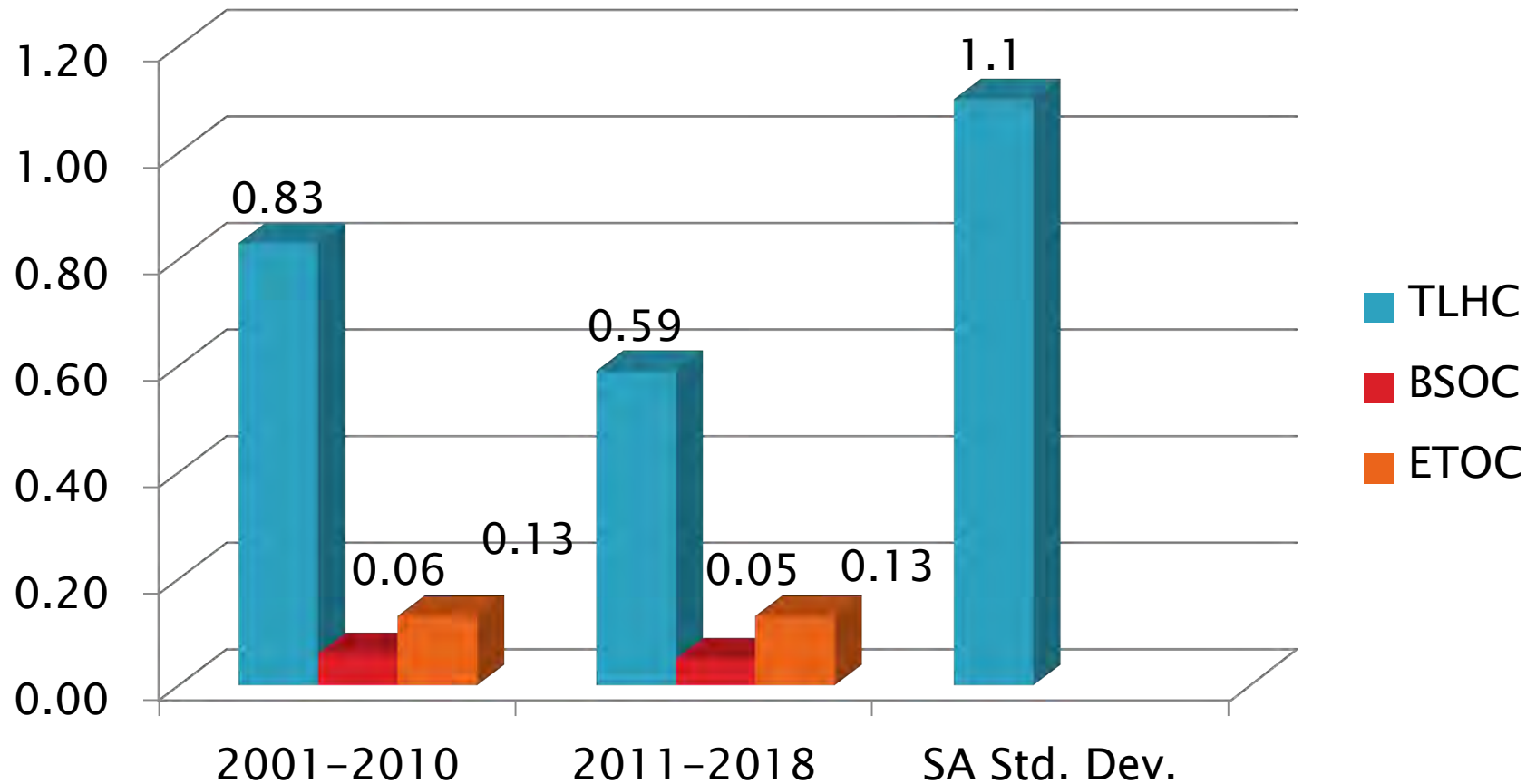
FINAL Weighted Total Demerits



1 K Precision Estimates



1 K Precision Estimates



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1 N Test Activity

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

1 N Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

1 N Lost Tests*

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

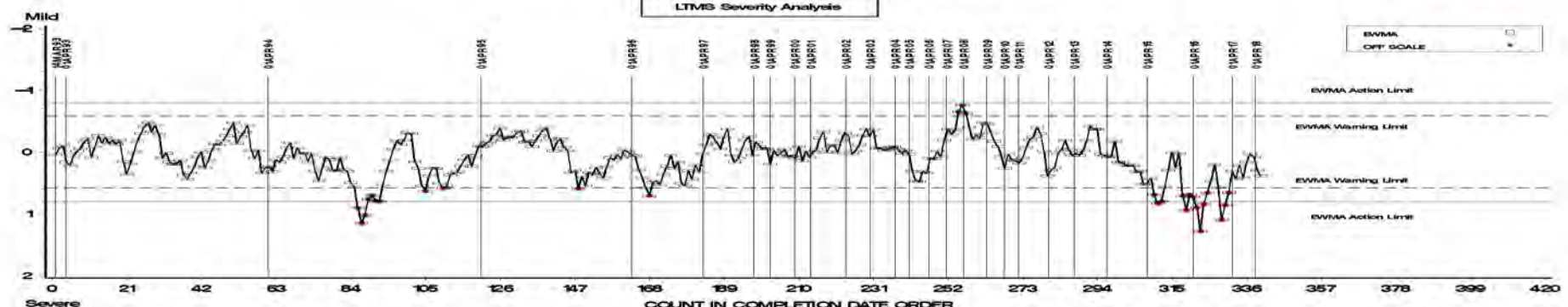
*Invalid and aborted tests

1 N Test Severity

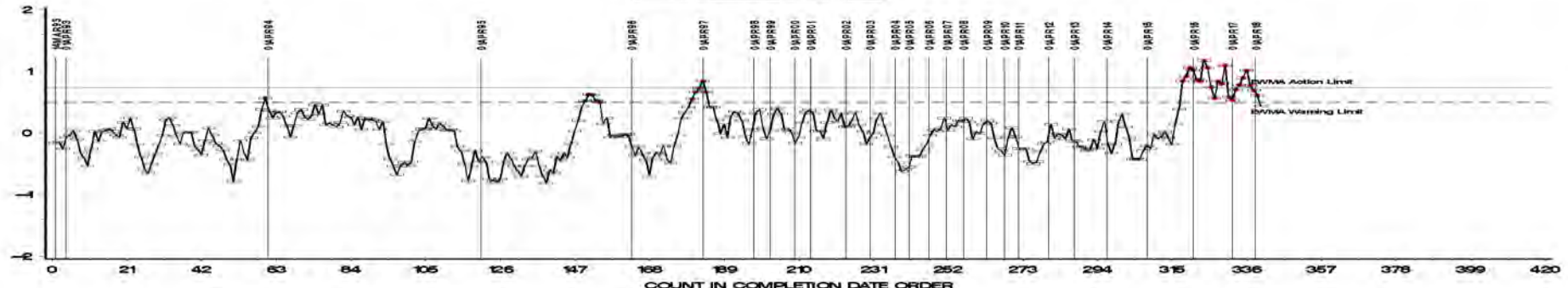
- ▶ WDN and BSOC in severity warning alarm mild direction
- ▶ TGF and TLHC in control
- ▶ Severity trends are being evaluated by surveillance panel

FINAL CORRECTED TGF

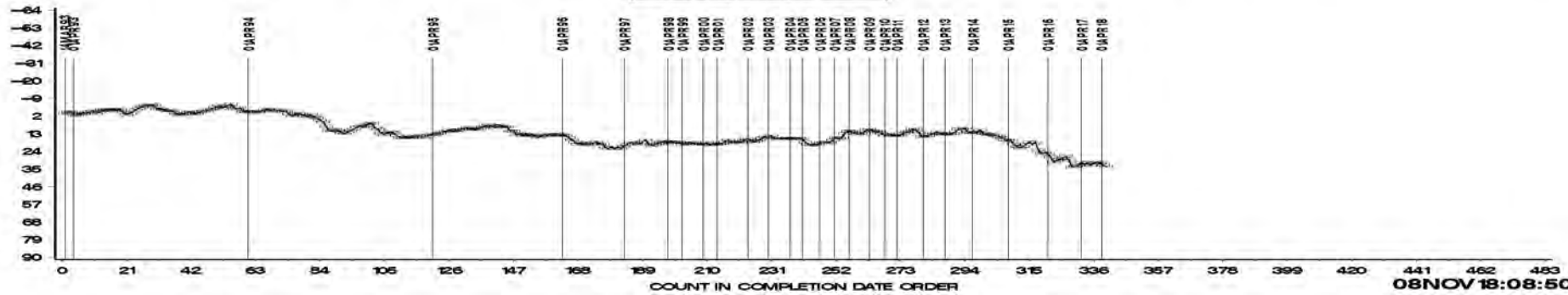
LTMS Severity Analysis



LTMS Precision Analysis

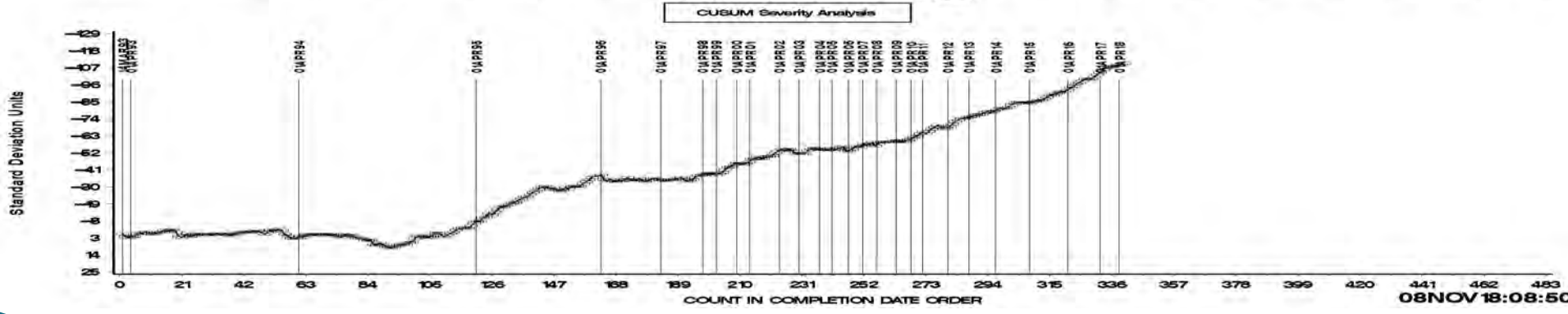
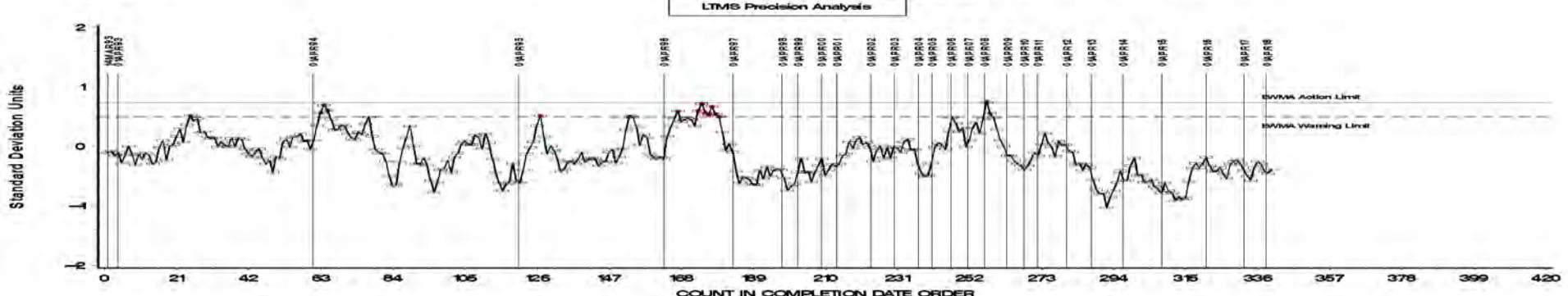
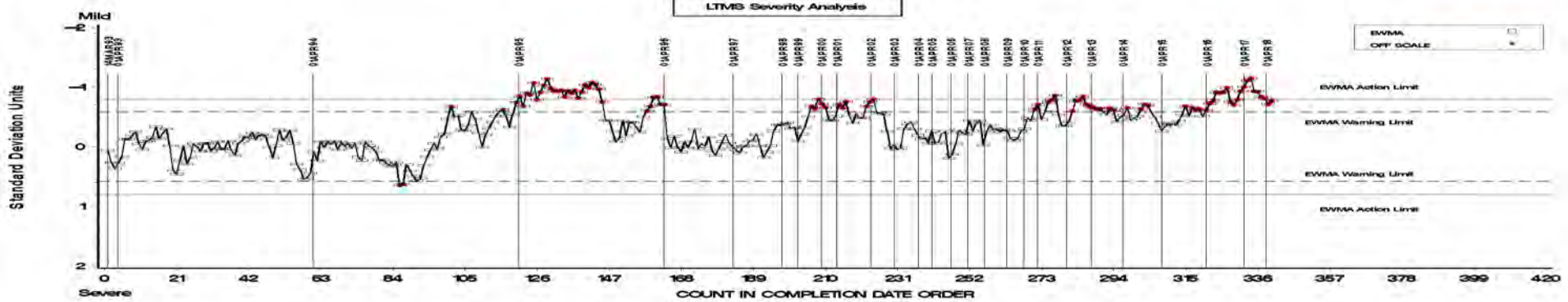


CUSUM Severity Analysis



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Weighted Total Demerits



CATERPILLAR IN INDUSTRY OPERATIONAL VALID DATA

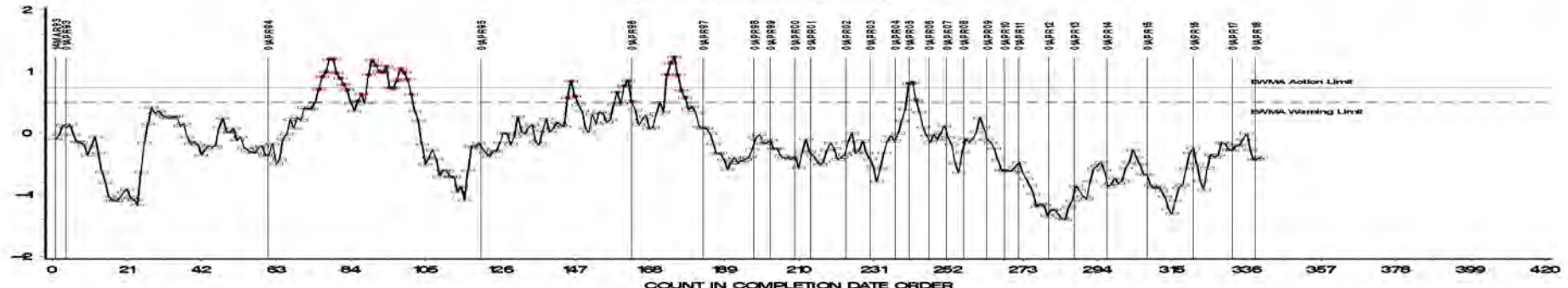


BSOC

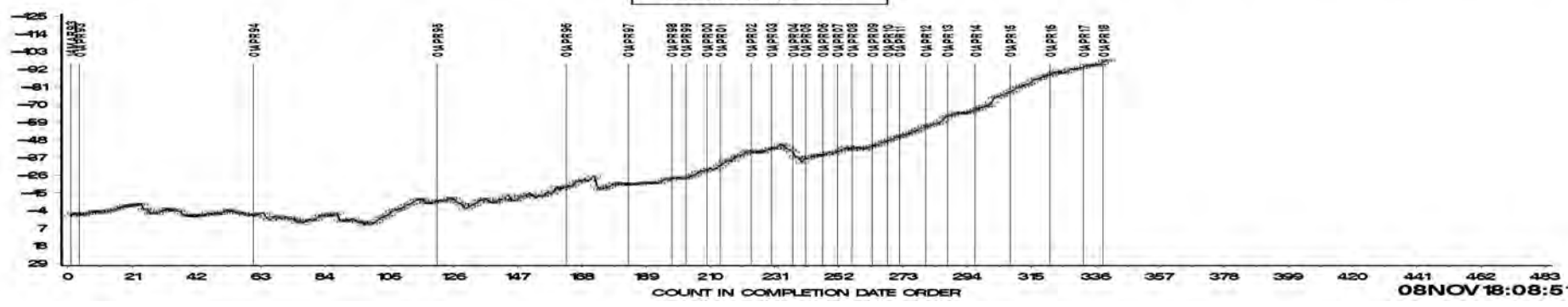
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



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Test Monitoring Center

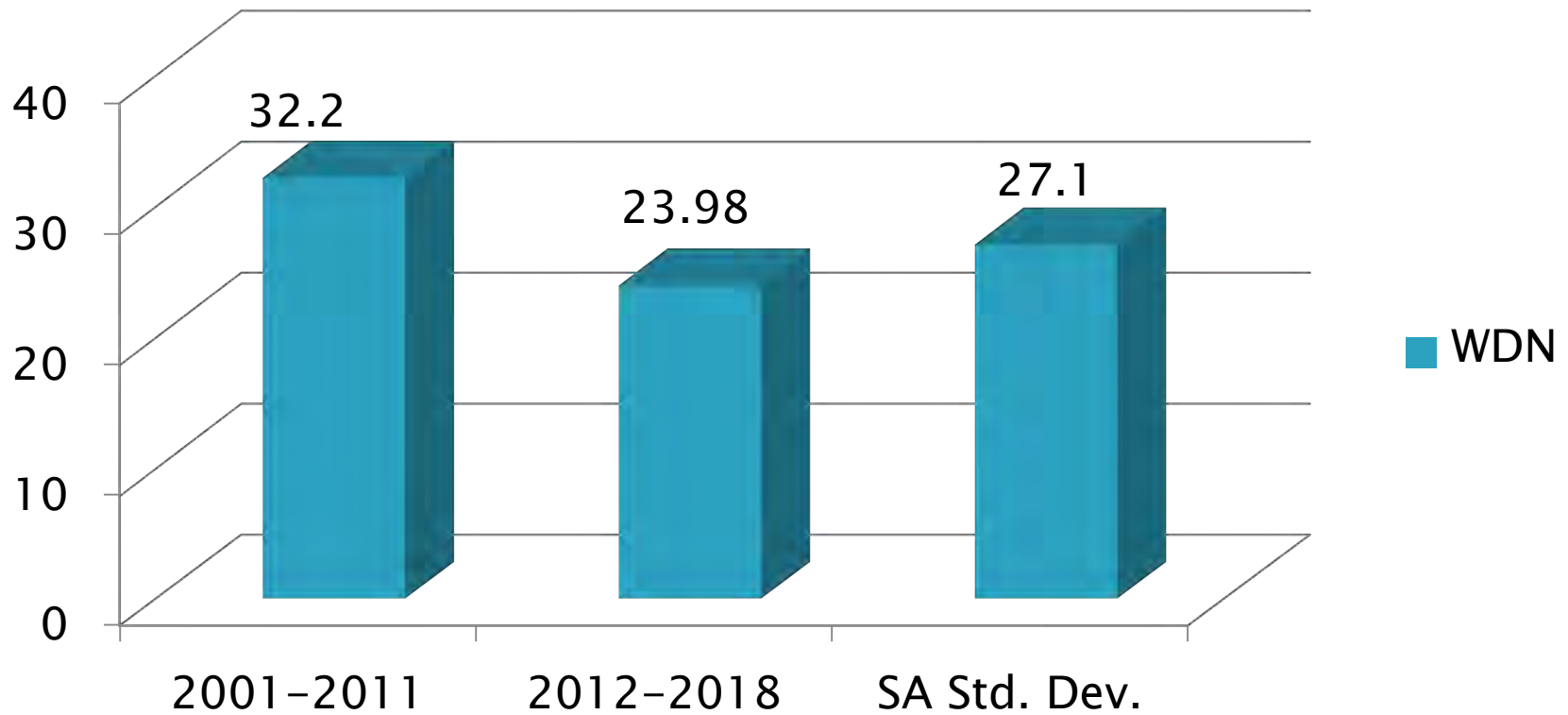
<http://astmtmc.cmu.edu>



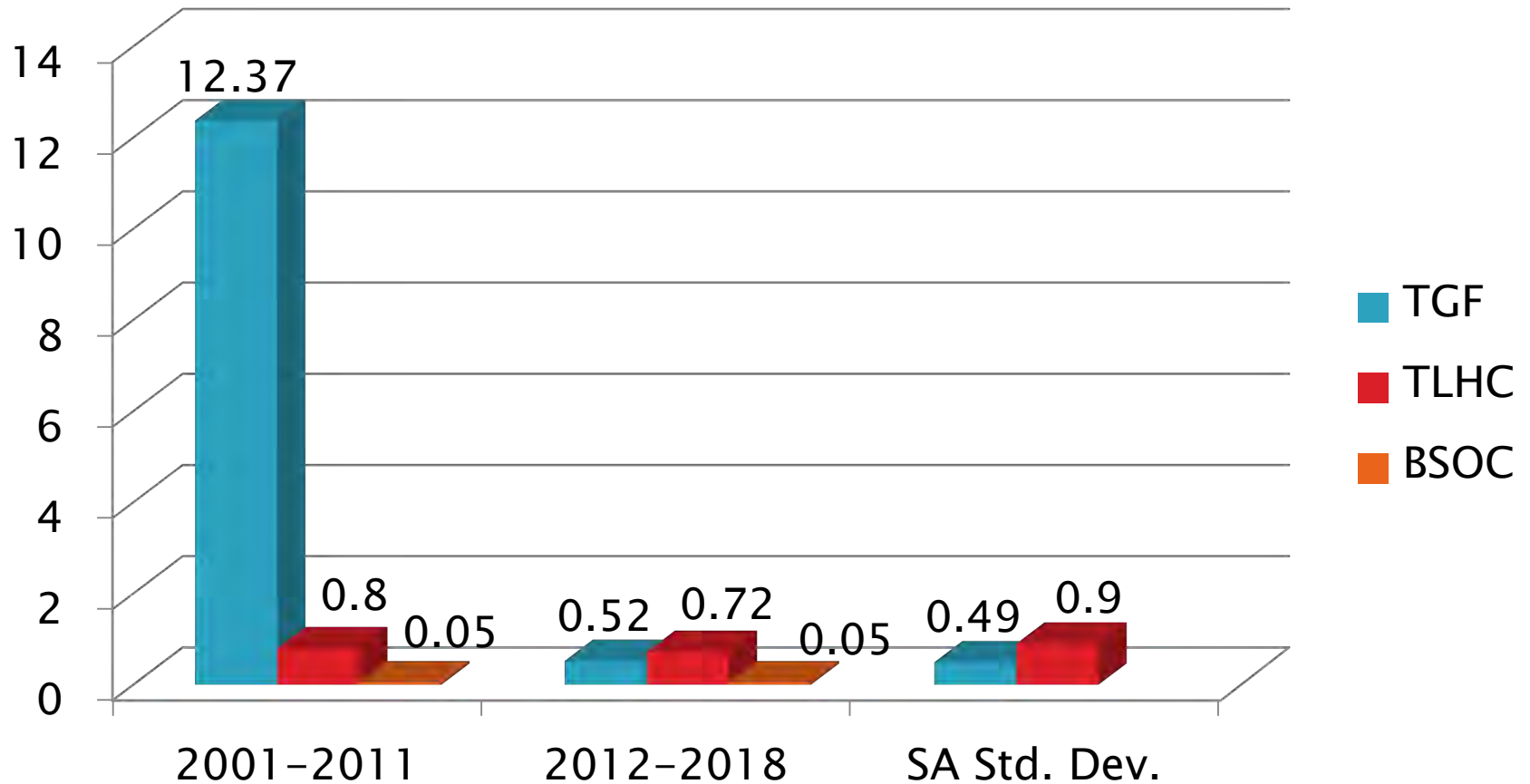
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1 N Precision Estimates

WDN



1N Precision Estimates



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SCOTE 1M-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

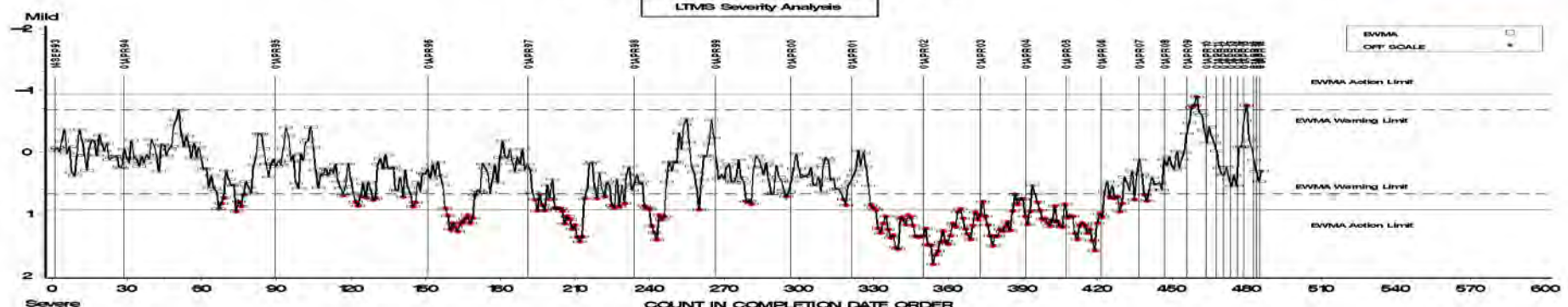
*Invalid and aborted tests

1 M-PC Test Severity

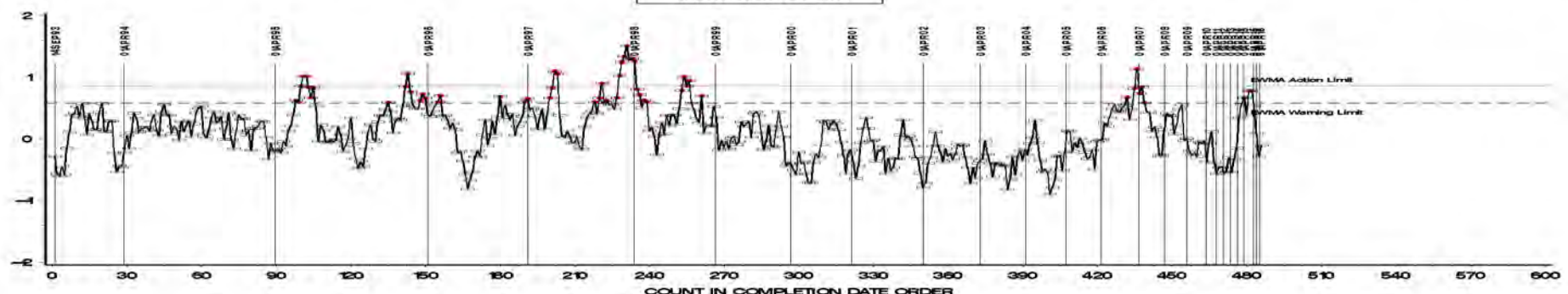
- ▶ As no 1 M-PC tests were run during this period no statement about test severity can be made.

FINAL TOP GROOVE FILLING

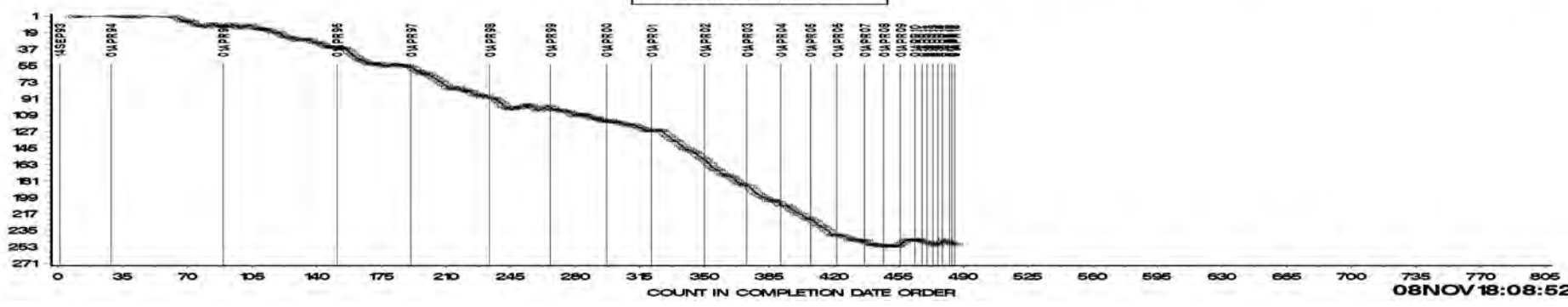
LTMS Severity Analysis



LTMS Precision Analysis



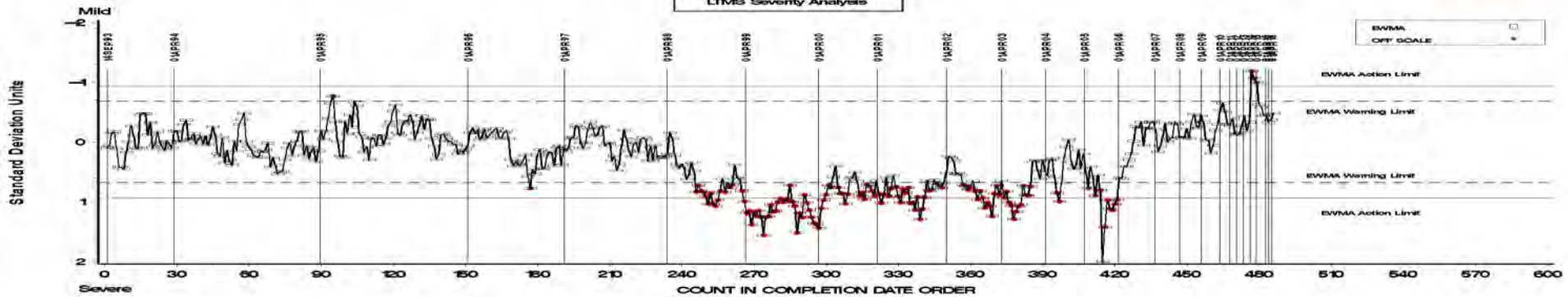
CUSUM Severity Analysis



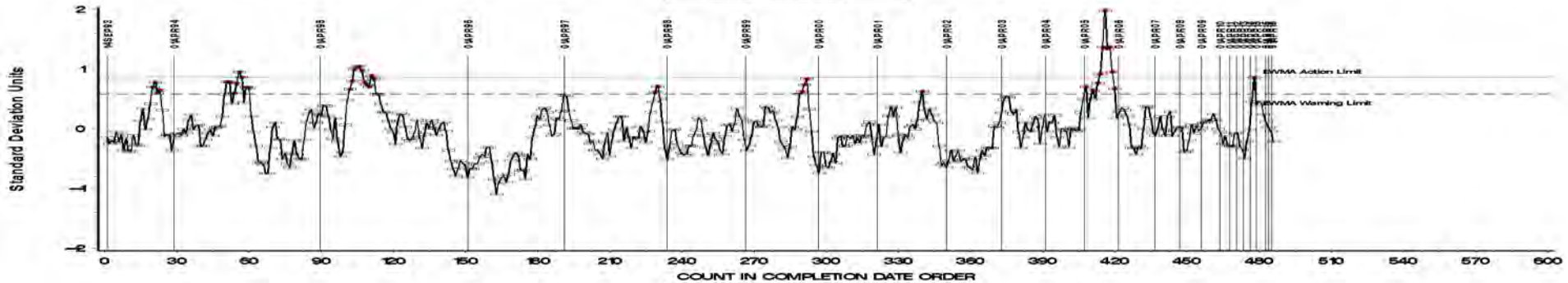
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Weighted Total Demerits

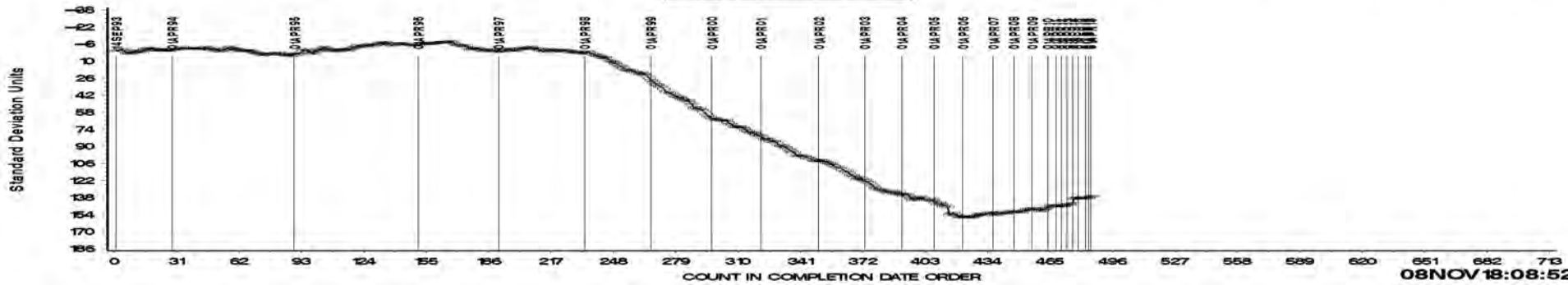
LTMS Severity Analysis



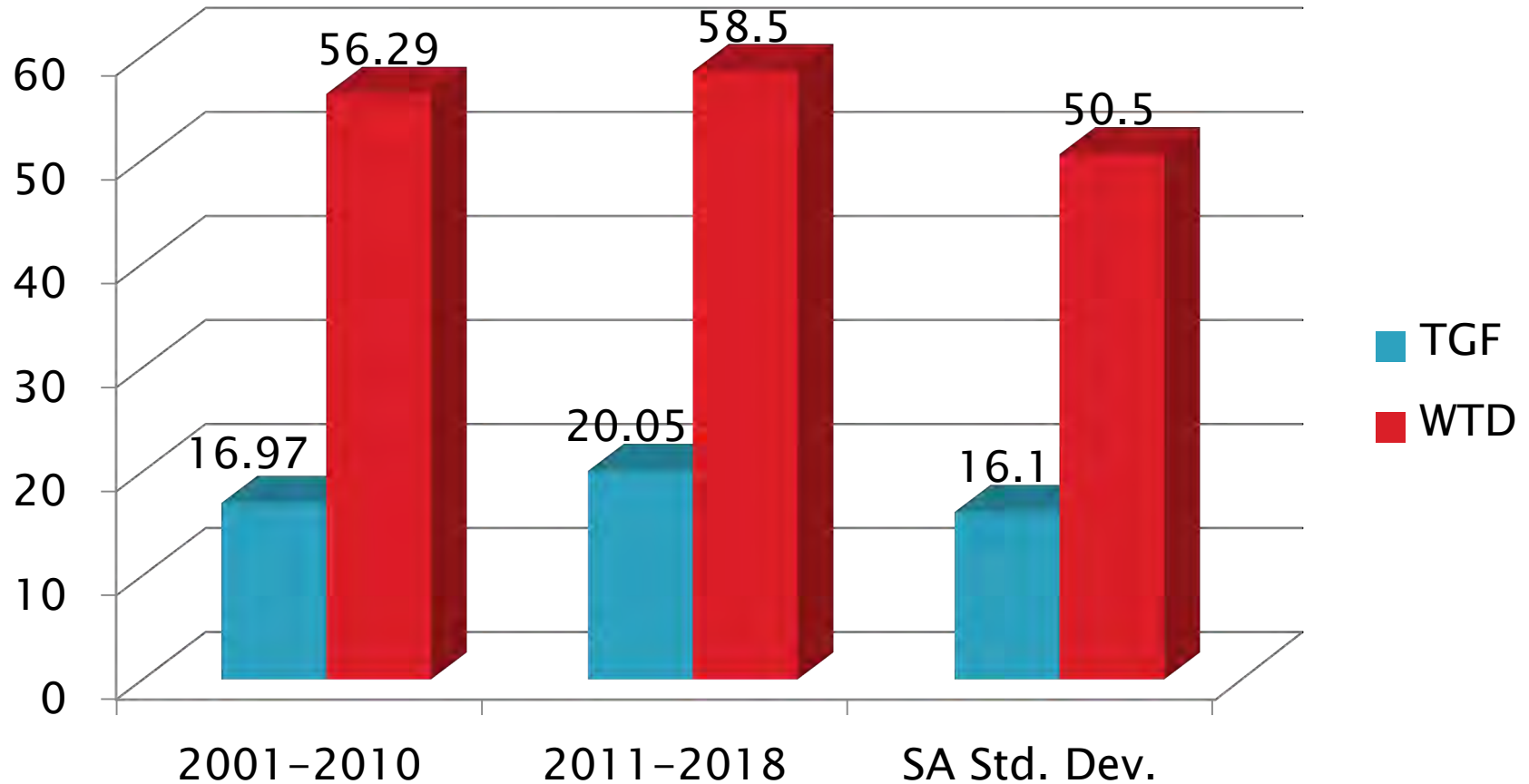
LTMS Precision Analysis



CUSUM Severity Analysis



1 MPC Precision Estimates



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SCOTE 1 P

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1P Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	3
Failed Calibration Test	OC	1
Operationally Invalid	LC	0
Aborted	XC	1
Donated	AG	0
Total		5

1 P Failed Tests

Failed Parameter	Number of Tests
EOTOC Severe	1
Total	1

1 P Lost Tests*

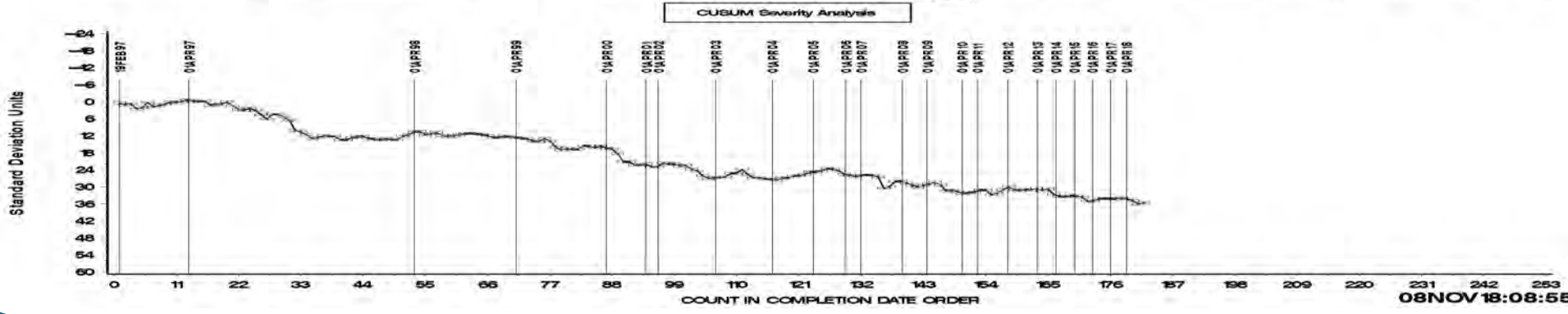
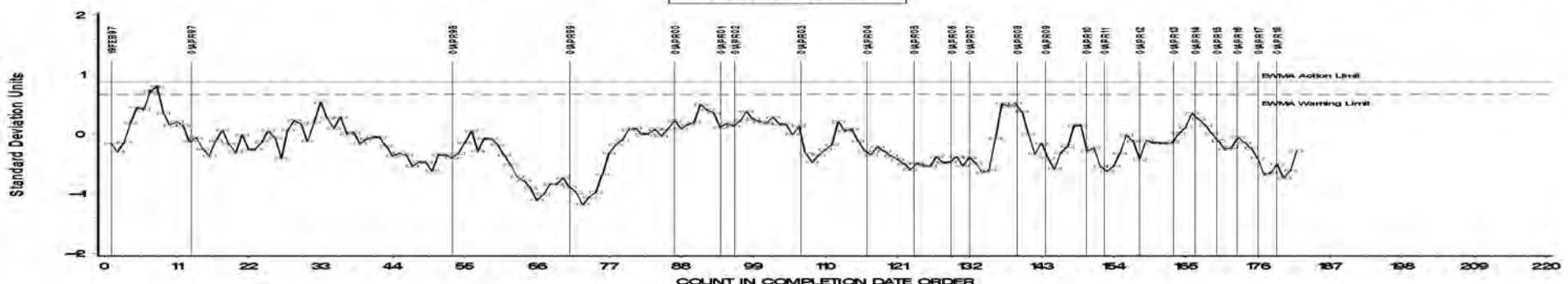
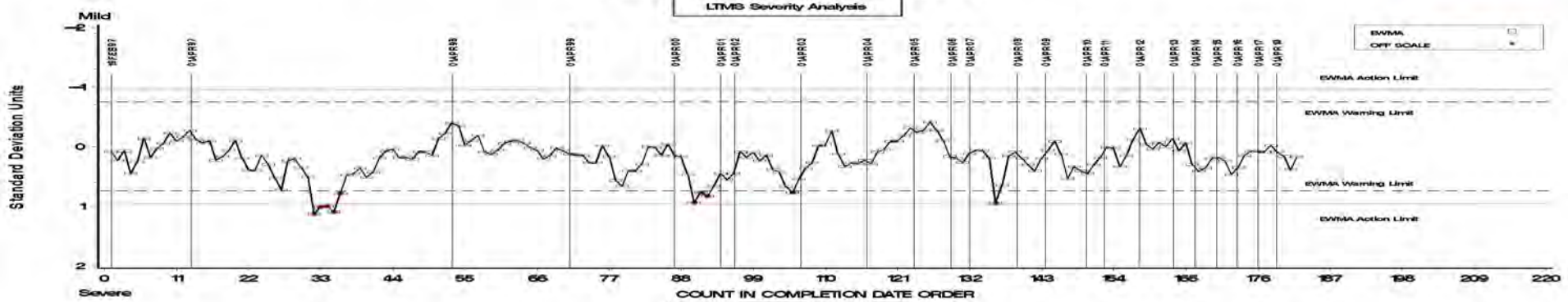
Status	Cause	#
Invalid	No invalid tests	0
Aborted	Aborted due to high oil consumption	1
Total		1

*Invalid and aborted tests

1 P Test Severity

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

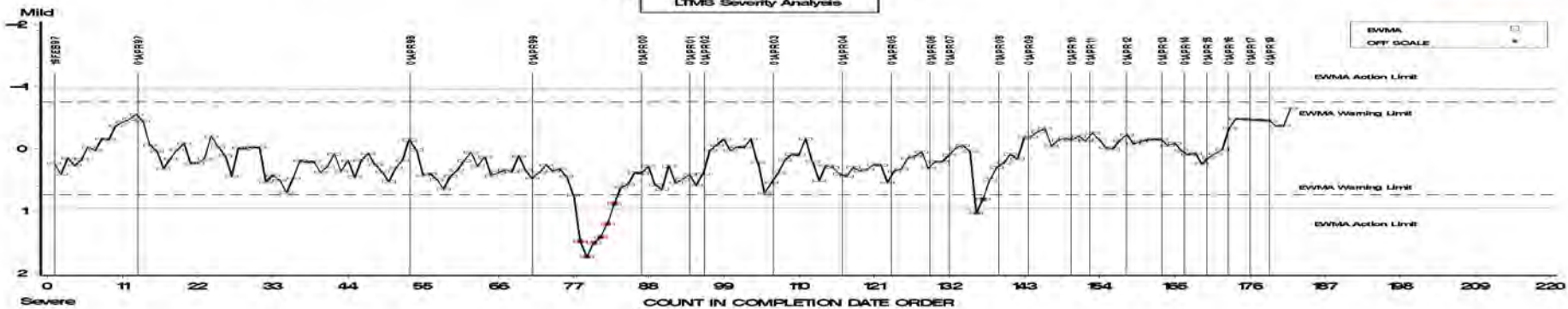
WEIGHTED TOTAL DEMERITS



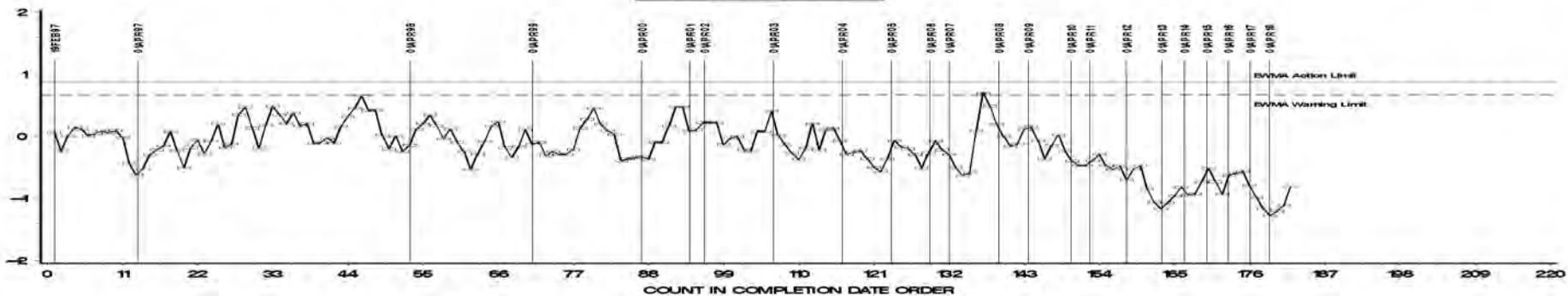
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TOP GROOVE CARBON

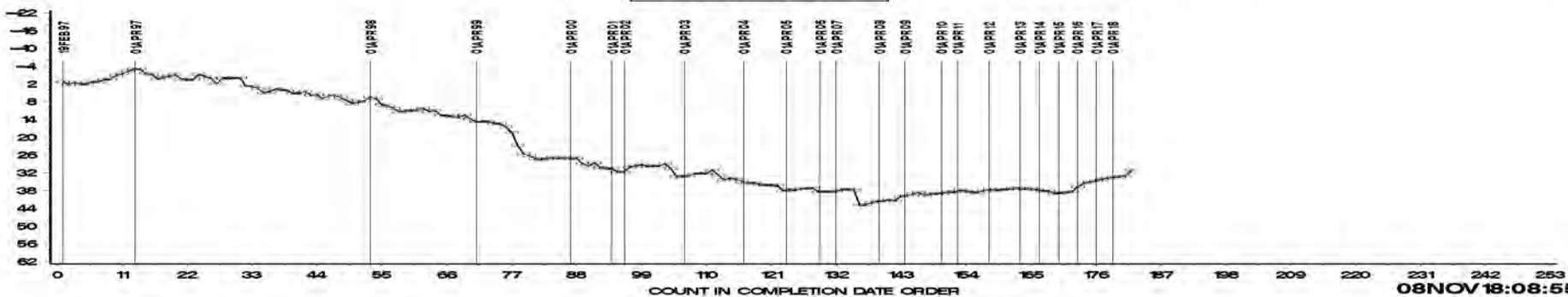
LTMS Severity Analysis



LTMS Precision Analysis



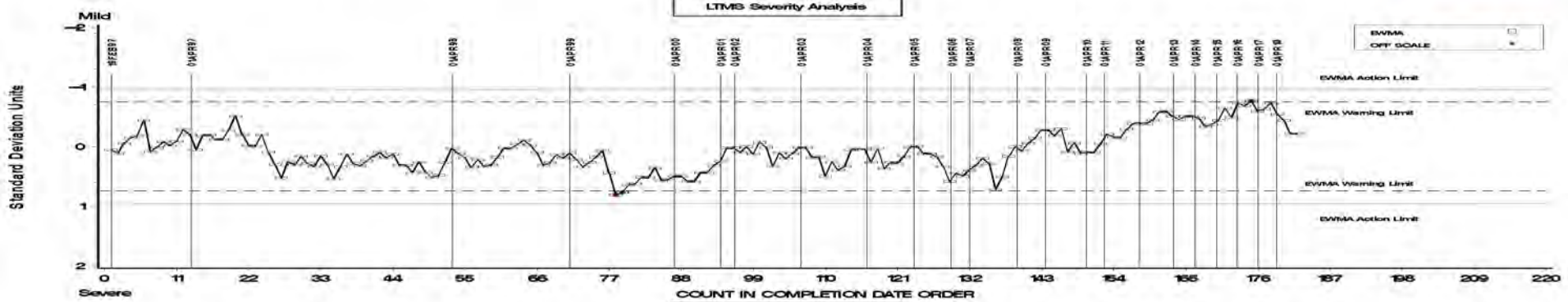
CUSUM Severity Analysis



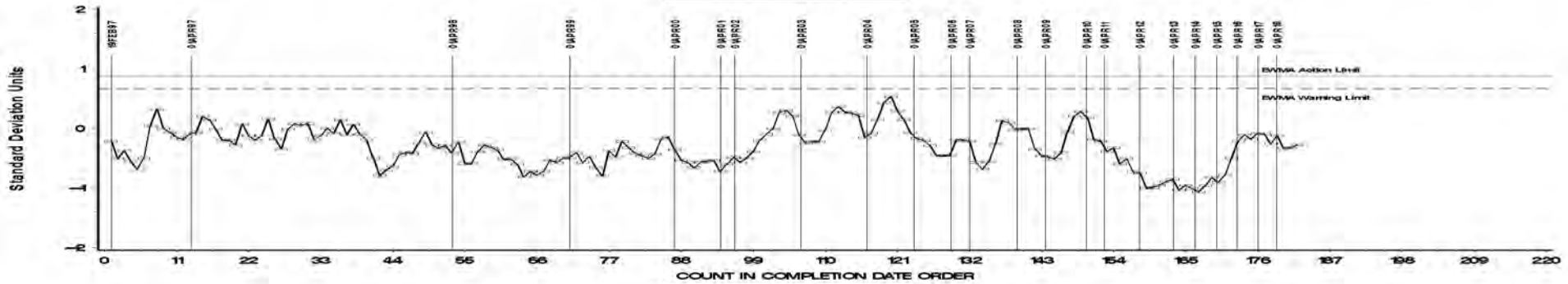
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TOP LAND CARBON

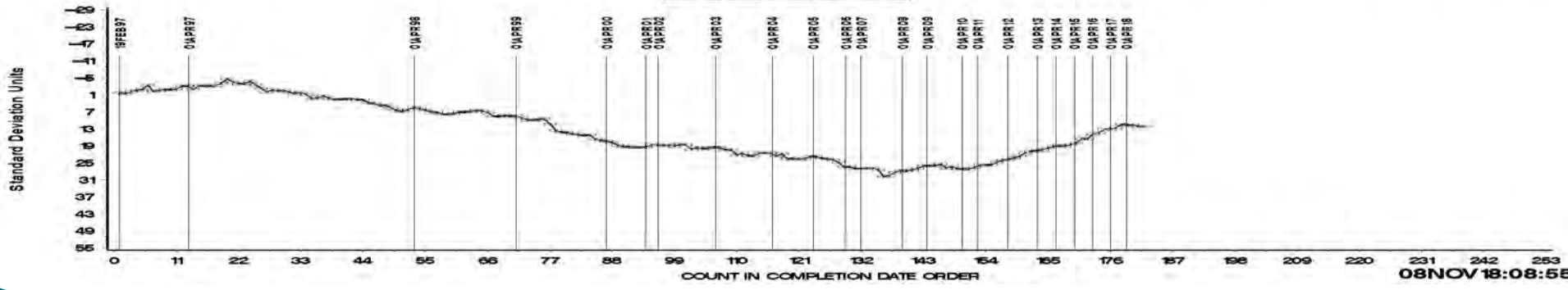
LTMS Severity Analysis



LTMS Precision Analysis

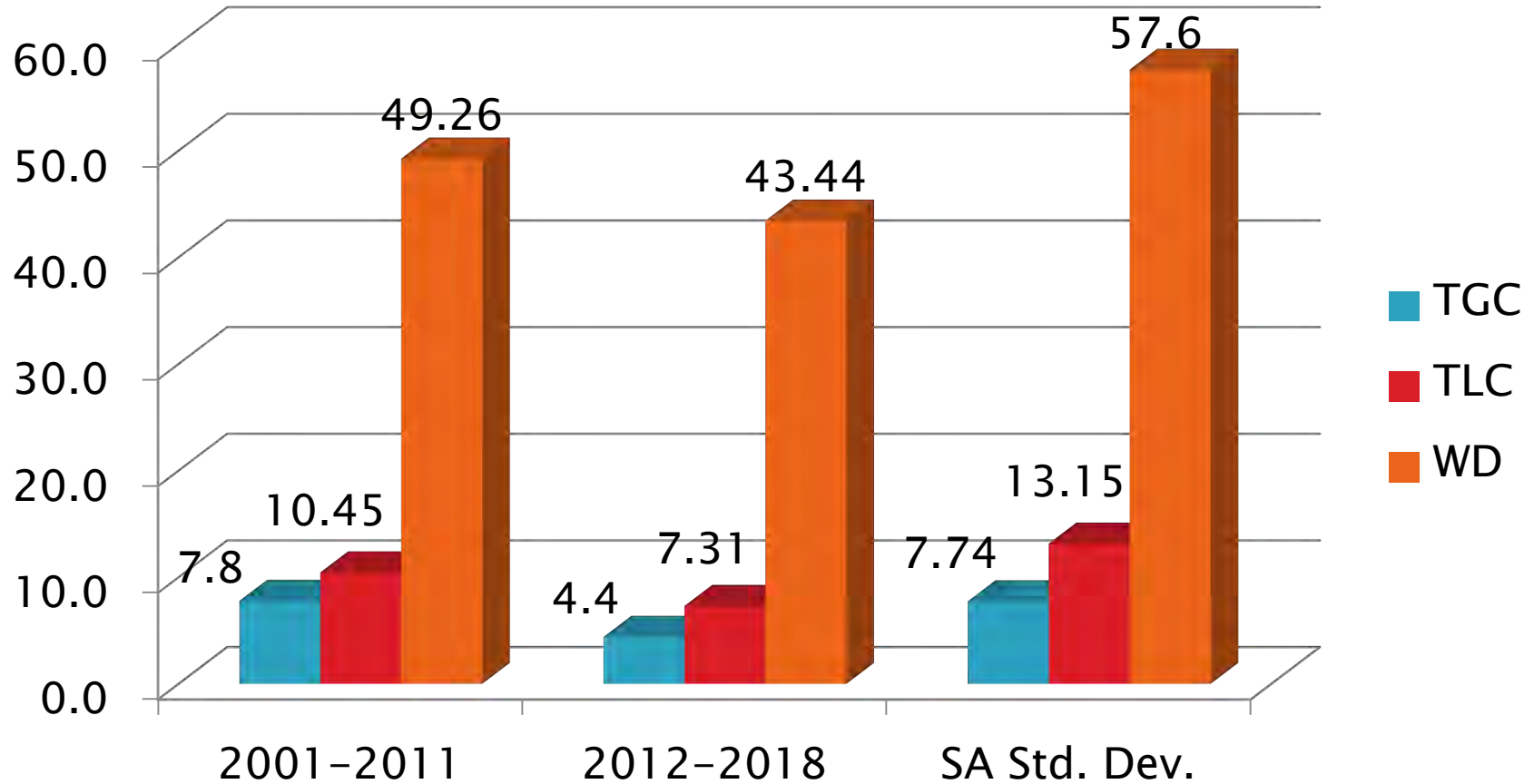


CUSUM Severity Analysis

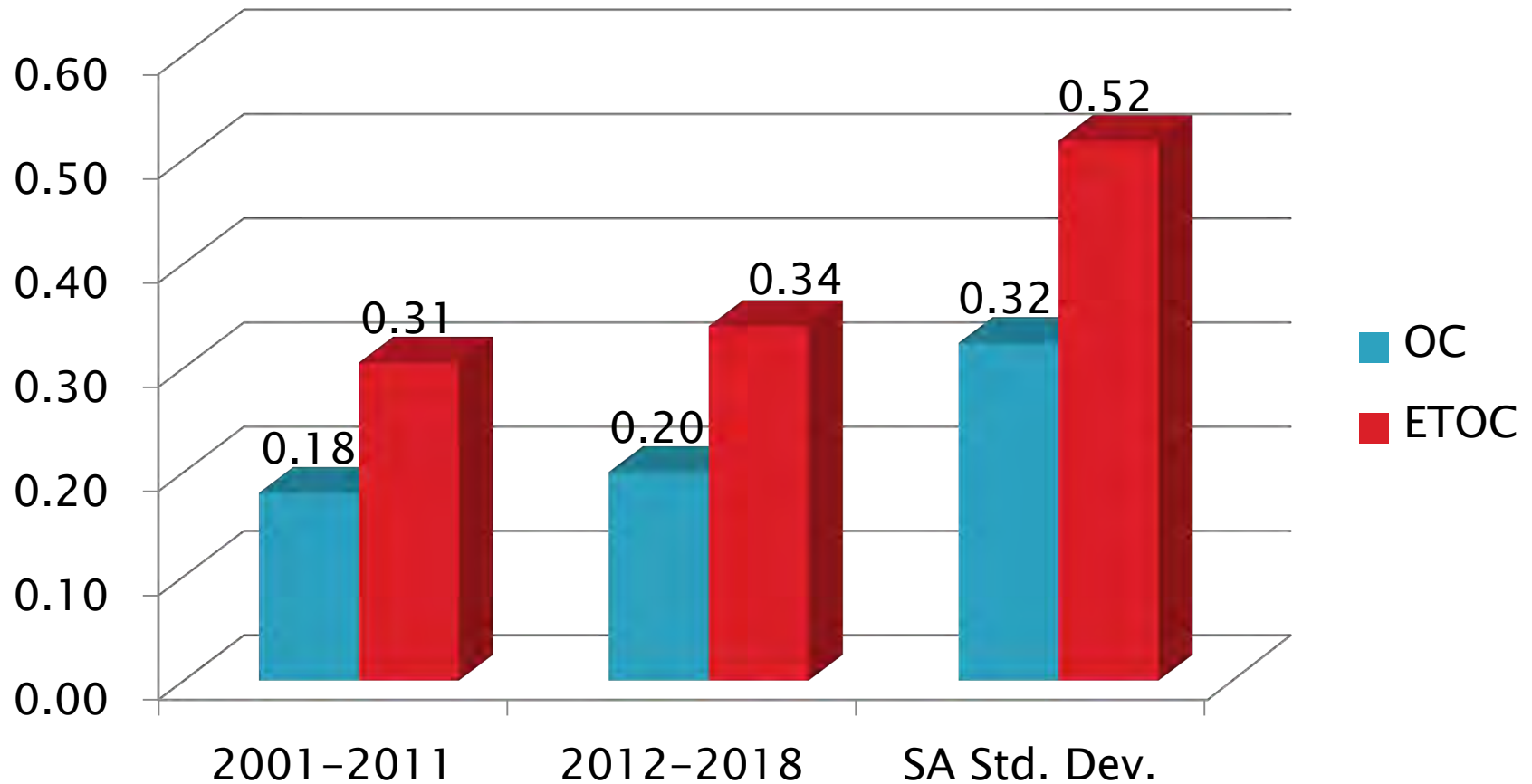


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1P Precision Estimates



1P 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	1
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	1
Total		2

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	Terminated due to loss of oil consumption control	1
Total		1

*Invalid and aborted tests

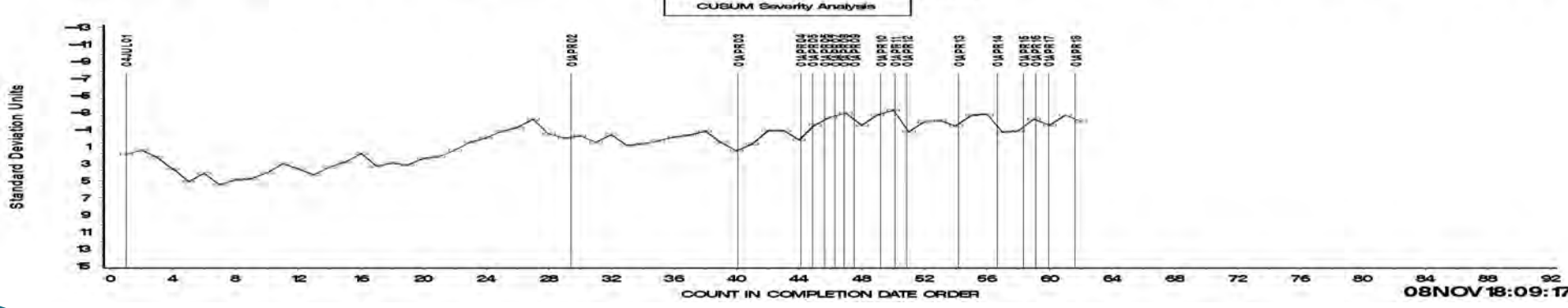
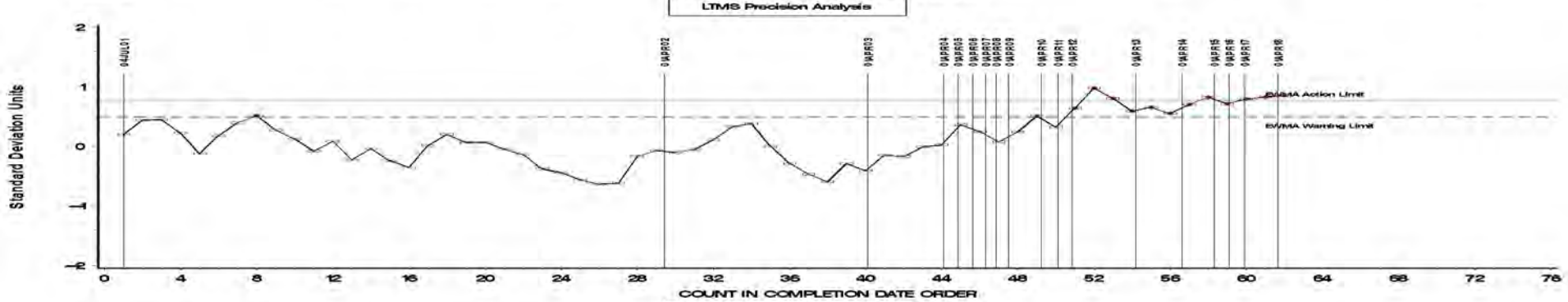
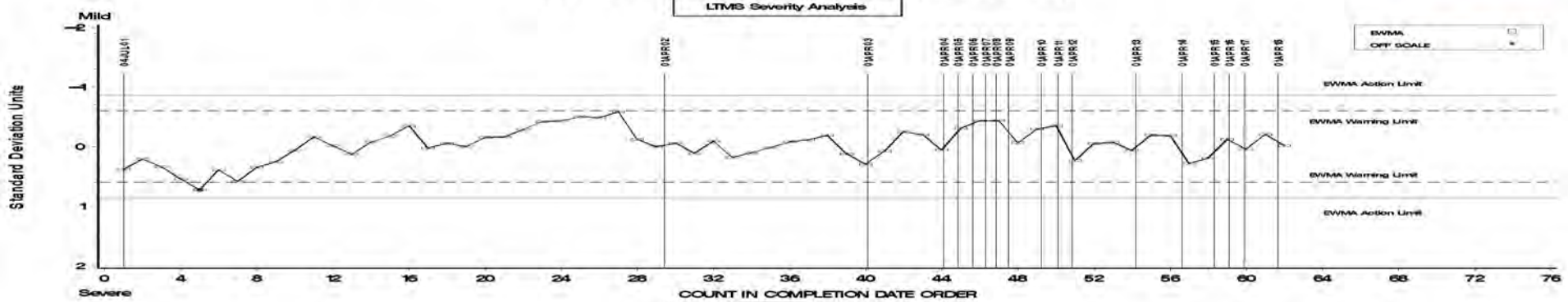
1 R Test Severity

- ▶ WD is in severity and precision action alarm.
- ▶ TGC is in precision action alarm.
- ▶ TLC and BTOC are in severity warning alarm.
- ▶ ETOC is in precision warning alarm.

CATERPILLAR 1R INDUSTRY FACTORY OPERATIONAL VALID DATA



FINAL TOP GROOVE CARBON (DEMERITS)

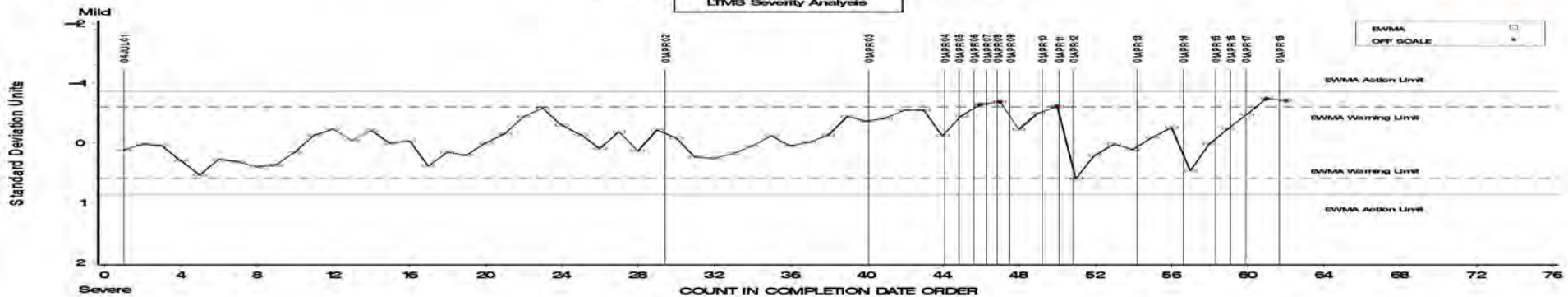


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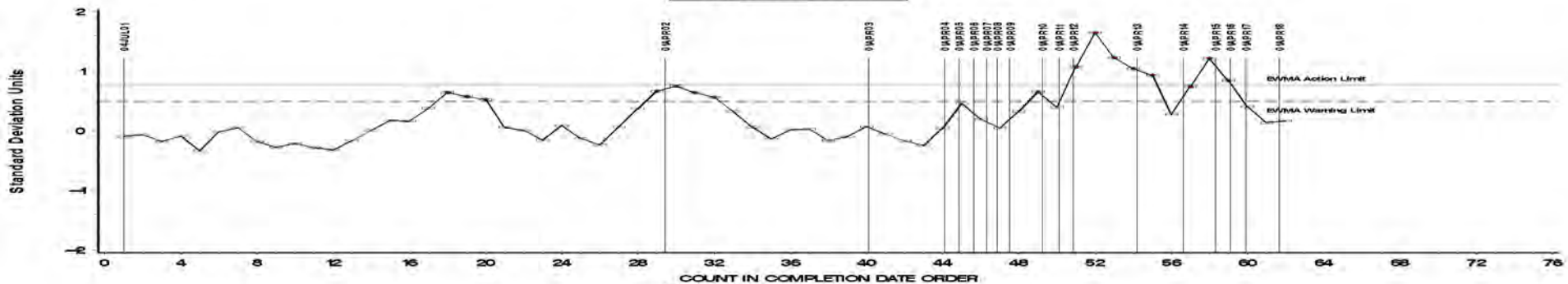


FINAL TOP LAND CARBON (DEMERITS)

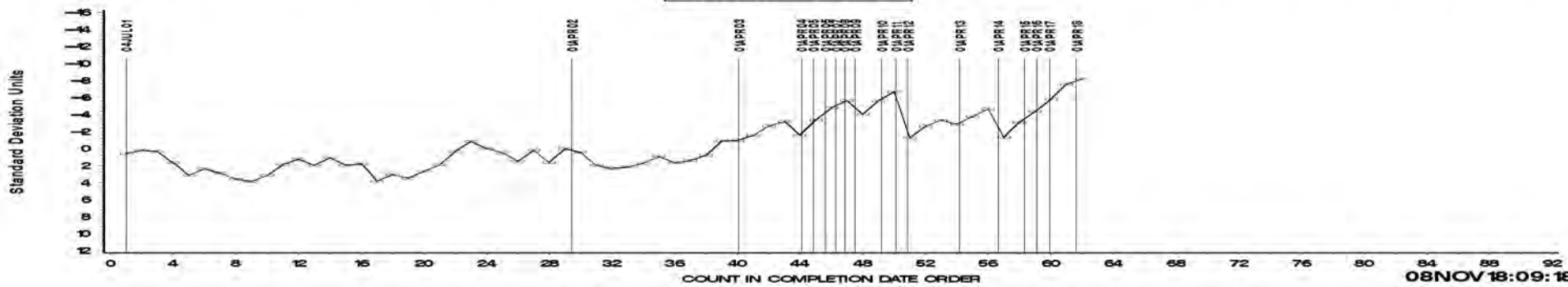
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



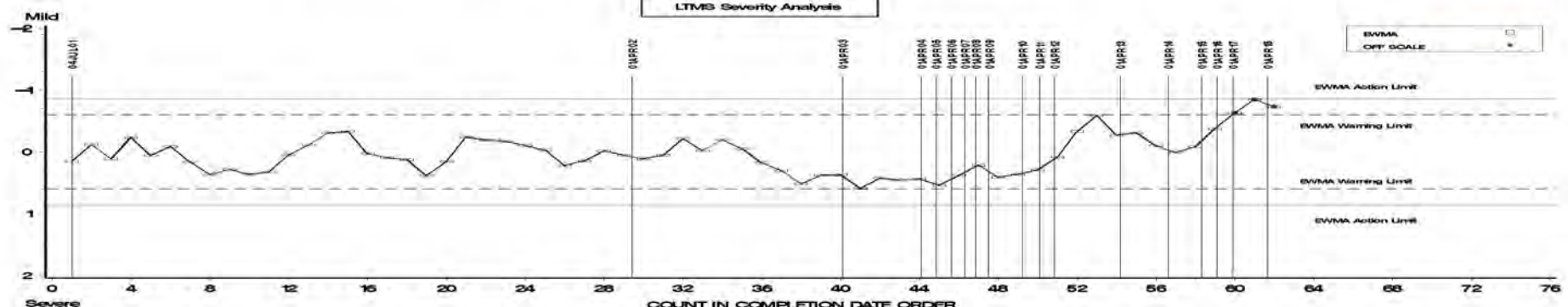
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CATERPILLAR 1R INDUSTRY OPERATIONAL VALID DATA

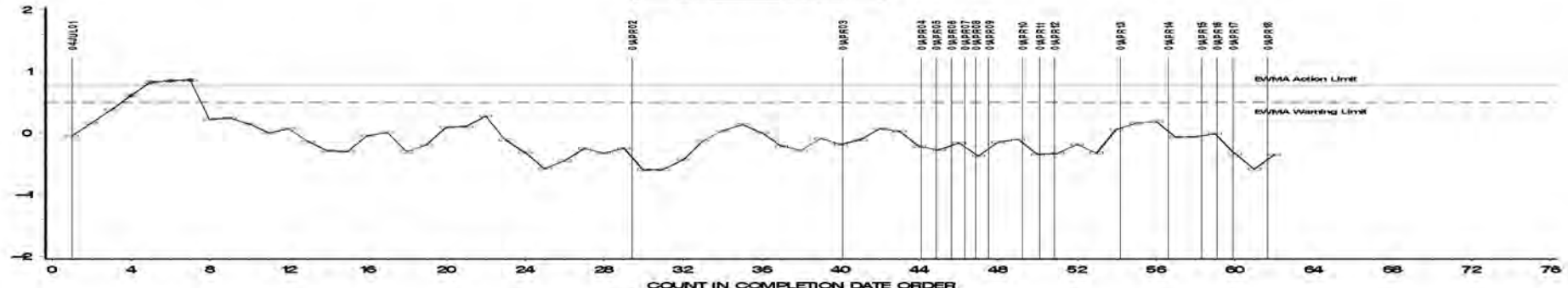


FINAL BOTOC

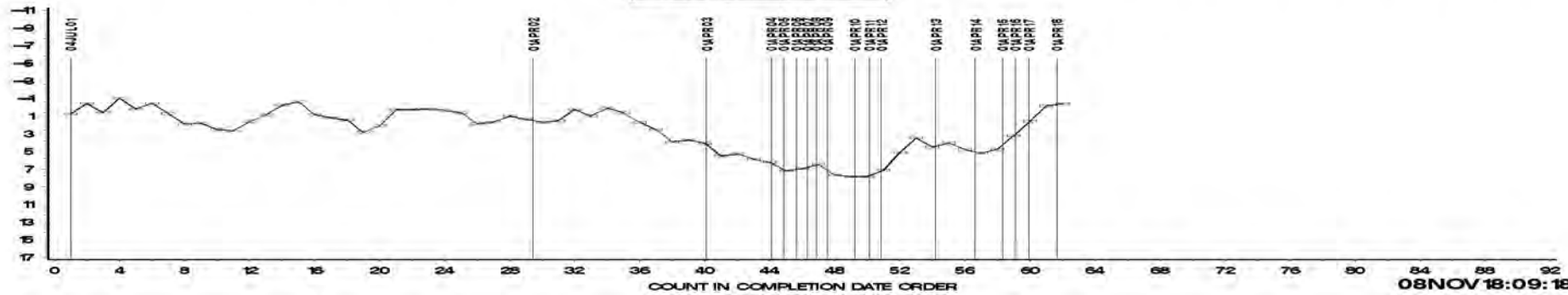
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



08NOV18:09:18

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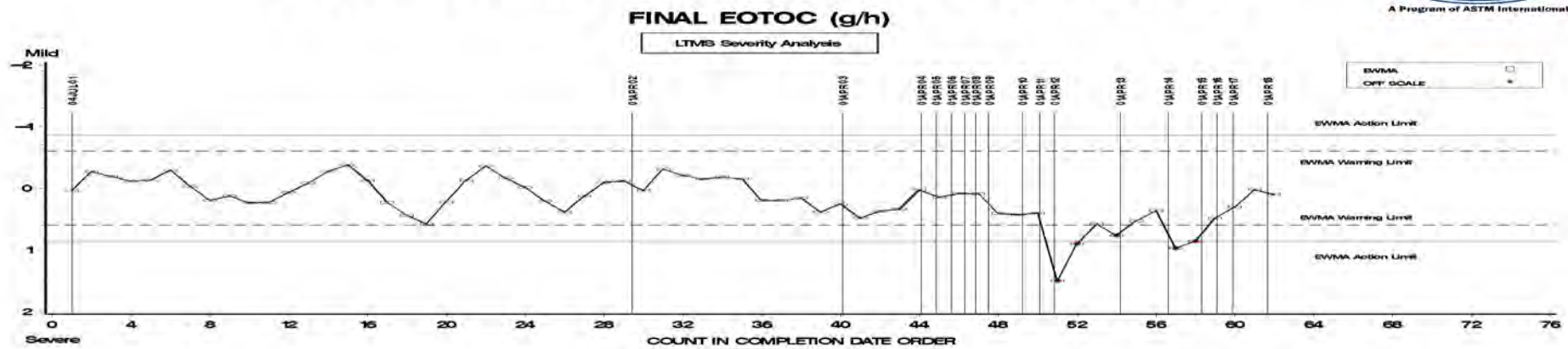


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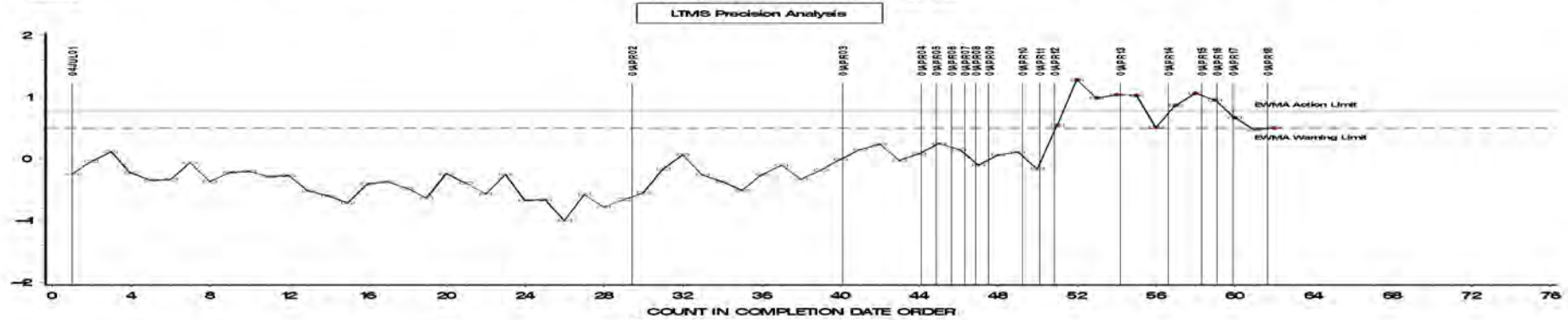
CATERPILLAR 1R INDUSTRY OPERATIONALLY VALID DATA



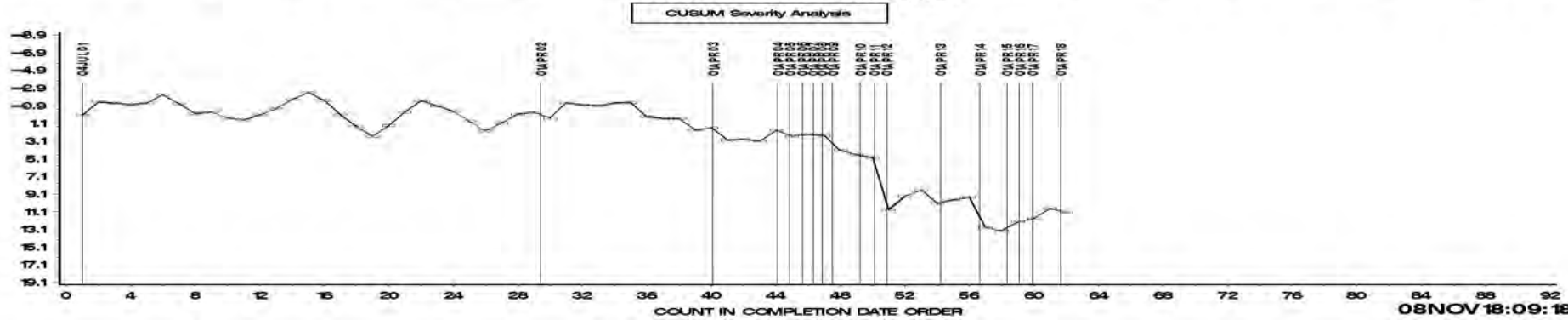
Standard Deviation Units



Standard Deviation Units



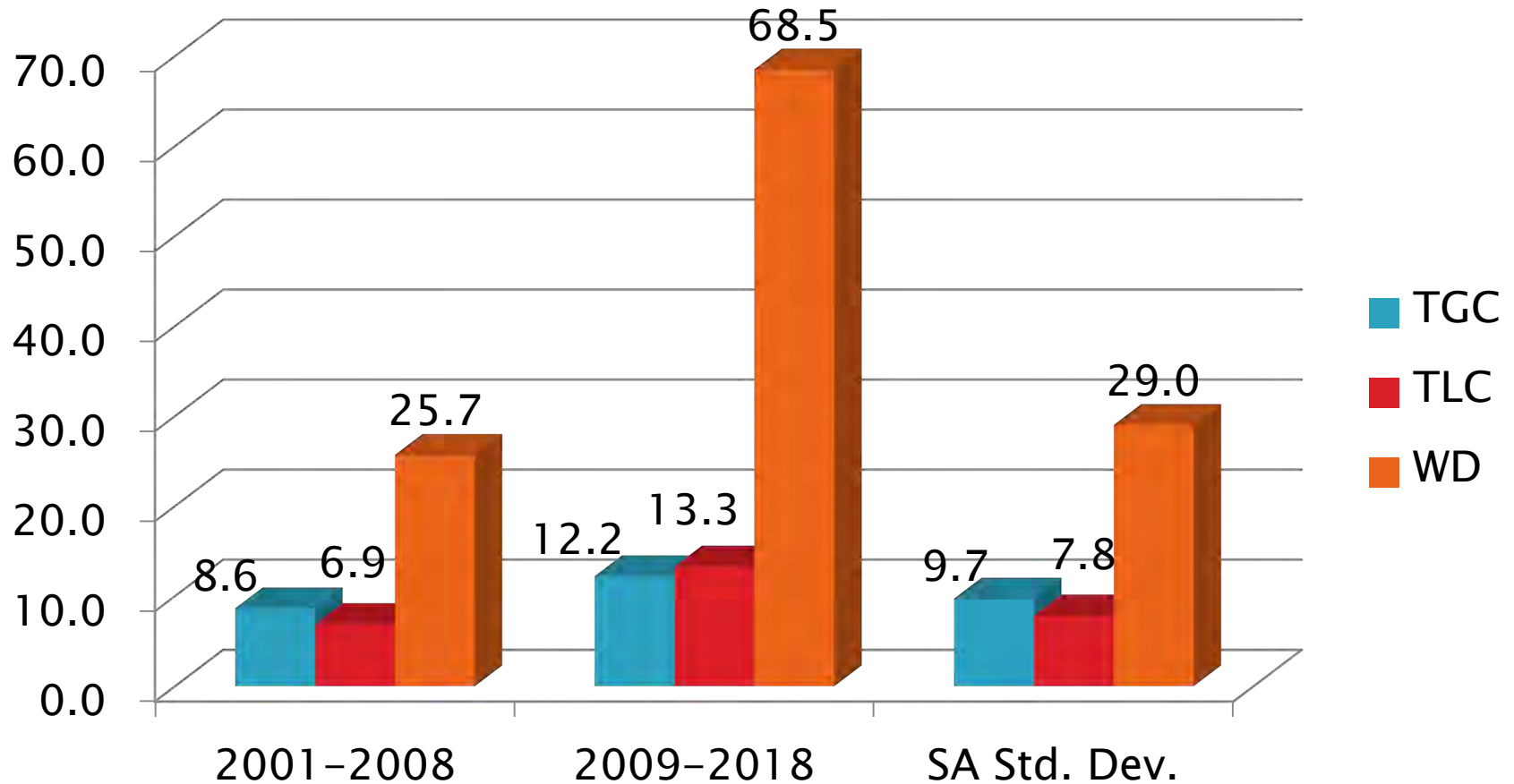
Standard Deviation Units



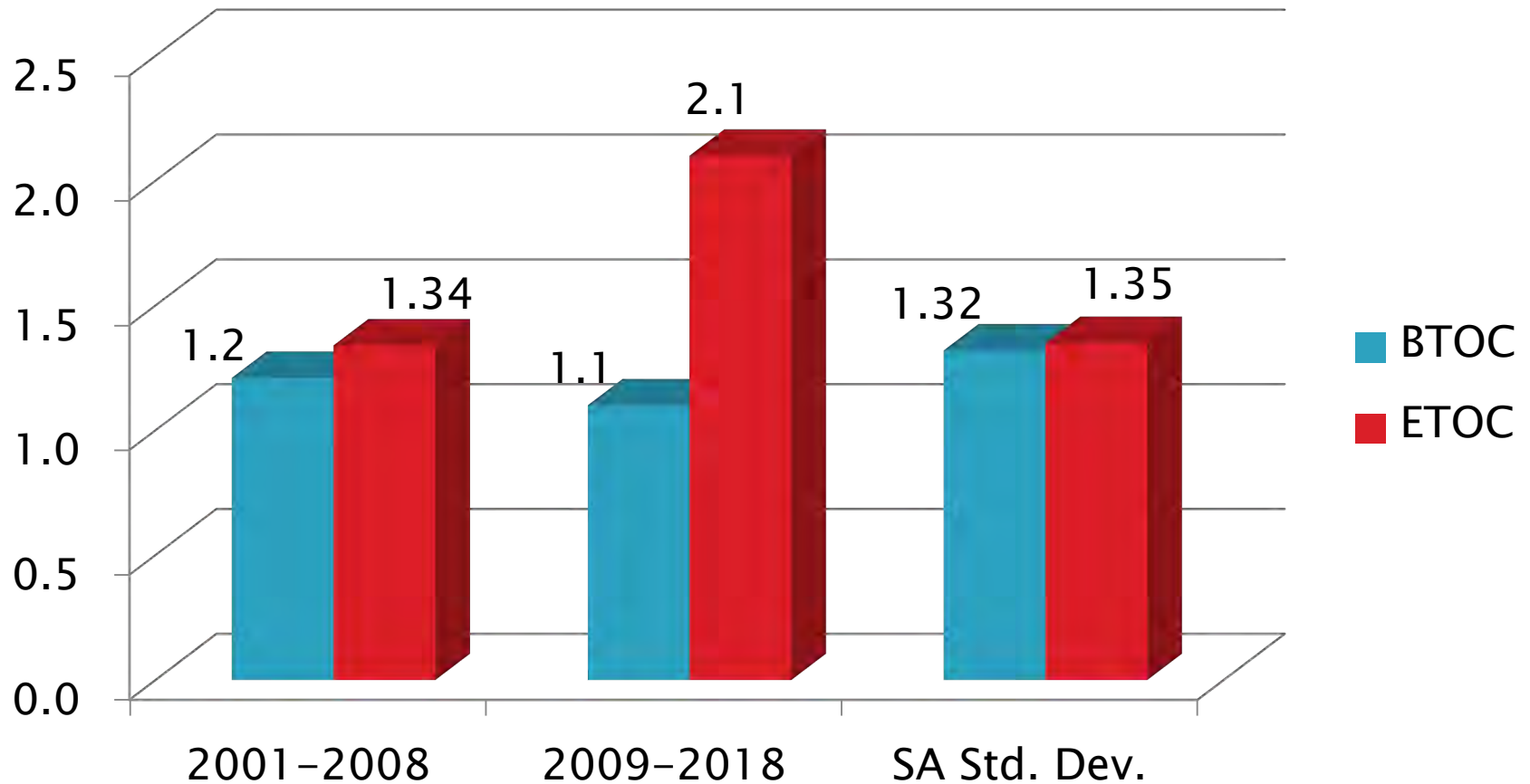
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1R Precision Estimates



1 R Precision Estimates



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CAT C13

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C13 Test Activity

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

C13 Failed Tests

Failed Parameter	Number of Tests
No Failed Tests	0
Total	0

C13 Lost Tests*

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

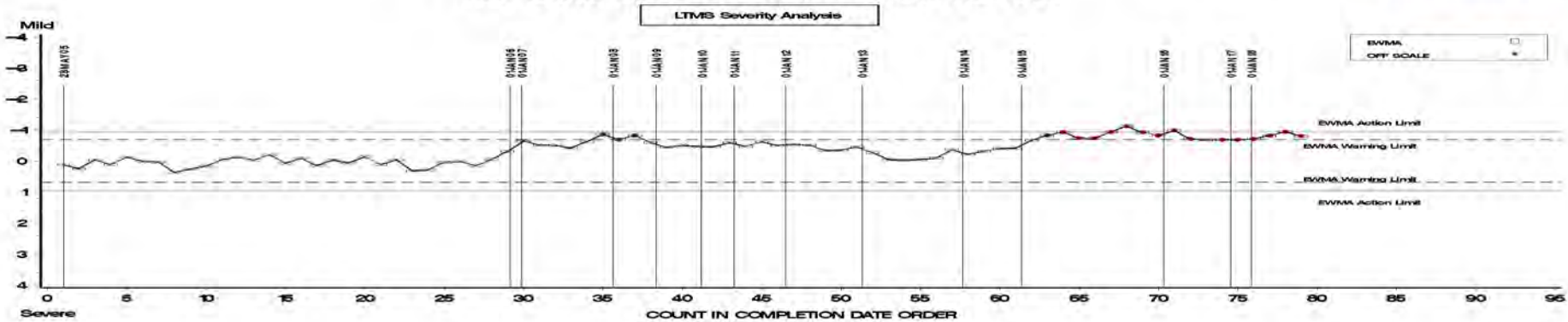
*Invalid and aborted tests

C13 Test Severity

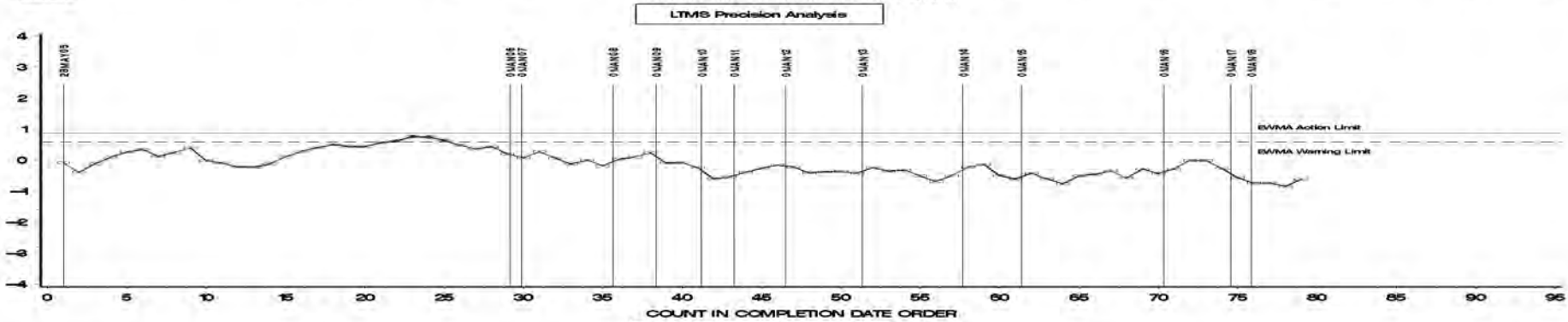
- ▶ R2TC and OC are in control
- ▶ TLC in severity warning alarm in the mild direction
- ▶ TGC in precision warning alarm

TOP LAND CARBON AVG. — FINAL RESULT

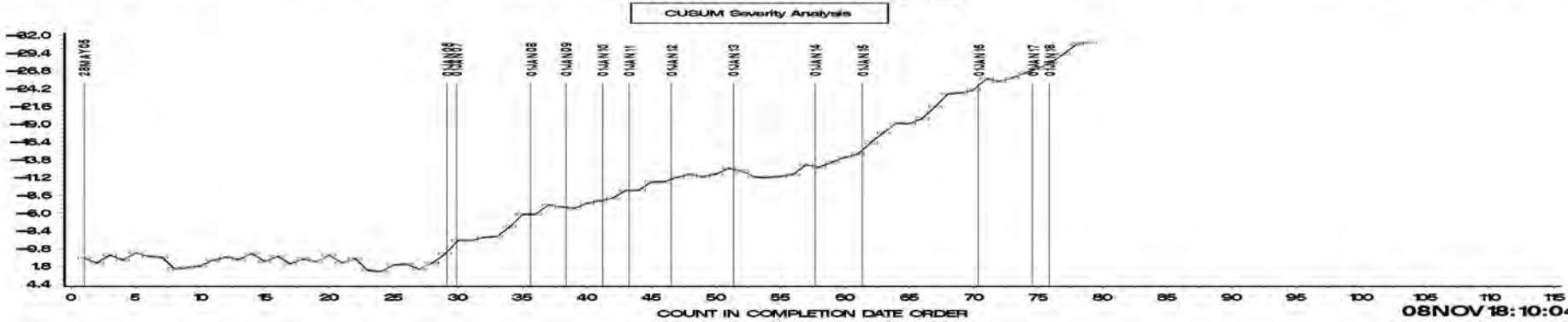
Standard Deviation Units



Standard Deviation Units



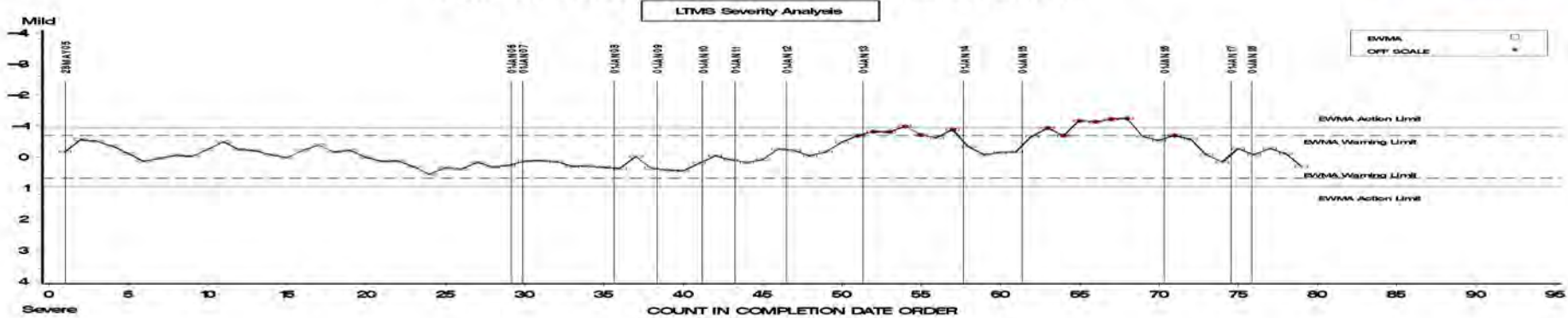
Standard Deviation Units



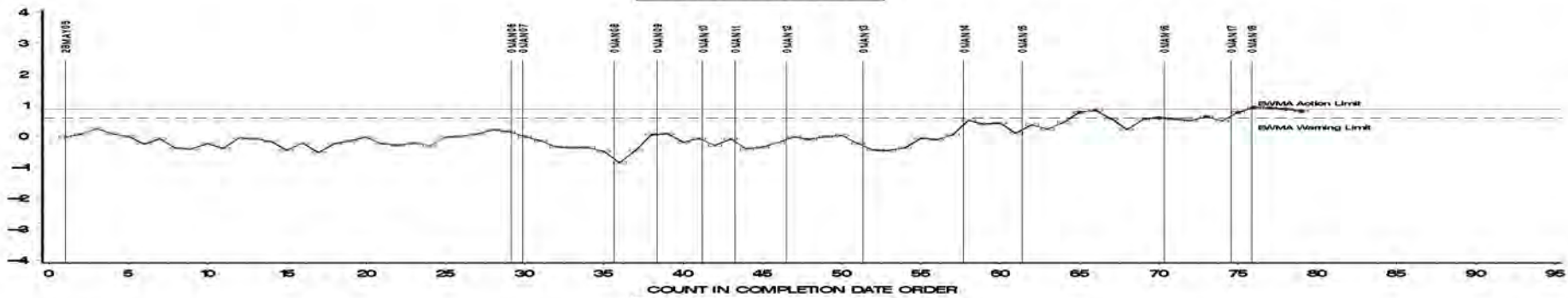
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TOP GROOVE CARBON AVG — FINAL RESULT

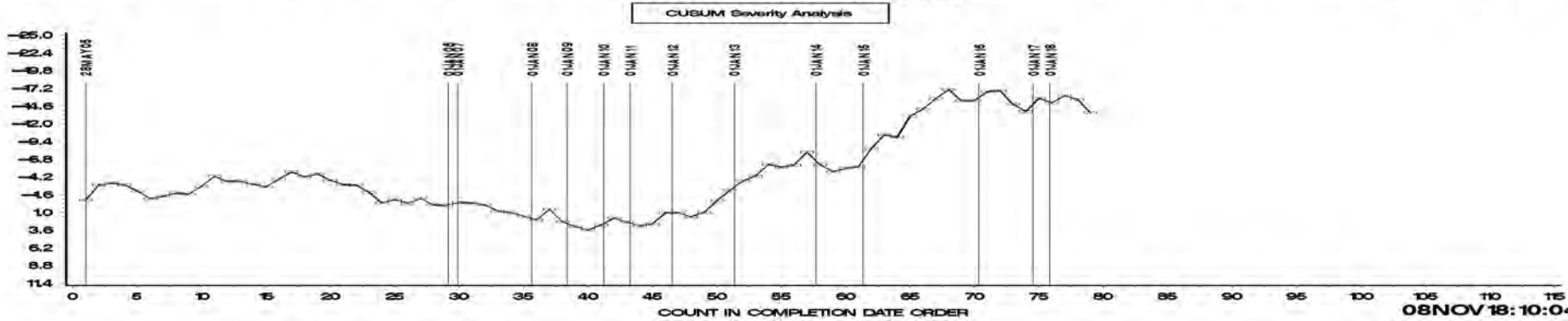
Standard Deviation Units



Standard Deviation Units



Standard Deviation Units

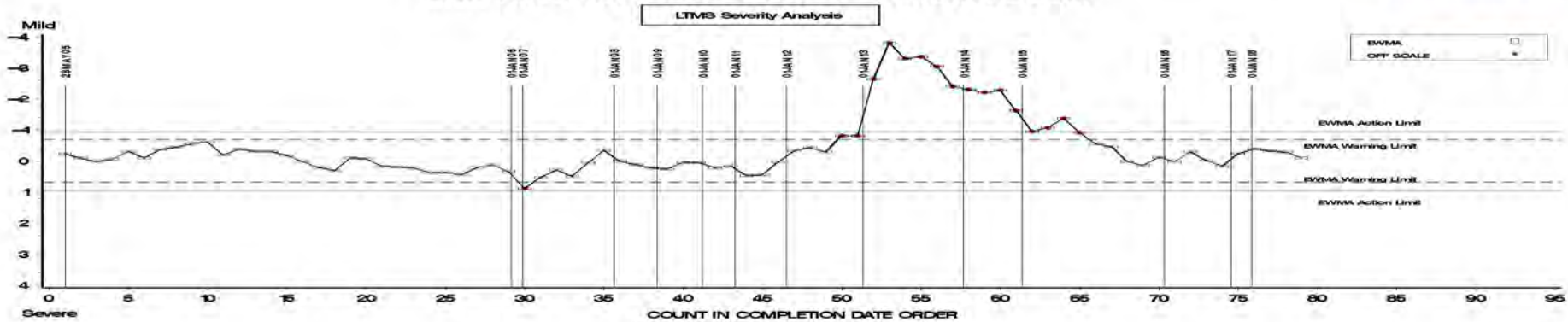


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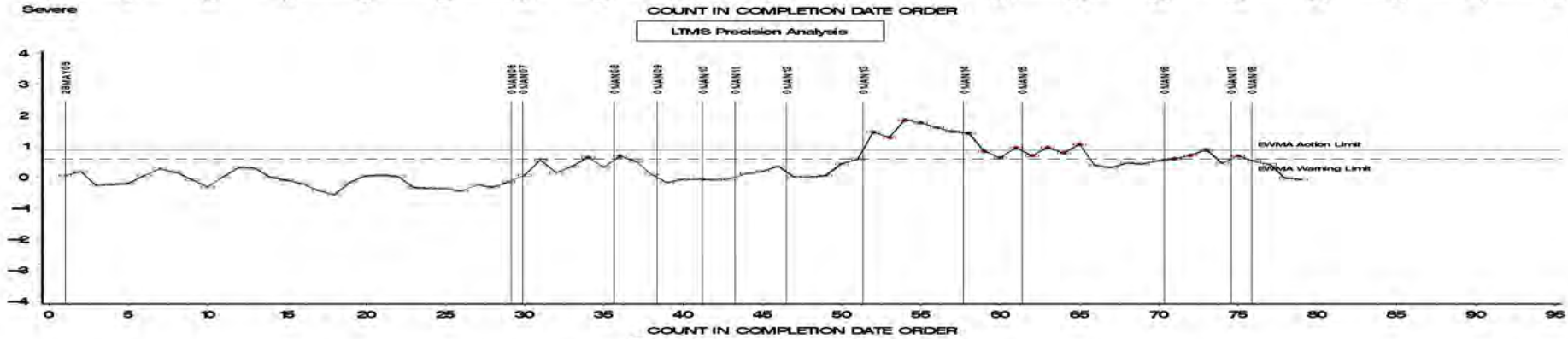
C13 INDUSTRY OPERATIONAL VALID DATA

2ND RING TOP CARBON AVG. — FINAL RESULT

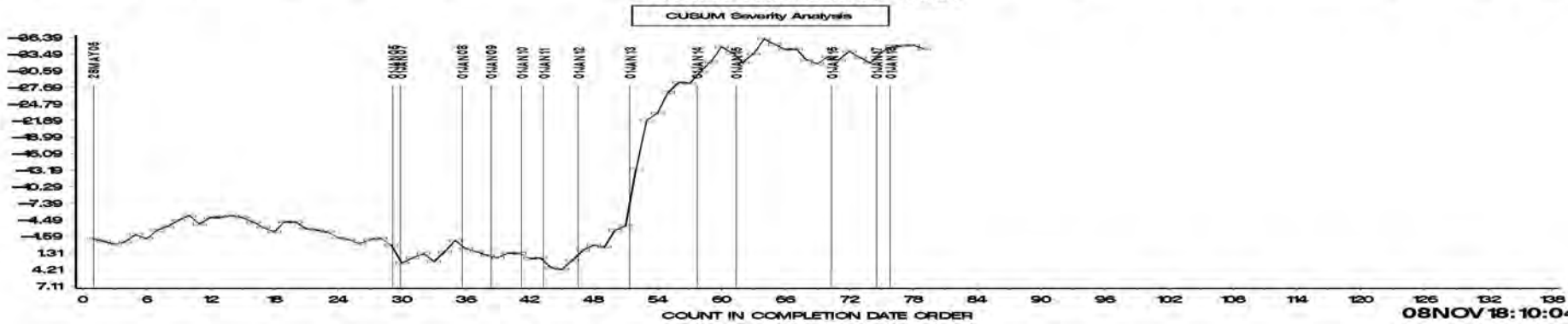
Standard Deviation Units



Standard Deviation Units



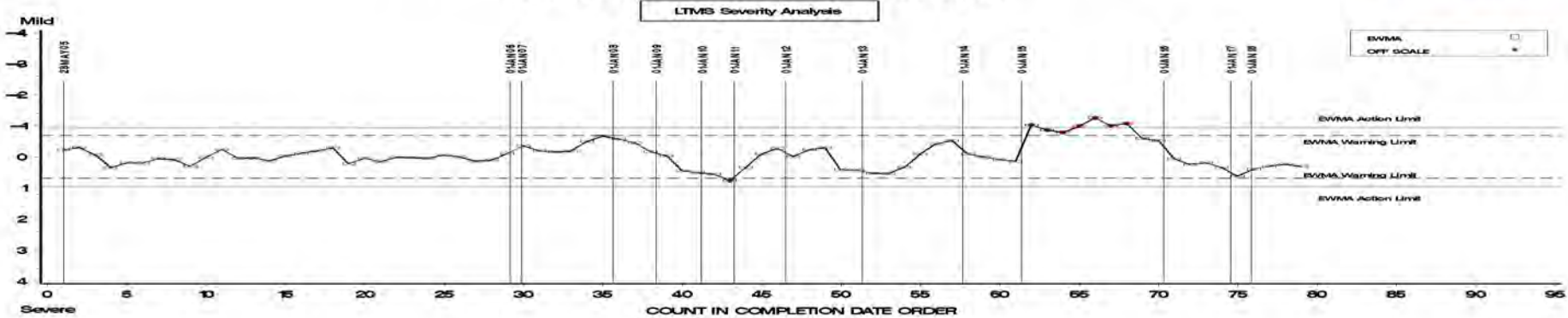
Standard Deviation Units



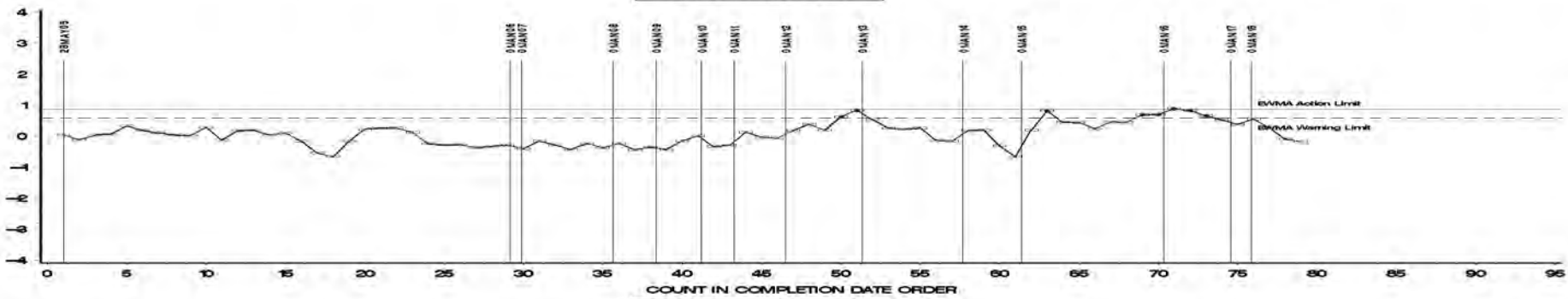
08NOV18:10:04

OIL CONS. DELTA — FINAL RESULT

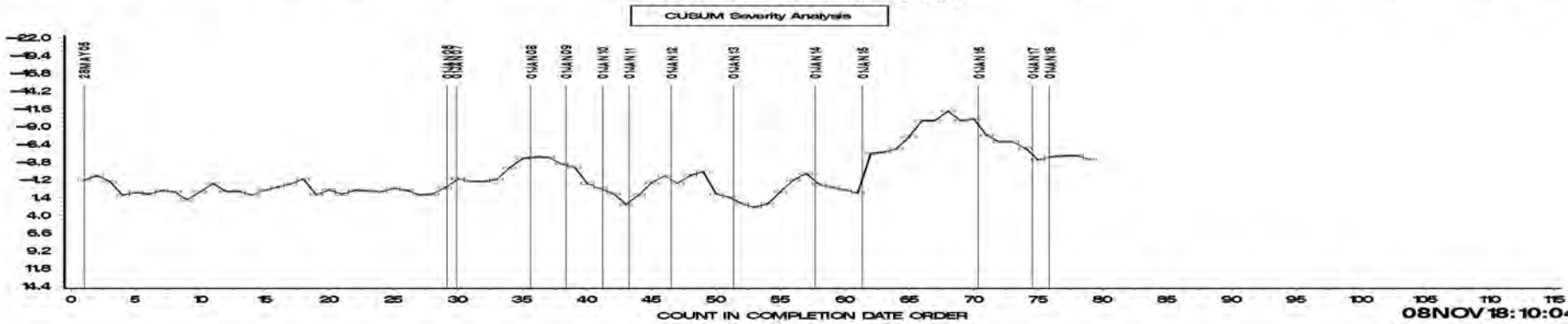
Standard Deviation Units



Standard Deviation Units

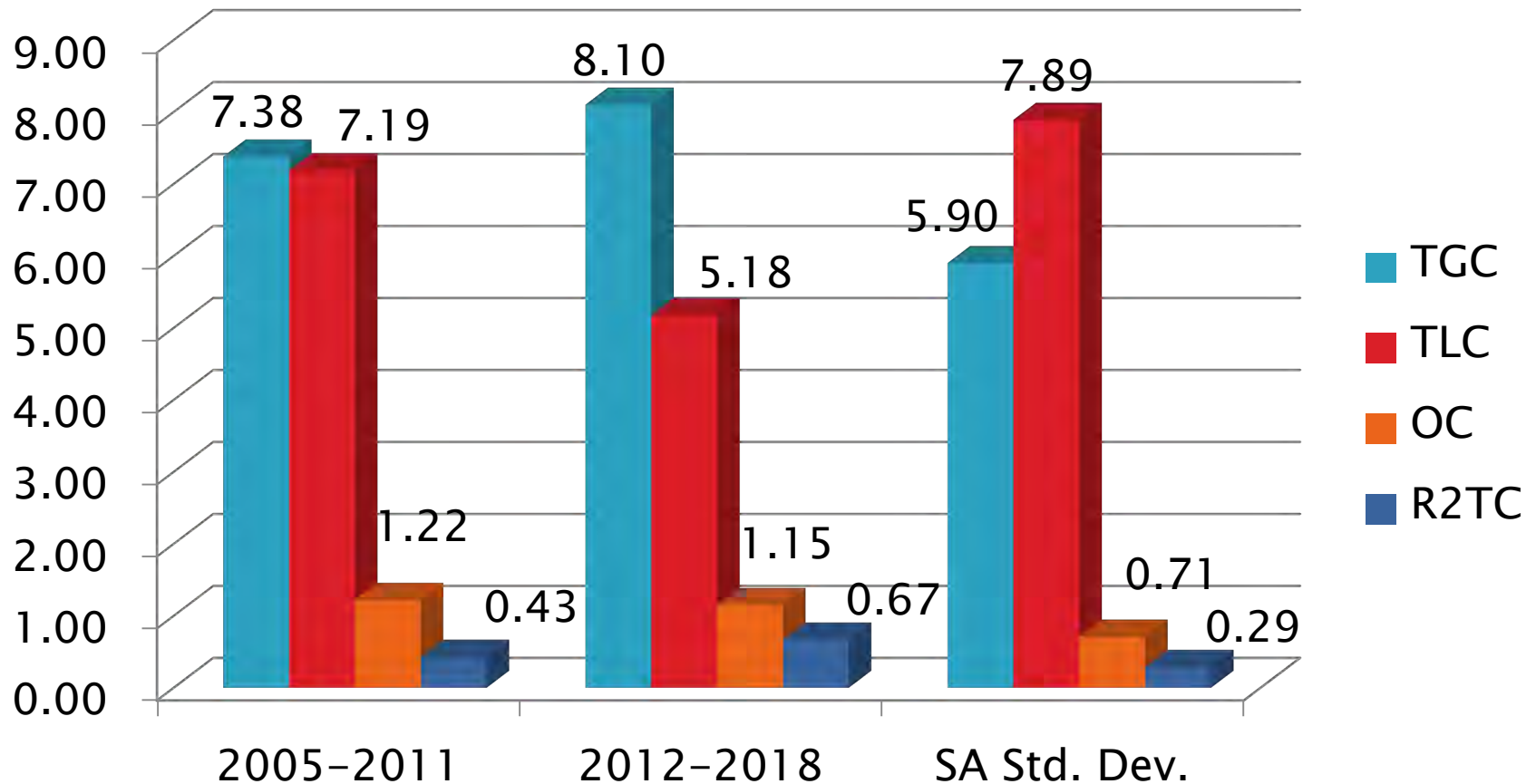


Standard Deviation Units



08NOV18:10:04

C13 Precision Estimates



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Test Monitoring Center

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C13 Oil Aeration (COAT)

»» October 2018

Test Monitoring Center

<http://astmtmc.cmu.edu>



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COAT Test Activity

Test Status	Validity Code	COAT
Acceptable Calibration Test	AC	0
Failed Calibration Test	OC	0
Operationally Invalid	LC	0
Aborted	XC	0
Informational Run	NN	12
Total		12

COAT Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

COAT Lost Tests*

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

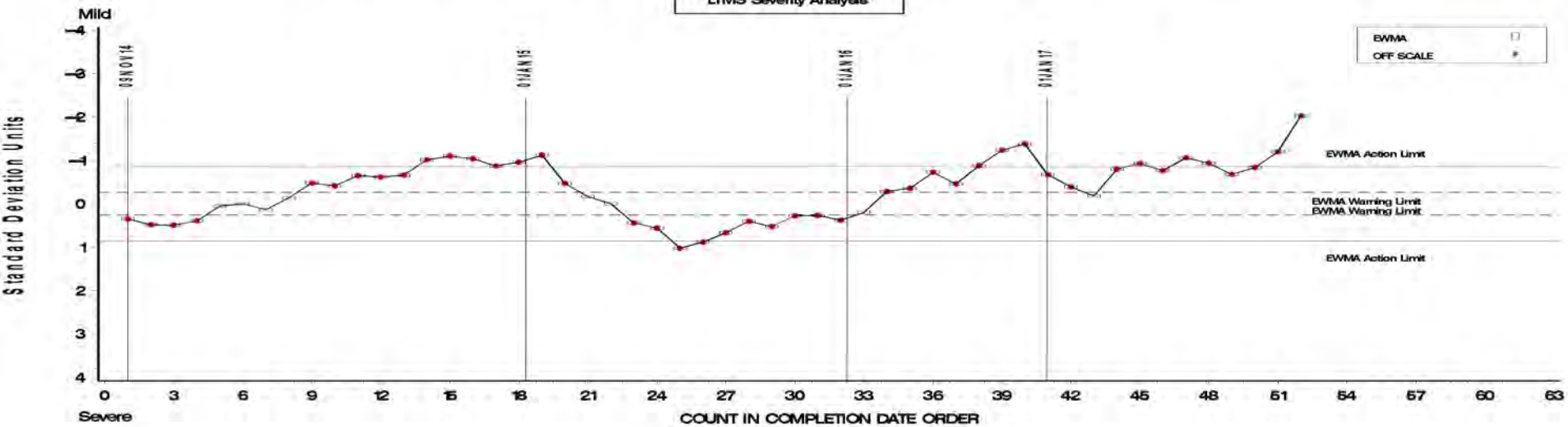
*Invalid and aborted tests

COAT Test Severity

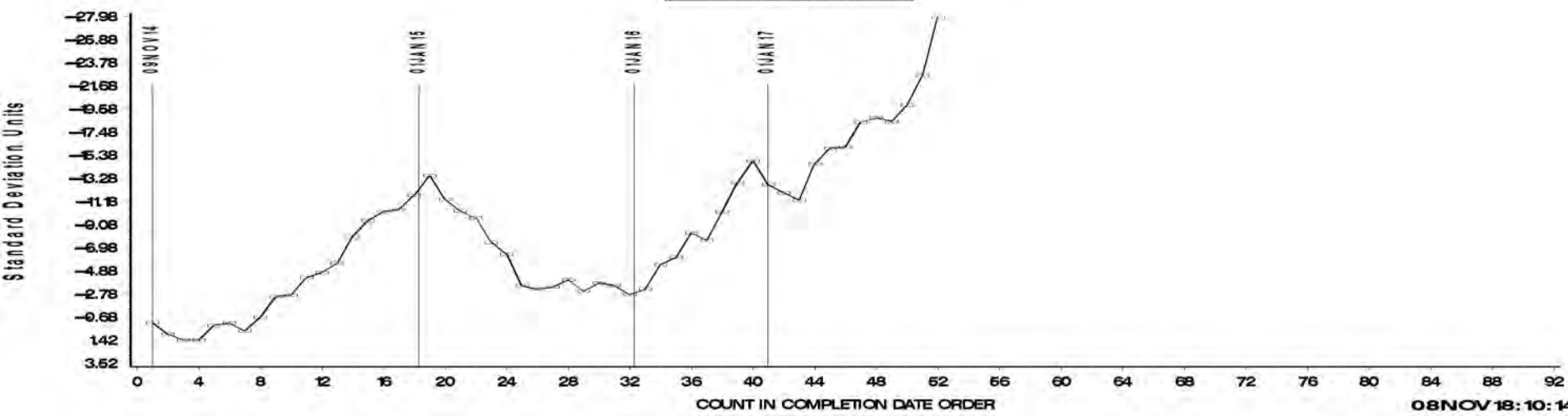
- ▶ As no chartable COAT tests were run during this period no statement about test severity can not be made.
- ▶ Testing matrix in progress to evaluate test procedure improvements.

FINAL AVERAGE OIL AERATION OVER TEST HOURS 40-50

LTMS Severity Analysis



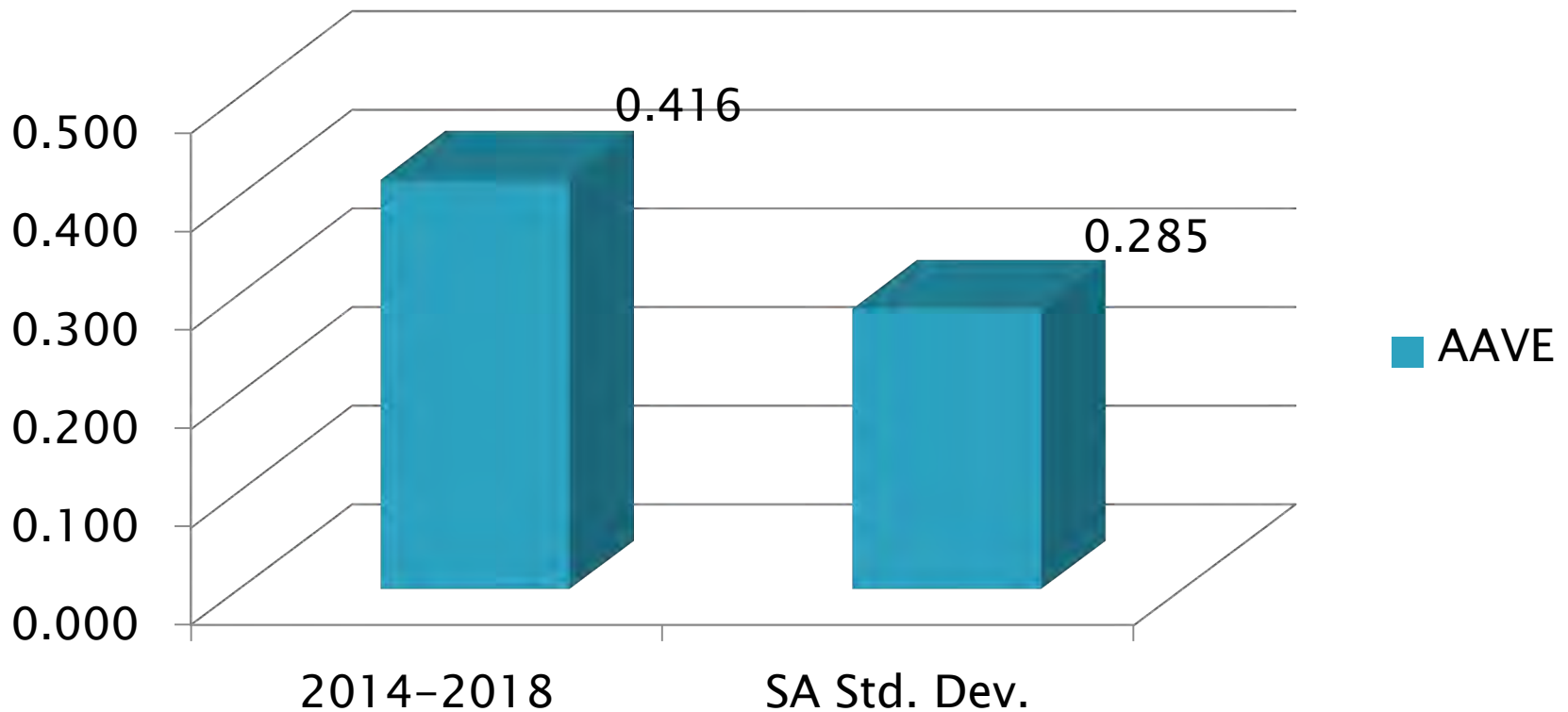
CUSUM Severity Analysis



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COAT Precision Estimates

AAVE



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Daimler DD13 Scuffing Test

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Test Monitoring Center

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DD13 Test Activity

Test Status	Validity Code	COAT
Acceptable Calibration Test	AC	3
Failed Calibration Test	OC	1
Operationally Invalid	LC	0
Aborted	XC	0
Industry donated Test	AG	2
Total		6

DD13 Failed Tests

Failed Parameter	Number of Tests
Hours to scuff severe	1
Total	1

DD13 Lost Tests*

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

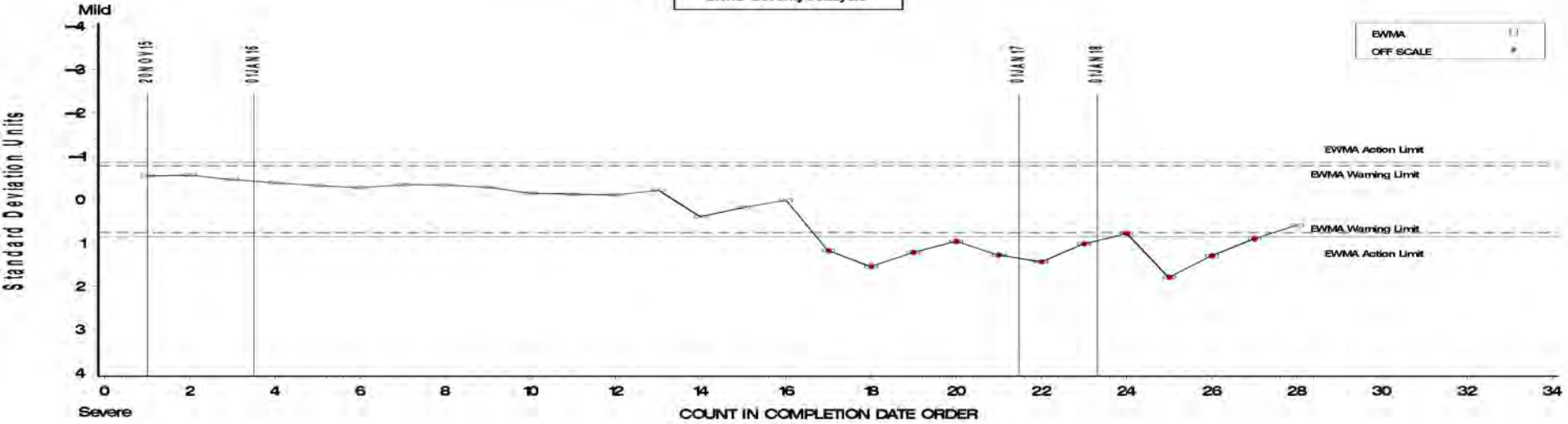
*Invalid and aborted tests

DD13 Test Severity

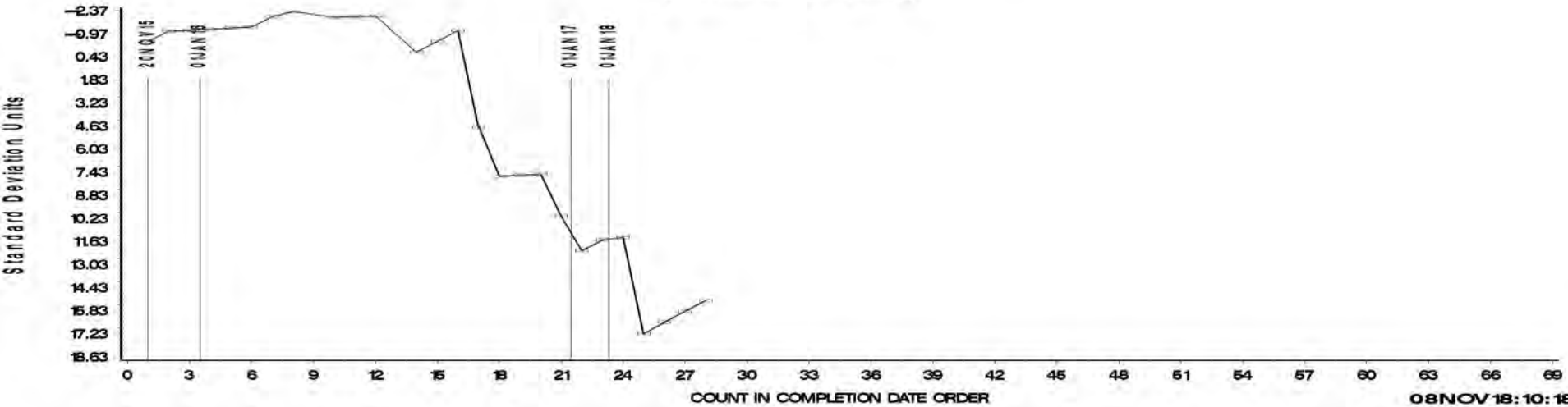
- ▶ HRS2 is in control

FNL. ORIG. UNIT HOURS TO SCUFF

LTMS Severity Analysis



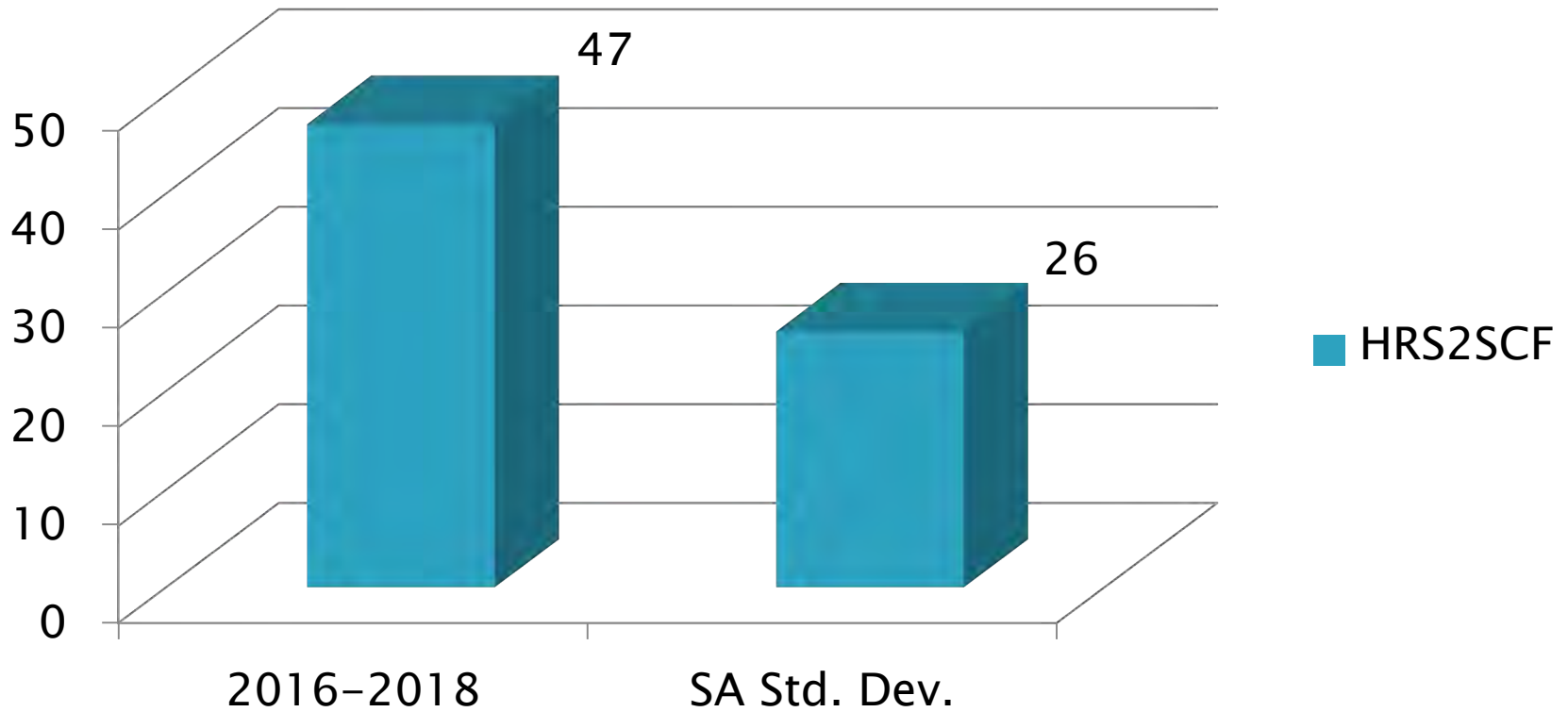
CUSUM Severity Analysis



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DD13 Precision Estimates

HRS2SCF



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Cummins ISB

»» October 2018

Test Monitoring Center

<http://astmtmc.cmu.edu>



A Program of ASTM International

ISB 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

ISB Failed Tests

Failed Parameter	Number of Tests
No Failed Tests	0
Total	0

ISB Lost Tests*

Status	Cause	#
Invalid	No Invalid Tests	0
Aborted	No Aborted Tests	0
Total		0

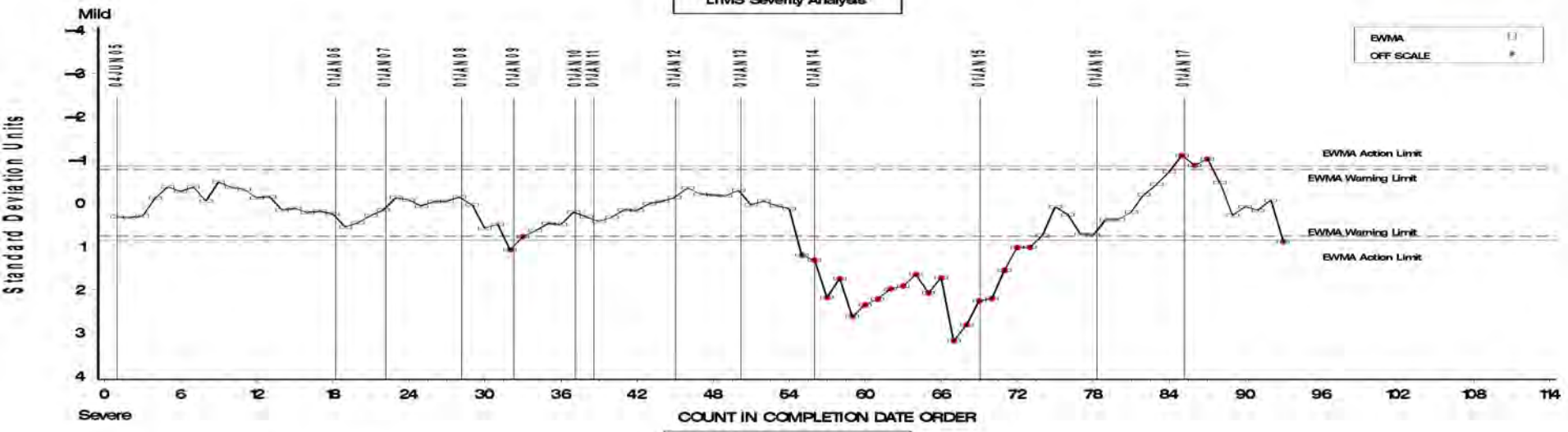
*Invalid and aborted tests

ISB Test Severity

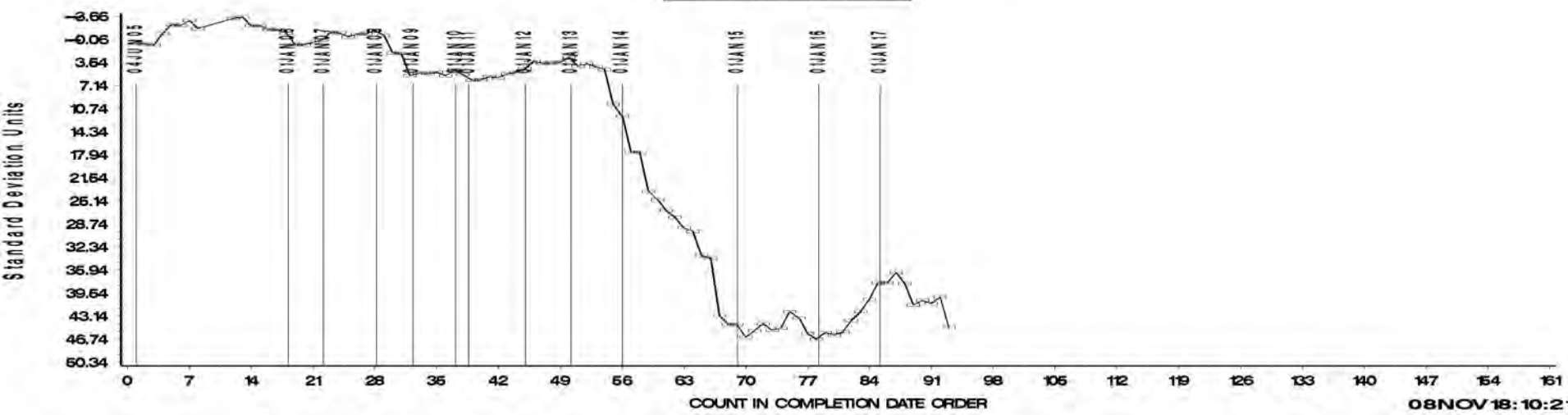
- ▶ As no ISB tests were run during this period no statement about test severity can be made.

AVERAGE CAMSHAFT WEAR

LTMS Severity Analysis

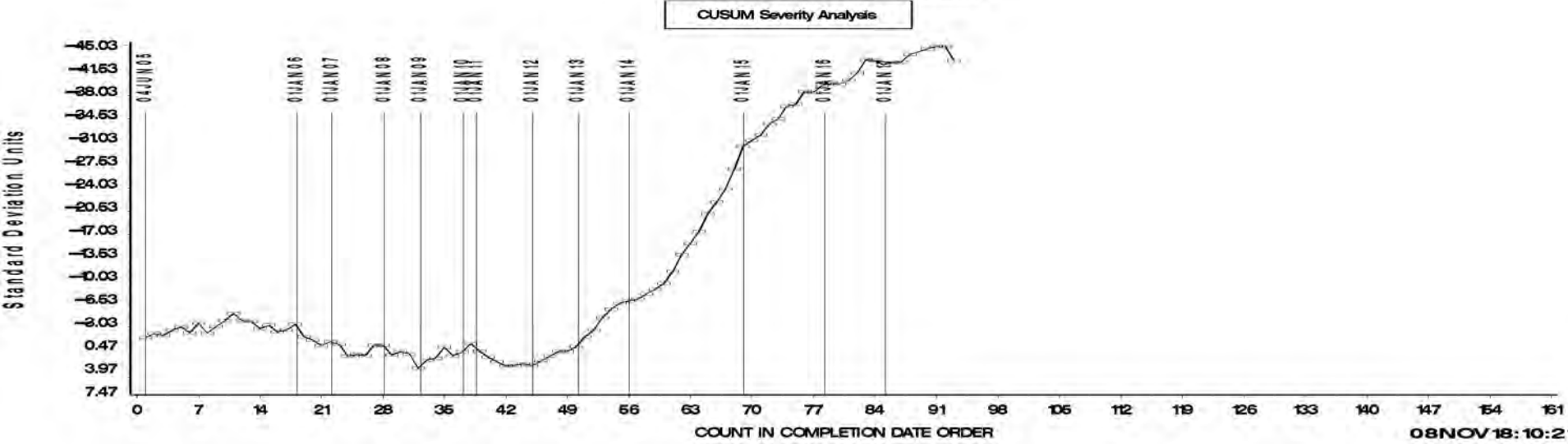
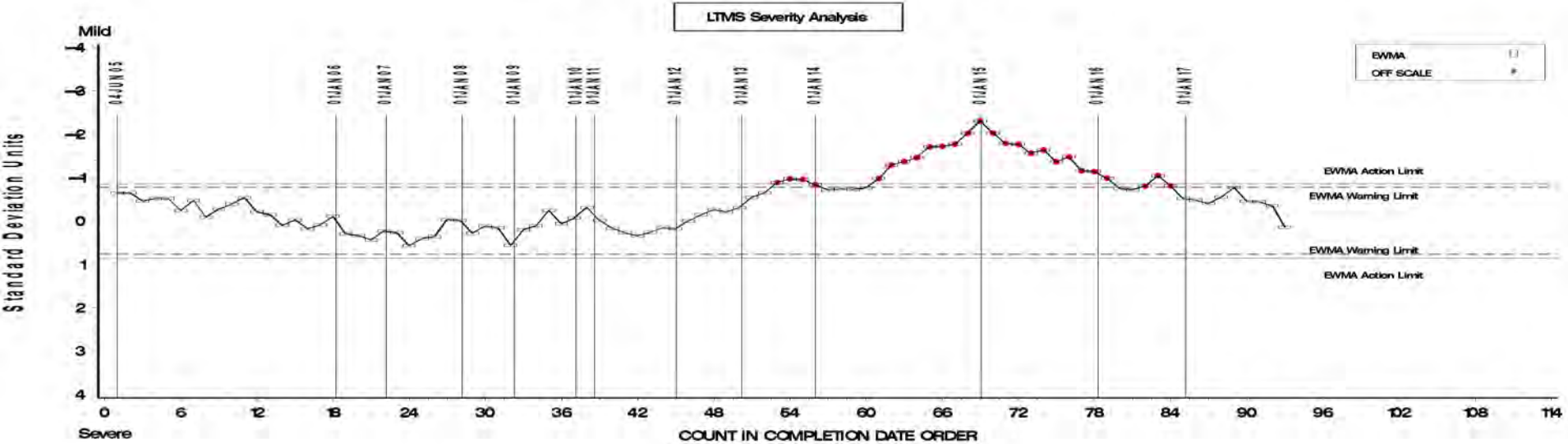


CUSUM Severity Analysis



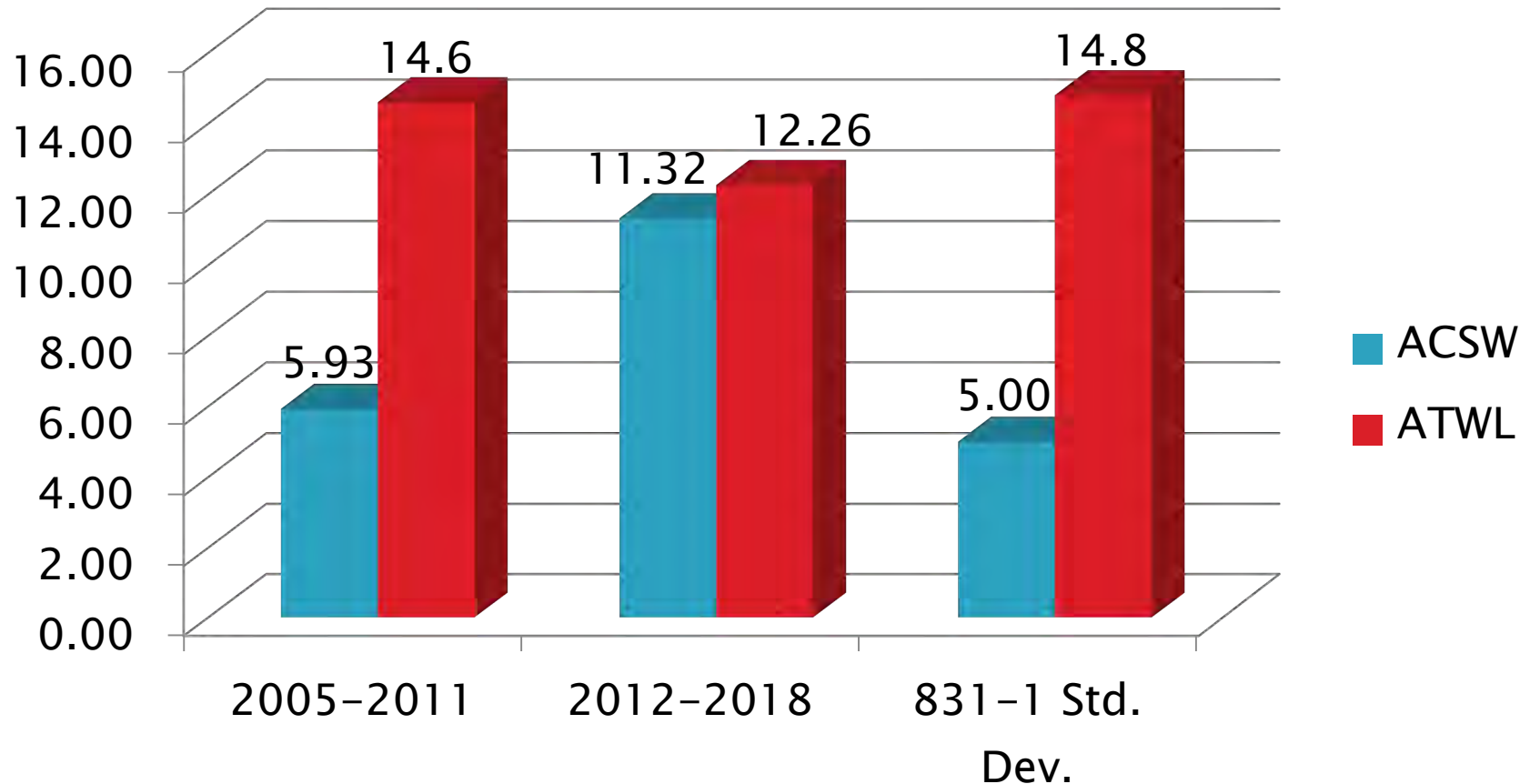
08NOV18:10:21

AVERAGE TAPPET WEIGHT LOSS



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ISB Precision Estimates



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Cummins ISM

»» October 2018

Test Monitoring Center

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ISM 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

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

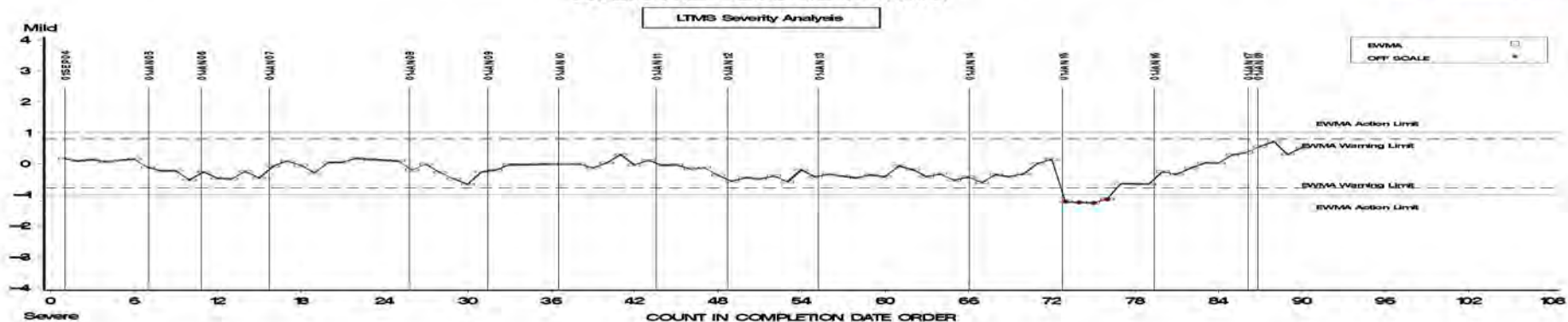
*Invalid and aborted tests

ISM Test Severity

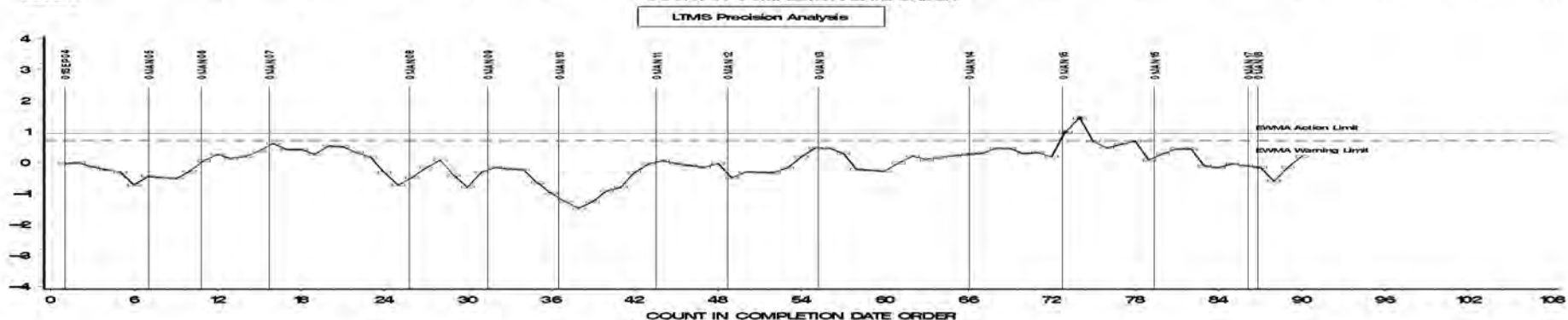
- ▶ FPD in severity warning alarm in the mild direction
- ▶ IAS, CWL and ASR are in control

AVERAGE SLUDGE RATING

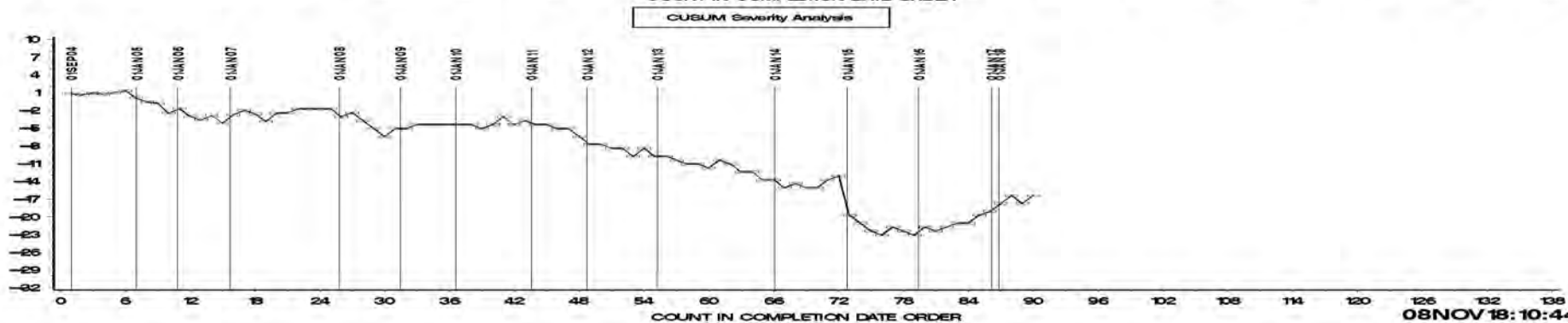
Standard Deviation Units



Standard Deviation Units



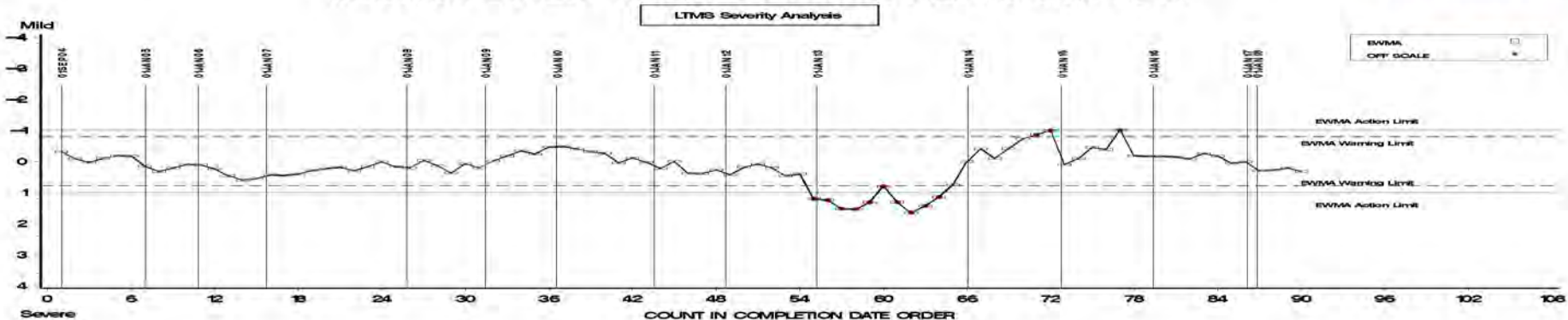
Standard Deviation Units



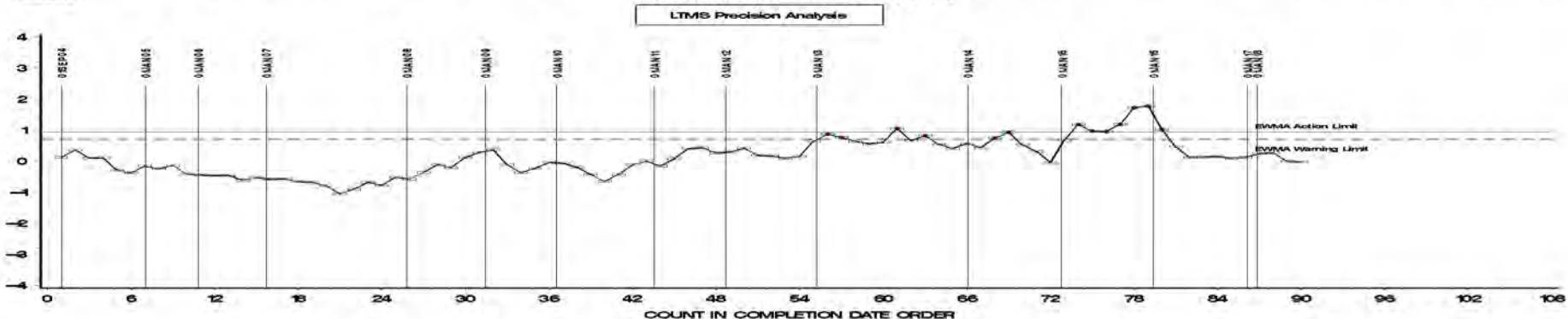
08NOV18:10:44

INJECTOR SCREW WEIGHT LOSS ADJUSTED TO 3.9% SOOT

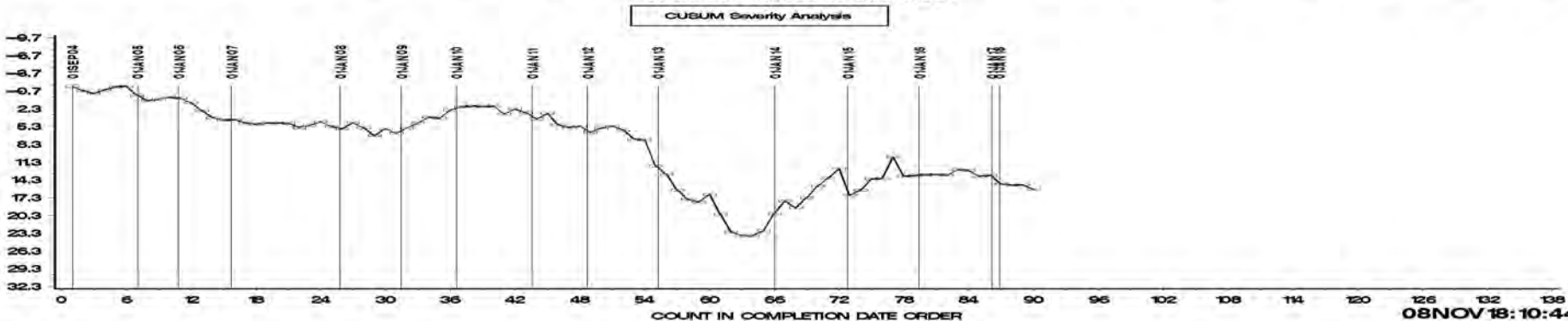
Standard Deviation Units



Standard Deviation Units

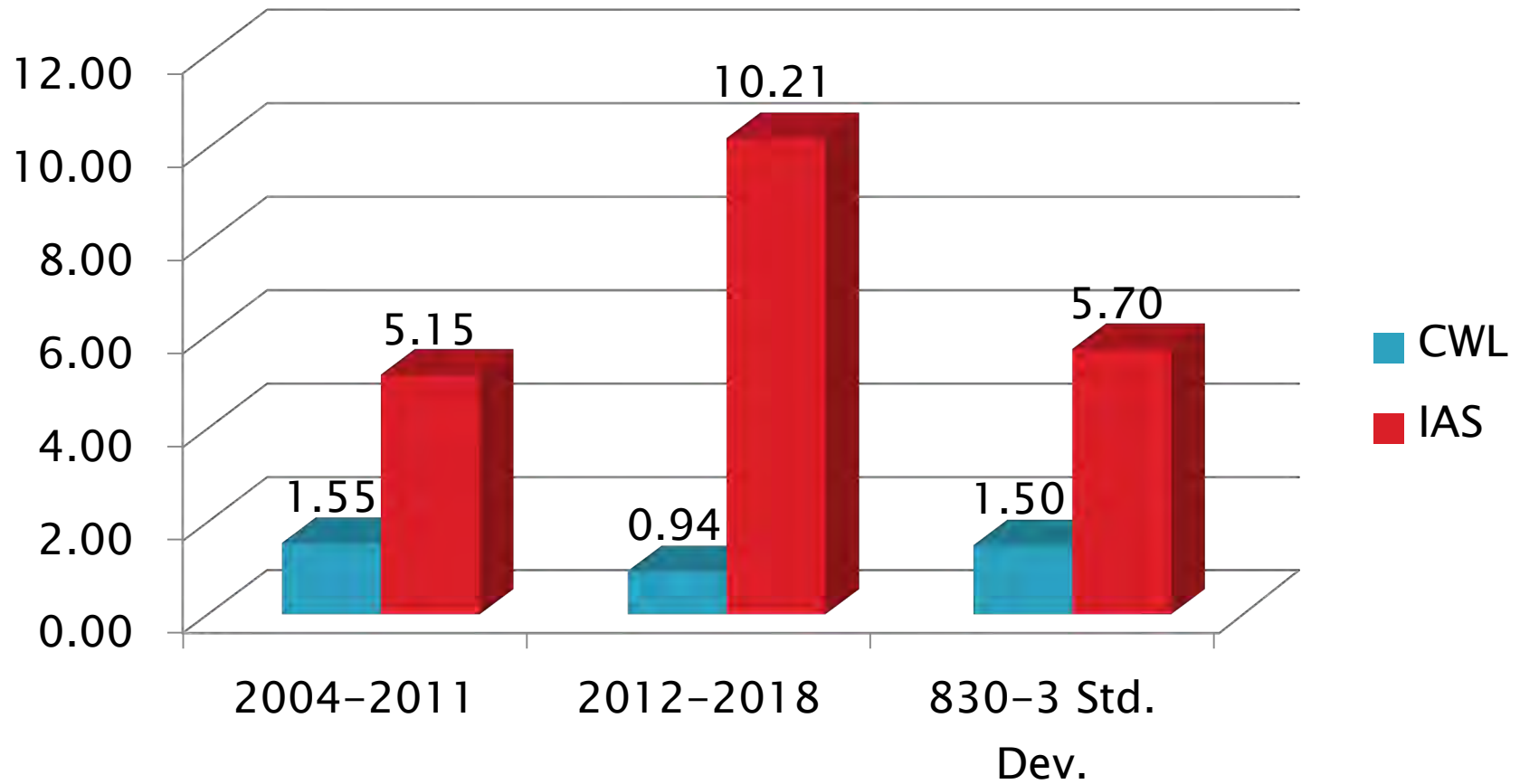


Standard Deviation Units

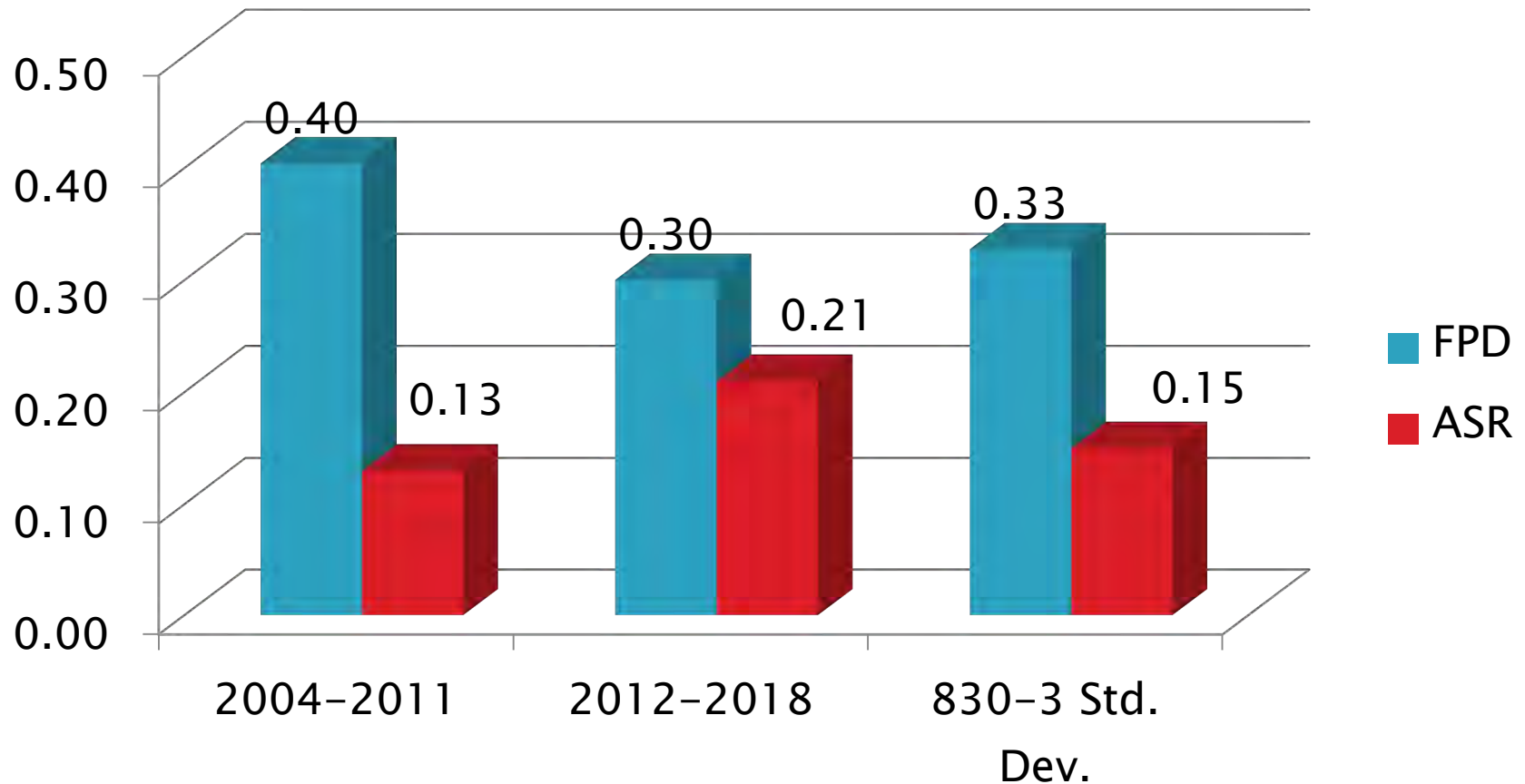


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ISM Precision Estimates



ISM Precision Estimates



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EOAT

»» October 2018

EOAT Test Activity

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

EOAT Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

EOAT Lost Tests*

Status	Cause	#
Invalid	Intake air pressure control failure	1
Aborted	No aborted tests	0
Total		1

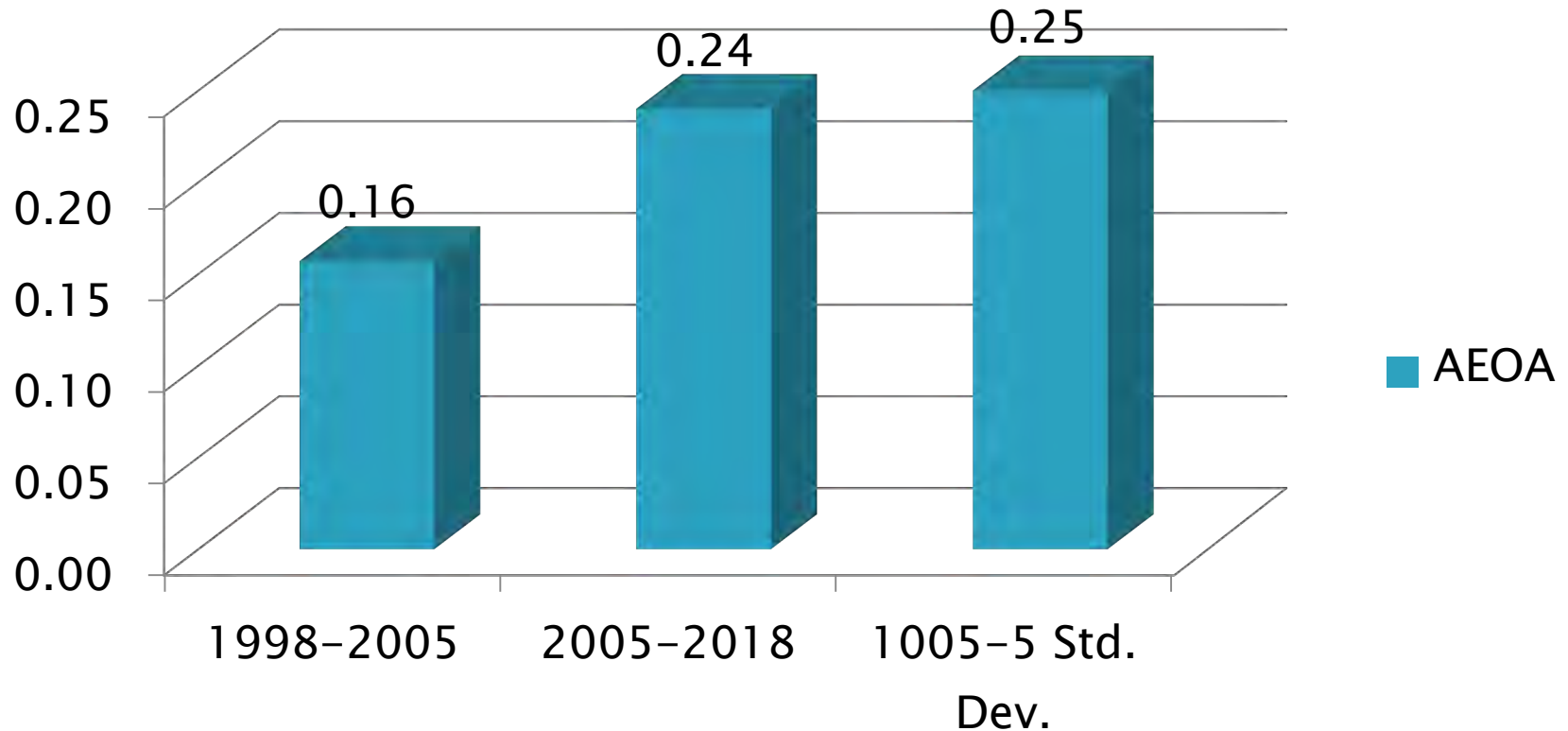
*Invalid and aborted tests

EOAT Test Severity

- ▶ Engine oil aeration is in control.

EOAT Precision Estimates

AEOA



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RFWT

»» October 2018

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

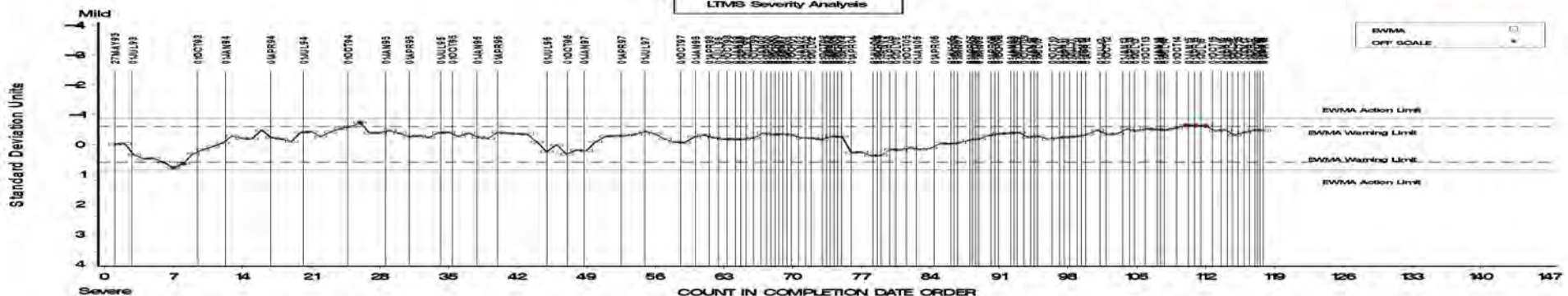
*Invalid and aborted tests

RFWT Test Severity

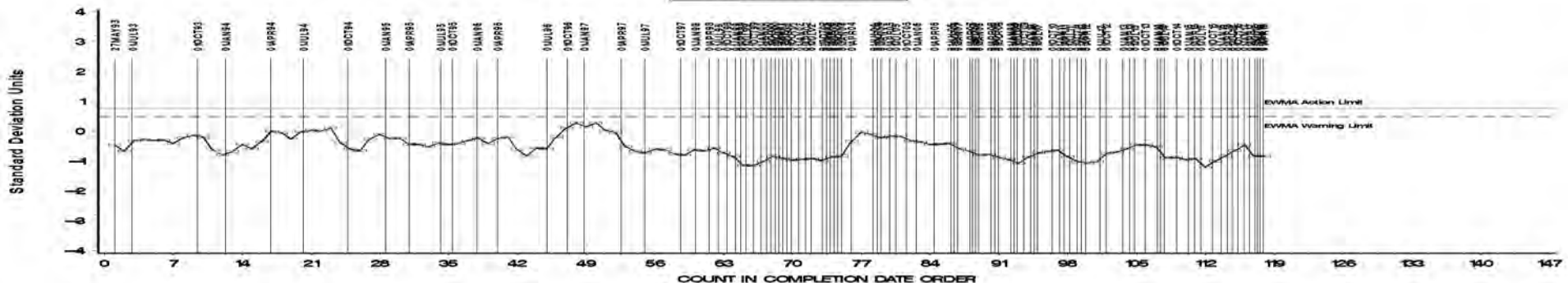
- ▶ AFW is in control.

Average Follower Wear

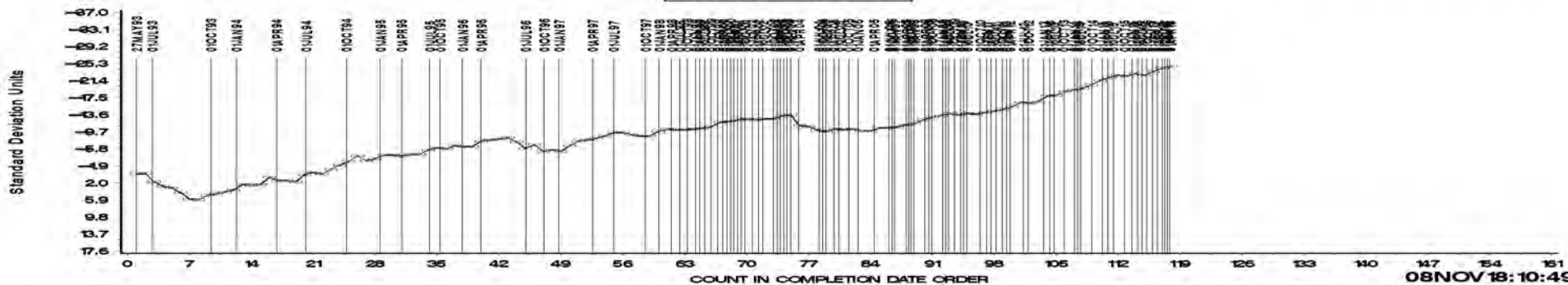
LTMS Severity Analysis



LTMS Precision Analysis



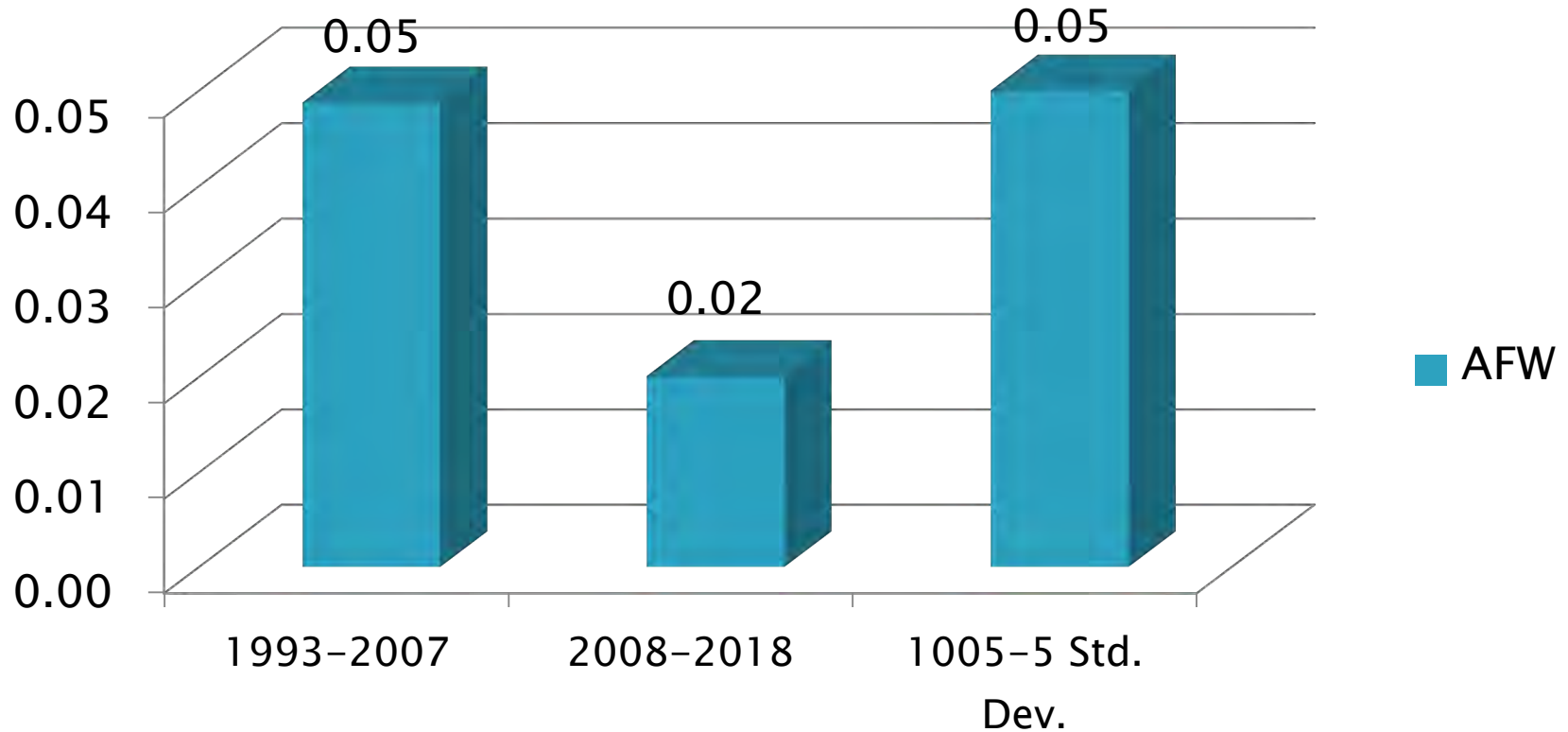
CUSUM Severity Analysis



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RFWT Precision Estimates

AFW



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Mack T-8/T-8E

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T-8/T-8E Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	2
Failed Calibration Test	OC	1
Operationally Invalid	LC	0
Aborted	XC	1
Total		4

T-8/T8-E Failed Tests

Failed Parameter	Number of Tests
VI38, RV48 and RV2 Mild	1
Total	1

T-8/T8-E Lost Tests*

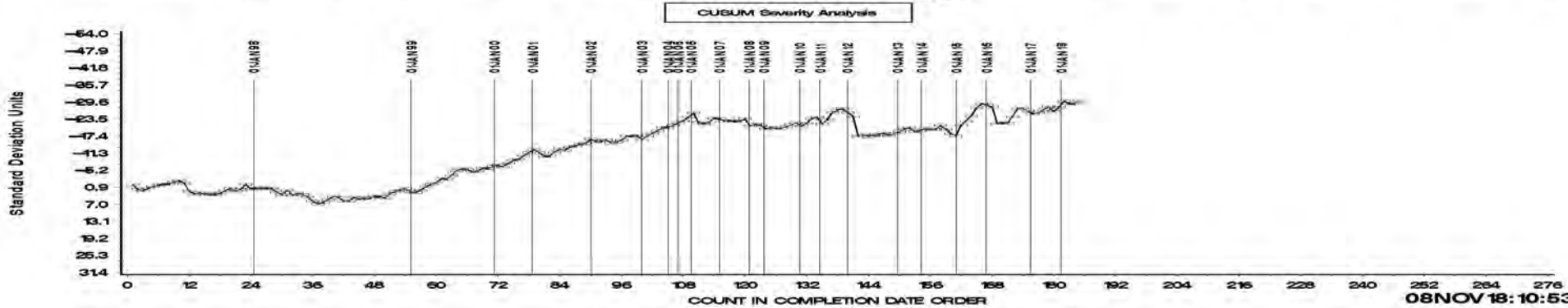
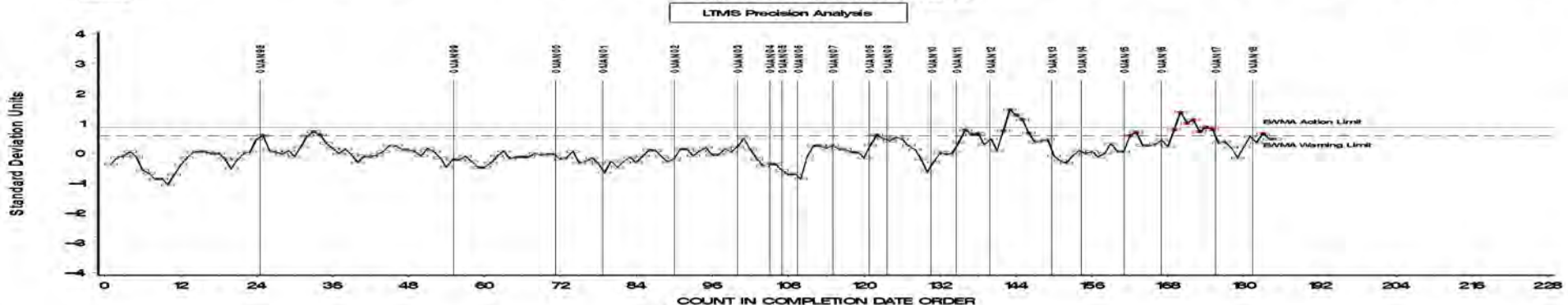
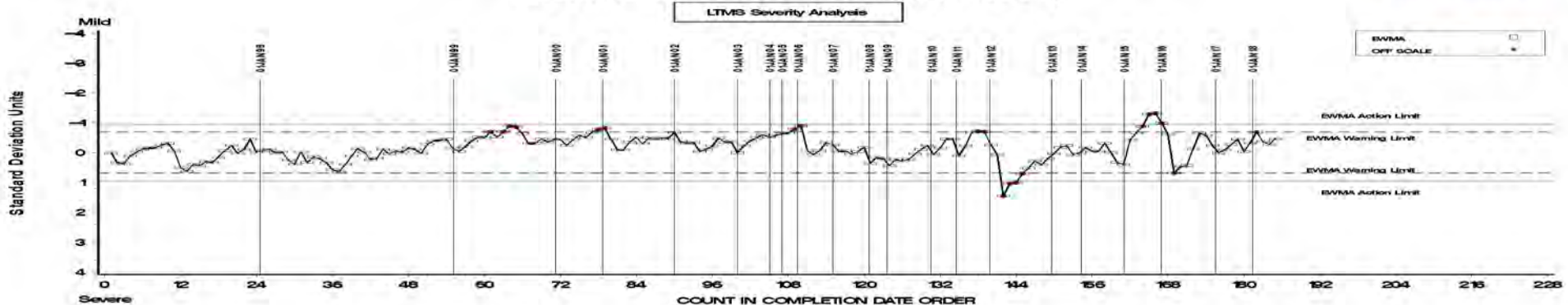
Status	Cause	#
Invalid	No invalid tests	0
Aborted	Aborted due to missed soot window	1
Total		1

*Invalid and aborted tests

T-8/T-8E Test Severity

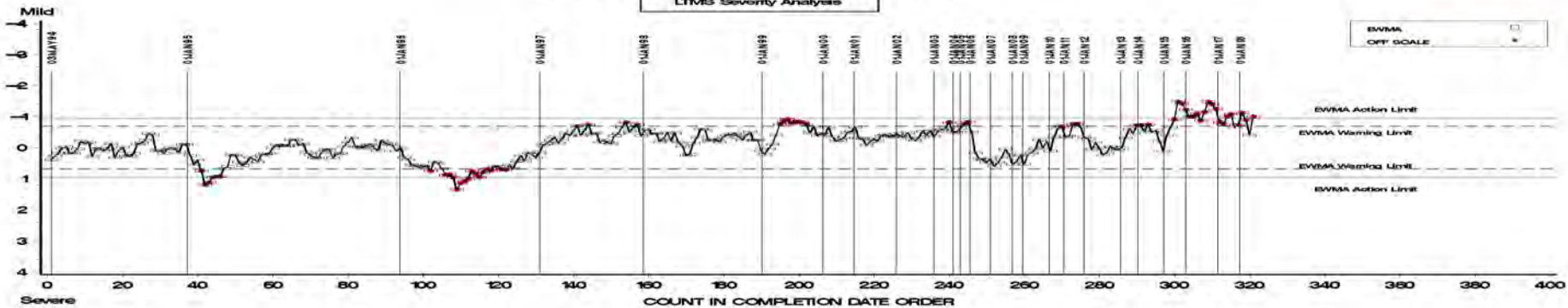
- ▶ VI38 is in severity warning alarm in mild direction.
- ▶ VI38 is in precision action alarm.
- ▶ RV48 and RV2 are in control.

RELATIVE VISCOSITY @ 4.8% (50% LOSS)

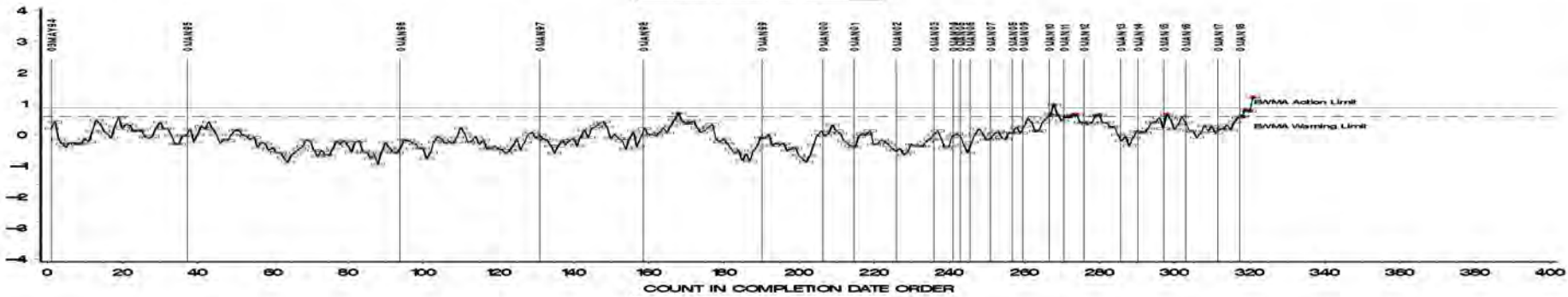


VISCOUSITY INCR @ 3.8% SOOT

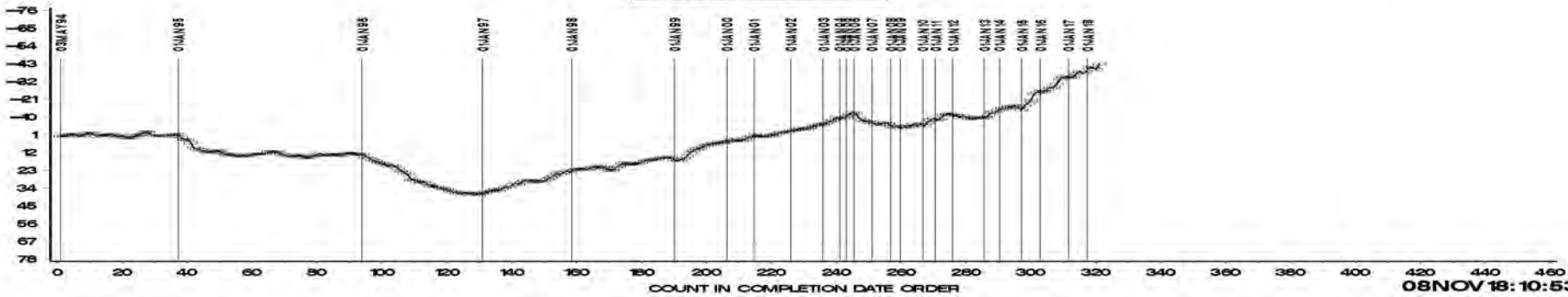
LTMS Severity Analysis



LTMS Precision Analysis

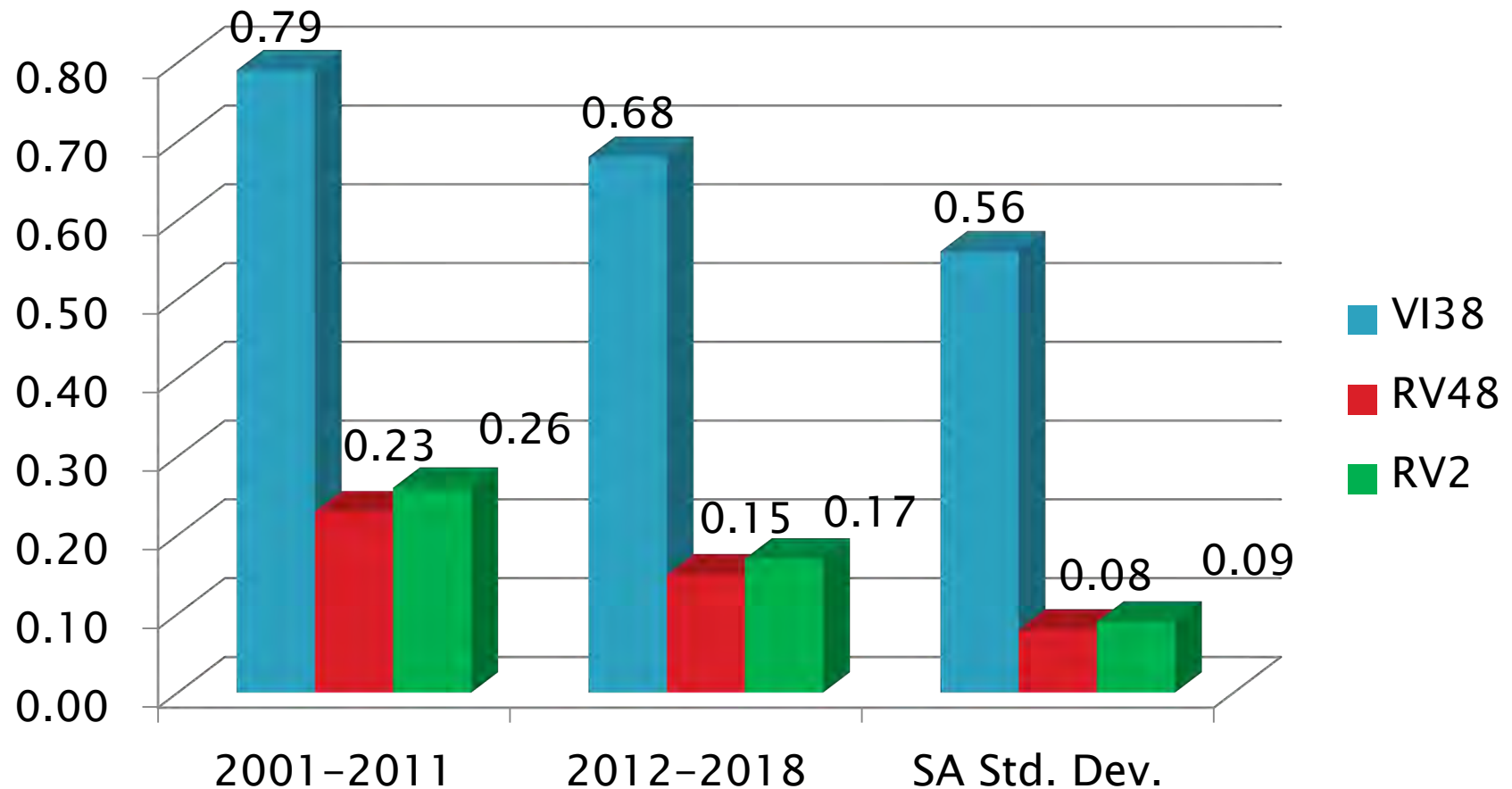


CUSUM Severity Analysis



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T-8/E Precision Estimates



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Mack T-11

»» October 2018

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T-11 Test Activity

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

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

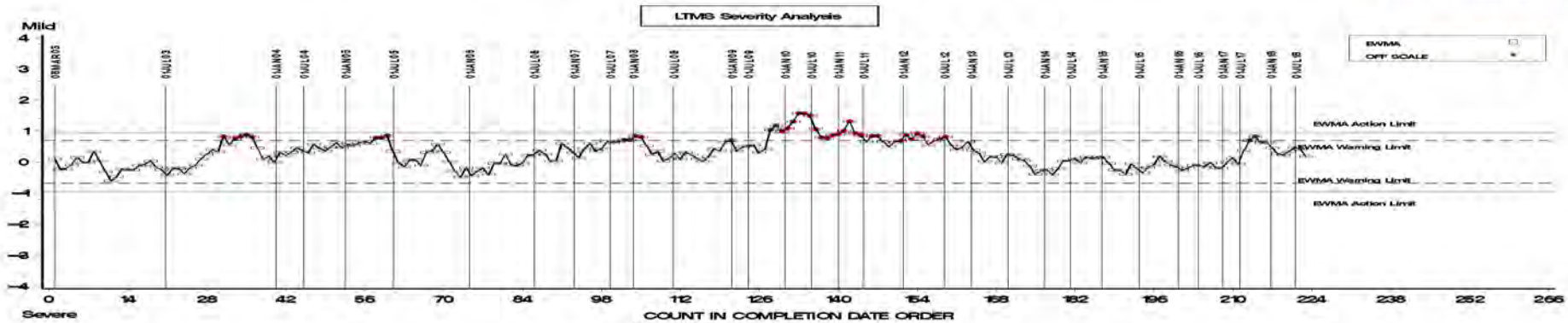
T-11 Test Severity

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

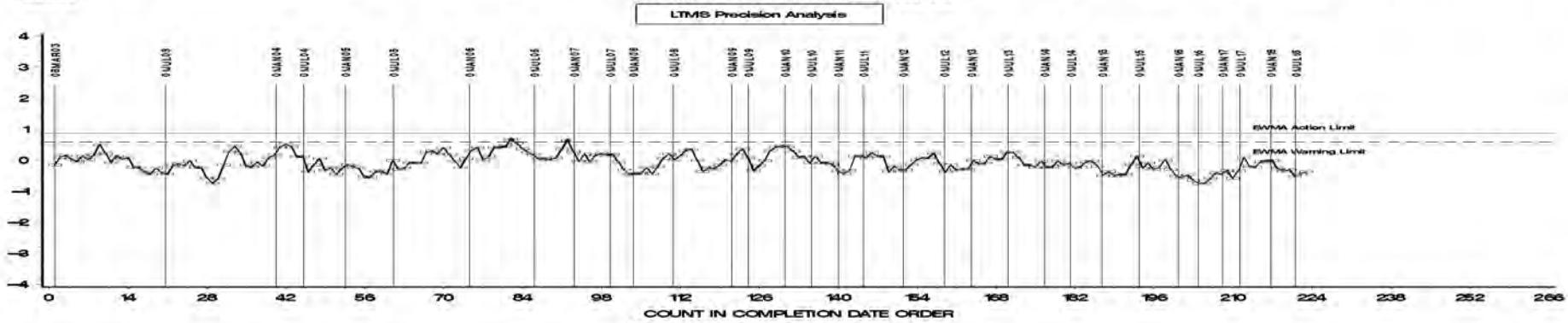
T-41 INDUSTRY VALID DATA

SOOT AT 12 cSt

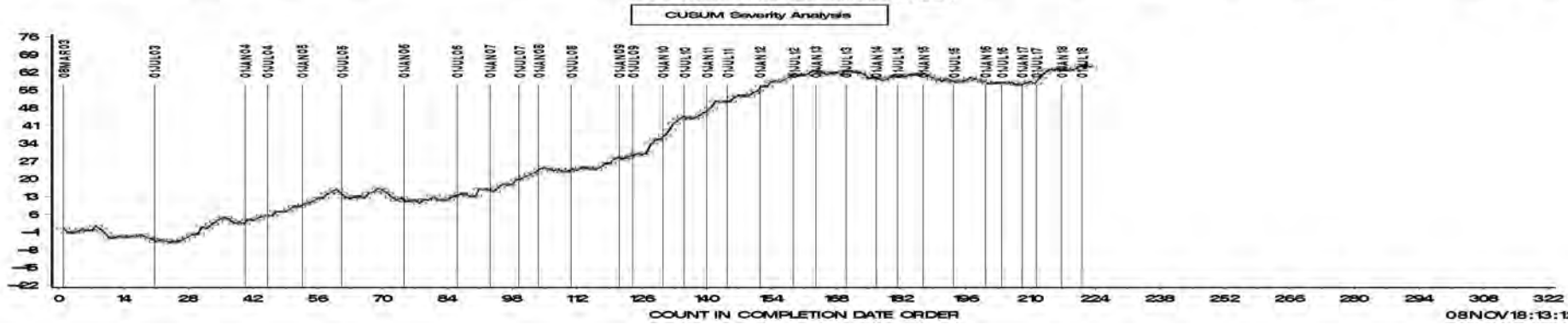
Standard Deviation Units



Standard Deviation Units



Standard Deviation Units



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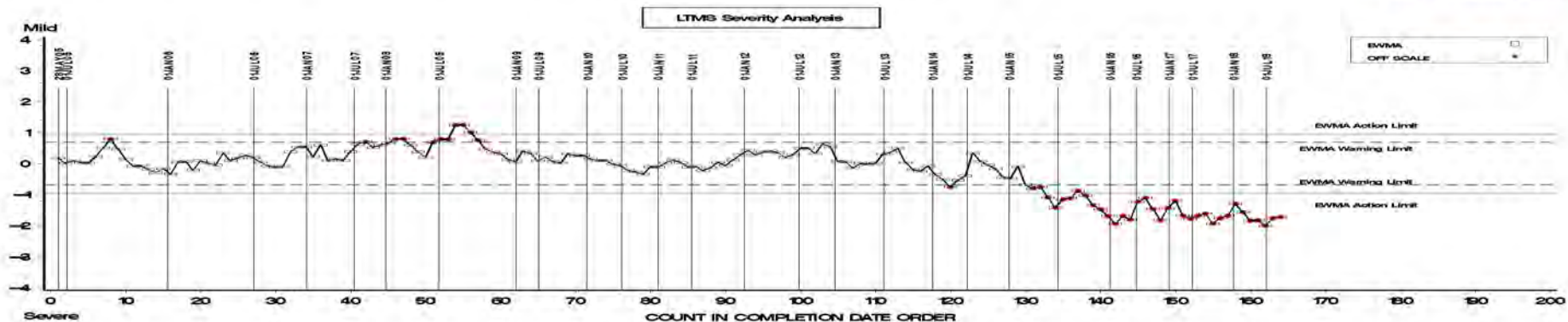
Test Monitoring Center

<http://astmtmc.cmu.edu>

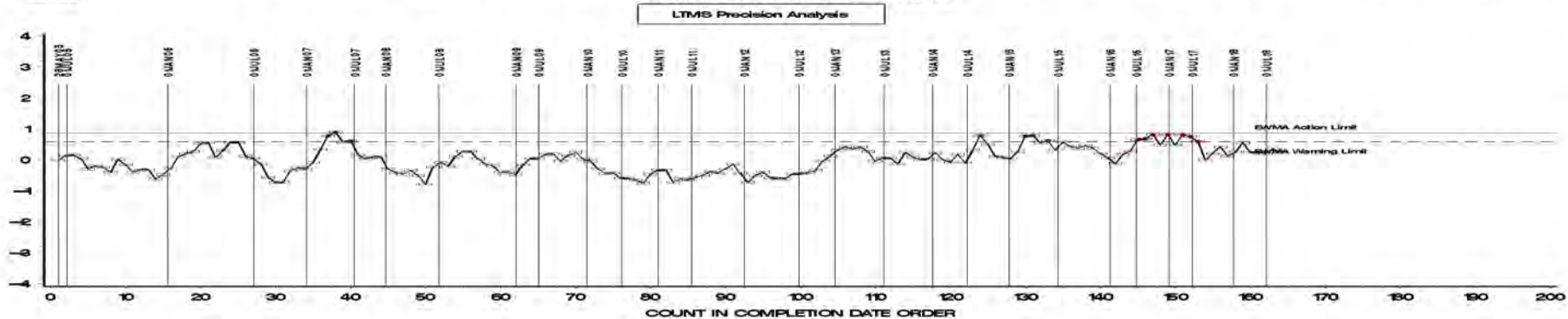


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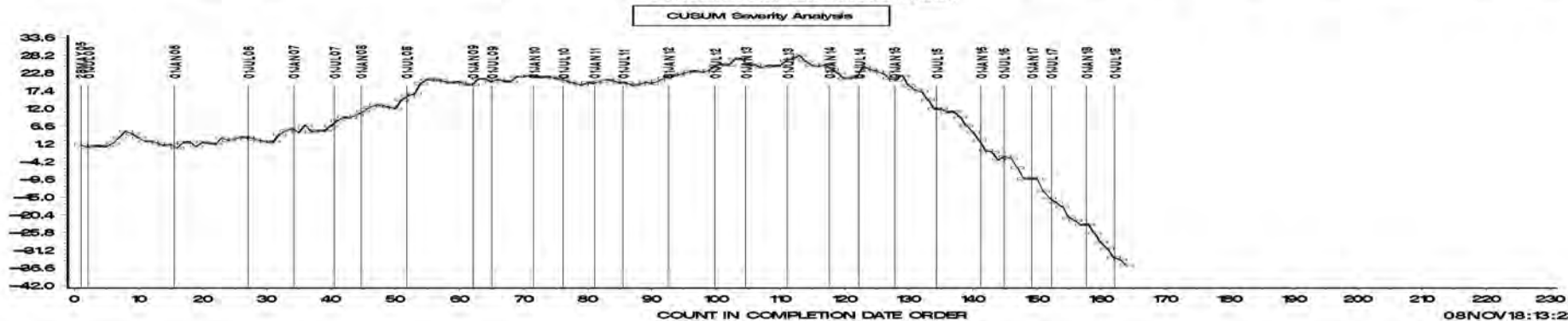
Standard Deviation Units



Standard Deviation Units



Standard Deviation Units

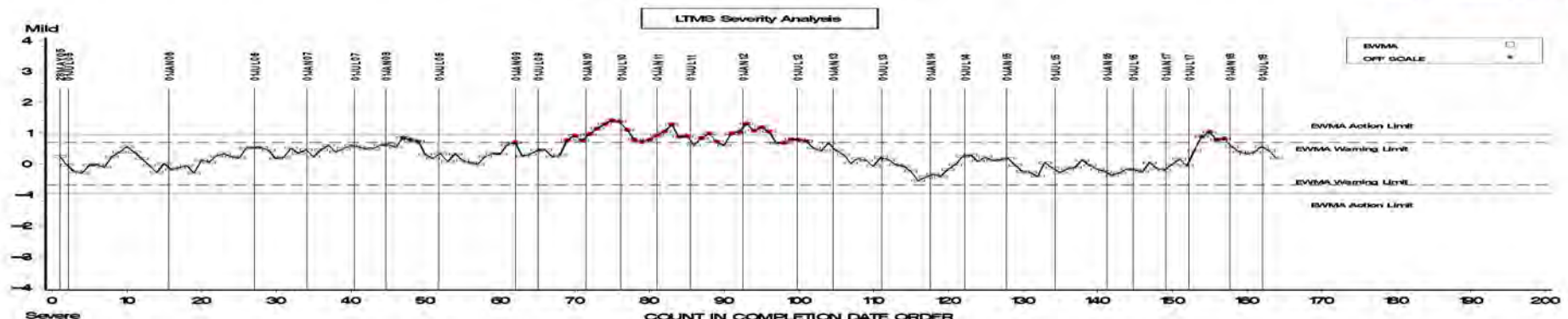


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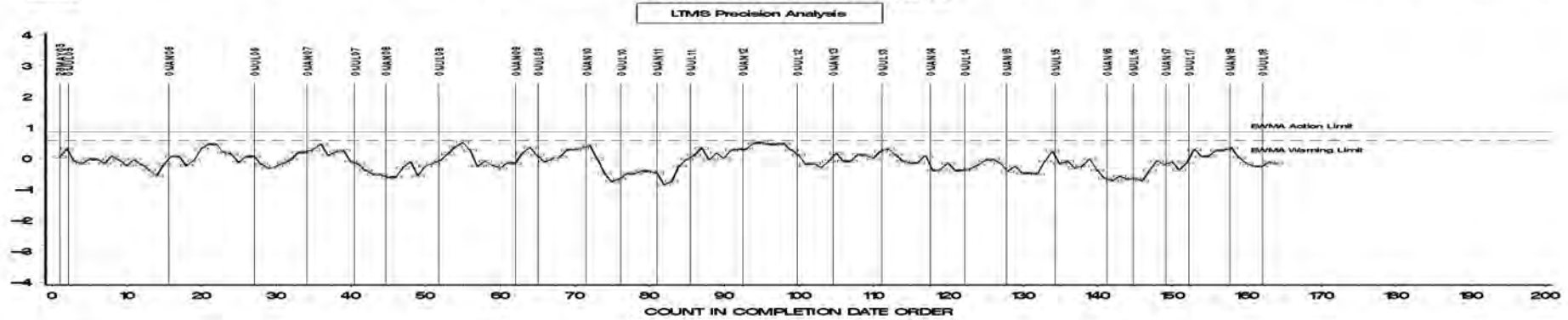
T-41 INDUSTRY CYCLE OPERATIONAL VALID DATA

SOOT @ 15 cSt — FINAL RESULT

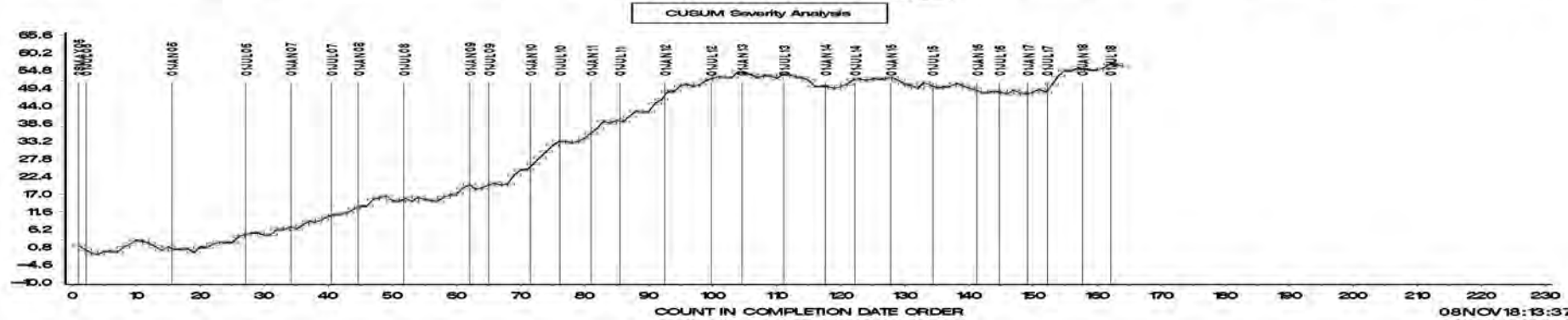
Standard Deviation Units



Standard Deviation Units



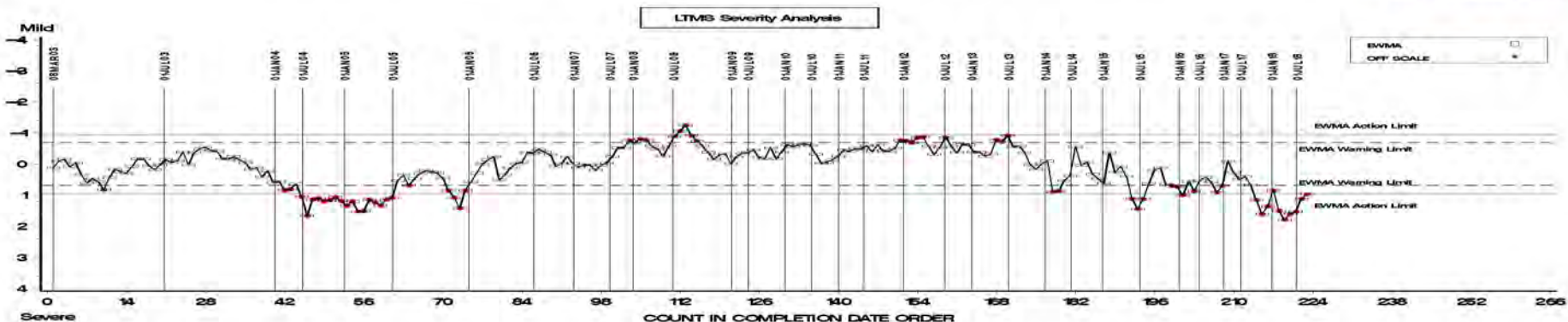
Standard Deviation Units



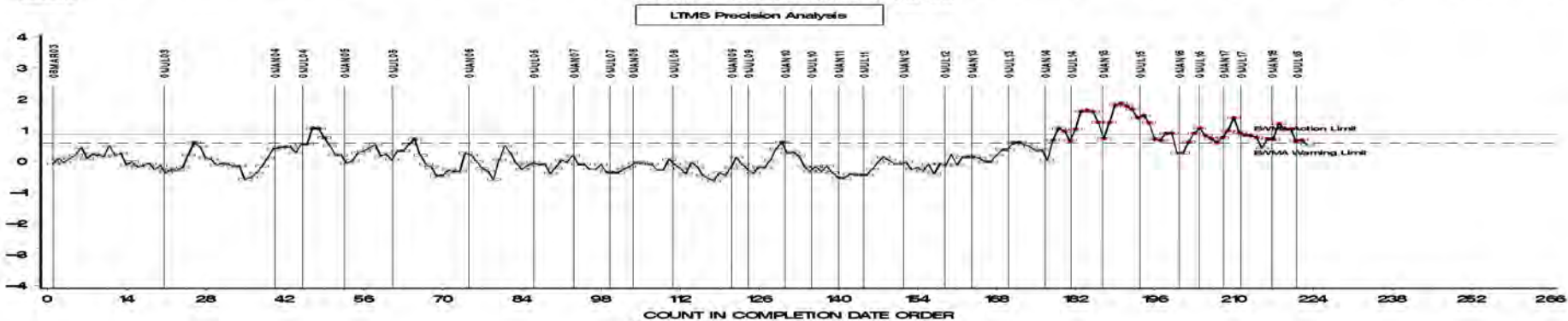
08NOV18:13:37

MRV VISCOSITY

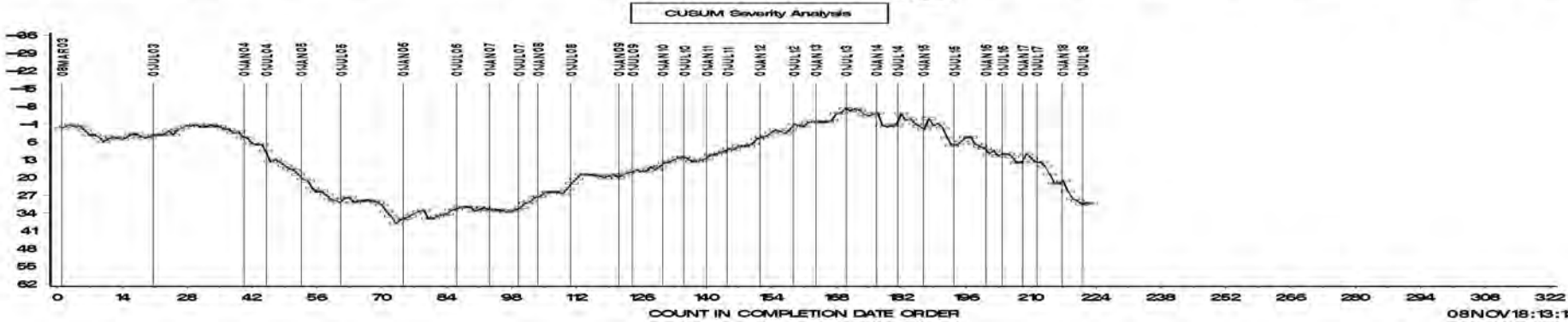
Standard Deviation Units



Standard Deviation Units

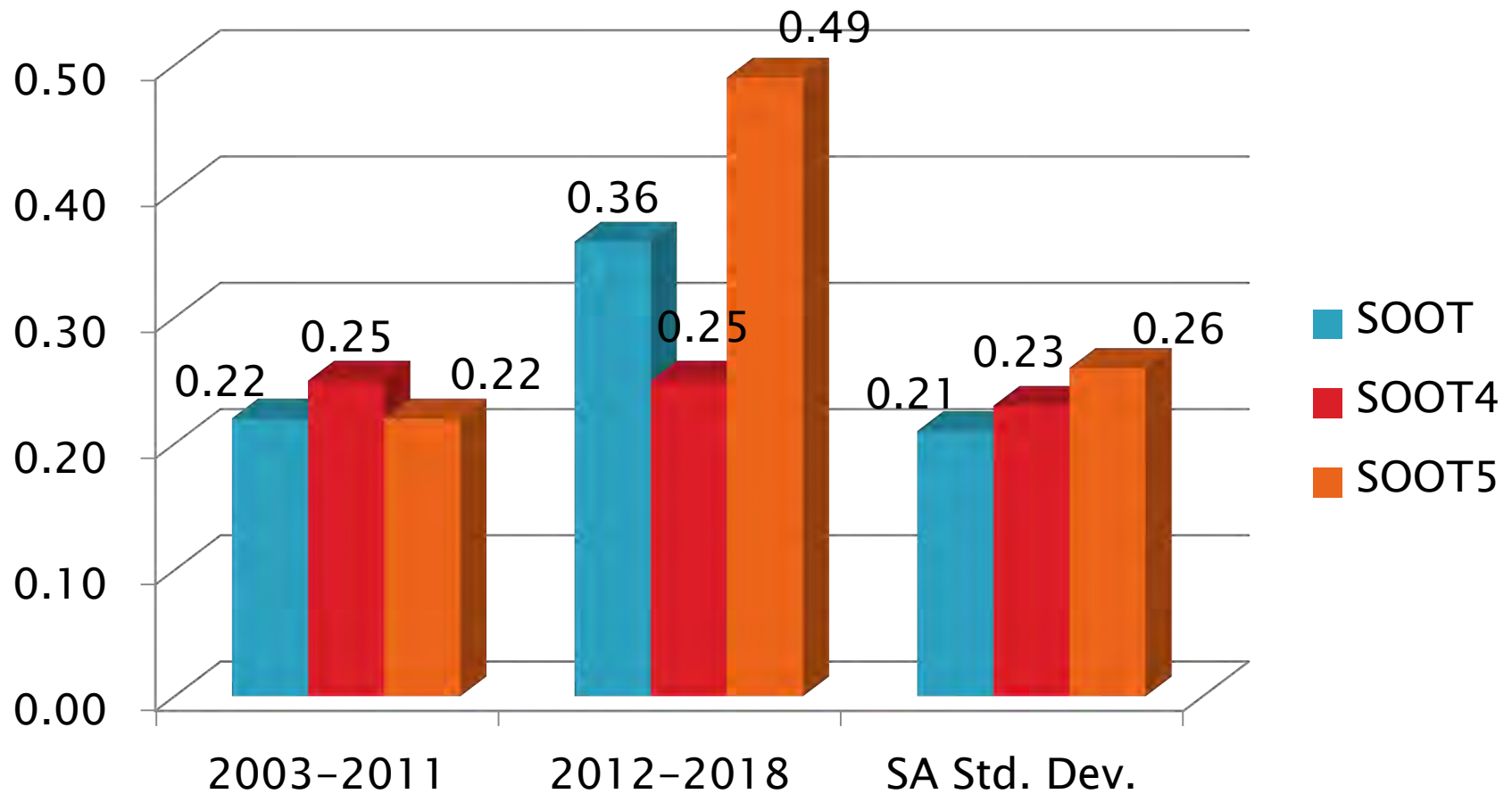


Standard Deviation Units



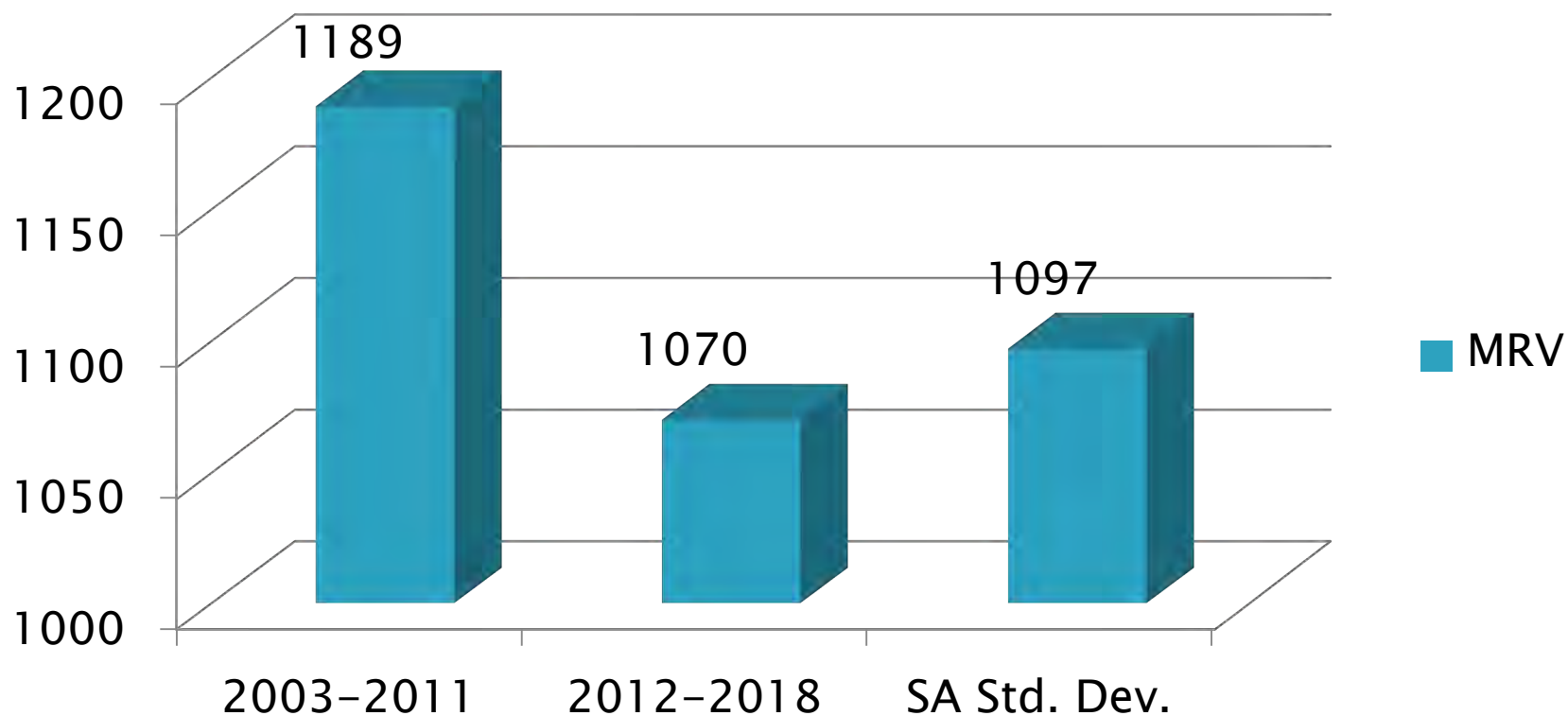
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T-11 Precision Estimates



T-11 Precision Estimates

MRV



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Mack T-12

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T-12 Test Activity

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

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	Charge air cooler failure	1
Total		1

*Invalid and aborted tests

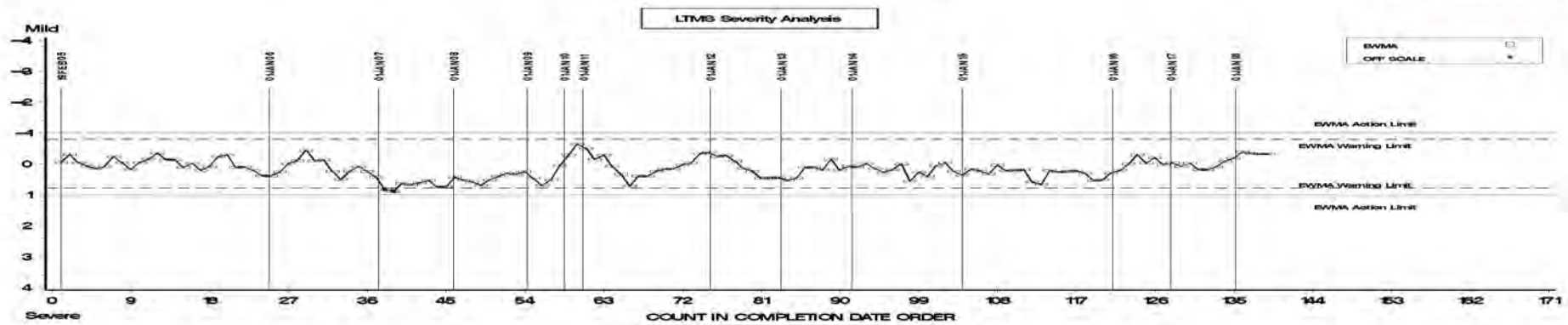
T-12 Test Severity

- ▶ CLW, TRWL and OC are in control.
- ▶ PB and PB2 are in precision action alarm.

MACK T-42 INDUSTRY CYCLER VALID DATA
 AVG. CYLINDER LINER WEAR (CLW)



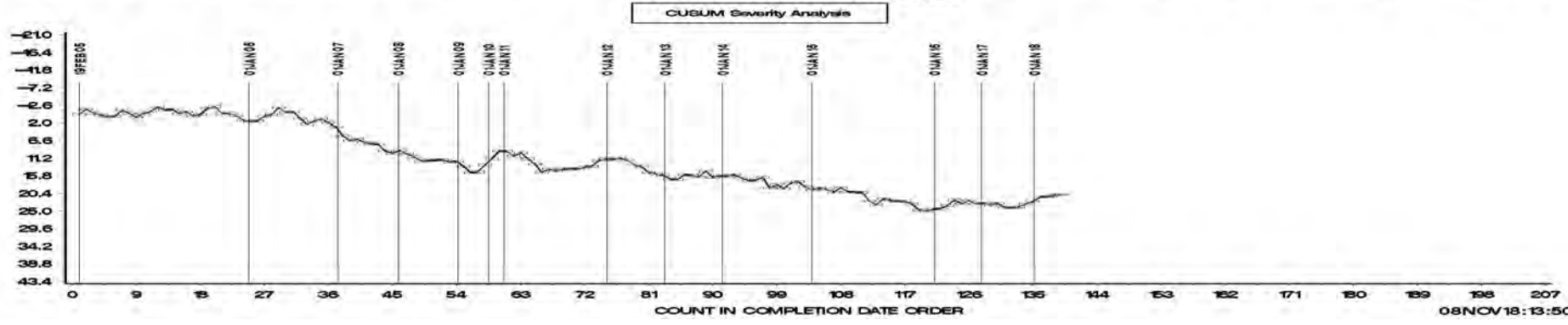
Standard Deviation Units



Standard Deviation Units



Standard Deviation Units



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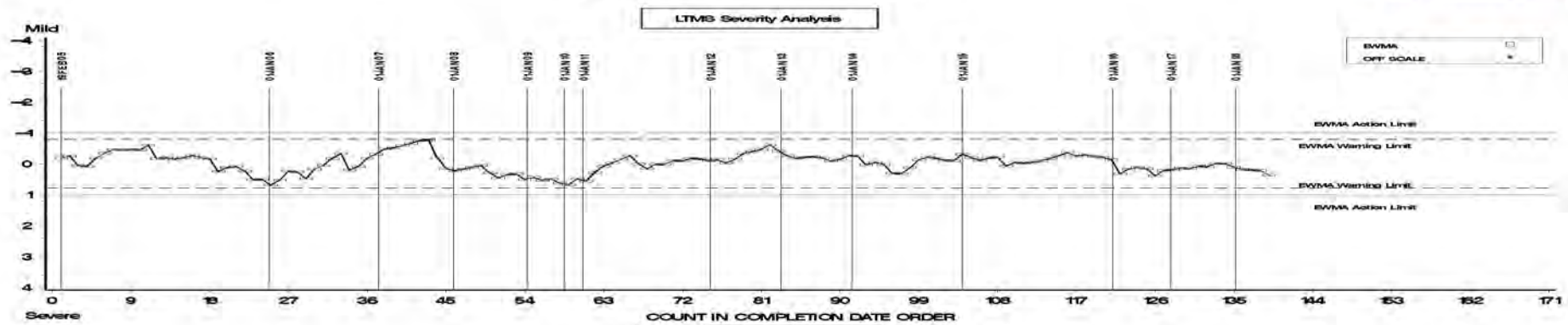


MACK T-42 INDUSTRY OPERATIONAL VALID DATA

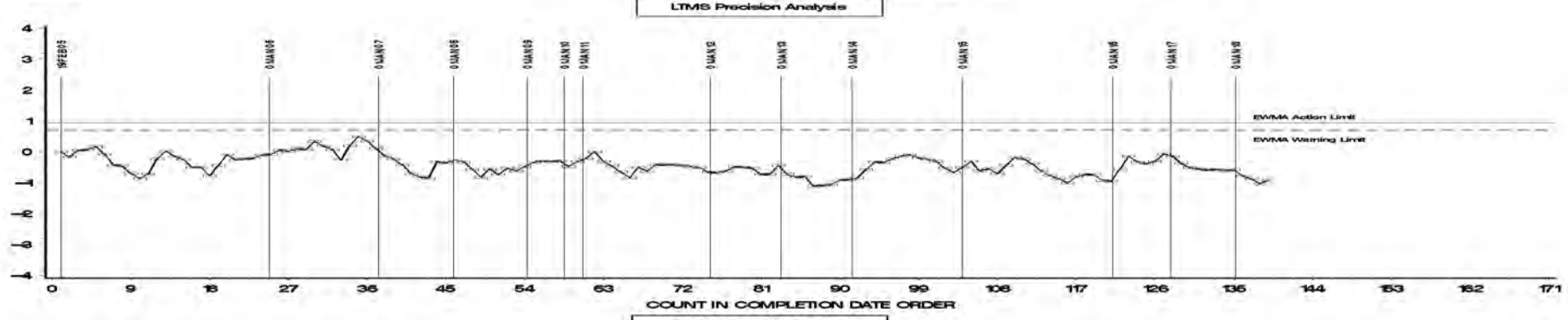
AVG. TOP RING WEIGHT LOSS (TRWL)



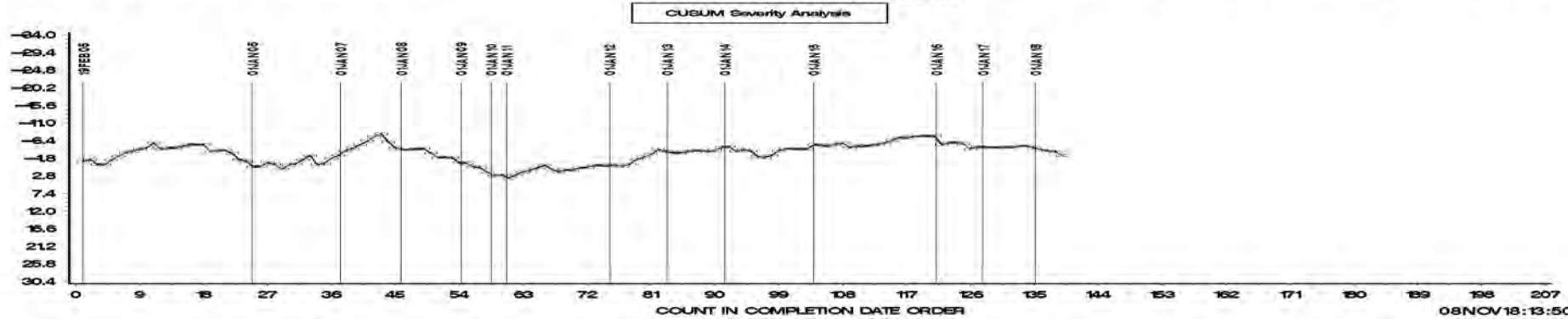
Standard Deviation Units



Standard Deviation Units



Standard Deviation Units



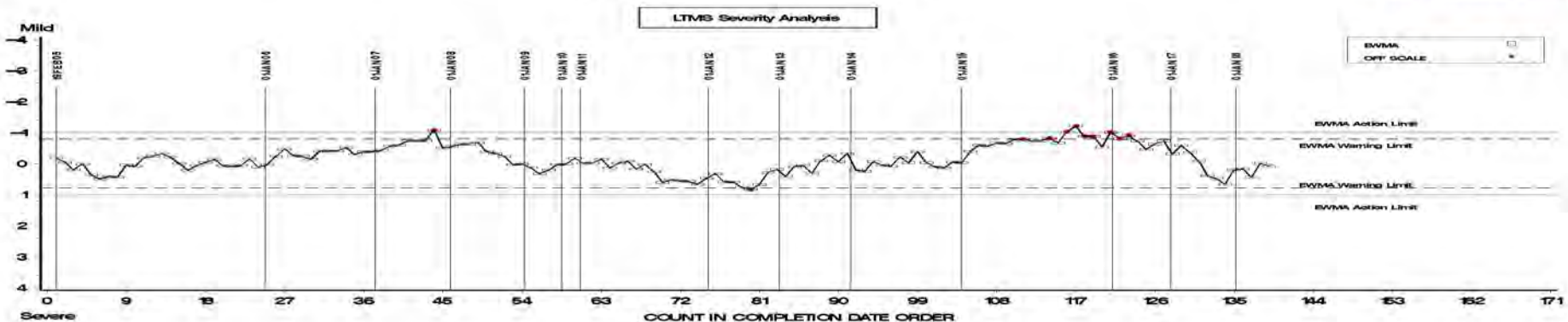
Test Monitoring Center

<http://astmtmc.cmu.edu>



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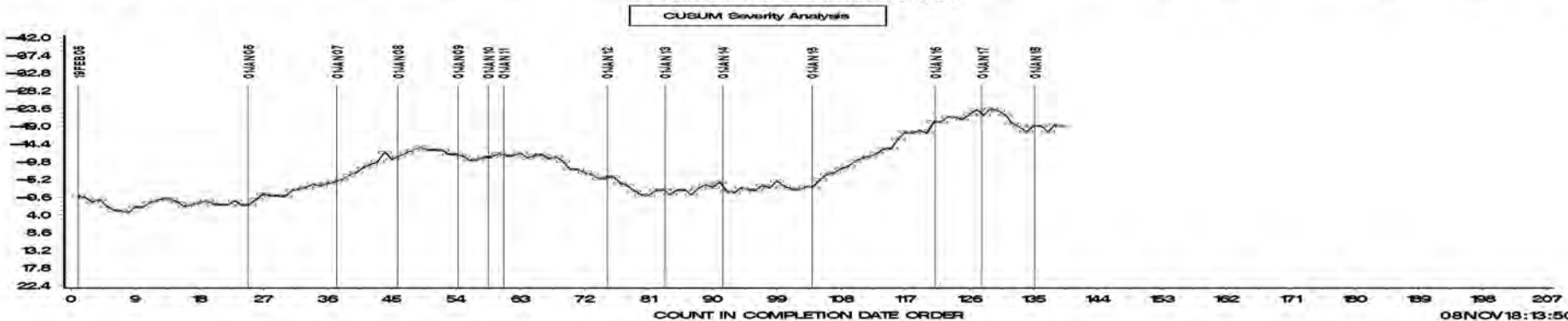
Standard Deviation Units



Standard Deviation Units



Standard Deviation Units

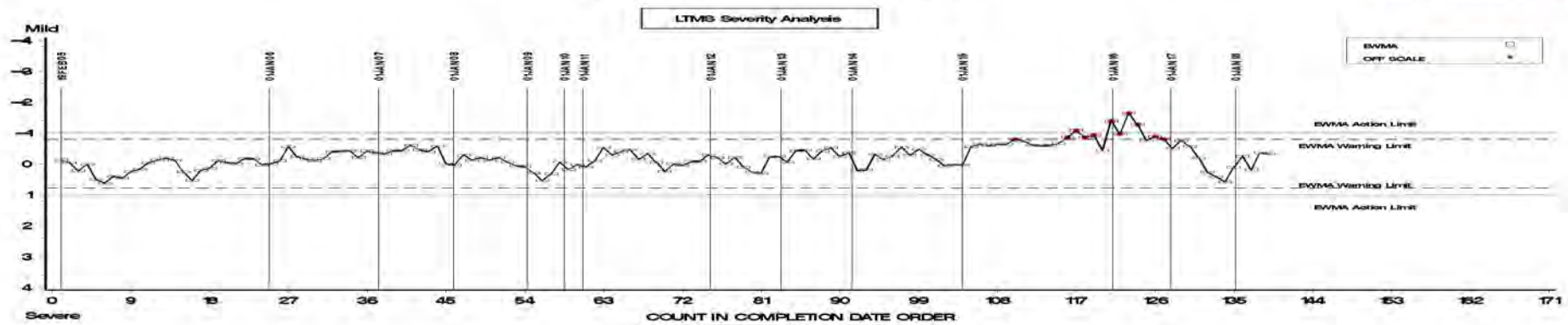


08NOV18:13:50

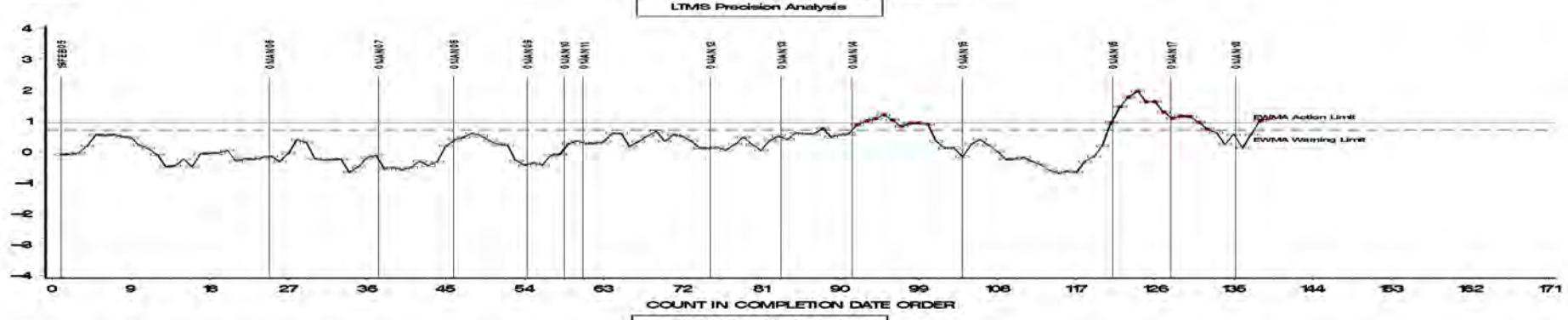
MACK T-42 INDUSTRY OPERATIONAL VALID DATA
 FINAL TRANS. RES. DELTA PB 250-300H



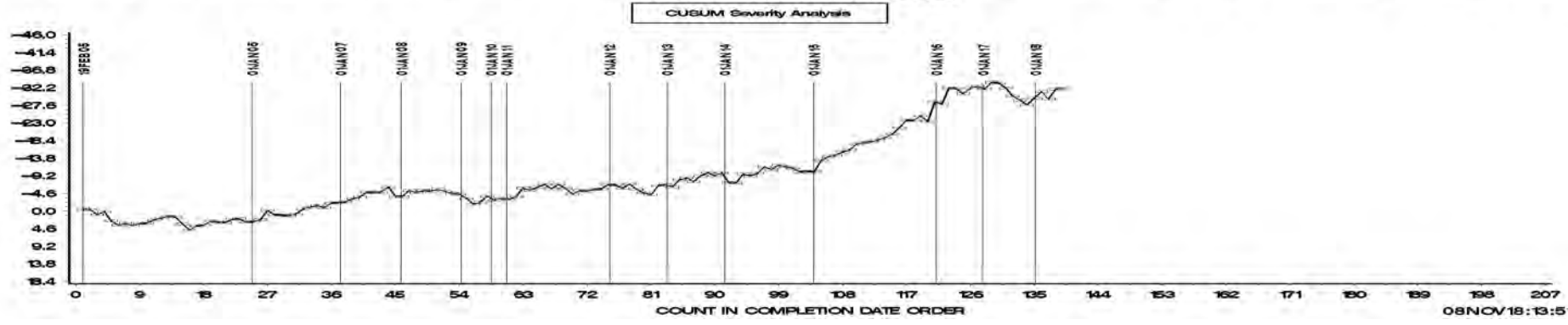
Standard Deviation Units



Standard Deviation Units



Standard Deviation Units

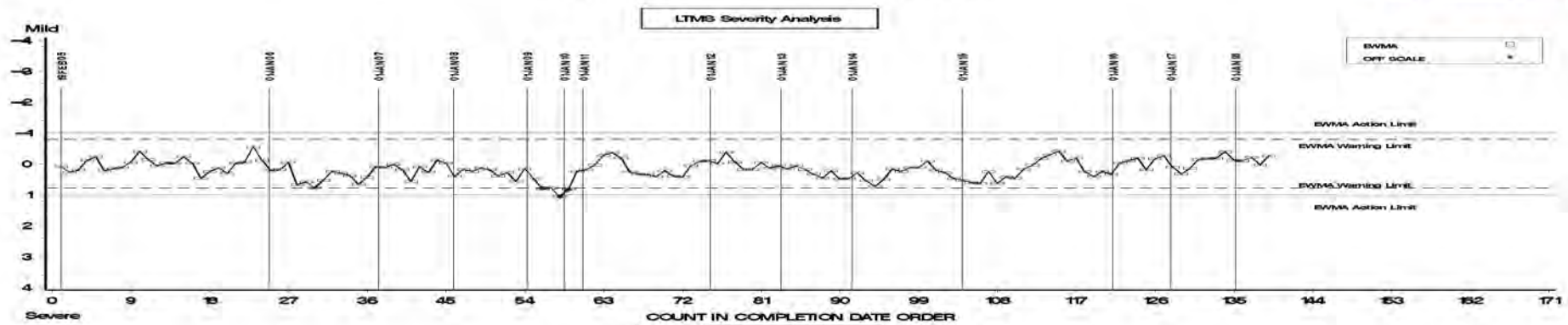


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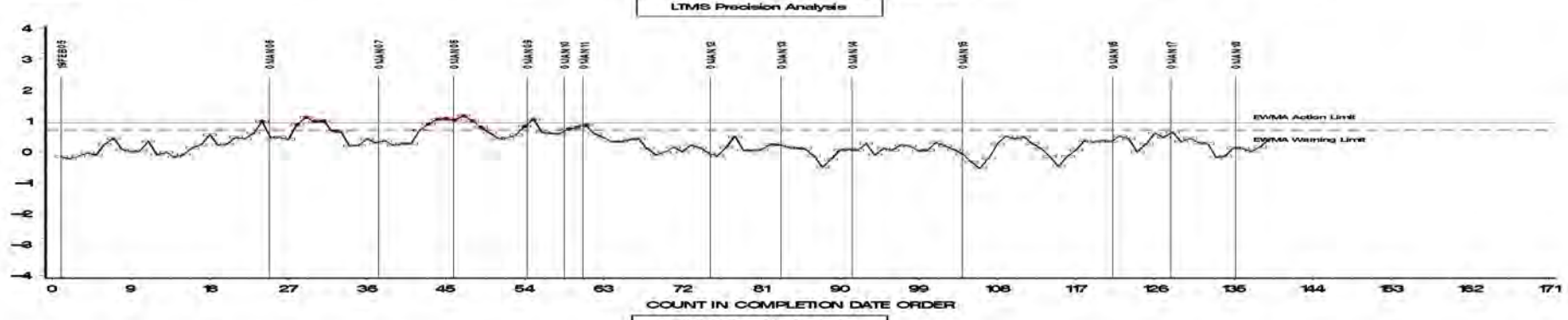


MACK T-42 INDUSTRY OPERATIONAL VALID DATA
FINAL TRANS. RES. OIL CONSUMPTION

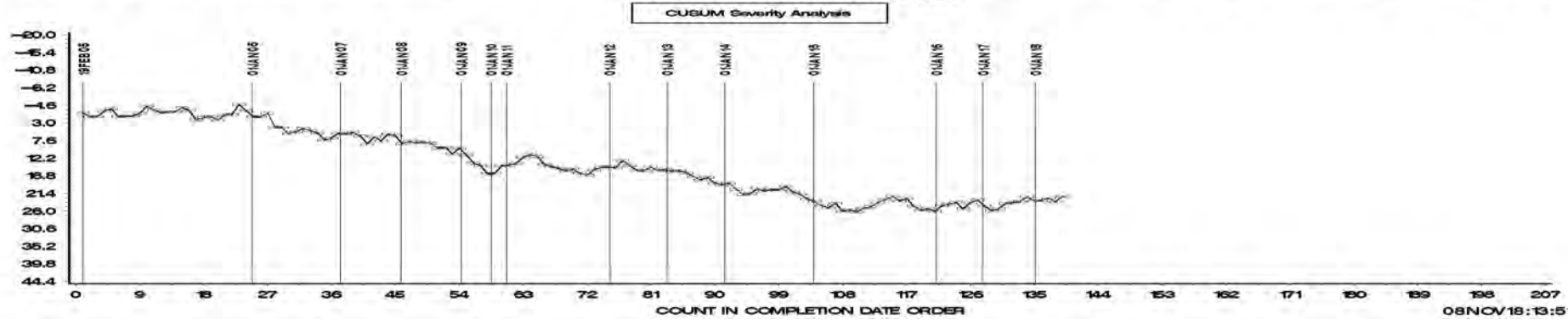
Standard Deviation Units



Standard Deviation Units

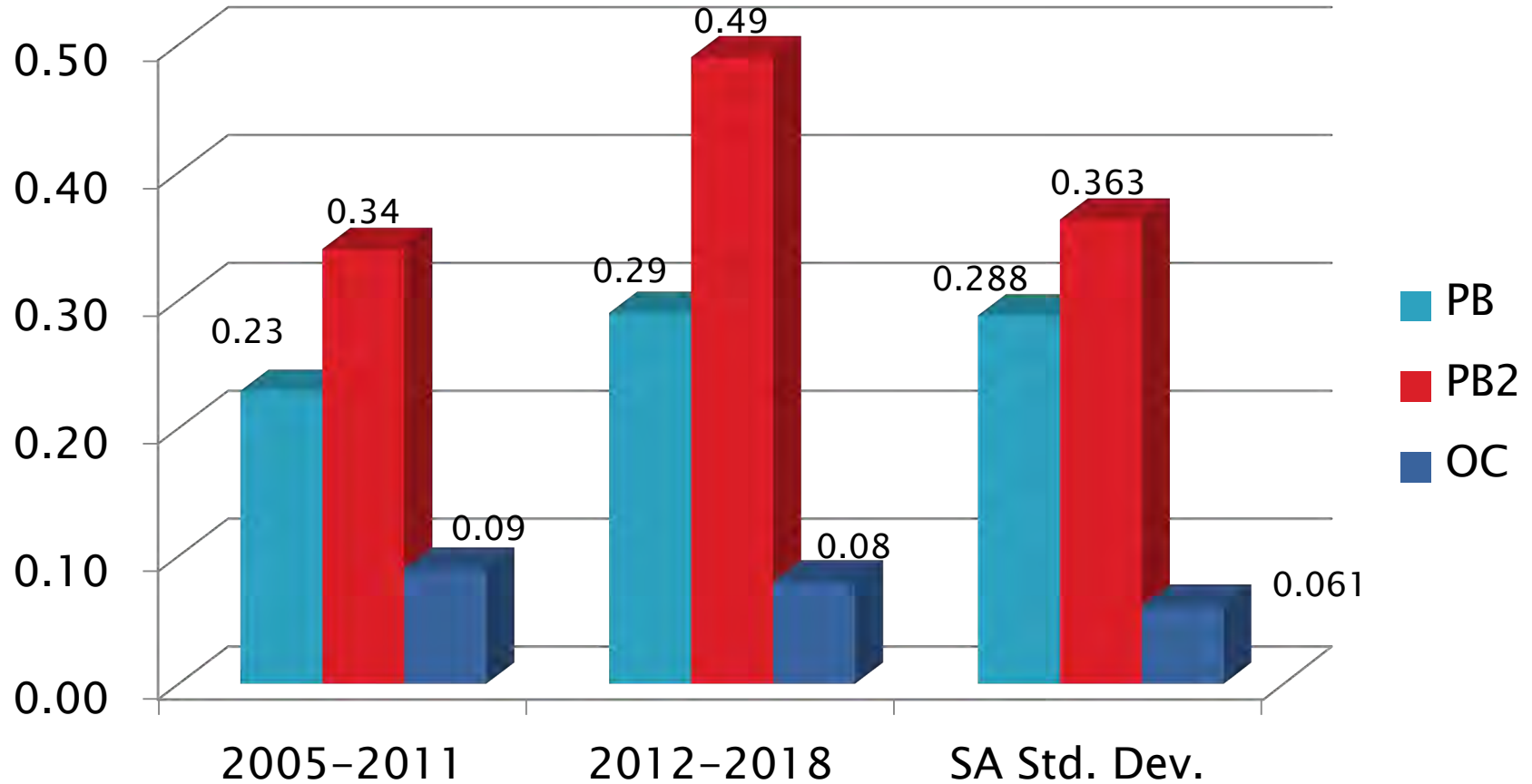


Standard Deviation Units

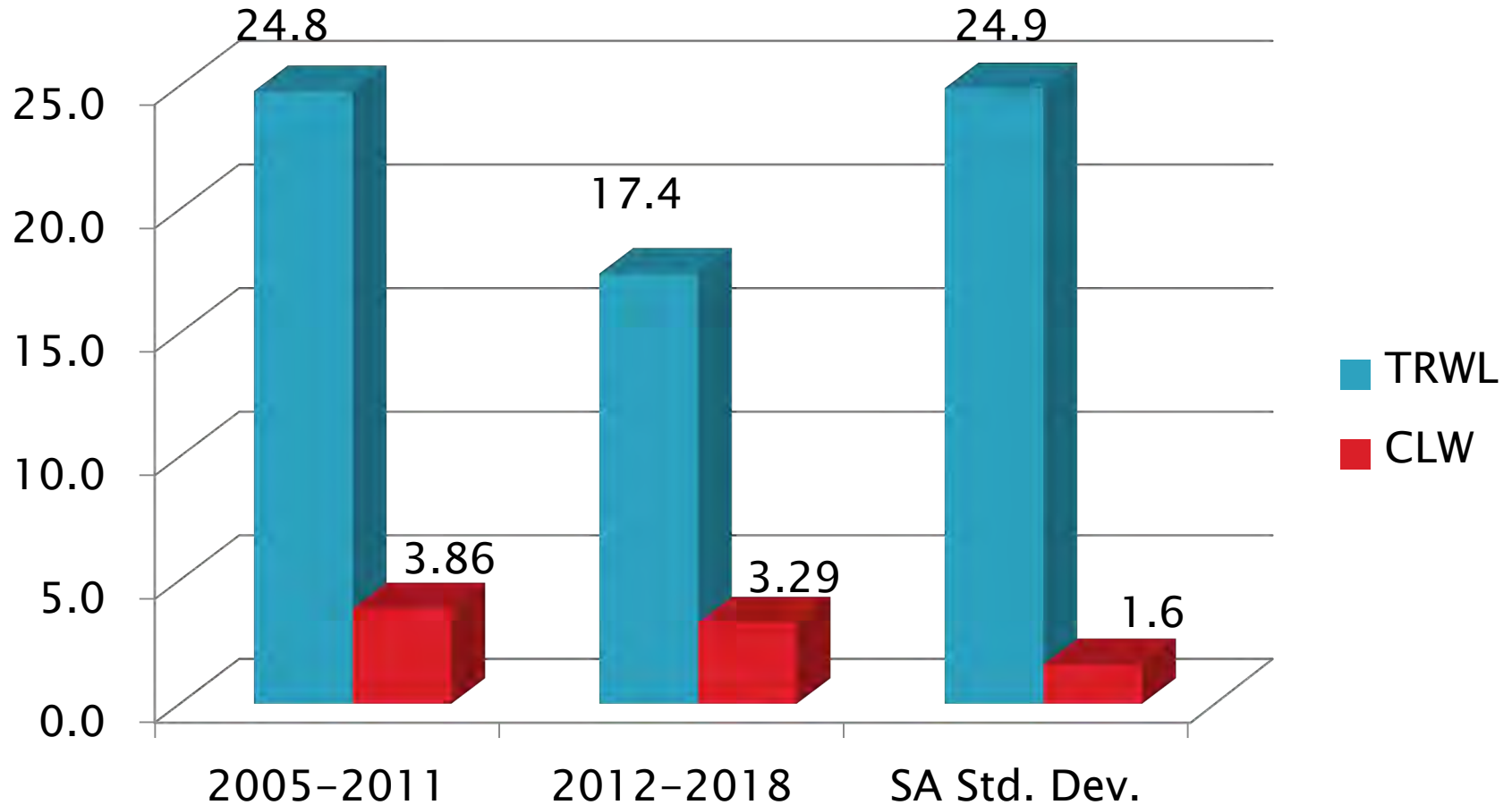


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T-12 Precision Estimates



T-12 Precision Estimates



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Mack T-12A

»» October 2018

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T-12A Test Activity

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

T-12A Failed Tests

Failed Parameter	Number of Tests
No failed tests	0
Total	0

T-12A Lost Tests*

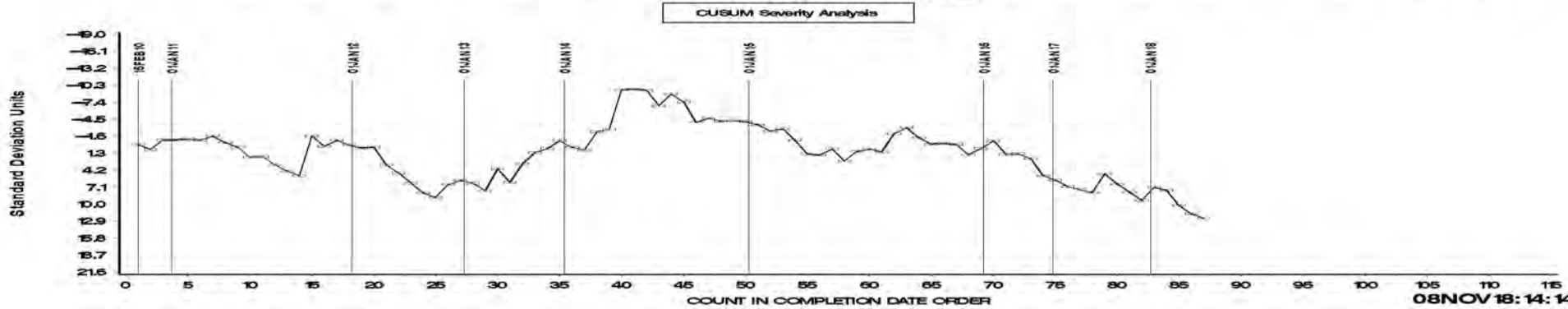
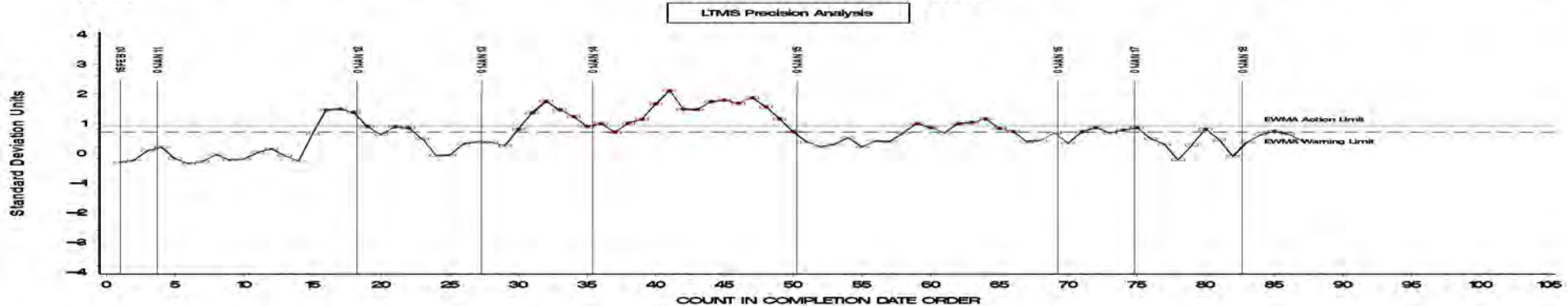
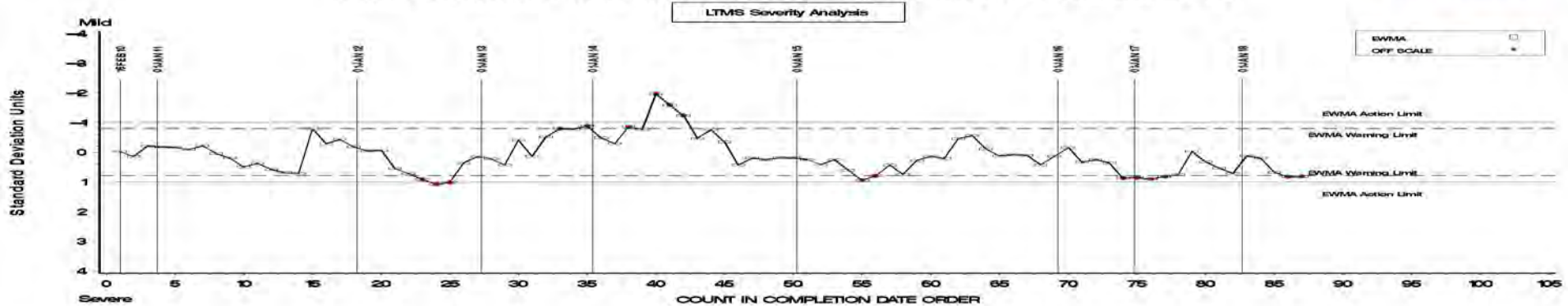
Status	Cause	#
Invalid	No invalid tests	0
Aborted	Charge air cooler failure	1
Total		1

*Invalid and aborted tests

T-12A Test Severity

- ▶ MRV is in severity warning alarm.

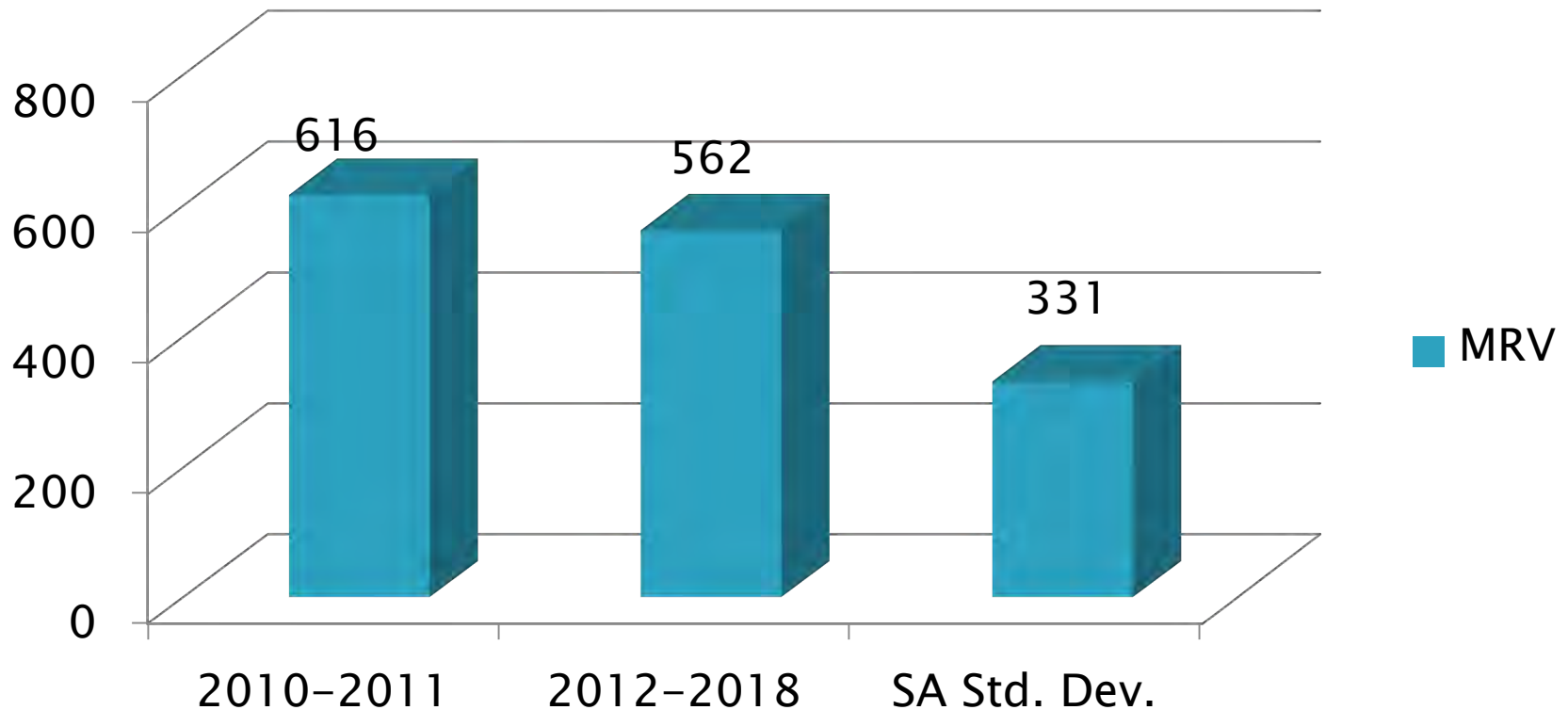
FINAL ORIGINAL UNIT MRV VISCOSITY [NM, SOLID, FROZEN, <, >]



08NOV18:14:14

T-12A Precision Estimates

MRV



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Mack T-13

»» October 2018

T-13 Test Activity

Test Status	Validity Code	#
Acceptable Calibration Test	AC	9
Failed Calibration Test	OC	1
Operationally Invalid	LC	0
Aborted	XC	1
Total		11

T-13 Failed Tests

Failed Parameter	Number of Tests
IRPH and KV40 Severe	1
Total	1

T-13 Lost Tests*

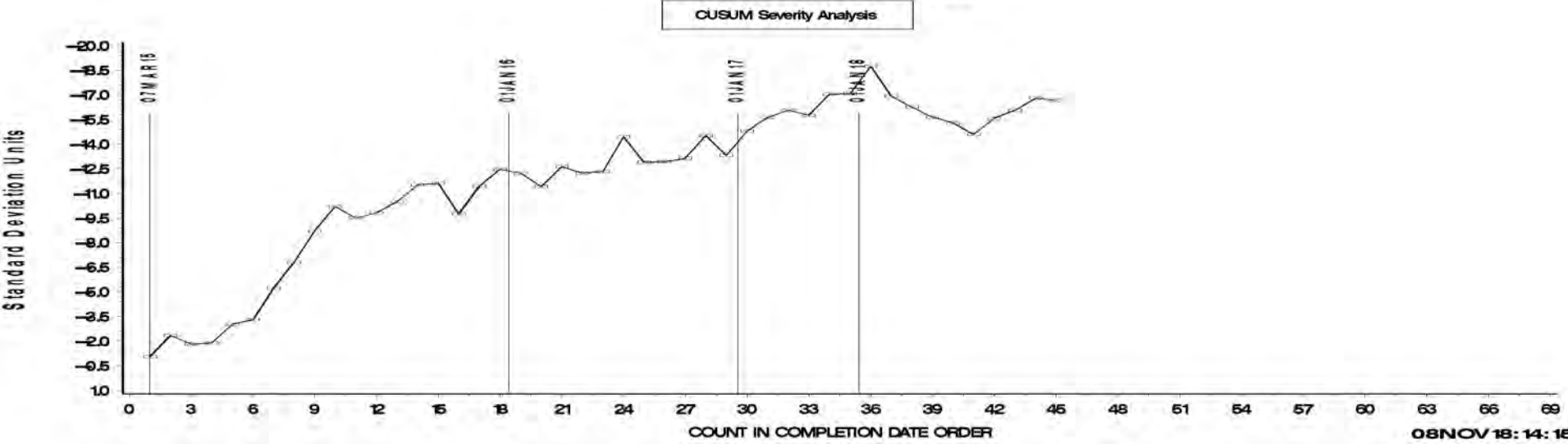
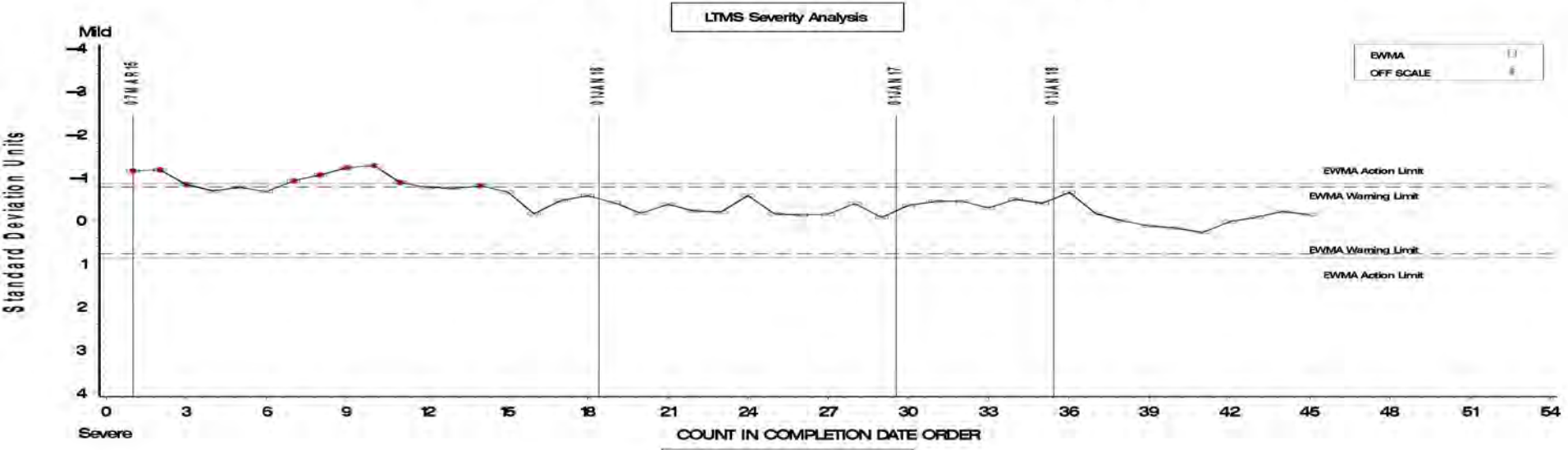
Status	Cause	#
Invalid	No invalid test	0
Aborted	EGR heat exchanger control valve malfunction	1
Total		1

*Invalid and aborted tests

T-13 Test Severity

- ▶ IRPH is in control.
- ▶ KV40PC is in level 2 severity alarm in the mild direction.

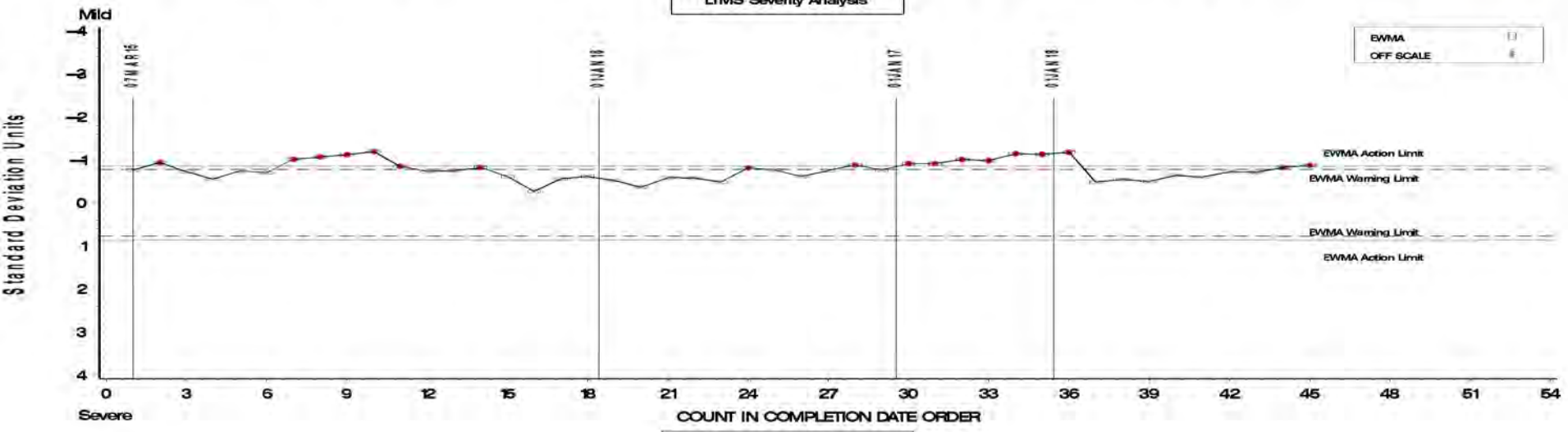
FINAL ORIGINAL PEAK HEIGHT IR AT EOT



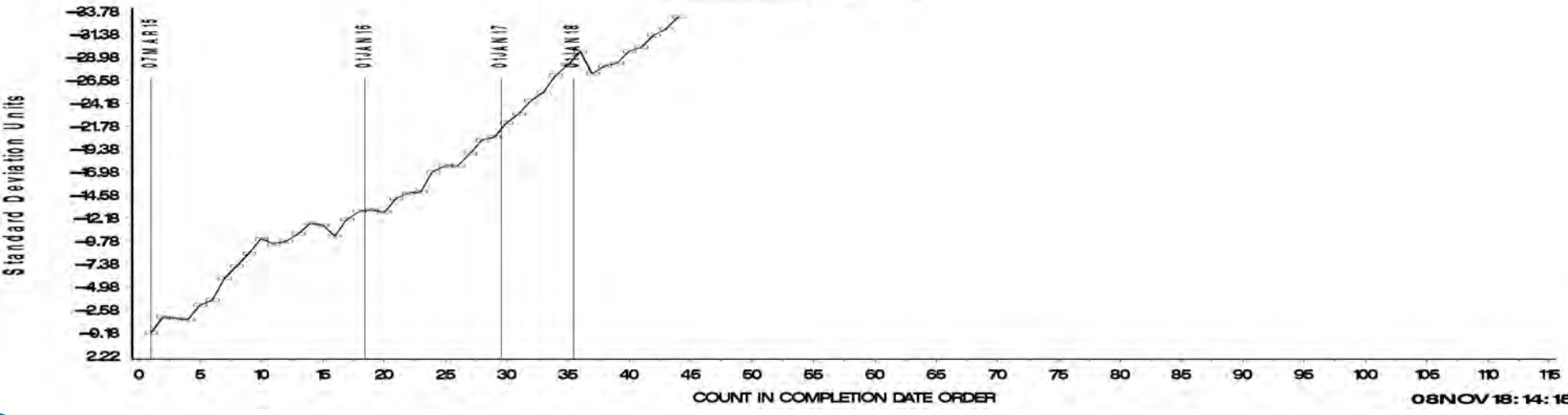
08 NOV 18 : 14 : 15

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

LTMS Severity Analysis

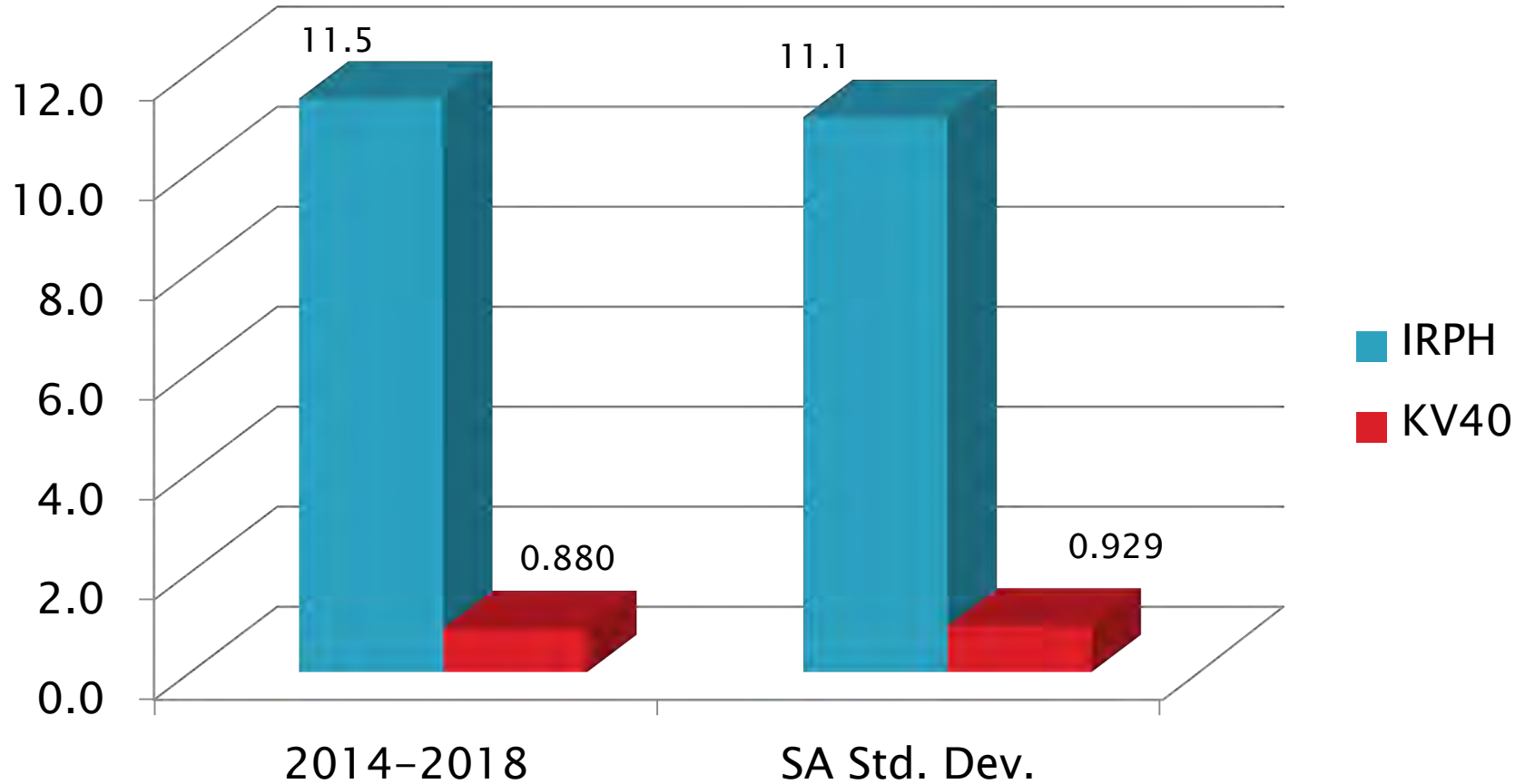


CUSUM Severity Analysis



08 NOV 18: 14: 15

T-13 Precision Estimates



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Information Letters

»» April 1, 2018 –
September 30, 2018

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Information Letters*

Test	Date	IL	Topic
1R	4/30/2018	18-1	Changes to 1R Humidity Probe Location
C13	4/30/2018	18-2	Oil Filter Housing Modifications and Critical Parts Updates
1K/1N	5/7/2018	18-1	Correction to 1K/1N Liner Measurement Requirements
T13	6/12/2018	18-1	T-13 Humidity Control

*Available from TMC Website

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Reference Oil Inventory

»» Actions, Re-blends, Inventories
and Estimated Life

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Reference Oil Reblends

- ▶ Re-blend of 832 complete and in use

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	10	2123	214	5+ years
811-2	1K, 1N	1732	0	908	40	5+ years
821-4	T-12	4495	50	2676	150	5+ years
822-2	1R, T-11	4386	112	2816	168	5+ years
823	T-13	1796	220	762	180	2.5 years
830-2	ISM	3786	0	115	125	2.5 years
830-3	ISM	2891	50	2816	75	5+ years
831-3	C13, ISB	972	0	61	165	1 year
831-4	C13, ISB	1699	20	1497	145	5+ years

Reference Oil Inventory Estimated Life

Oil	Tests	Original Blend Amount	Quantity Shipped in last 6 months	TMC Inventory	Lab Inventory	Estimated Life
832	COAT	1166	280	72	168	< 1 year
832-1	COAT	1951	196	1750	28	5+ years
833	COAT	1152	28	48	84	< 1 year
833-1	COAT	1248	140	1047	0	5+ years
864-1	DD13	1576	100	1130	150	5+ years
866	DD13	341	25	241	0	5 years
873-2	1M-PC	1650	0	36	40	3 years
1005-4	1P, 1R, EOAT, RFWT, T-8/E	2000	0	74	30	< 0.5 years
1005-5	1P, 1R, EOAT, RFWT, T-8/E	3826	215	2278	214	3 years

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LTMS Deviations

»» April 1, 2018 –
September 30, 2018

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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, 2018 –

September 30, 2018

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Quality Index Deviations

- ▶ 2 Quality Index Deviations during this period
 - 1P–Inlet Air Pressure
 - T13–Oil Gallery Temperature

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	6
T-13	2
COAT	4

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TMC Laboratory Visits

»» April 1, 2018 –

September 30, 2018

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TMC Lab Visits

- ▶ 2 Labs were visited during this period

Test	Number of Labs-Number of Stands
T-8/E	1-1
T-11	1-1
T-12	1-1
T-13	1-1

Lab Visit Issues

- ▶ T8
 - No discrepancies were found.
- ▶ T11
 - No discrepancies were found.
- ▶ T12
 - No discrepancies were found.
- ▶ T13
 - No discrepancies were found.

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Test Area Timelines

»» April 1, 2018 –
September 30, 2018

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Test Area Timeline Additions*

Test	Date	IL/Memo	Topic
1R	4/30/2018	18-1	Changes to 1R Humidity Probe Location
C13	4/30/2018	18-2	Oil Filter Housing Modifications and Critical Parts Updates
1K/1N	5/7/2018	18-1	Correction to 1K/1N Liner Measurement Requirements
T13	6/12/2018	18-1	T-13 Humidity Control

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*As of 3/31/2018

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Rating Workshop Data

»» 2018 Heavy Duty Workshop

Test Monitoring Center

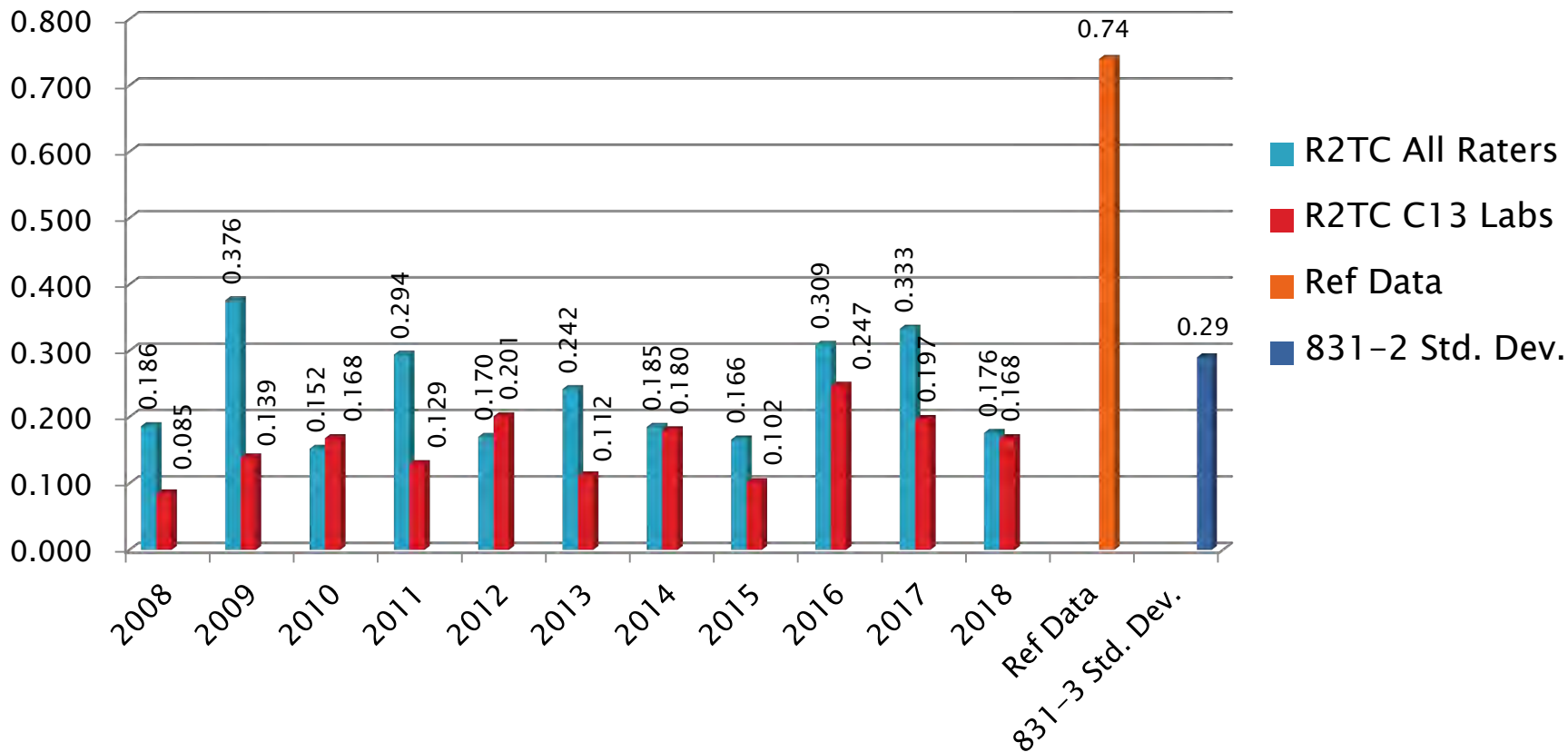
<http://astmtmc.cmu.edu>



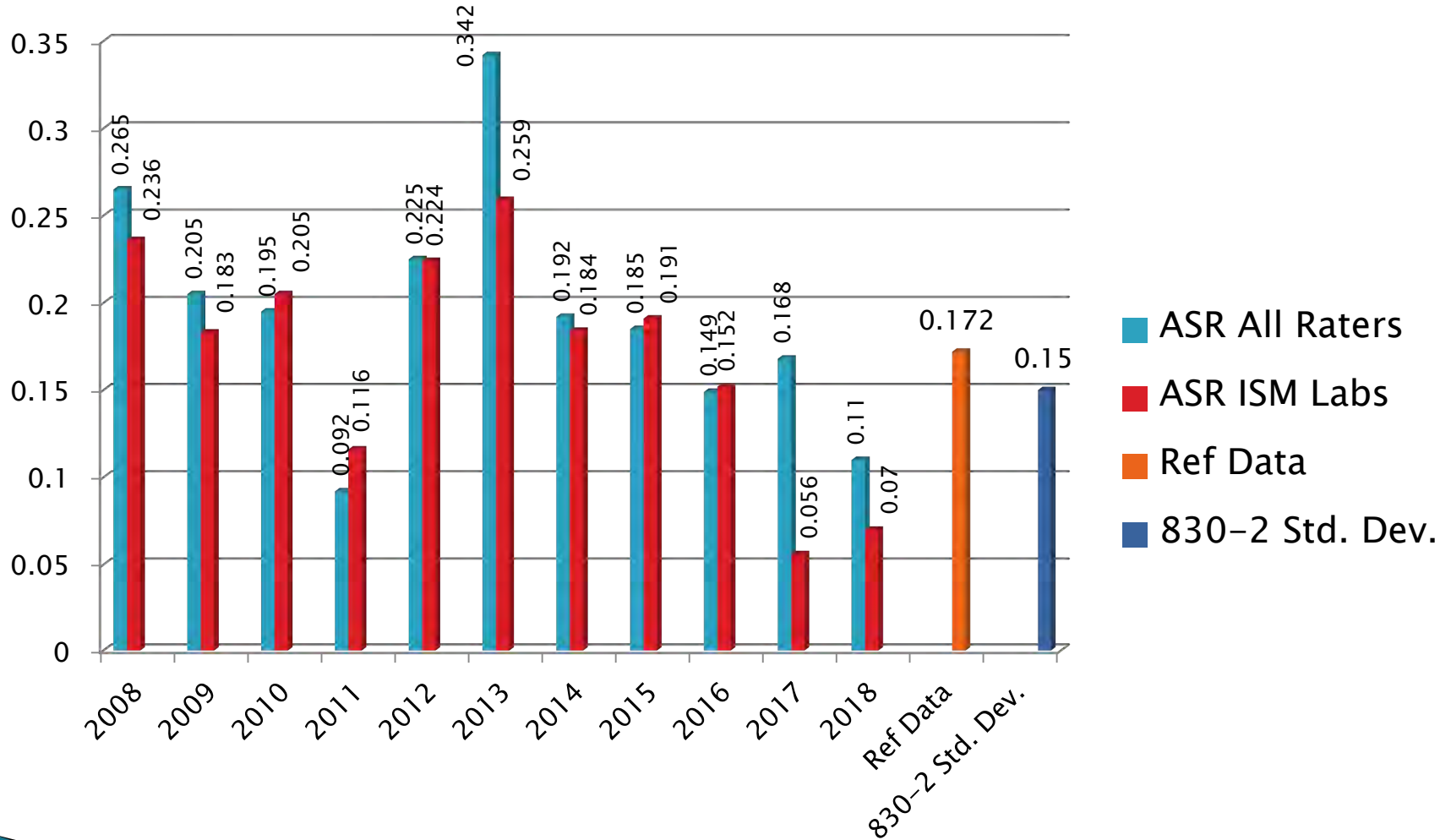
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C13 2nd Ring Carbon Precision – Rating Workshop Data

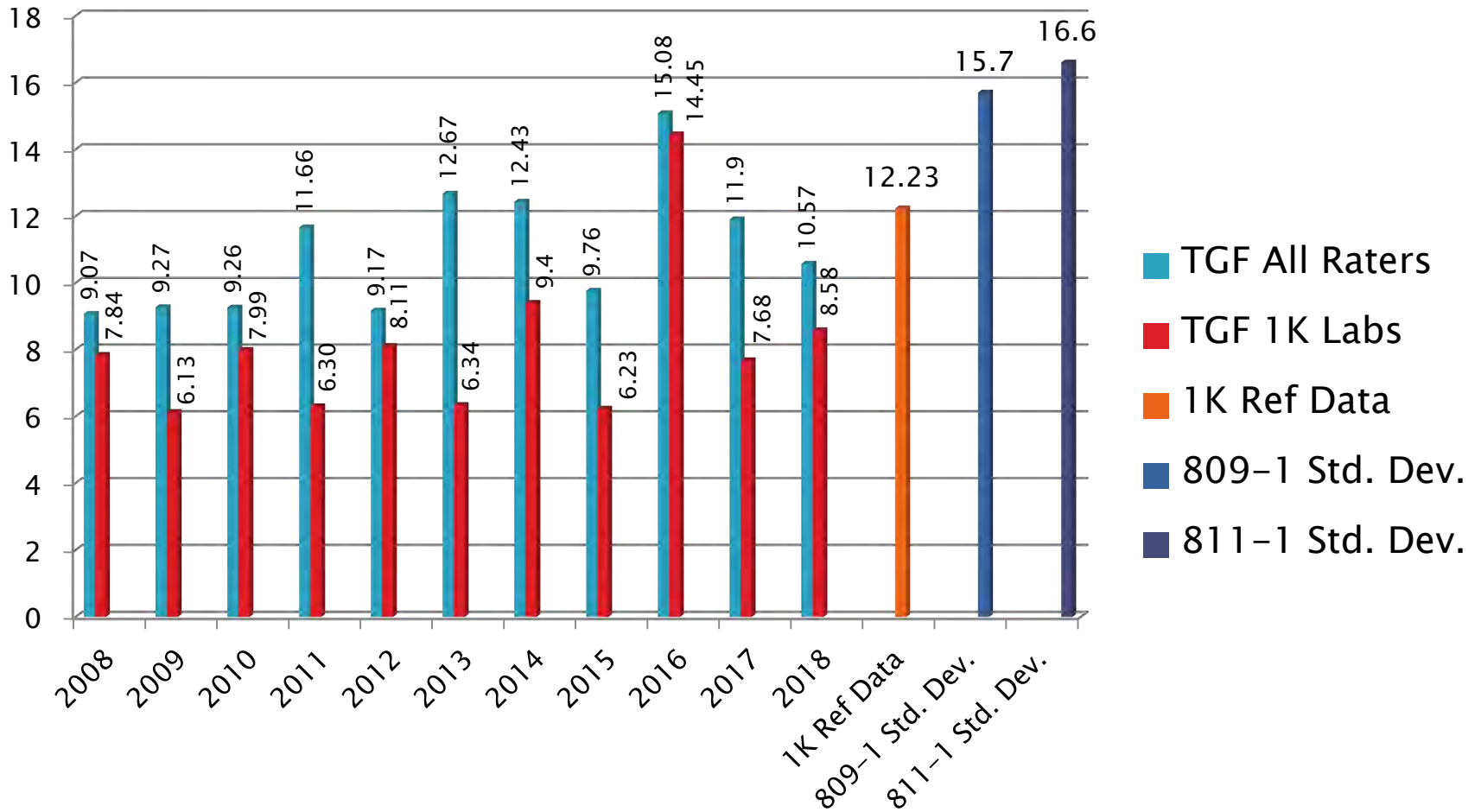
R2TC



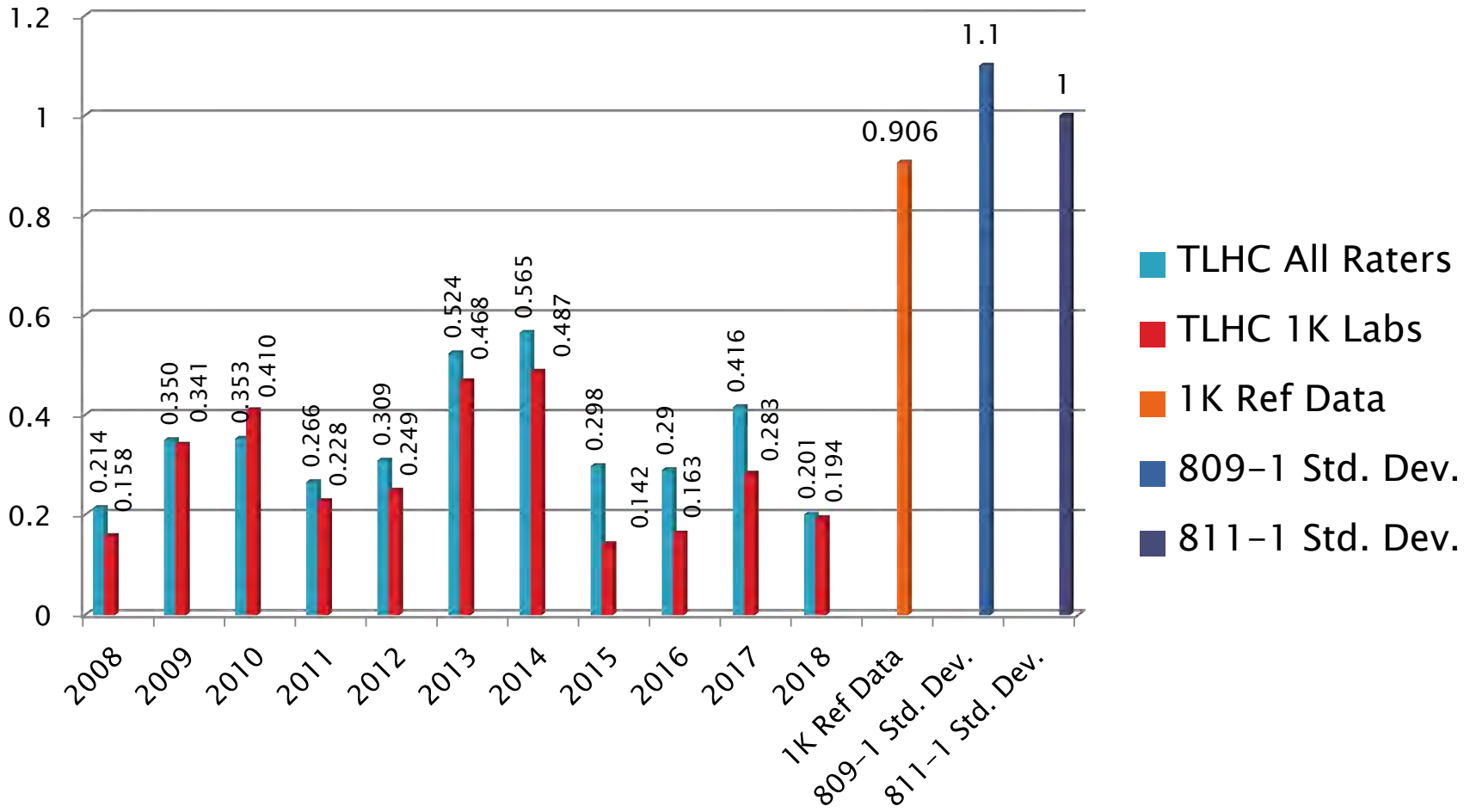
ISM Sludge Rating Precision - Rating Workshop Data



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

- ▶ www.astmtmc.cmu.edu

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