A Program of ASTM International

Test Monitoring Center

Carnegie Mellon University
6555 Penn Avenue, Pittsburgh, PA 15206, USA

http://astmtmc.cmu.edu
412-365-1000

MEMORANDUM: 09-069

DATE: December 3, 2009

TO: Becky Grinfield,
Chairman, Engine Oil Elastomer Compatibility Surveillance Panel

FROM: Michael T. Kasimirsky

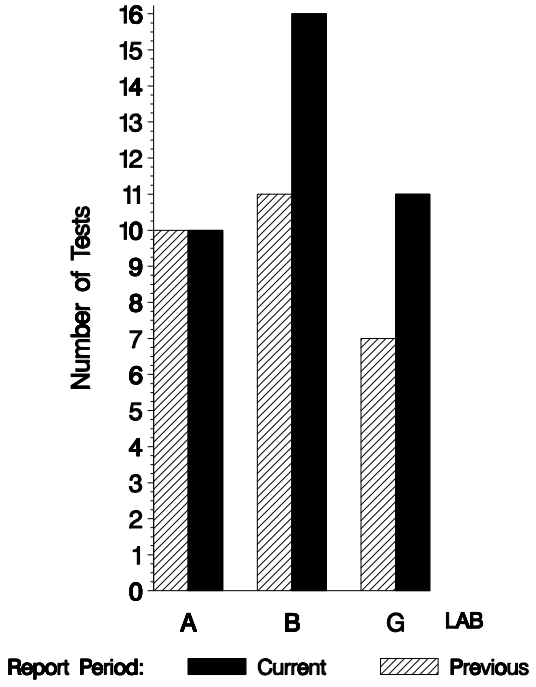
SUBJECT: EOEC Testing from April 1, 2009 through September 30, 2009

A total of 174 EOEC tests were reported to the Test Monitoring Center during the period from April 1, 2009 through September 30, 2009. Following is a summary of testing activity this period.

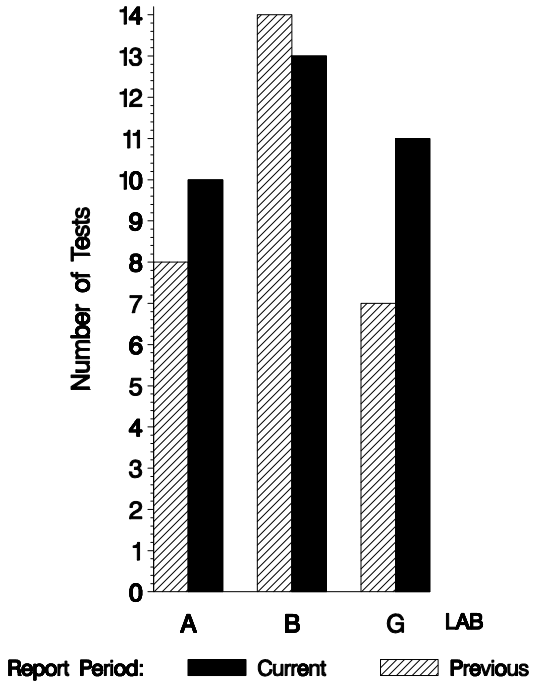
	Reporting Data
Number of Labs	3

Tests reported this period were distributed as shown below:

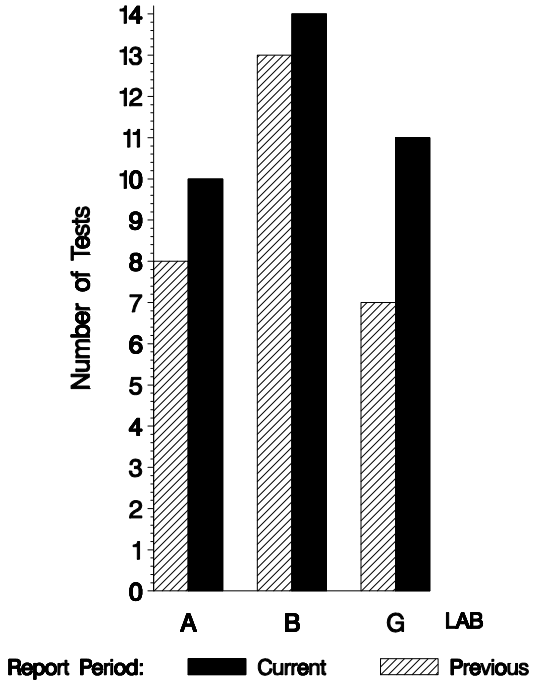
NUMBER OF FLUOROELASTOMER TESTS
REPORTED BY LAB AND REPORT PERIOD



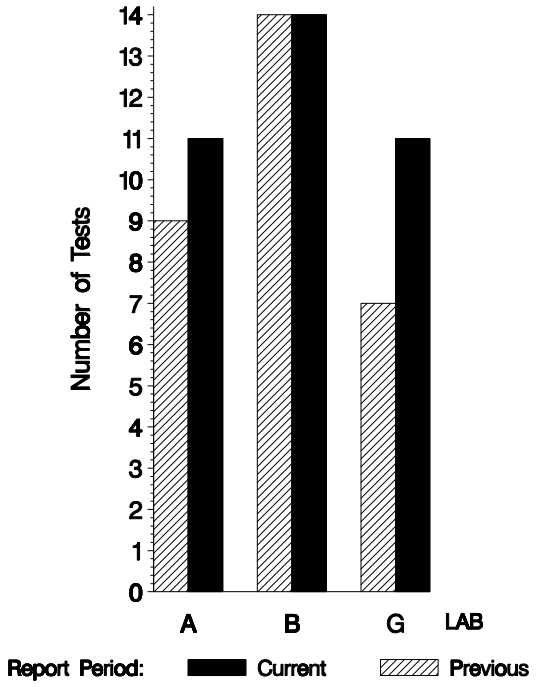
NUMBER OF NITRILE TESTS
REPORTED BY LAB AND REPORT PERIOD



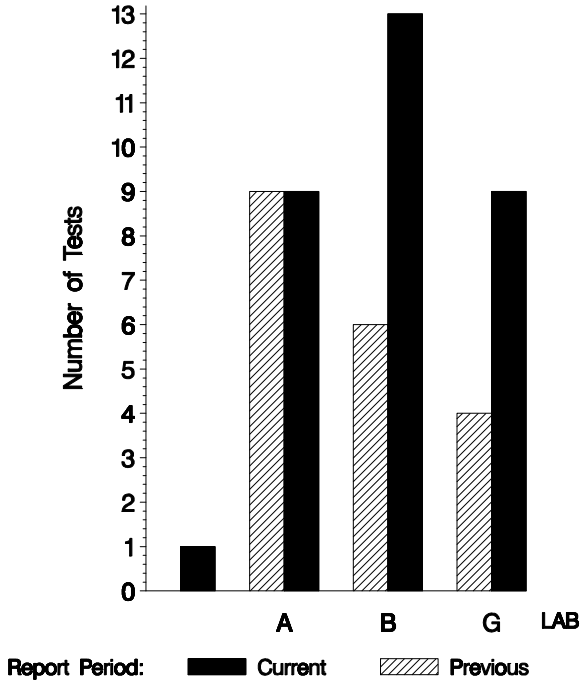
NUMBER OF POLYACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



NUMBER OF SILICONE TESTS
REPORTED BY LAB AND REPORT PERIOD

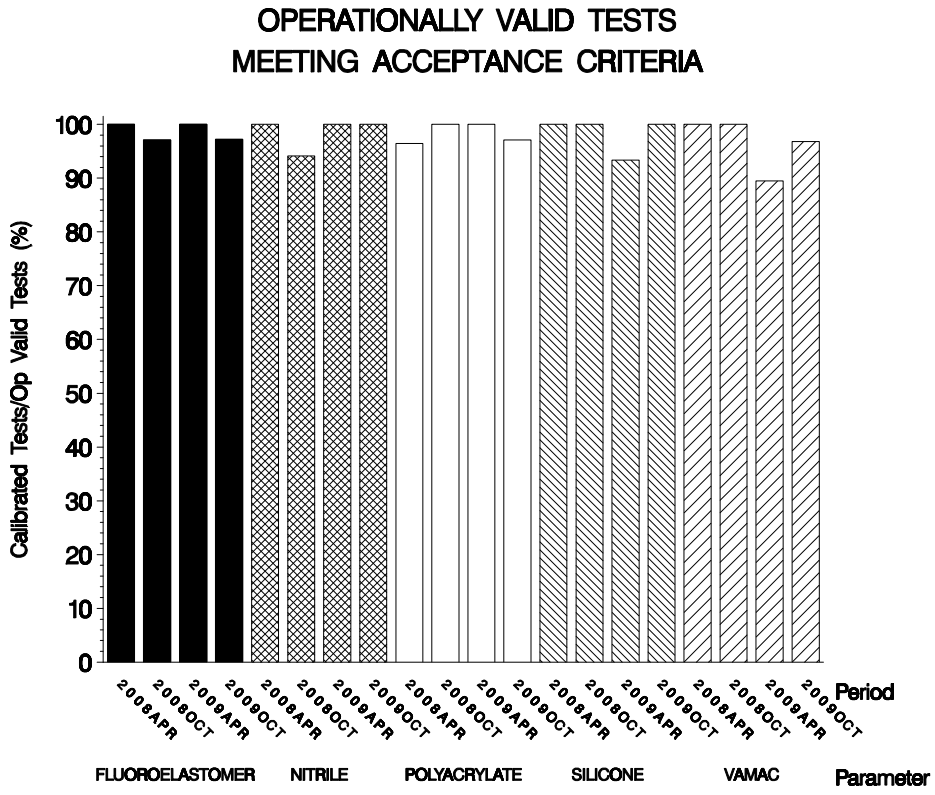


NUMBER OF VAMAC TESTS
REPORTED BY LAB AND REPORT PERIOD



Test Distribution by Oil and Validity

		Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Vamac	Totals Last Period	Totals This Period
Accepted for Calibration	AC	35	33	33	35	30	128	166
Rejected	OC	1	0	1	0	1	2	3
Information Run (not for calibration)	NI	0	0	0	0	0	0	0
Operationally Invalid (lab)	LC	1	1	1	1	1	0	5
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0	0	0
Aborted Calibration	XC	0	0	0	0	0	0	0
Total		37	34	35	36	32	132	174



The above chart shows the percentage of accepted operationally valid tests. This period one fluoroelastomer test, on polyacrylate test, and one vamac test failed to meet the acceptance criteria.

Lost Tests per Start by Lab and Elastomer Type

	Fluoroelastomer			**Nitrile**			**Polyacrylate**			**Silicone**			**Vamac**			Total		
Lab	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A	0	10	0	0	10	0	0	10	0	0	11	0	0	10	0	0	51	0
B	1	16	6	1	13	8	1	14	7	1	14	7	1	13	8	5	70	7
G	0	11	0	0	11	0	0	11	0	0	11	0	0	9	0	0	53	0
Total	0	37	0	0	34	0	0	35	0	0	36	0	0	32	0	0	174	0

Lost tests are those that were aborted or operationally invalid.

Causes for Lost Tests

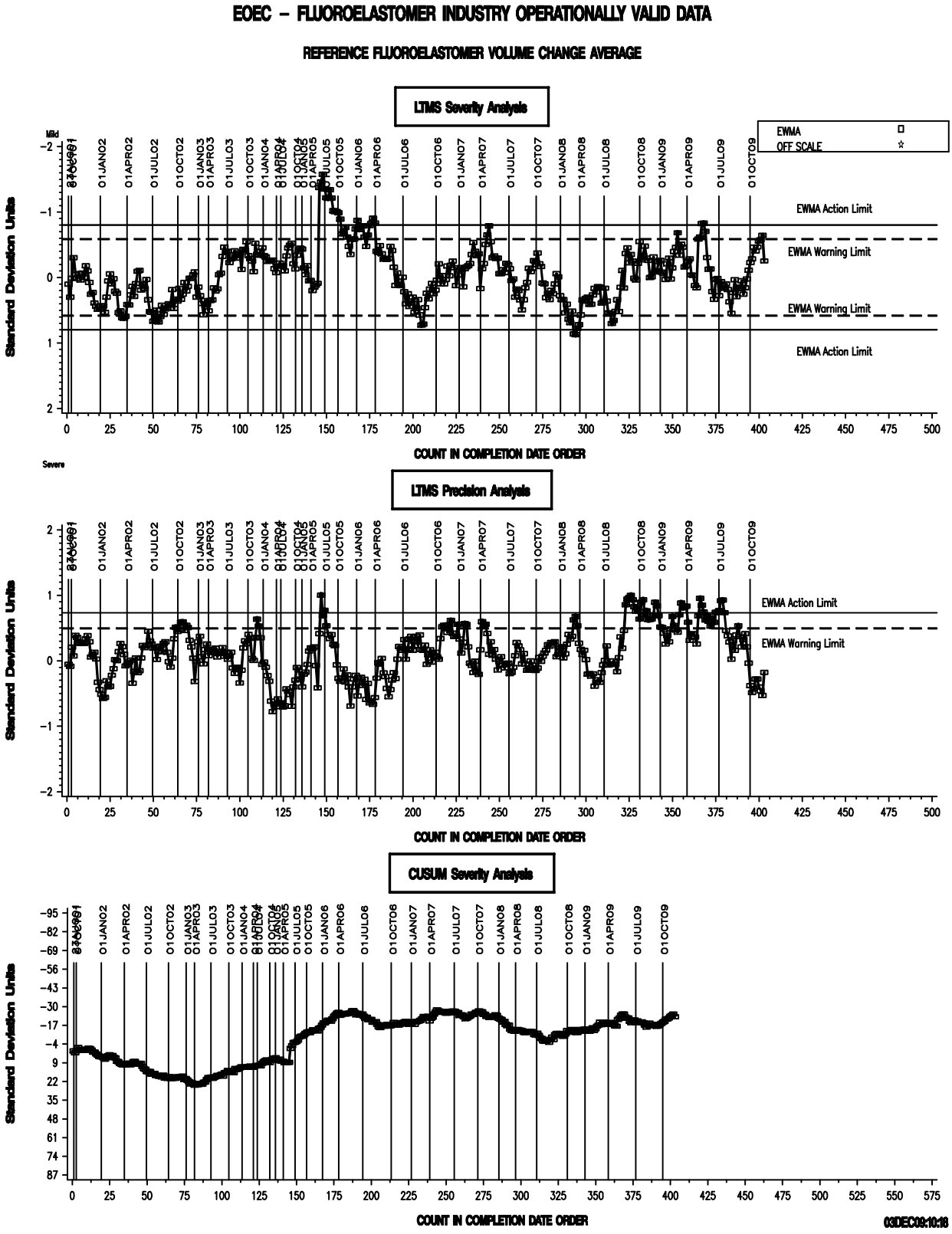
			Elastomer										
			Fluoroelastomer	Nitrile	Polyacrylate	Silicone	VAMAC	Validity			Loss Rate		
Lab	Cause							LC	RC	XC	Lost	Starts	%
B	Power Failure		●	●	●	●	●	●			5	174	3%
		Lost	1	1	1	1	1	5	0	0			
		Starts	37	34	35	36	31	174	174	174			
		%	3%	3%	3%	3%	3%	3%	0%	0%			

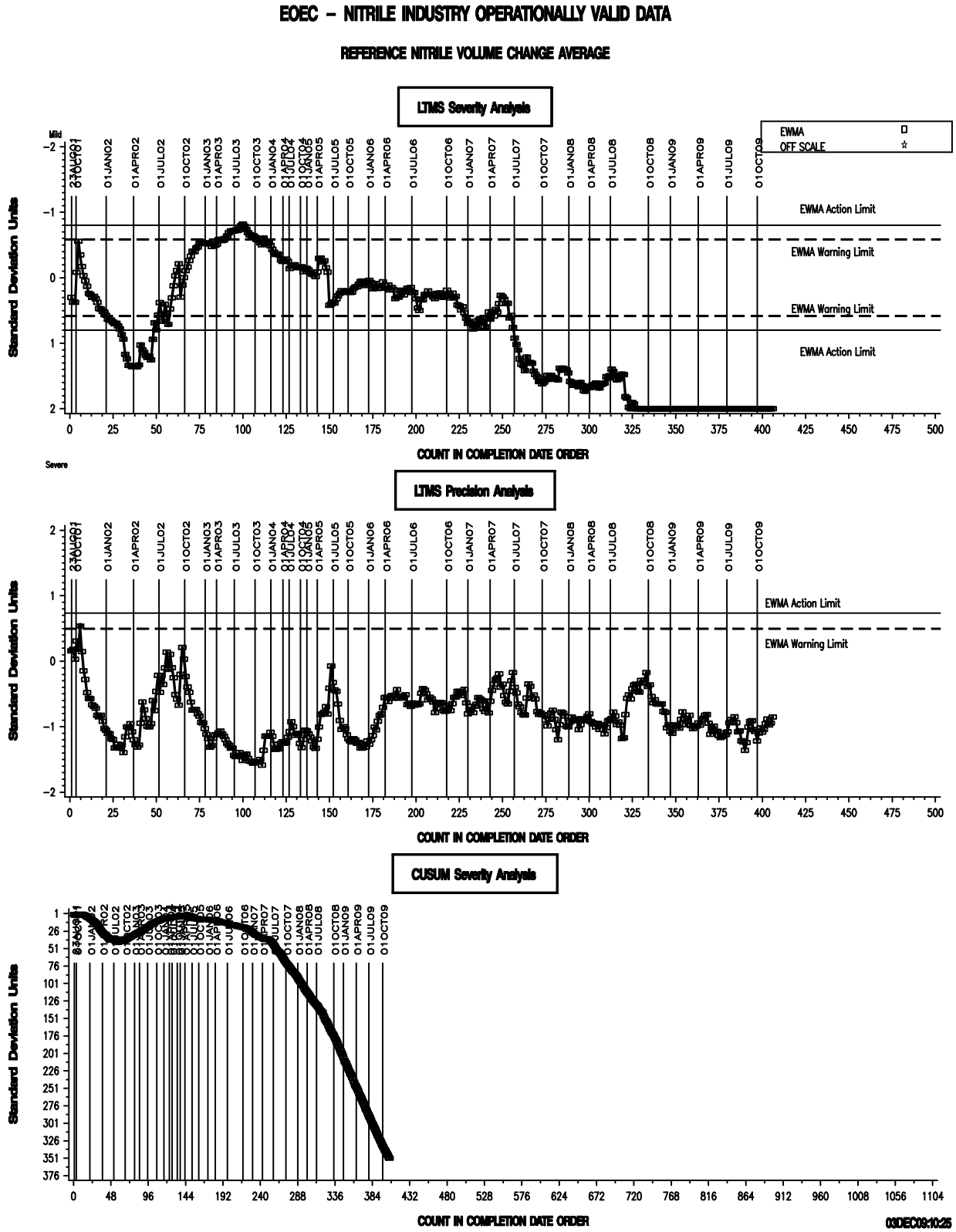
Average Δ/s by Lab						
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI	ELONYI
Fluoroelastomer						
	A	10	-0.682	0.318	-0.531	-0.803
	B	15	-0.626	0.561	-0.152	-0.720
	G	11	1.437	-0.756	0.221	-0.054
	Industry	36	-0.011	0.091	-0.143	-0.539
Nitrile						
	A	10	2.363	0.582	-1.038	-0.363
	B	12	2.678	0.610	-0.629	-0.363
	G	11	2.368	-0.224	0.277	-1.370
	Industry	33	2.479	0.323	-0.451	-0.699
Polyacrylate						
	A	10	1.786	0.061	0.542	0.473
	B	13	2.029	-0.358	0.860	0.694
	G	11	1.858	-0.121	0.404	1.287
	Industry	34	1.902	-0.158	0.619	0.821
Silicone						
	A	11	-0.296	0.191	-0.085	-0.007
	B	13	0.932	0.293	-0.641	0.109
	G	11	0.954	1.631	-0.479	-0.295
	Industry	35	0.553	0.682	-0.416	-0.054
VAMAC						
	A	10	1.136	-1.075	1.820	0.457
	B	12	1.530	-1.572	1.917	-0.009
	G	9	2.071	-1.543	2.116	1.001
	Industry	31	1.561	-1.433	1.932	0.426

Individual test results can be viewed at the links shown in the following table:

Links to Individual Test Result Data	
Elastomer Type	**Web Link to Data**
Fluoroelastomer	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecf/data/
Nitrile	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecn/data/
Polyacrylate	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecp/data/
Silicone	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecs/data/
VAMAC	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecv/data/

LTMS CONTROL CHARTS




EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA
REFERENCE NITRILE VOLUME CHANGE AVERAGE
LTMS Severity Analysis
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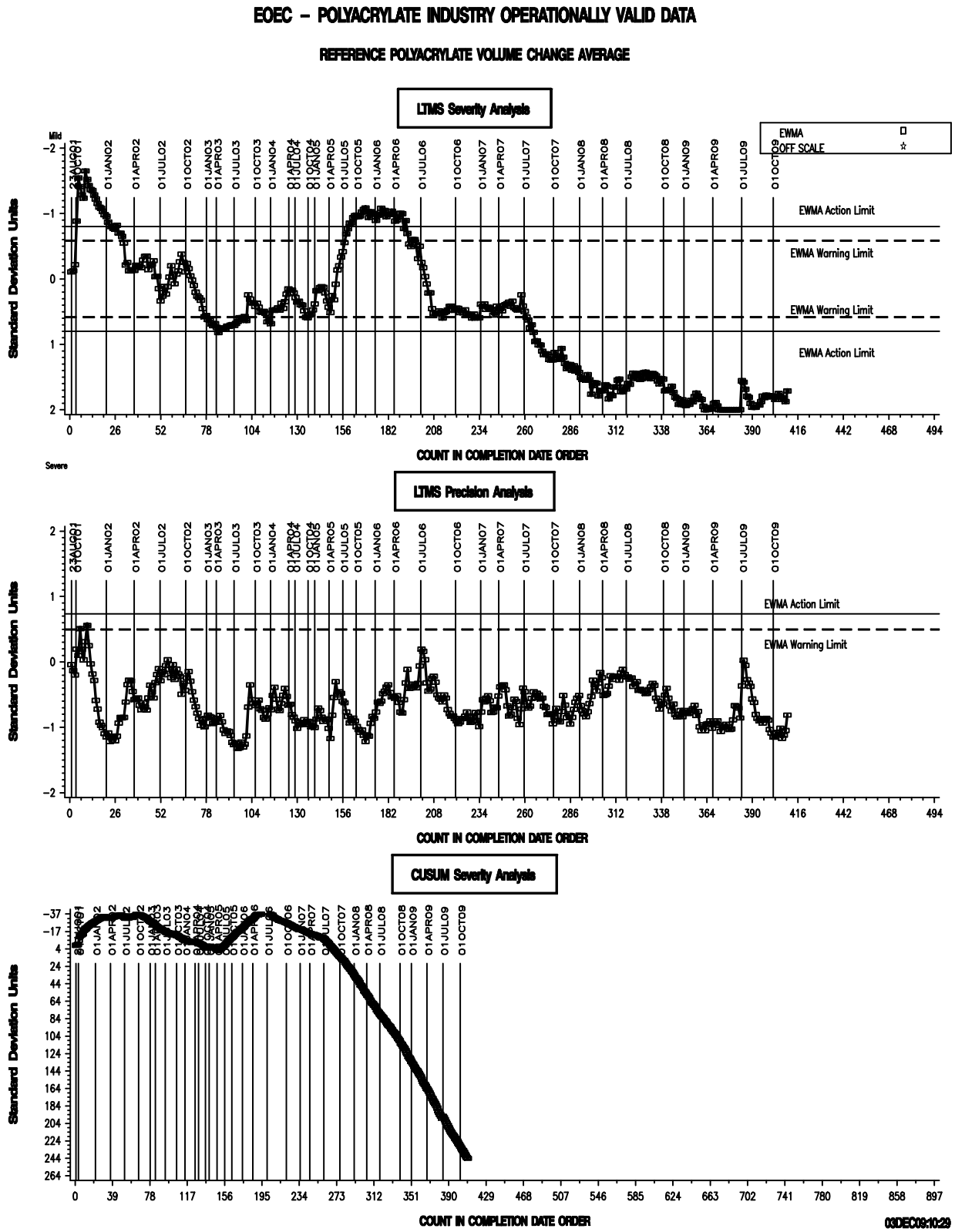
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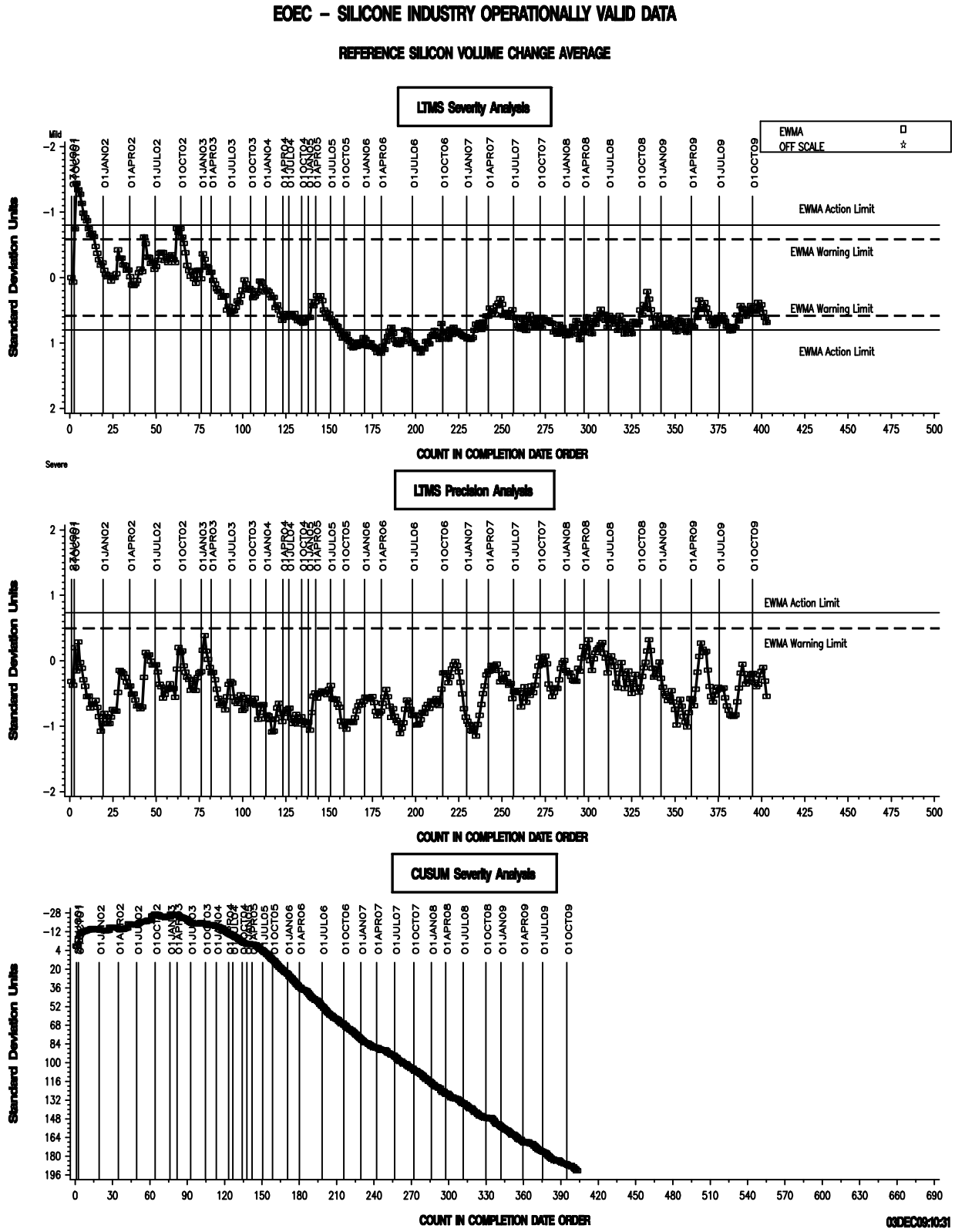
EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
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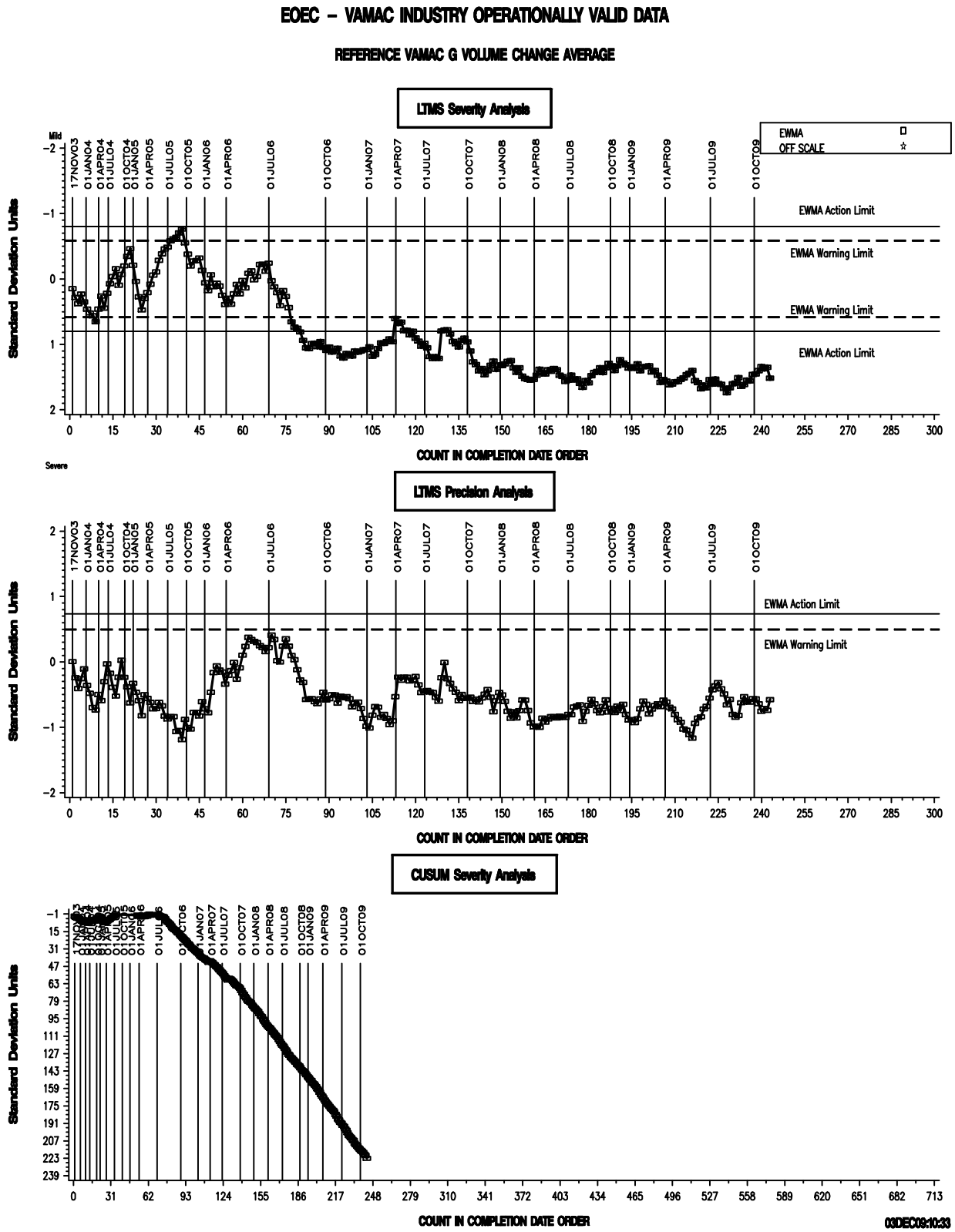
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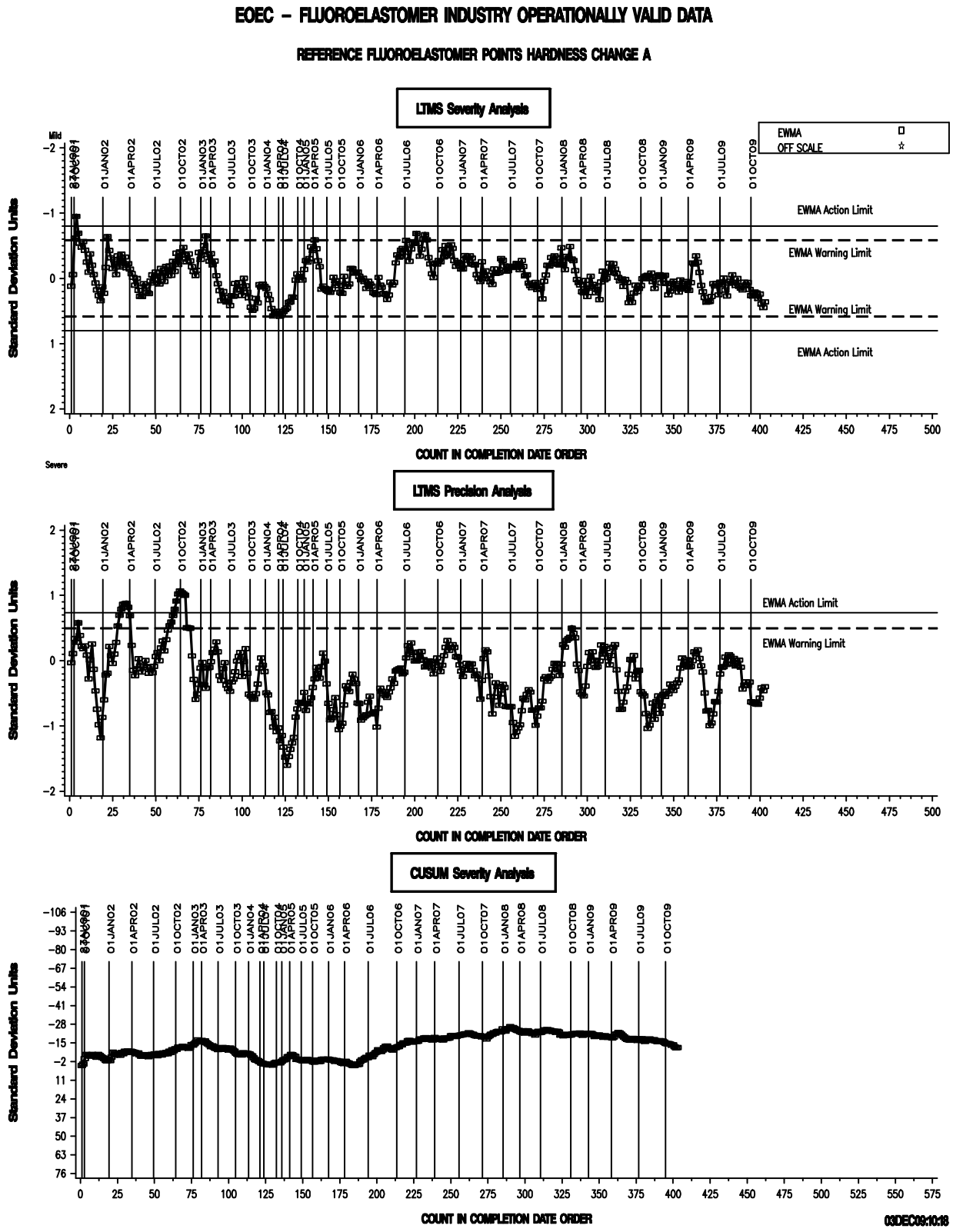
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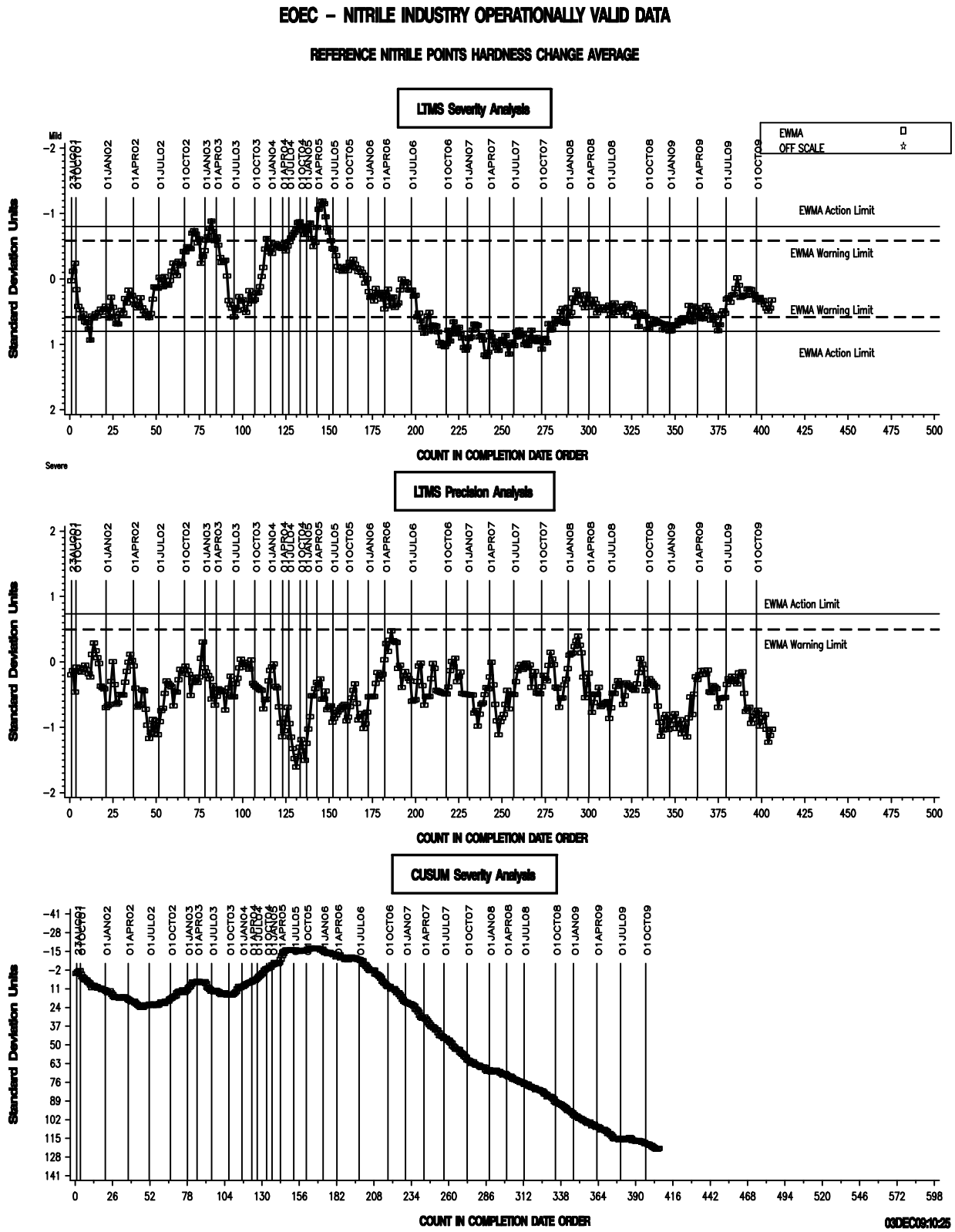
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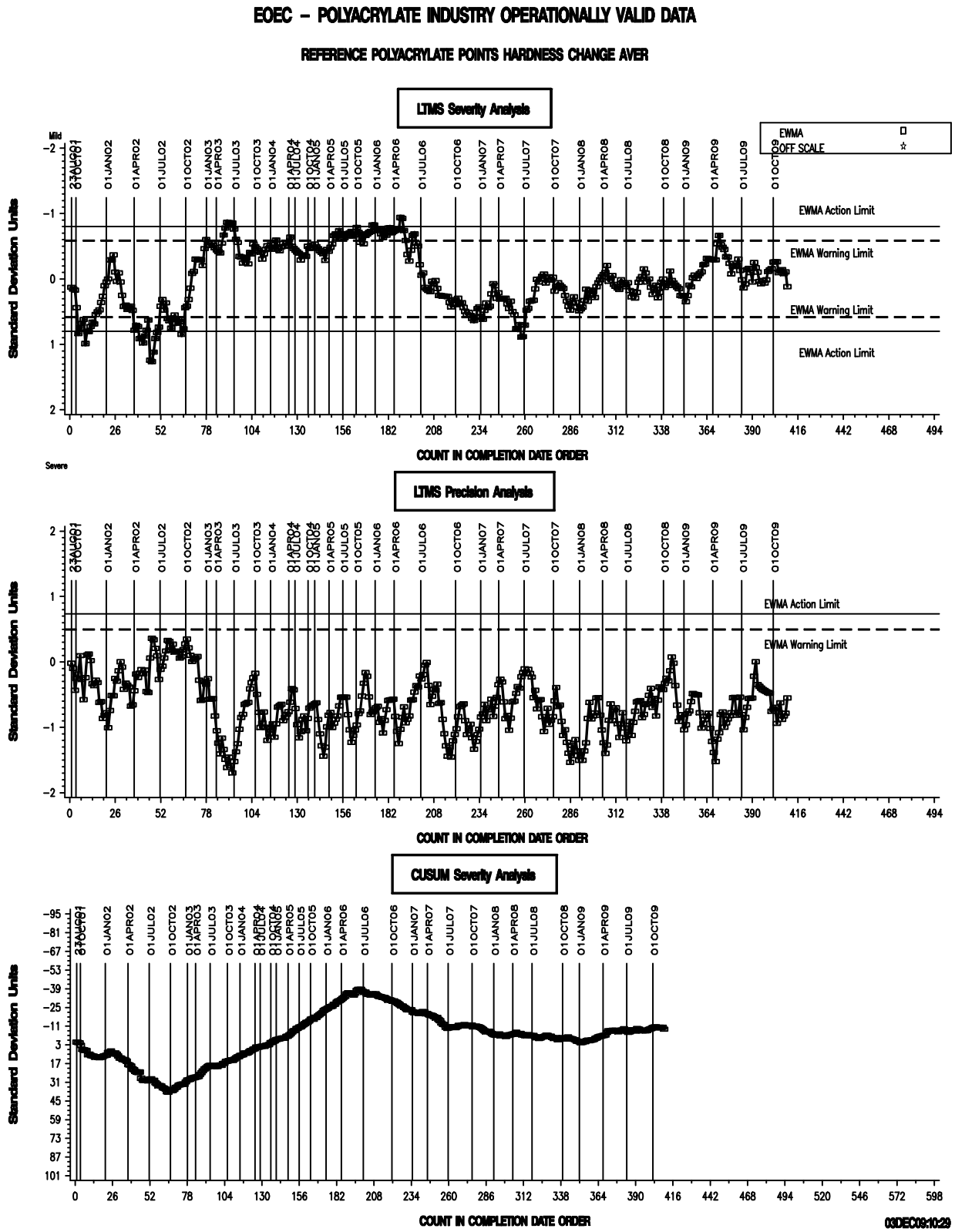
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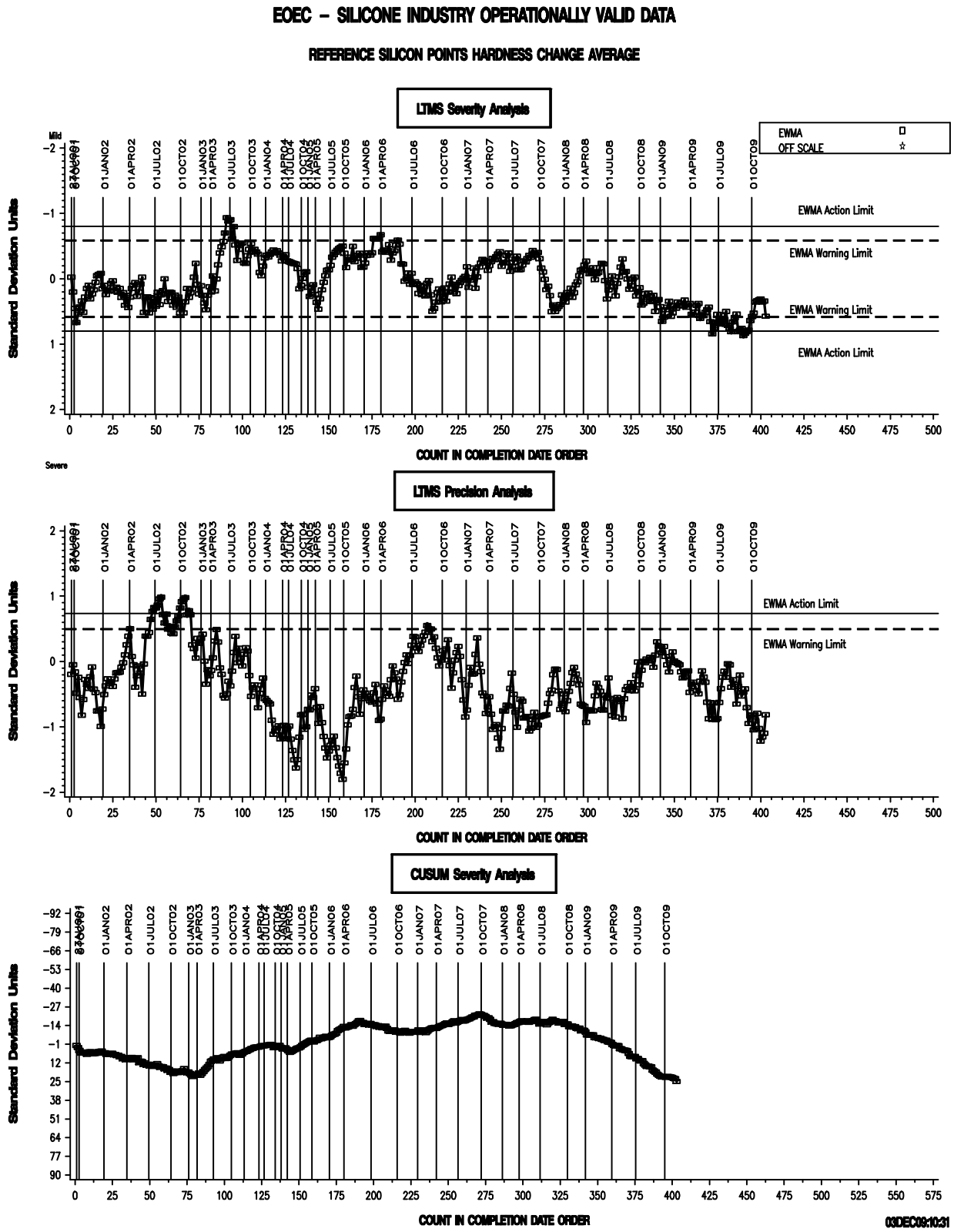
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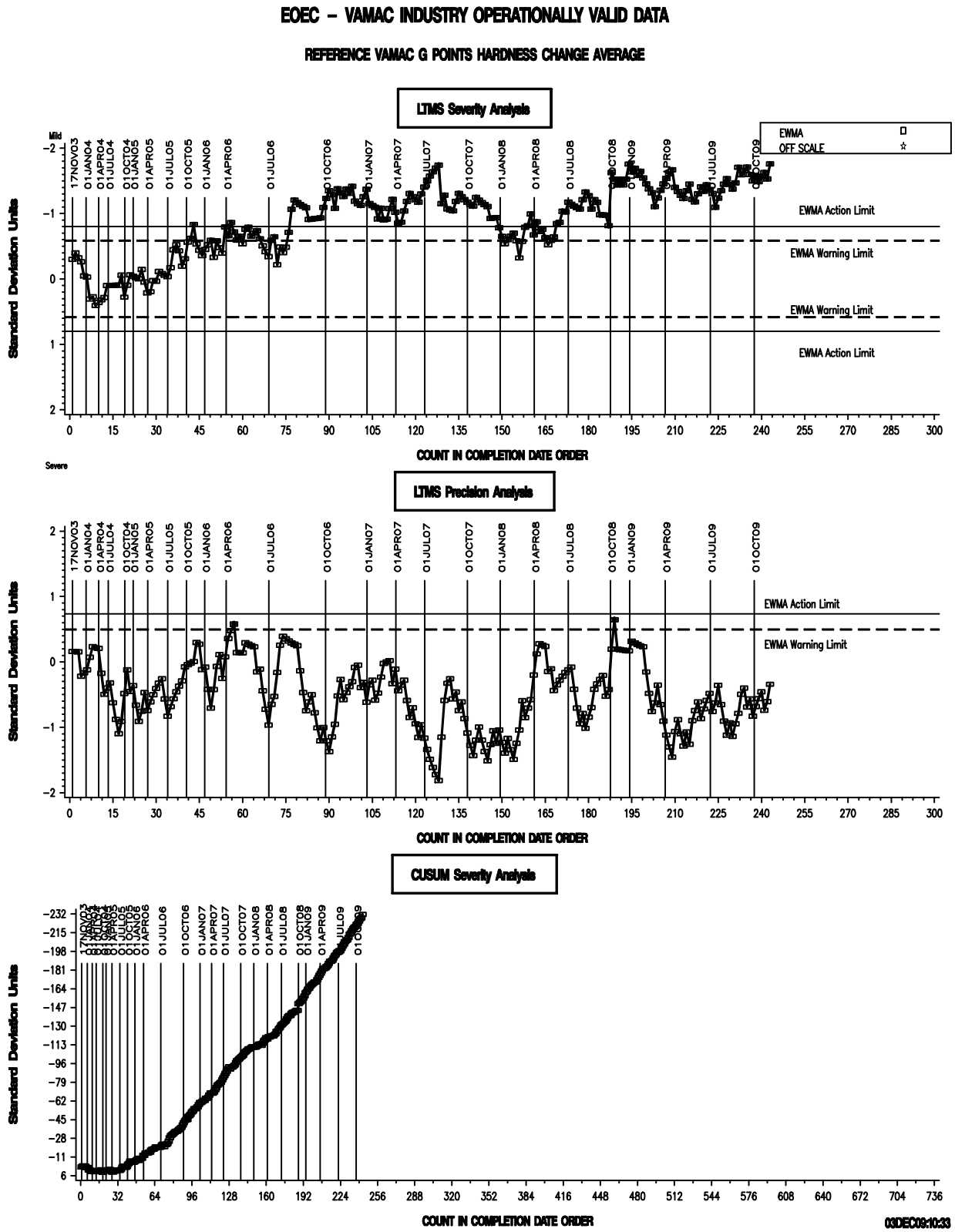
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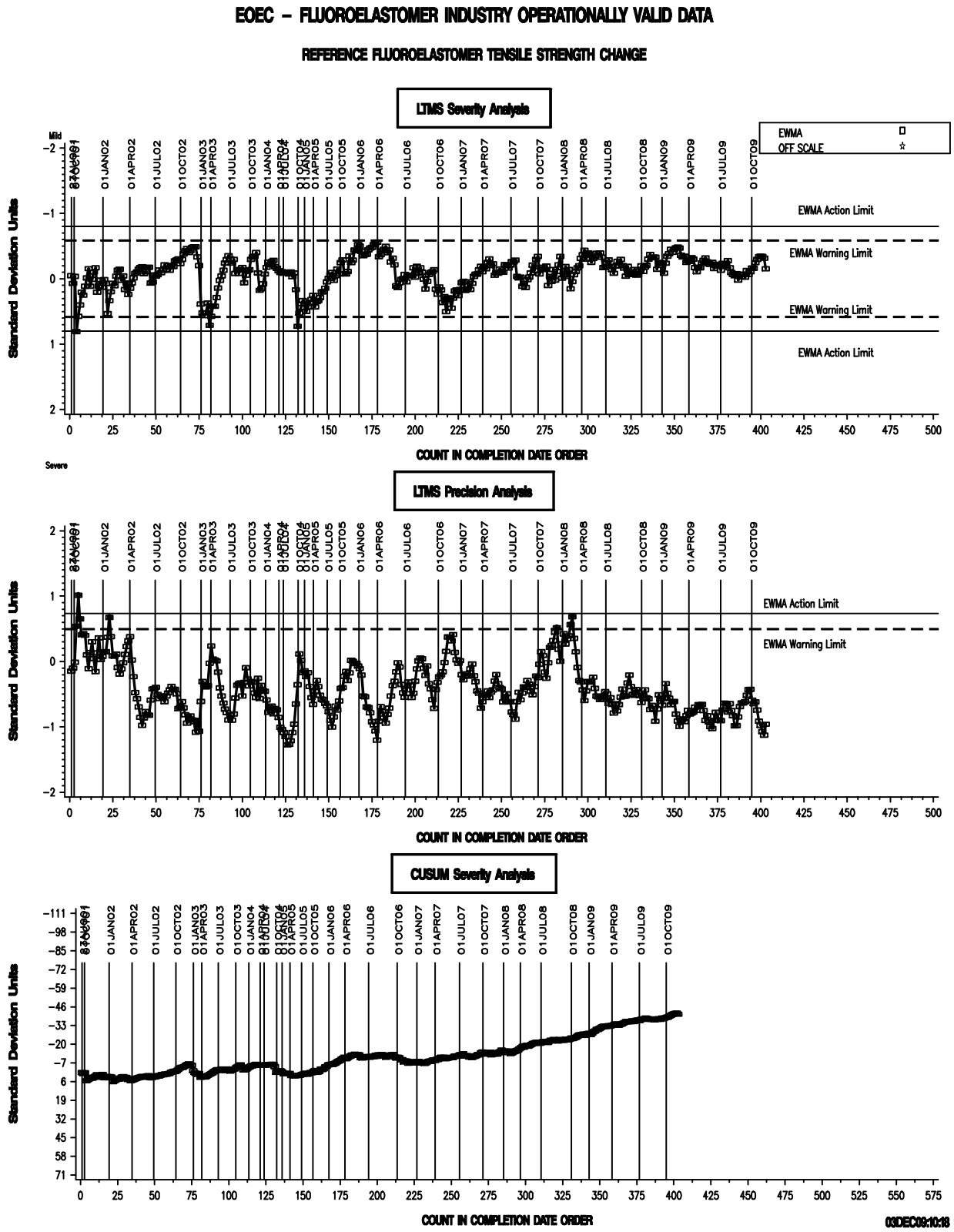
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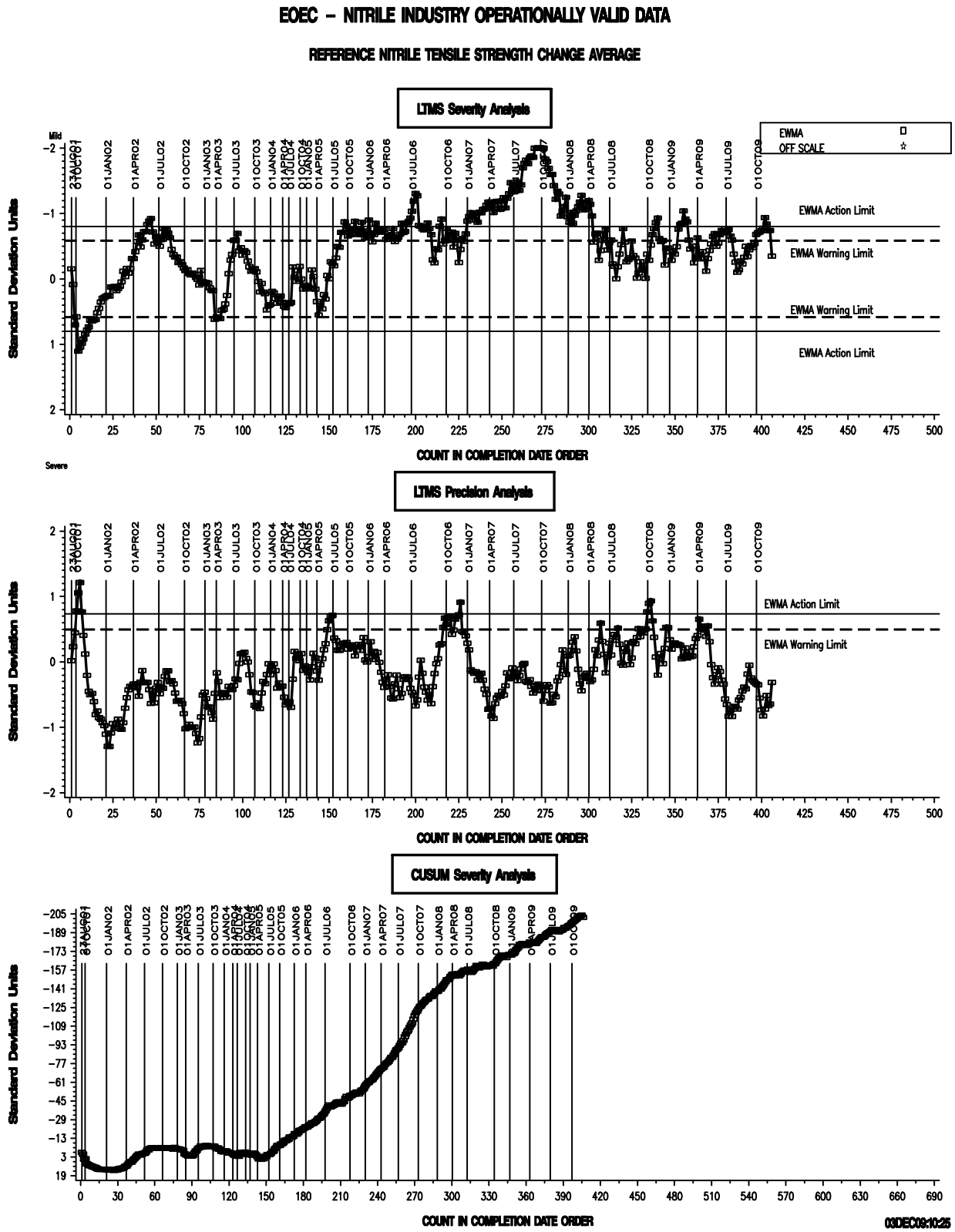
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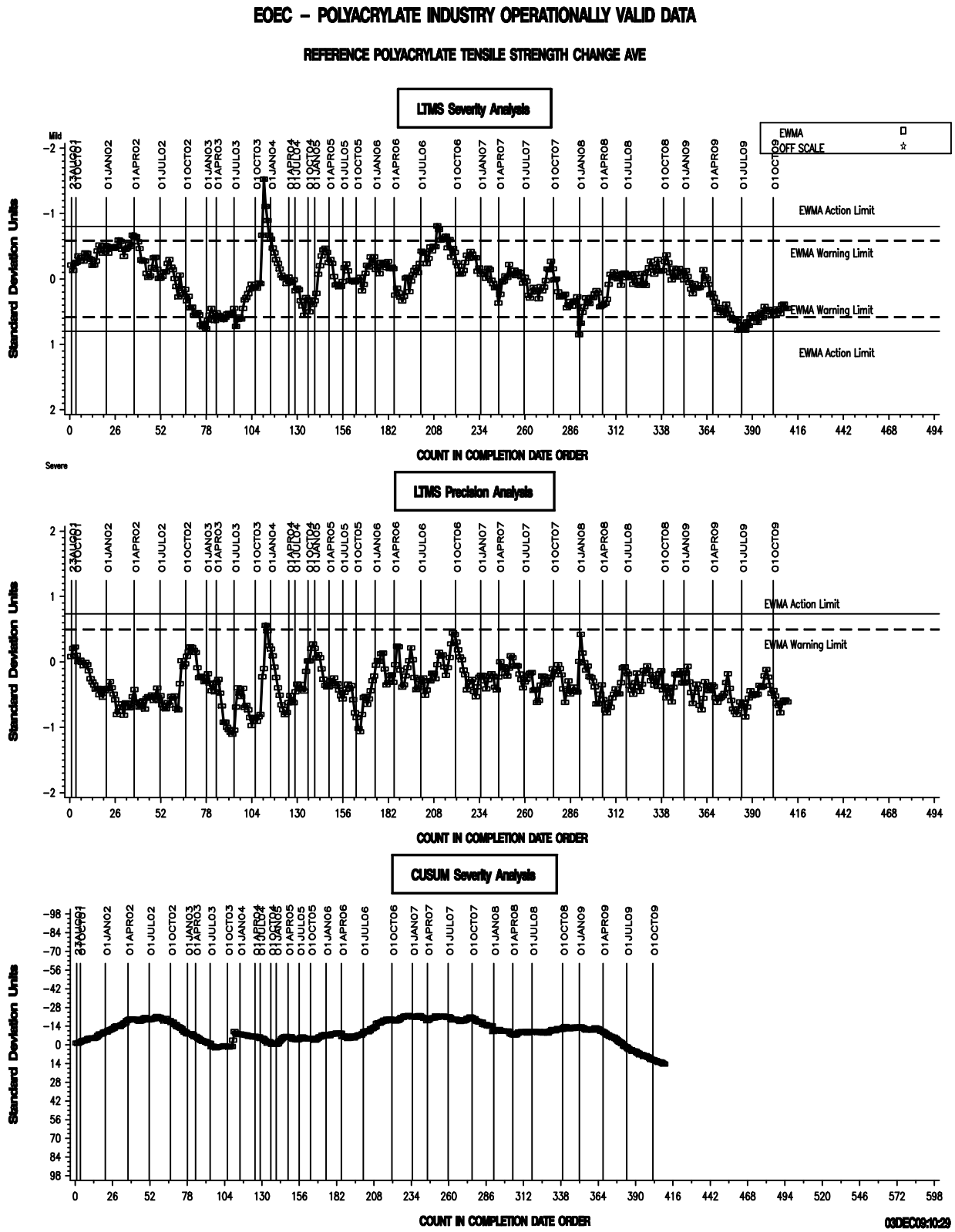
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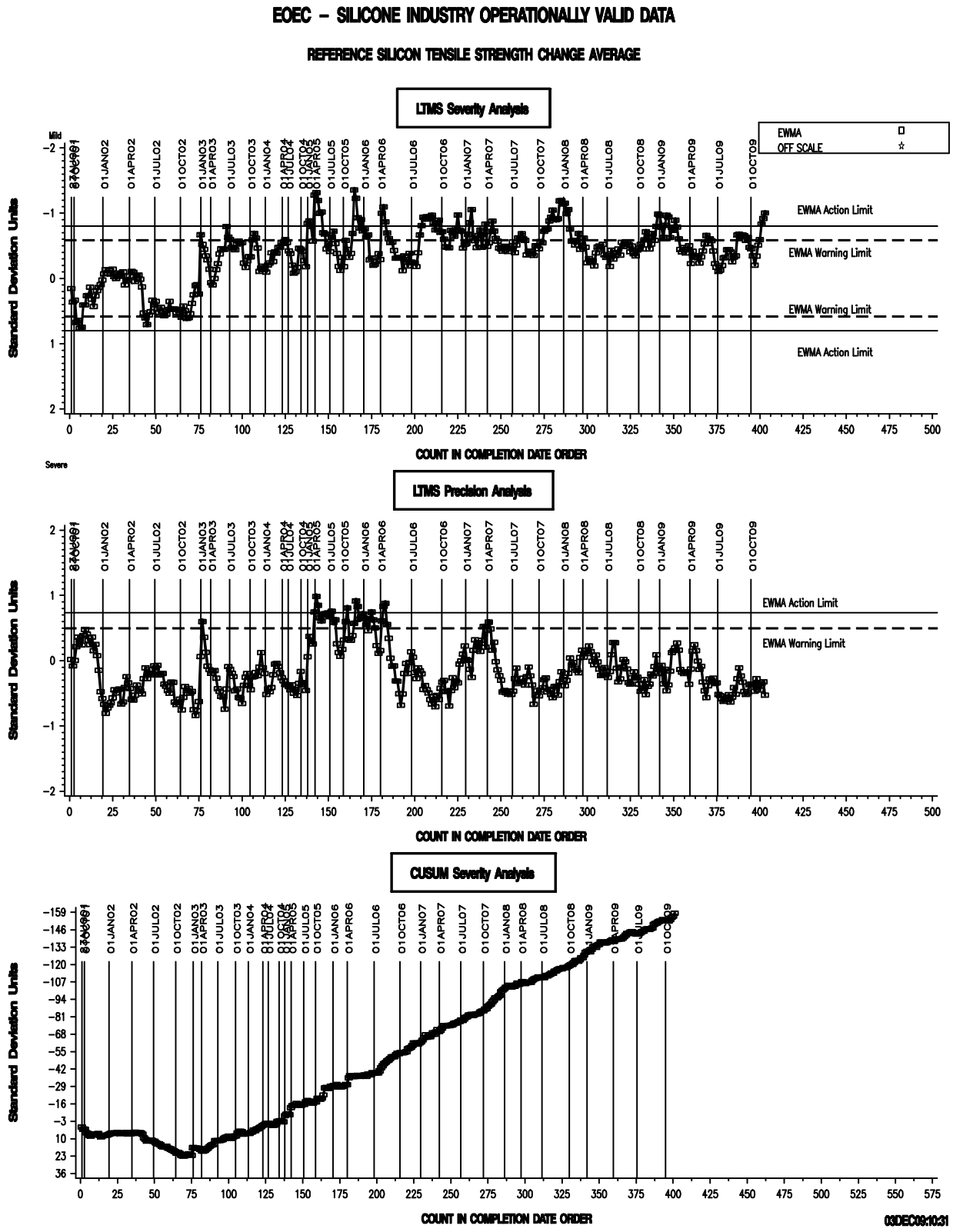
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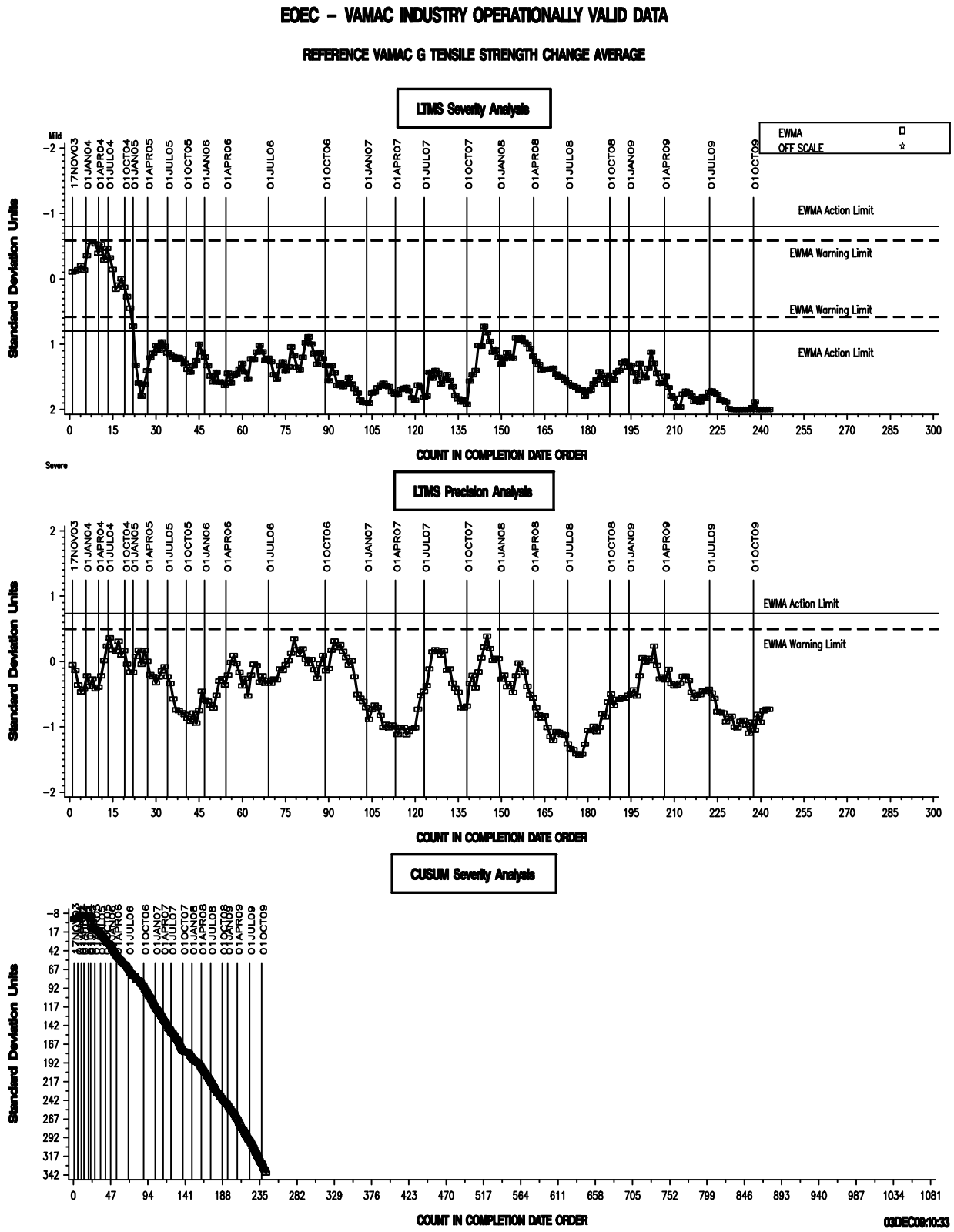
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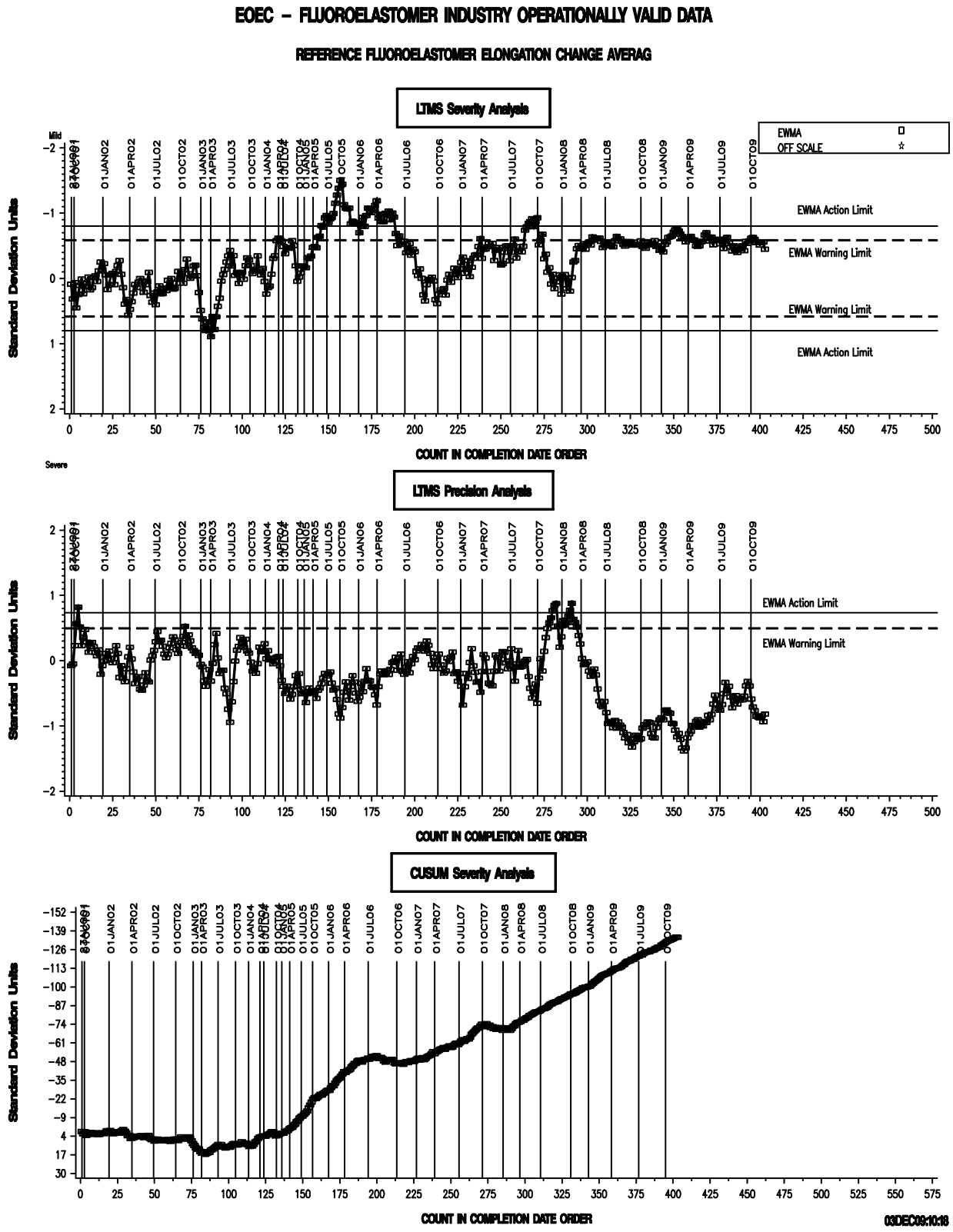
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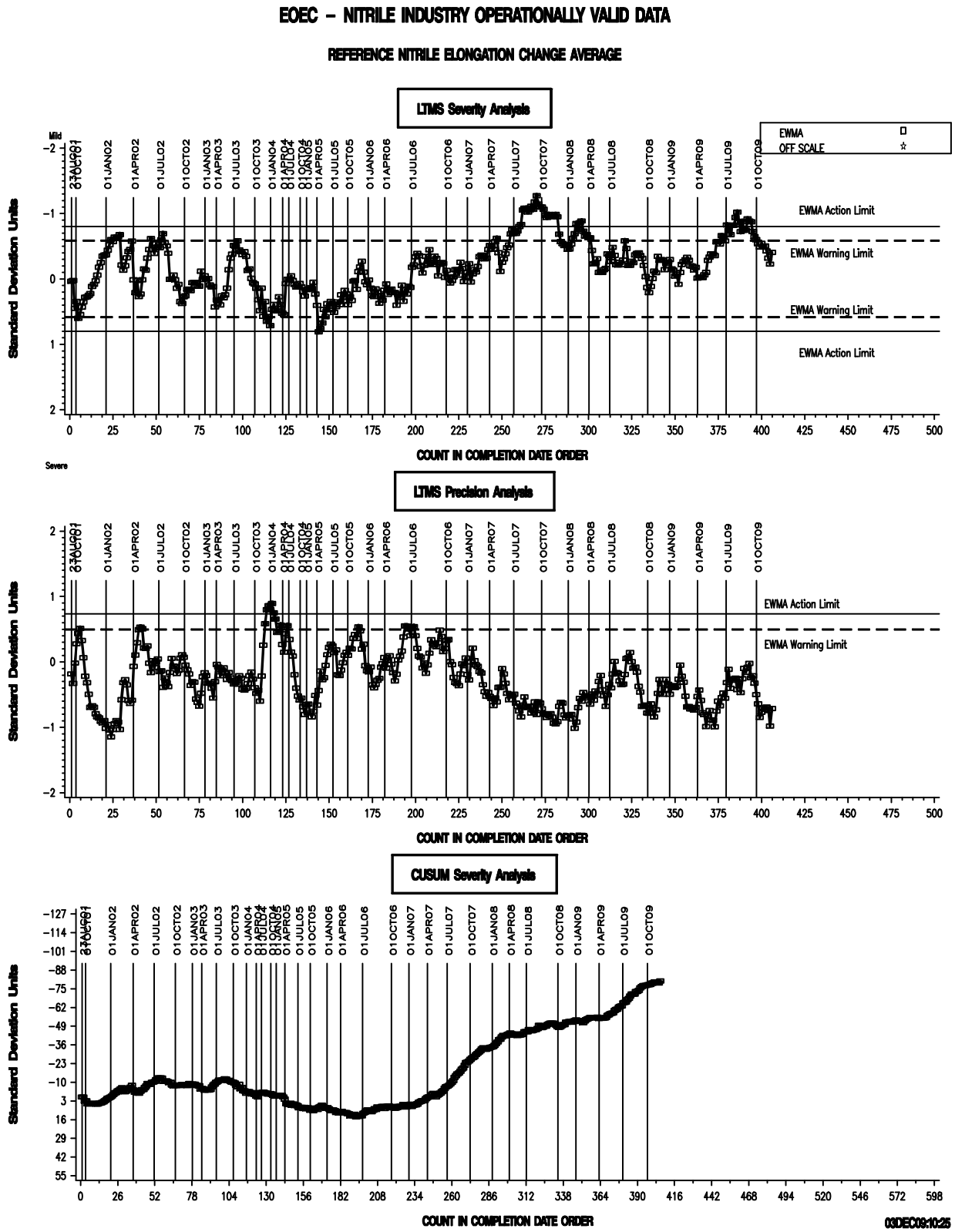
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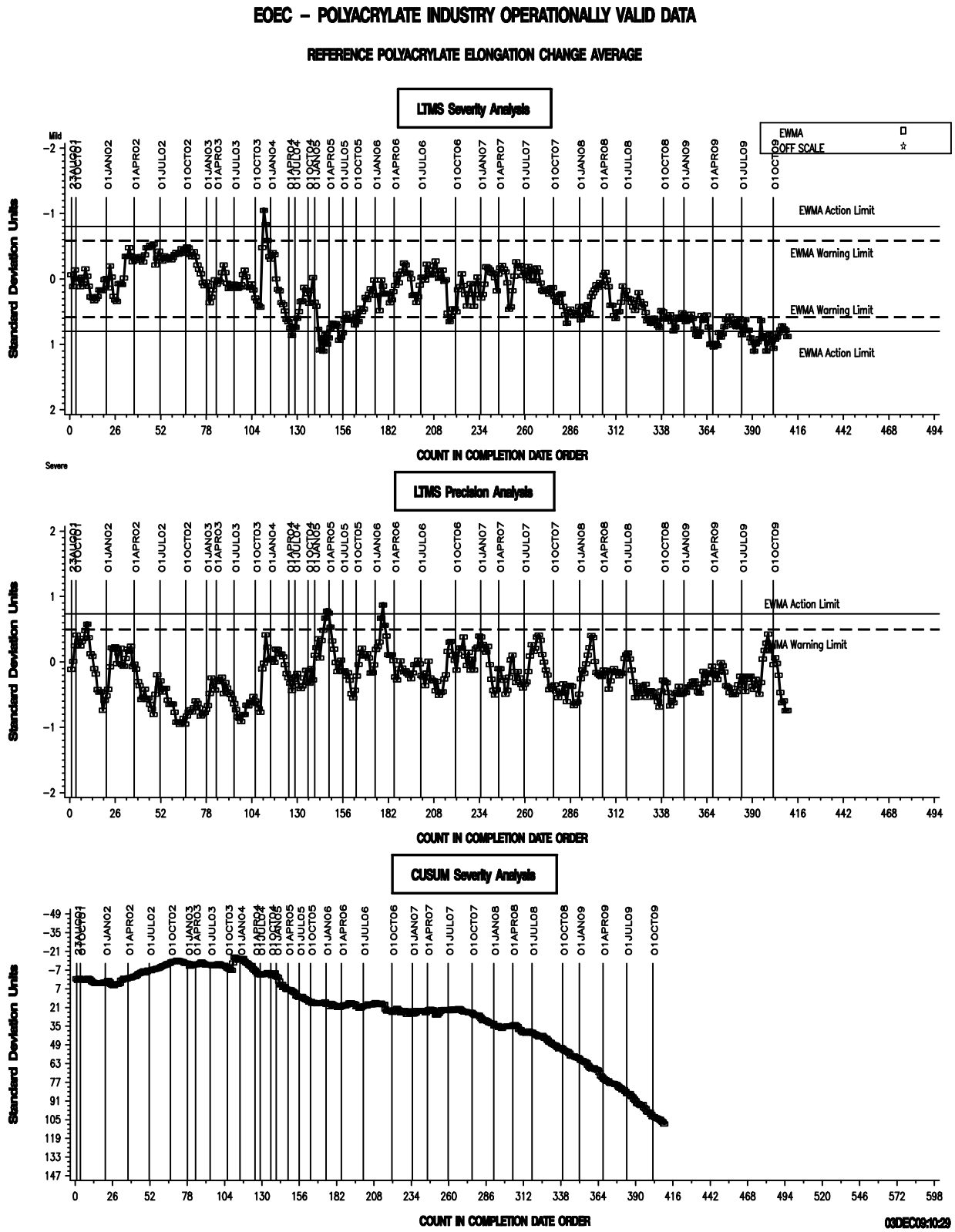
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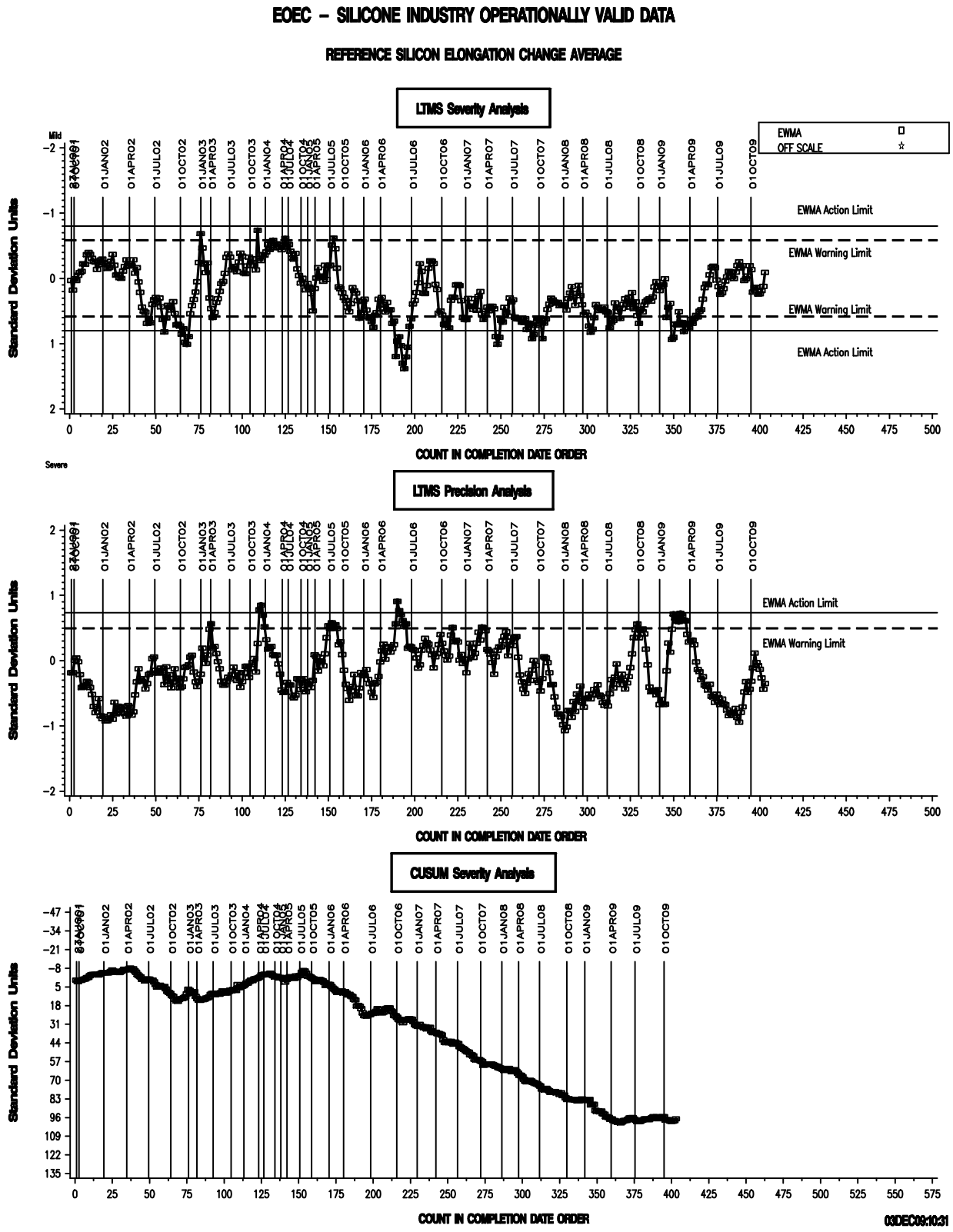
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COUNT IN COMPLETION DATE ORDER
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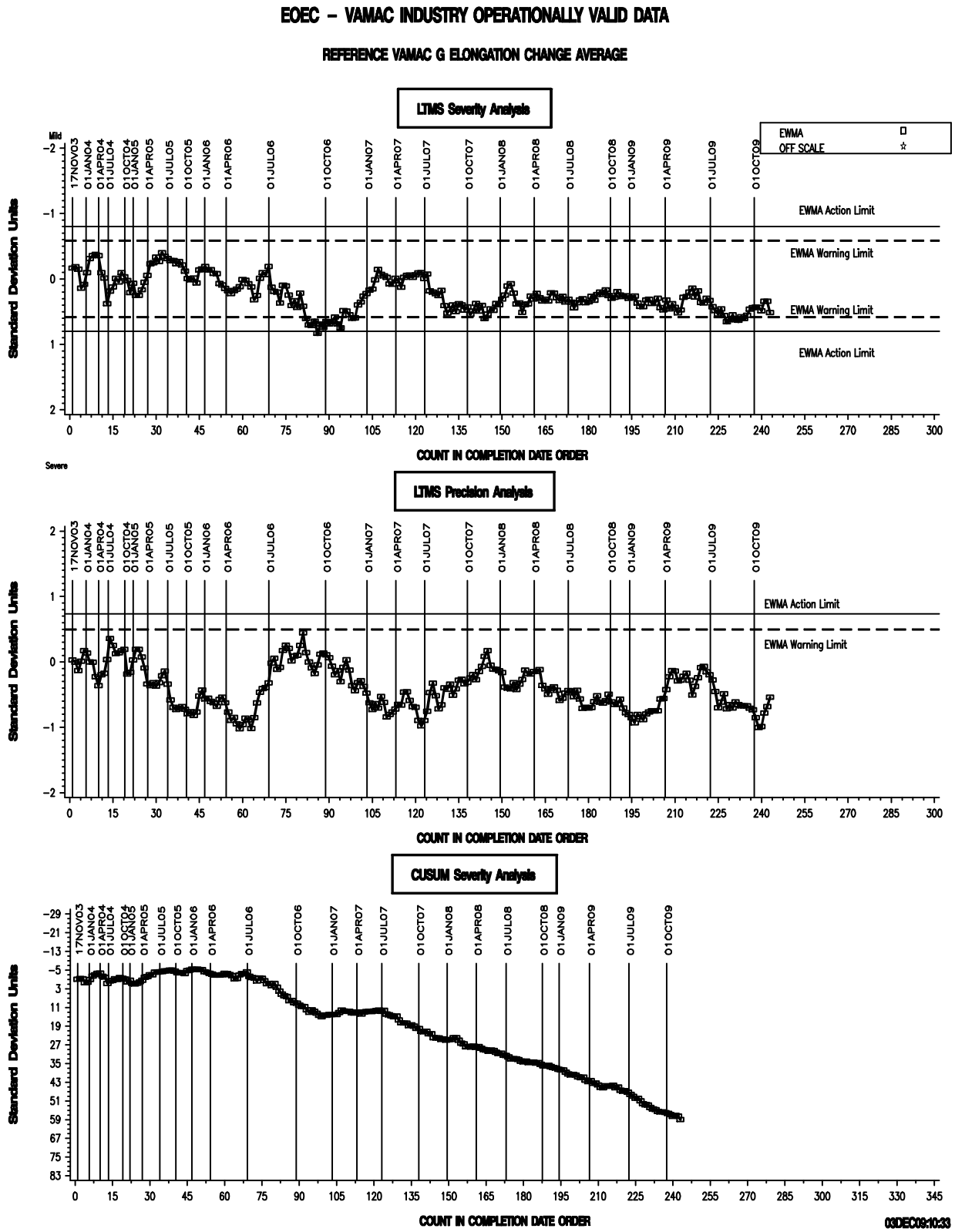
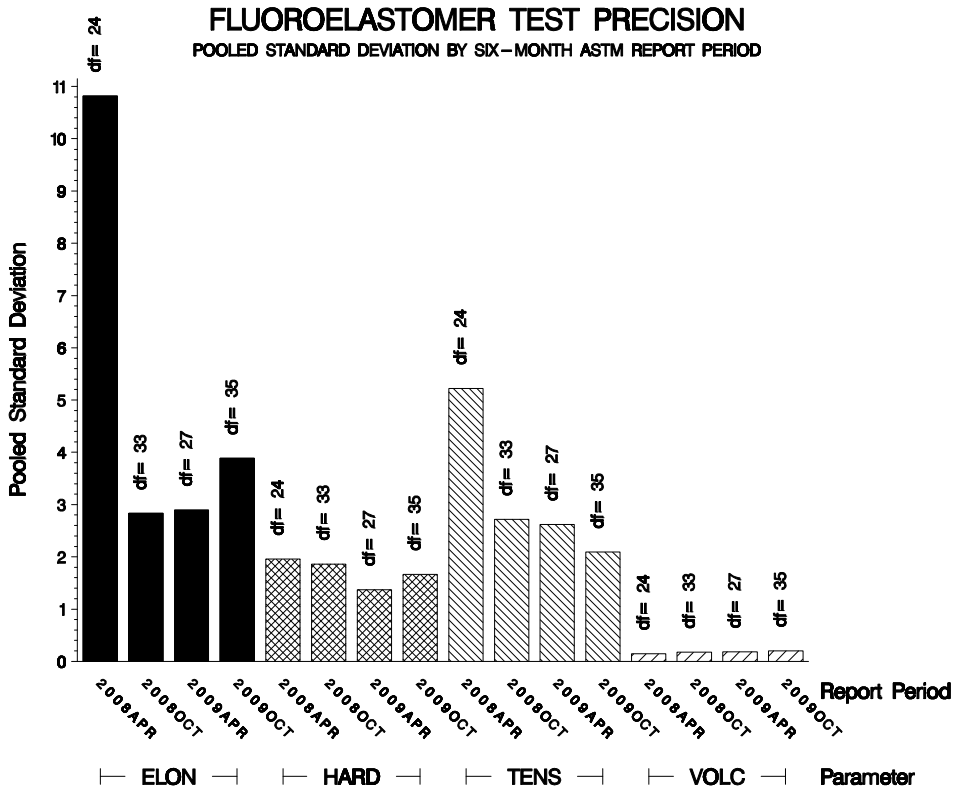
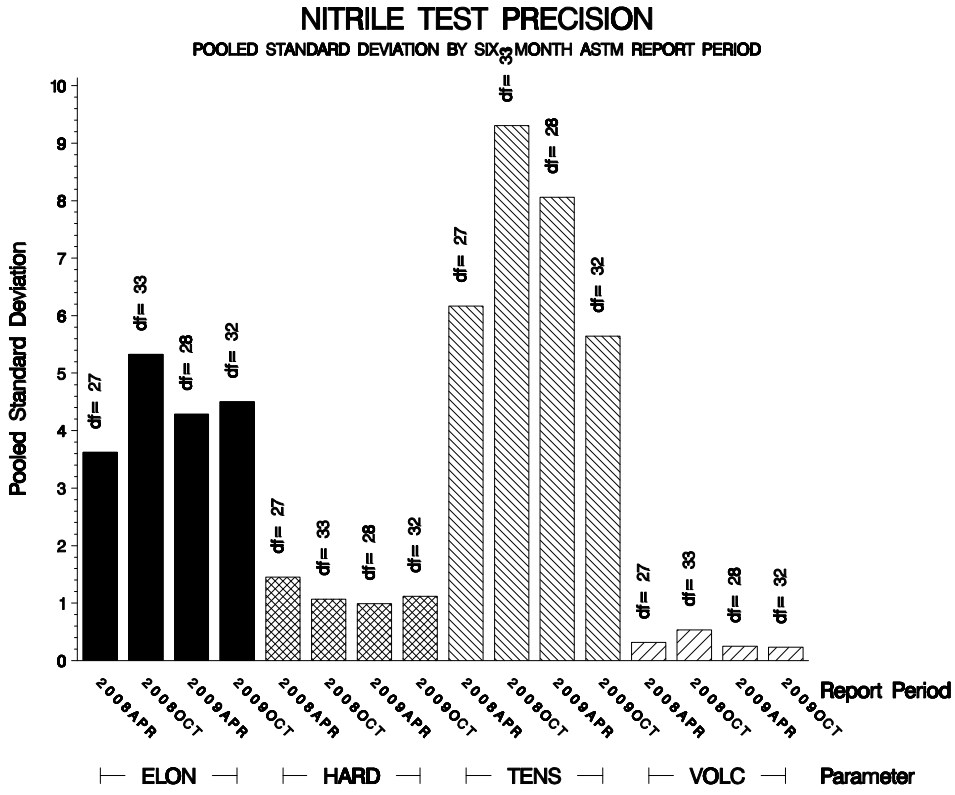
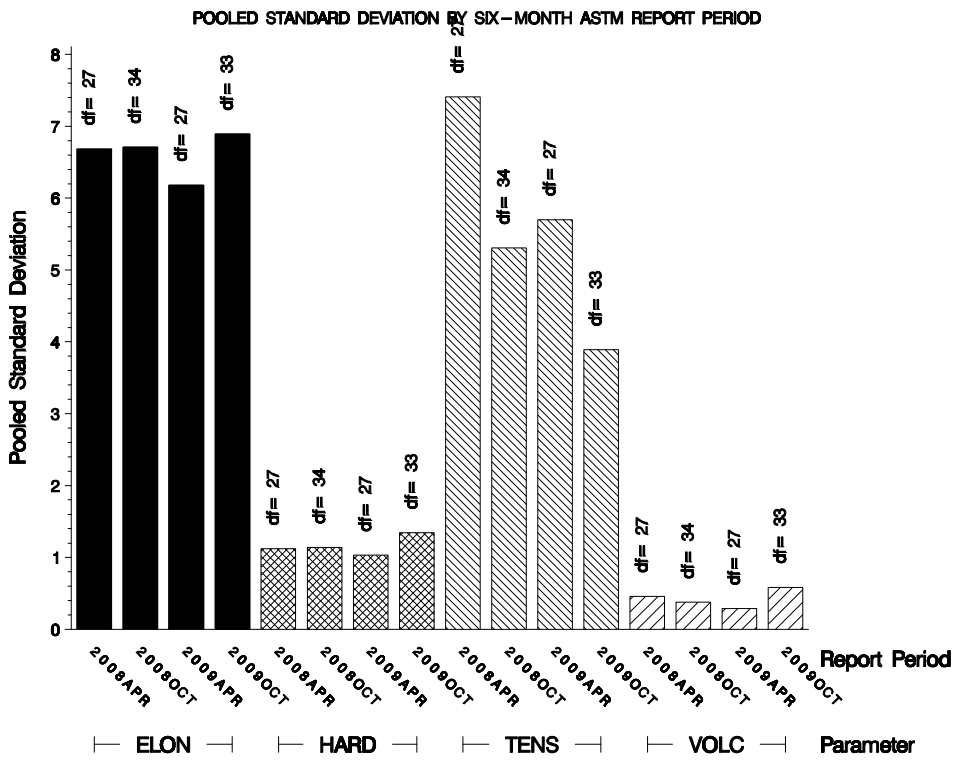

EOEC – VAMAC INDUSTRY OPERATIONALLY VALID DATA
REFERENCE VAMAC G ELONGATION CHANGE AVERAGE
LTMS Severity Analysis
Mild
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
17NOV03
01JAN04
01APR04
01JUL04
01OCT04
01JAN05
01APR05
01JUL05
01OCT05
01JAN06
01APR06
01JUL06
01OCT06
01JAN07
01APR07
01JUL07
01OCT07
01JAN08
01APR08
01JUL08
01OCT08
01JAN09
01APR09
01JUL09
01OCT09
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
Severe
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
03DEC09:10:33

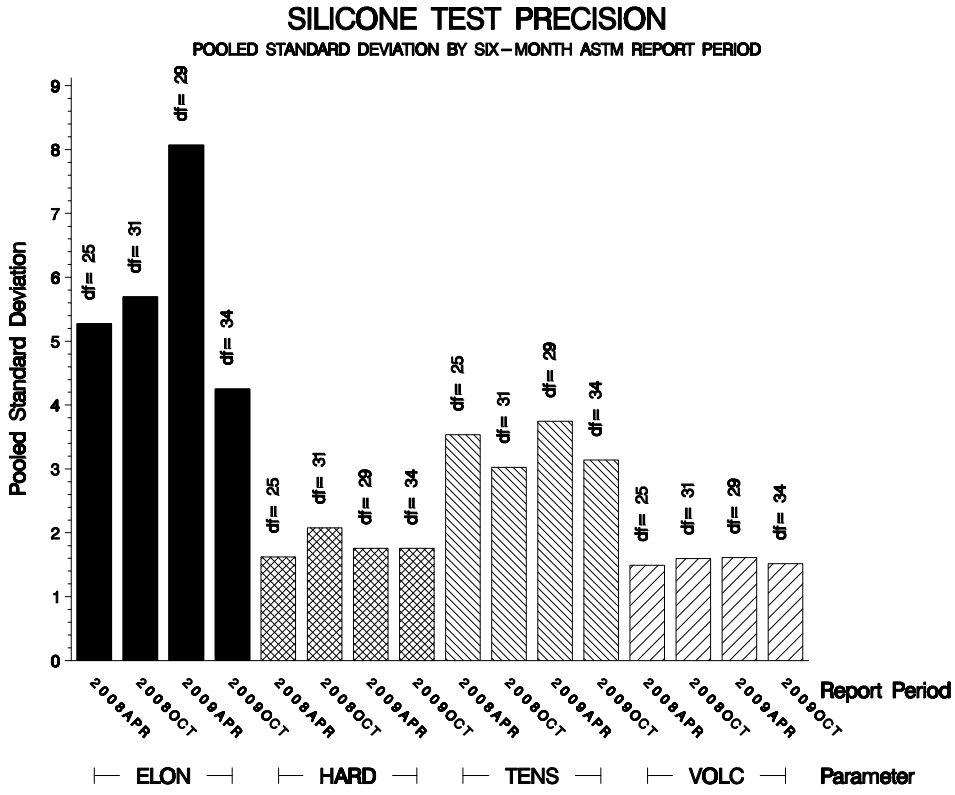
POOLED S:

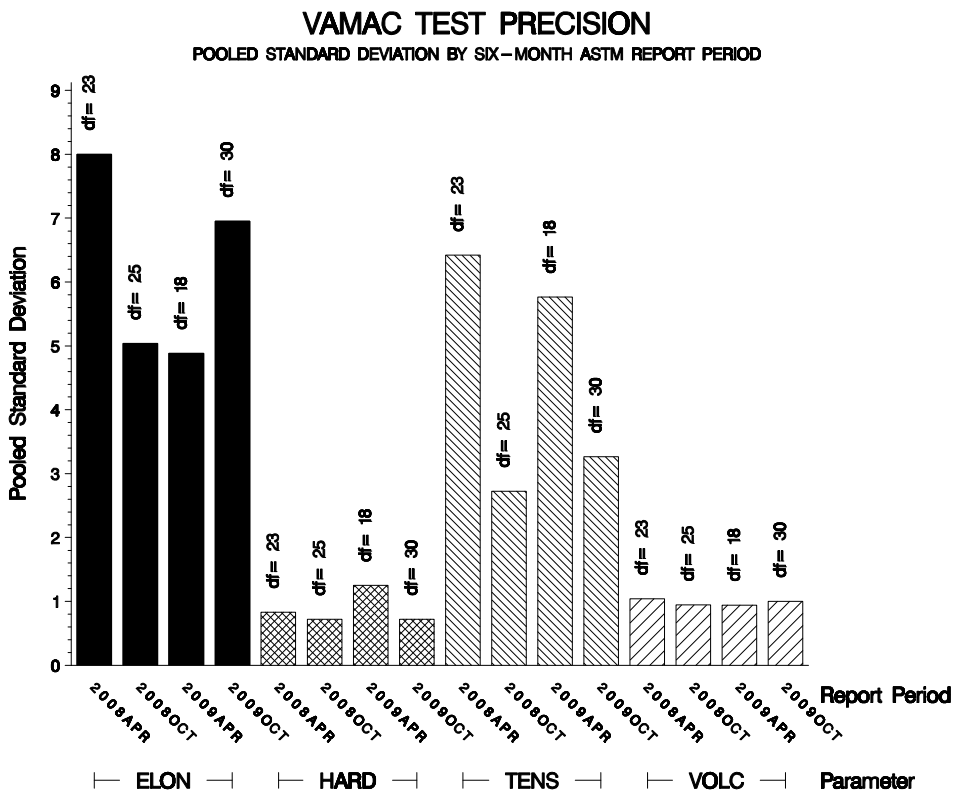
Shown below are bar charts comparing the pooled s values for the EOEC test parameters over the last four report periods.




NITRILE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
df= 27
df= 33
df= 28
df= 32
Report Period
2008APR
2008OCT
2009APR
2009OCT
ELON
HARD
TENS
VOLC
Parameter


POLYACRYLATE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
df= 27
df= 34
df= 33
Report Period
2008APR
2008OCT
2009APR
2009OCT
ELON
HARD
TENS
VOLC
Parameter


SILICONE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
df= 25
df= 31
df= 29
df= 34
2008APR
2008OCT
2009APR
2009OCT
Report Period
ELON
HARD
TENS
VOLC
Parameter


VAMAC TEST PRECISION
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
df= 23
df= 25
df= 18
df= 30
2008APR
2008OCT
2009APR
2009OCT
Report Period
ELON
HARD
TENS
VOLC
Parameter

STATUS OF REFERENCE OIL SUPPLY:
At the end of this report period, the testing oil supply stood as outlined in the following table:

		@ TMC	
Oil	Cans @ Labs	Cans	Gallons
1006-1	77	12157	2409
Total	77	12157	2409

Be aware that this table presumes that all of each of these oils is dedicated to the EOEC test area. This is not the case, as oil 1006-1 is also used in several other test areas.

INFORMATION LETTERS:

EOEC Information Letter No. 09-1, Sequence No. 3, dated June 11, 2009, was issued during the period and contained the addition of Passenger Car Elastomer Test Precision Estimates.

EOEC Information Letter No. 09-2, Sequence No. 4, dated September 1, 2009, was issued during the period and contained the revision of the Passenger Car Elastomer Test Precision Estimates.

SUMMARY

Summary of Severity
as Measured by LTMS Control Charting

Elastomer	VOLC	HARD	TENS	ELON
Fluoroelastomer	Within limits	Within limits	Within limits	**Mild**
Nitrile	**Severe**	Within limits	**Mild**	**Mild**
Polyacrylate	**Severe**	Within limits	**Severe**	**Severe**
Silicone	**Severe**	**Severe**	**Mild**	Within limits
VAMAC	**Severe**	**Mild**	**Severe**	Within limits

Summary of Precision
as Measured by LTMS Control Charting

Elastomer	VOLC	HARD	TENS	ELON
Fluoroelastomer	Within limits	Within limits	Within limits	Within limits
Nitrile	Within limits	Within limits	Within limits	Within limits
Polyacrylate	Within limits	Within limits	Within limits	Within limits
Silicone	Within limits	Within limits	Within limits	Within limits
VAMAC	Within limits	Within limits	Within limits	Within limits

MTK/mtk/astm1009.doc/mem09-069.mtk.doc

c: F. M. Farber
J. A. Clark
EOEC Surveillance Panel
ftp://ftp.astmtmc.cmu.edu/docs/bench/eoec/semiannualreports/eoec-10-2009.pdf

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