Test Monitoring Center
A Program of ASTM International
Carnegie Mellon University
6555 Penn Avenue, Pittsburgh, PA 15206, USA
http://astmtmc.cmu.edu
412-365-1000

MEMORANDUM: 12-020

DATE: May 23, 2012

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

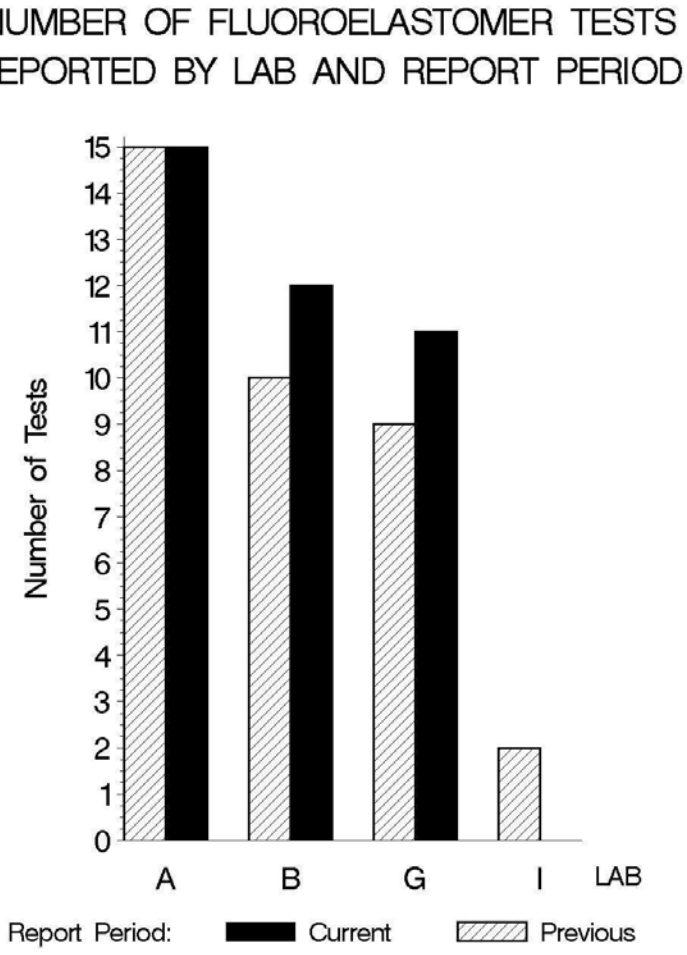
FROM: Michael T. Kasimirsky

SUBJECT: EOEC Testing from October 1, 2011 through March 31, 2012

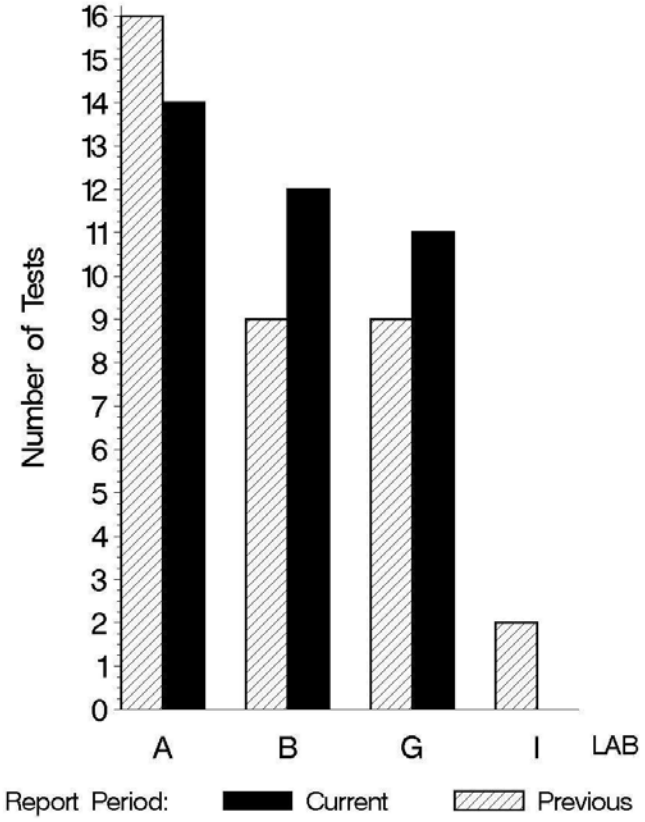
A total of 196 EOEC tests were reported to the Test Monitoring Center during the period from October 1, 2011 through March 31, 2012. Following is a summary of testing activity this period.

	Reporting Data
Number of Labs	4

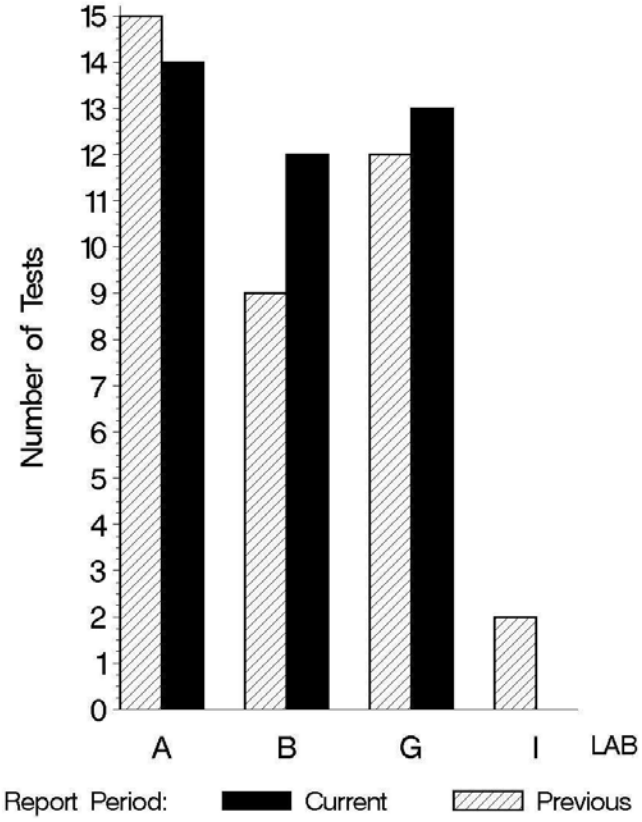
Tests reported this period were distributed as shown below:



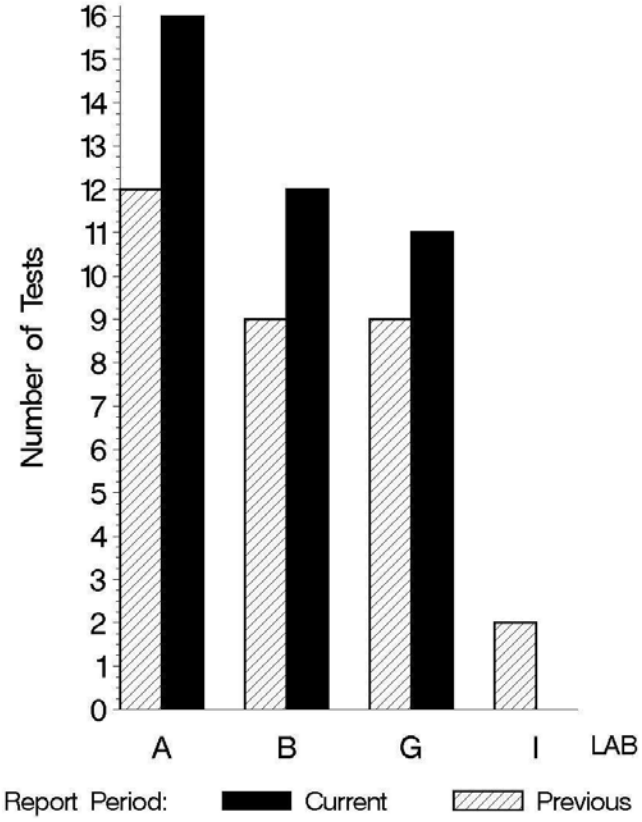
NUMBER OF NITRILE TESTS
REPORTED BY LAB AND REPORT PERIOD



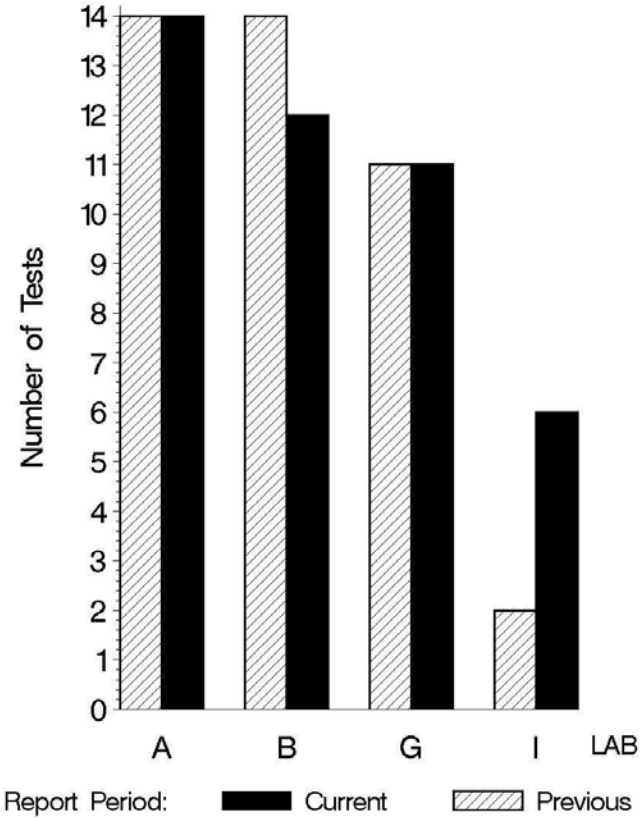
NUMBER OF POLYACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



NUMBER OF SILICONE TESTS
REPORTED BY LAB AND REPORT PERIOD

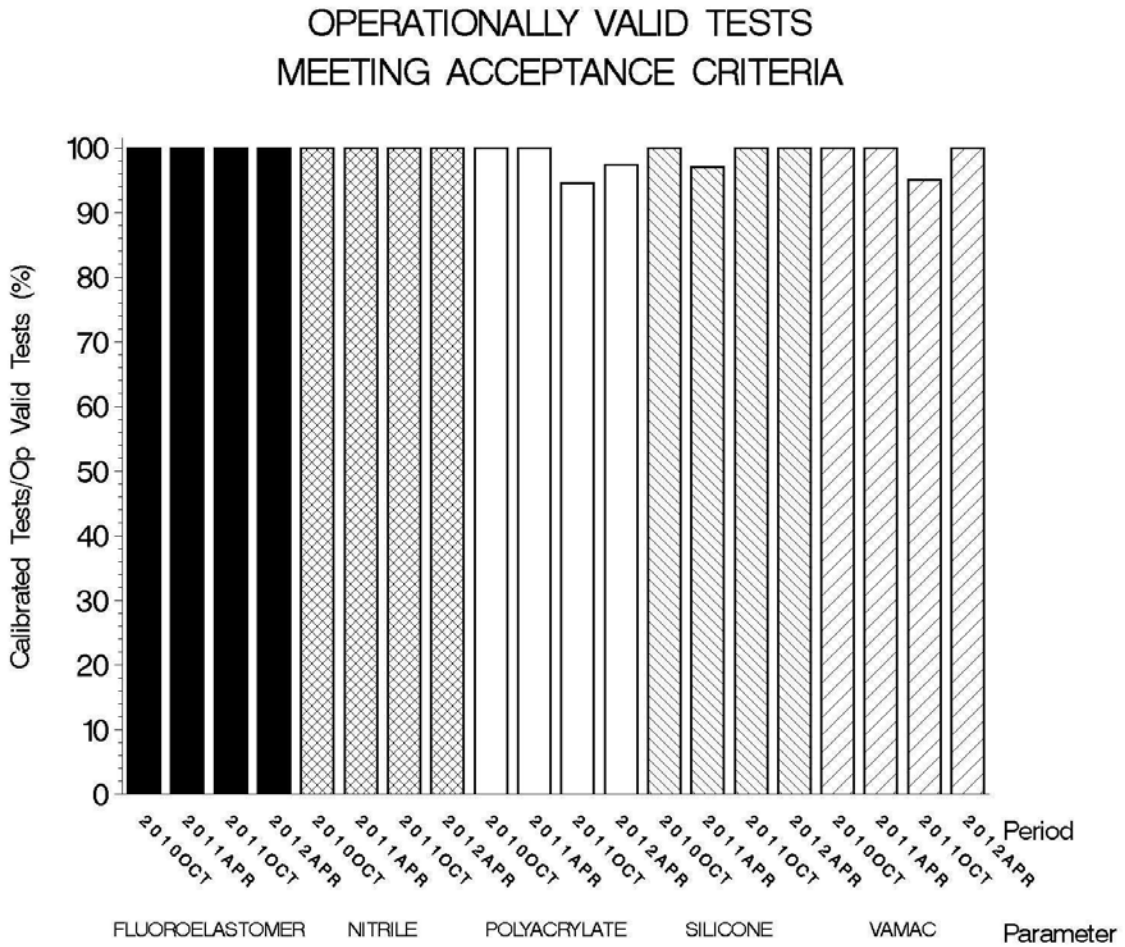


NUMBER OF VAMAC TESTS
REPORTED BY LAB AND REPORT PERIOD



Test Distribution by Oil and Validity

		Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Vamac	Totals This Period	Totals Last Period
Accepted for Calibration	AC	38	37	38	39	43	195	173
Rejected	OC	0	0	1	0	0	1	4
Information Run (not for calibration)	NI	0	0	0	0	0	0	0
Operationally Invalid (lab)	LC	0	0	0	0	0	0	3
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0	0	0
Aborted Calibration	XC	0	0	0	0	0	0	0
Total		38	37	39	39	43	196	180



The above chart shows the percentage of accepted operationally valid tests. This period one 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	15	0	0	14	0	0	14	0	0	16	0	0	14	0	0	73	0
B	0	12	0	0	12	0	0	12	0	0	12	0	0	12	0	0	60	0
G	0	11	0	0	11	0	0	13	0	0	11	0	0	11	0	0	57	0
I	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	6	0
Total	0	38	0	0	37	0	0	39	0	0	39	0	0	43	0	0	196	0

Lost tests are those that were aborted or operationally invalid.

Causes for Lost Tests

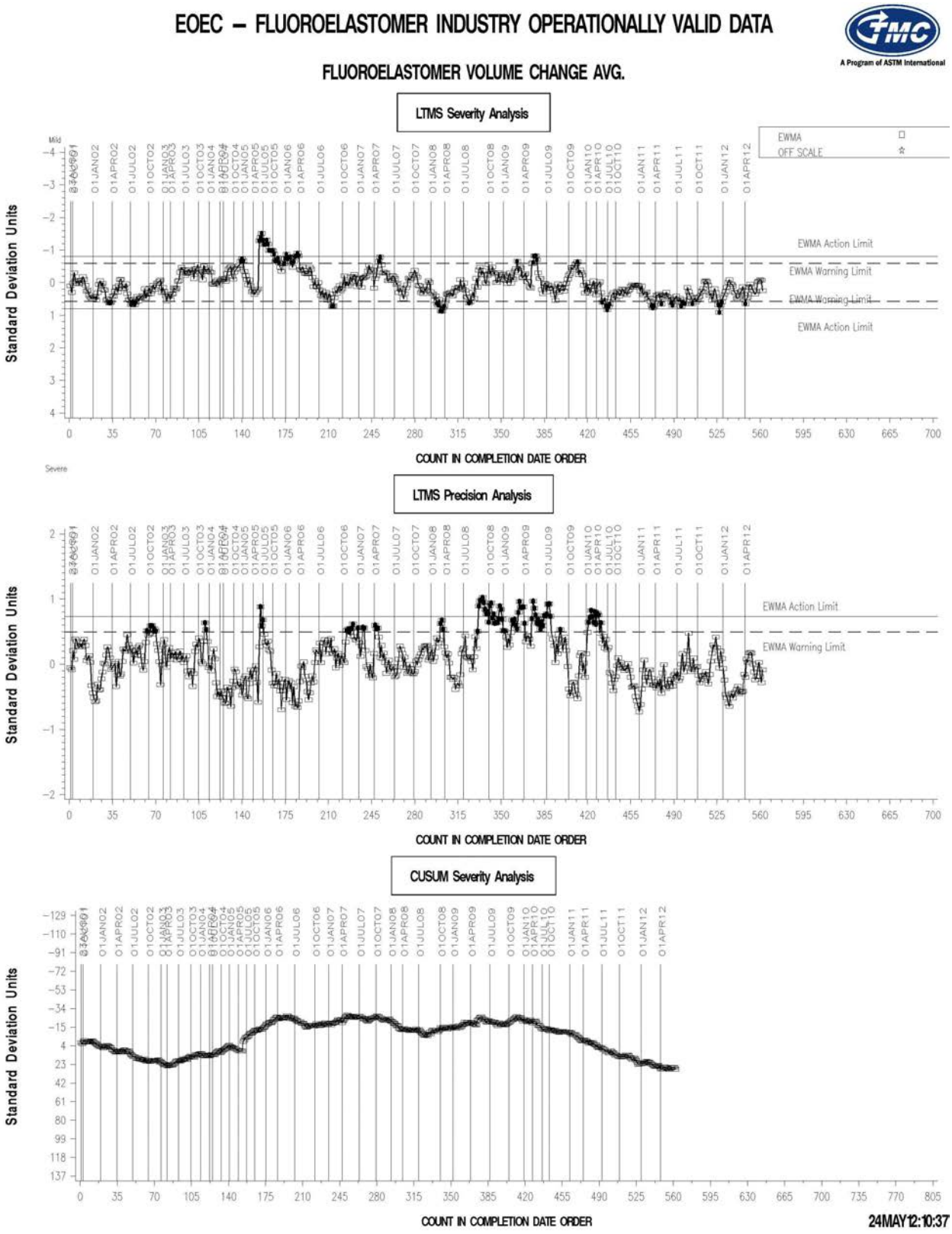
Lab	Cause		Elastomer: Fluoroelastomer	Nitrile	Polyacrylate	Silicone	VAMAC	Validity: LC	RC	XC	Loss Rate: Lost	Starts	%
-	No tests were lost this period										0	196	0
		Lost	0	0	0	0	0	0	0	0			
		Starts	38	37	39	39	43	196	196	196			
		%	0	0	0	0	0	0	0	0			

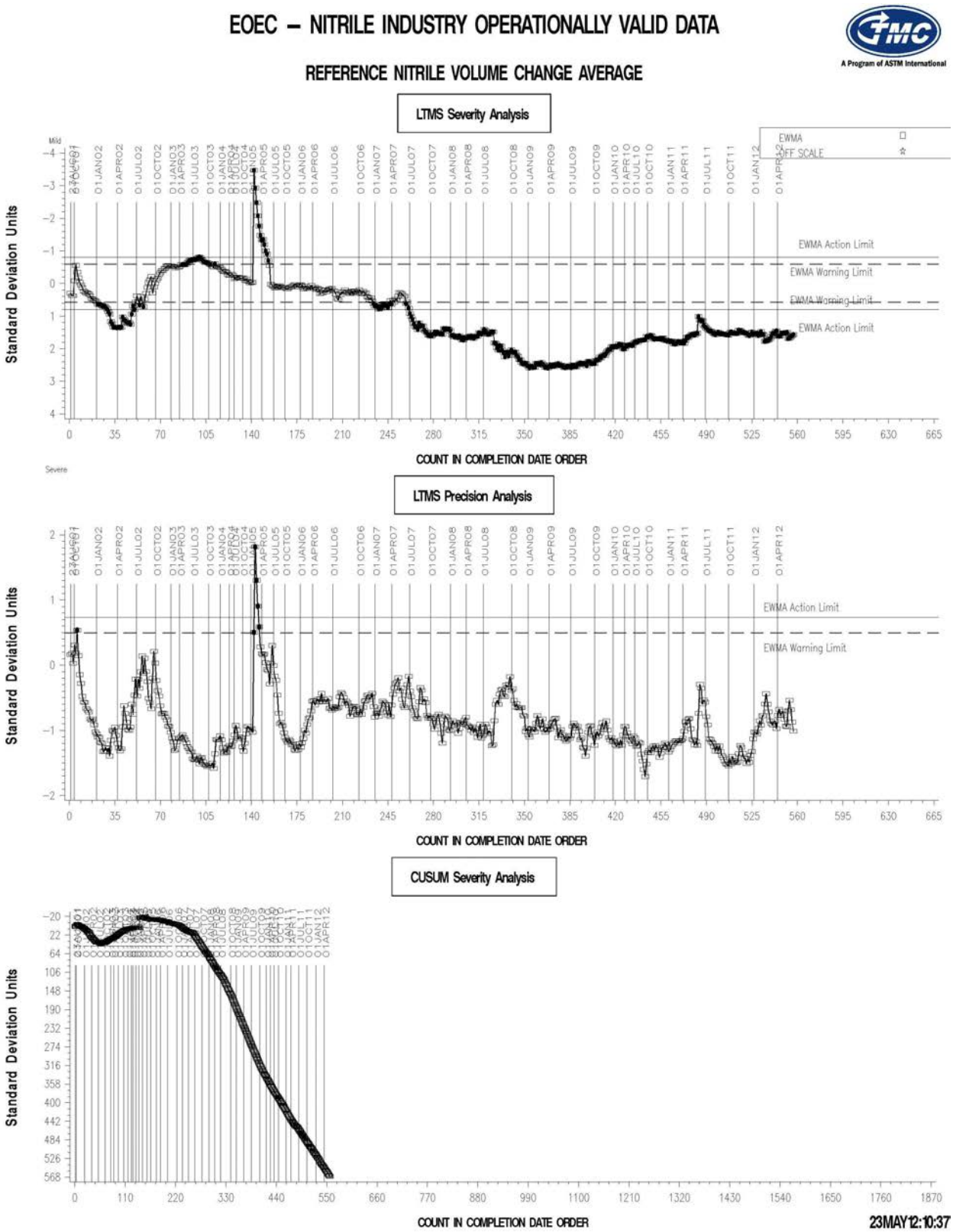
Average Δ/s by Lab						
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI	ELONYI
Fluoroelastomer	A	15	0.559	0.348	-0.775	-0.849
	B	12	-0.214	0.621	-0.256	-0.515
	G	11	0.418	-0.715	-0.338	-0.553
	I	0	-	-	-	-
	Industry	38	0.274	0.127	-0.485	-0.658
Nitrile	A	14	1.459	1.195	0.213	-0.559
	B	12	1.561	1.599	0.885	0.390
	G	11	1.596	0.700	-0.193	-0.800
	I	0	-	-	-	-
	Industry	37	1.533	1.179	0.310	-0.323
Polyacrylate	A	14	0.870	0.521	-0.398	0.685
	B	12	1.367	0.006	-0.191	1.285
	G	13	0.622	1.010	0.021	1.293
	I	0	-	-	-	-
	Industry	39	0.941	0.525	-0.194	1.072
Silicone	A	16	0.198	-0.448	-1.019	0.099
	B	12	1.254	-0.187	-1.620	0.976
	G	11	1.209	1.290	-1.184	0.168
	I	0	-	-	-	-
	Industry	39	0.808	0.122	-1.250	0.388
VAMAC	A	14	1.510	-1.710	1.362	0.119
	B	12	1.786	-1.835	1.461	0.164
	G	11	1.770	-1.245	0.821	-0.241
	I	6	1.808	-1.309	1.516	-0.374
	Industry	43	1.695	-1.570	1.273	-0.029

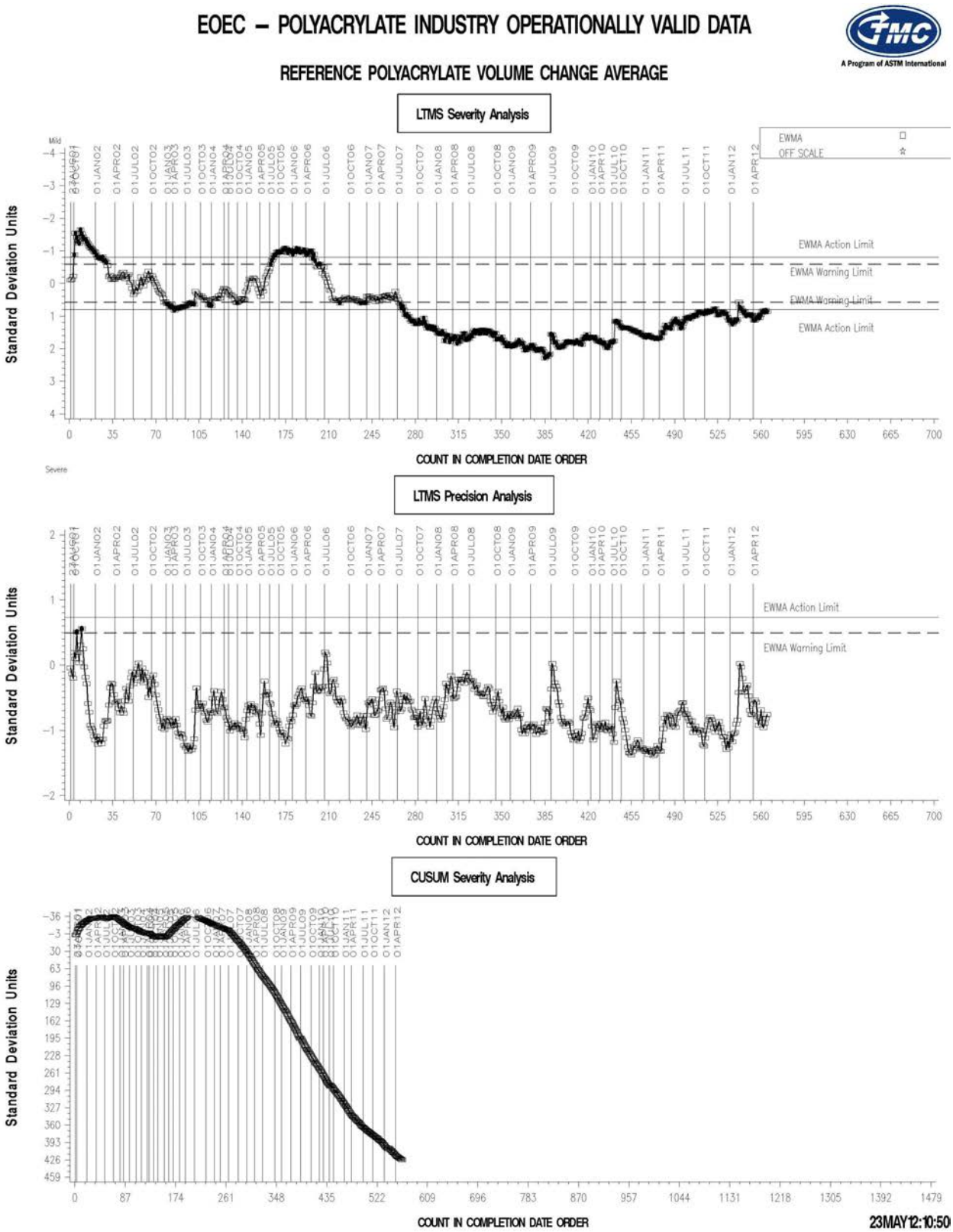
Individual test results can be viewed at the links shown in the following table:

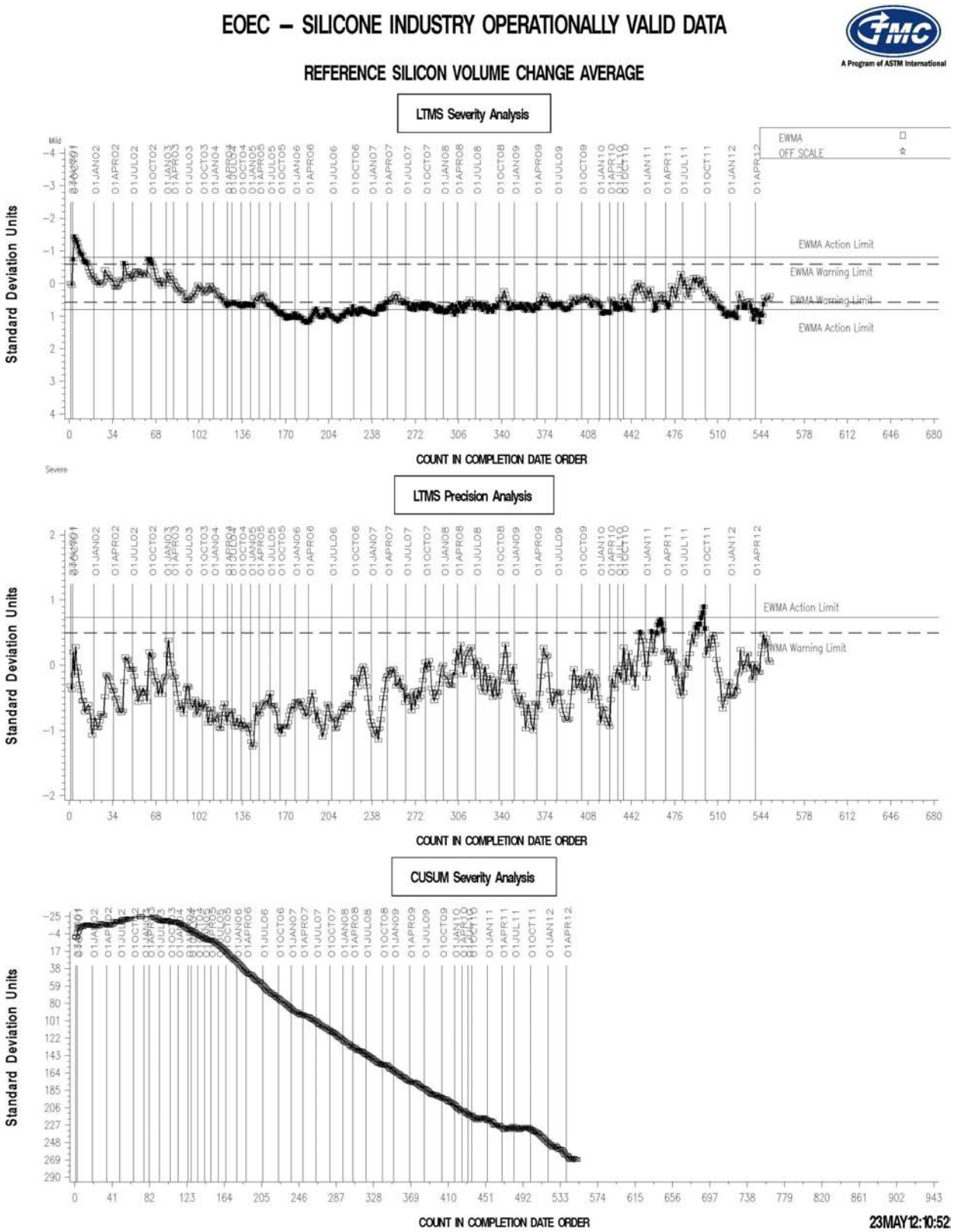
Links to Individual Test Result Data	
Elastomer Type	**Web Link to Data**
Fluoroelastomer	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecf/data/
Nitrile	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecn/data/
Polyacrylate	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecp/data/
Silicone	ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecs/data/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

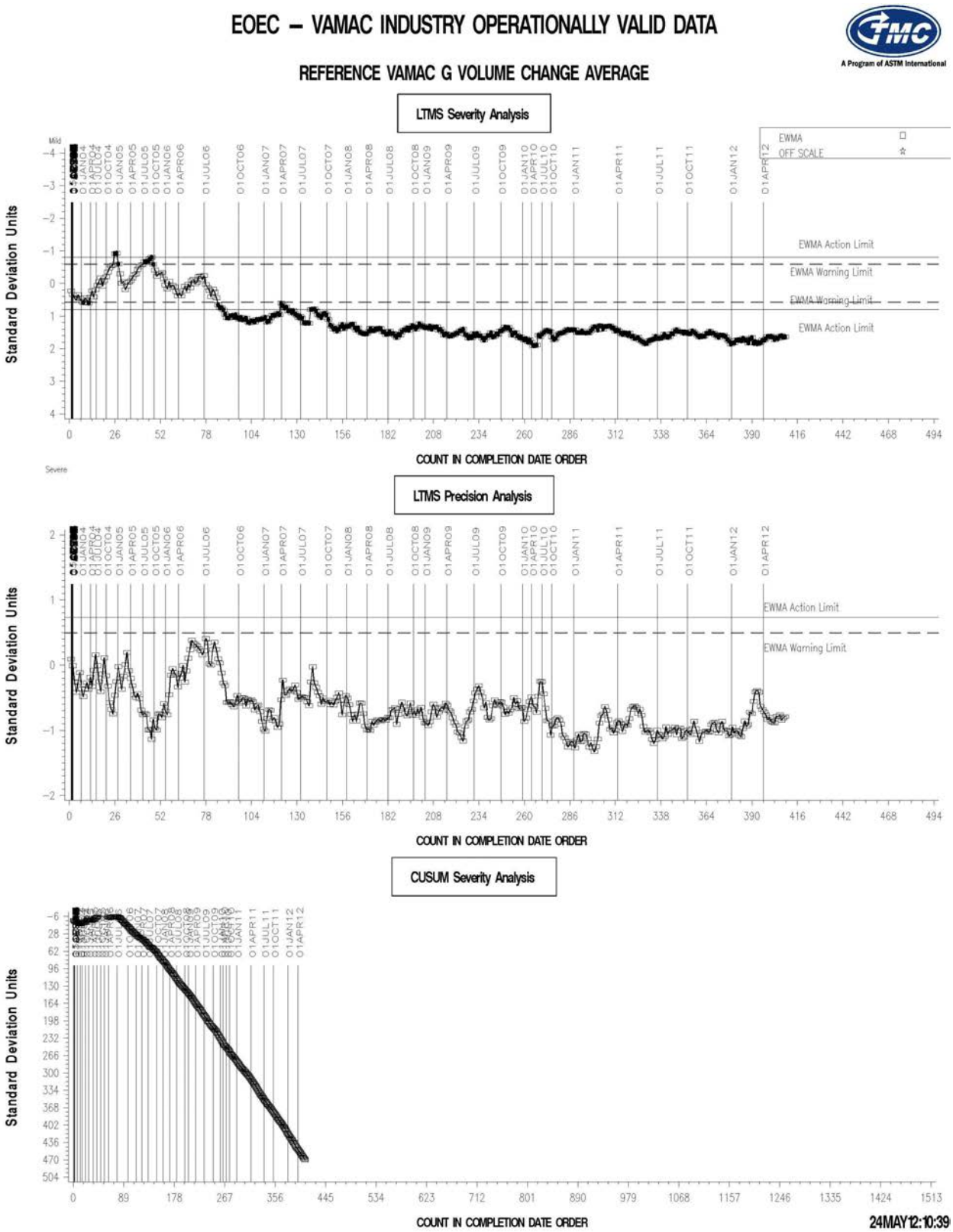
LTMS CONTROL CHARTS

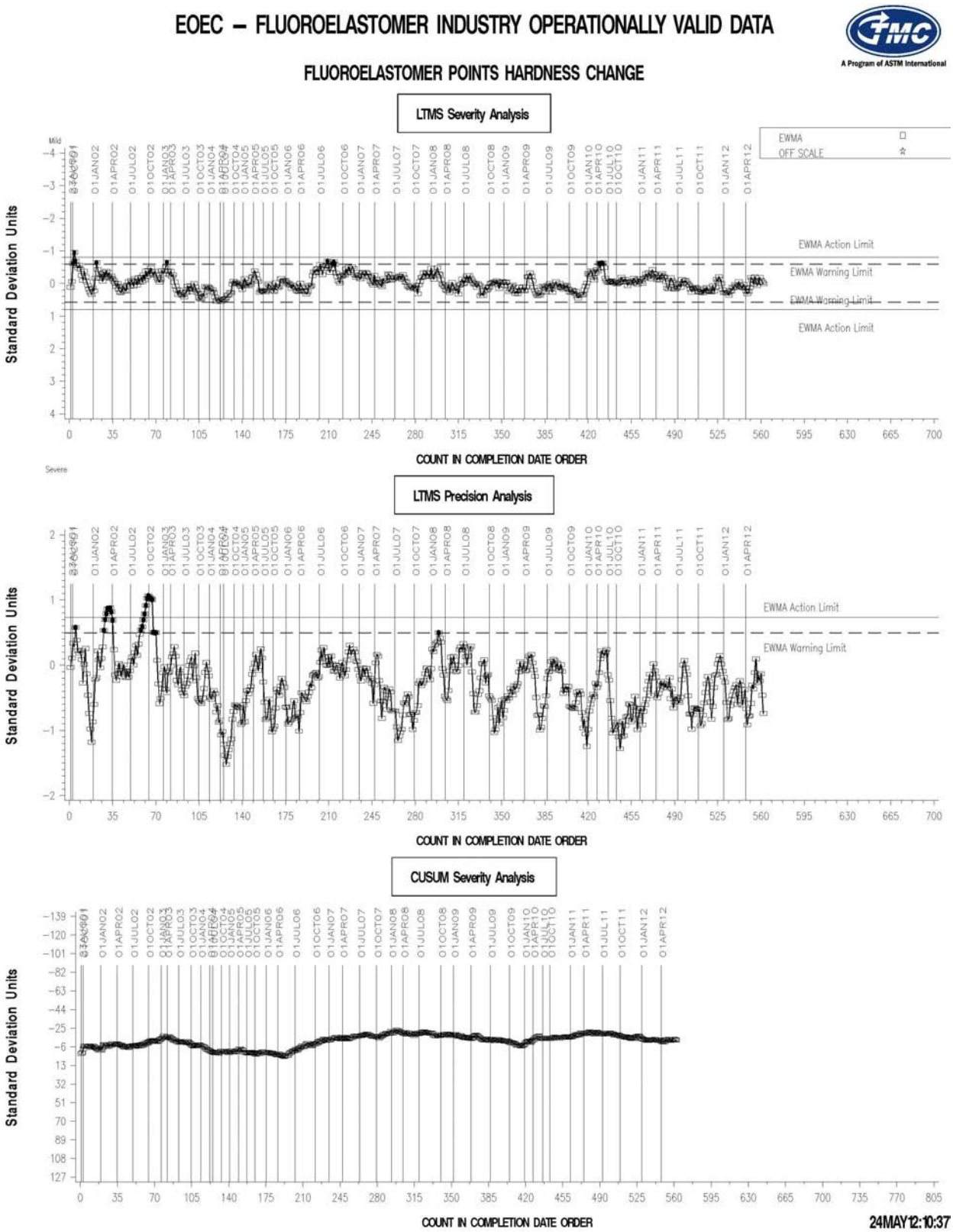


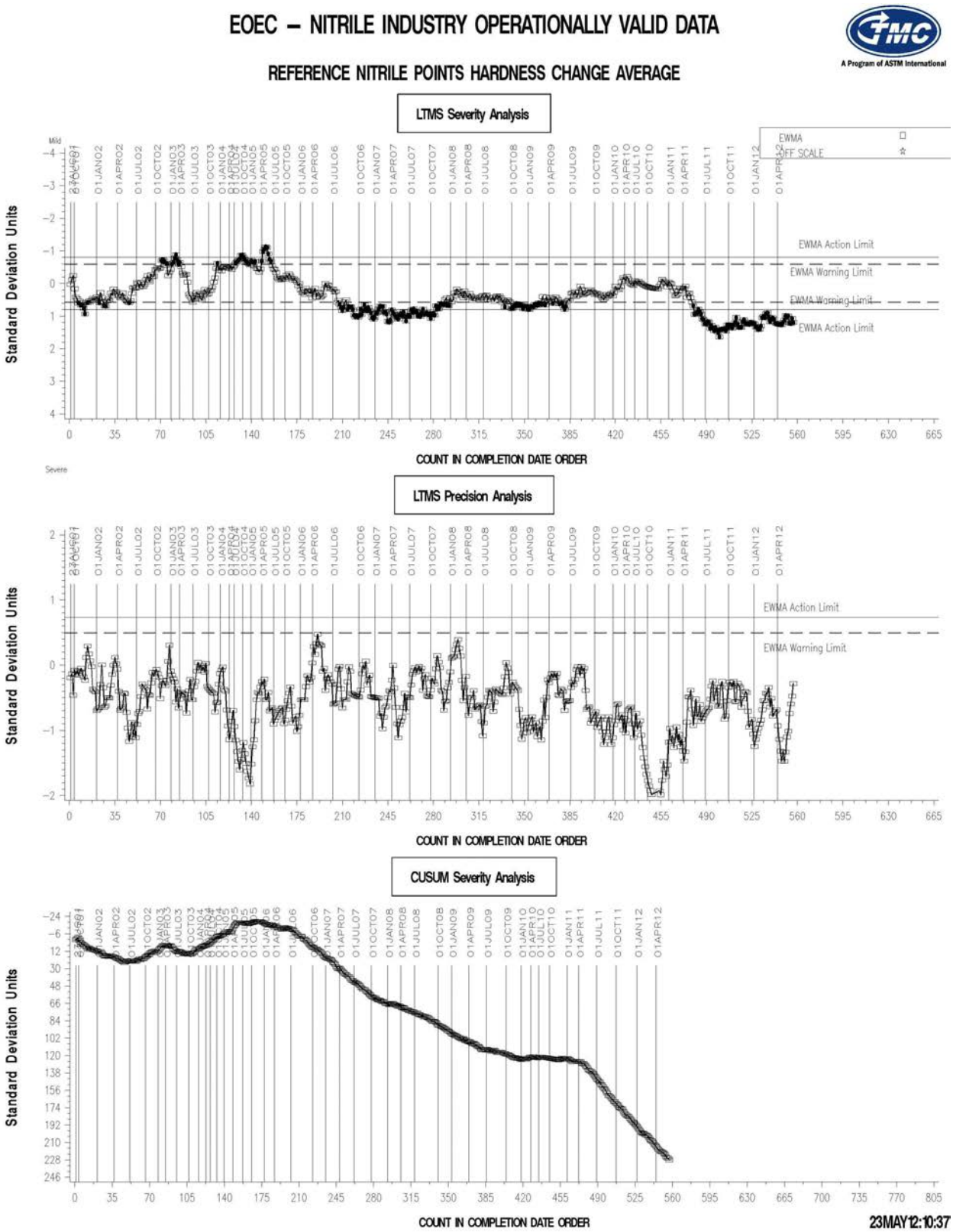

EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE NITRILE VOLUME CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
23MAY12:10:37

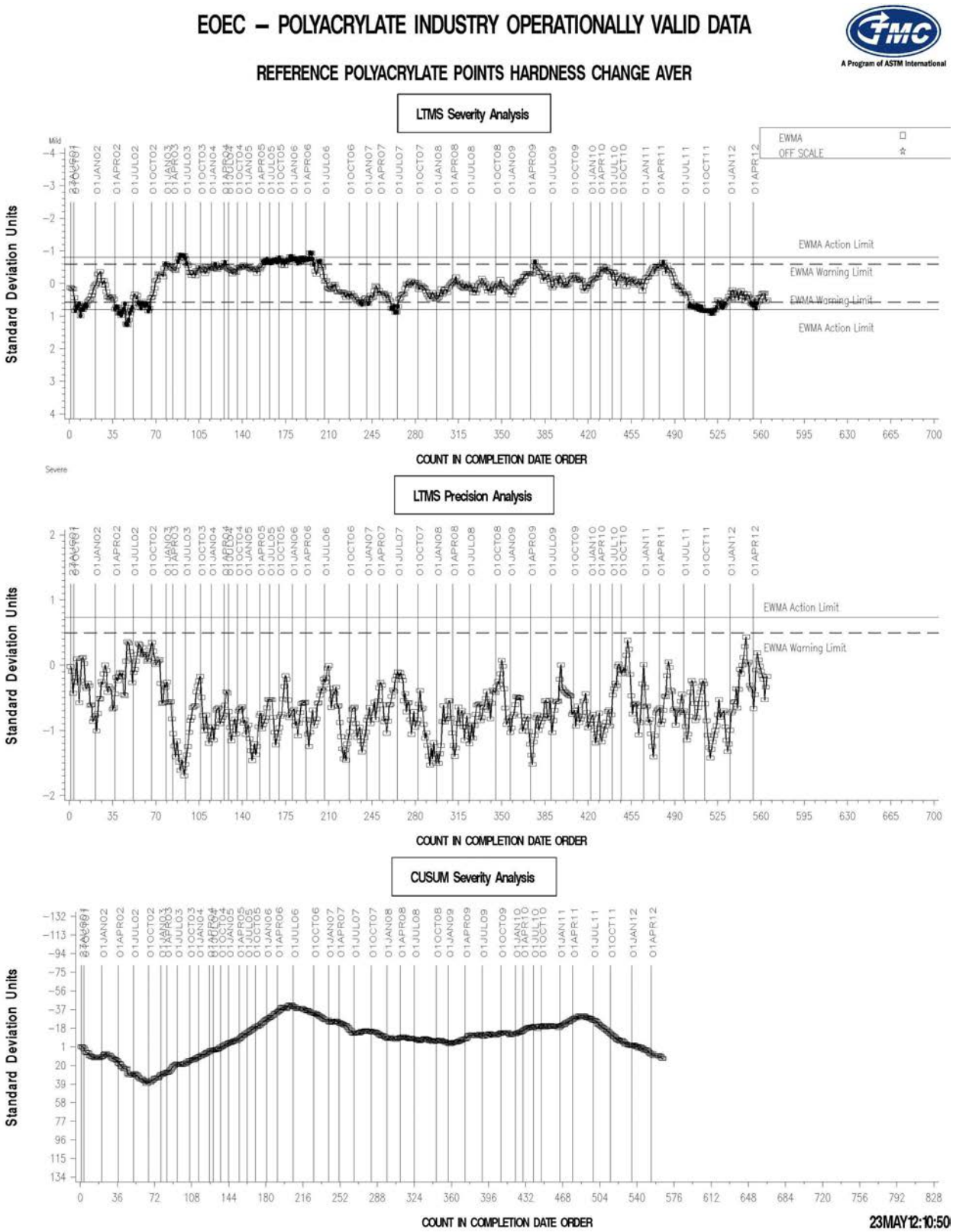

EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
REFERENCE POLYACRYLATE VOLUME CHANGE AVERAGE
A Program of ASTM International
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
23MAY12:10:50

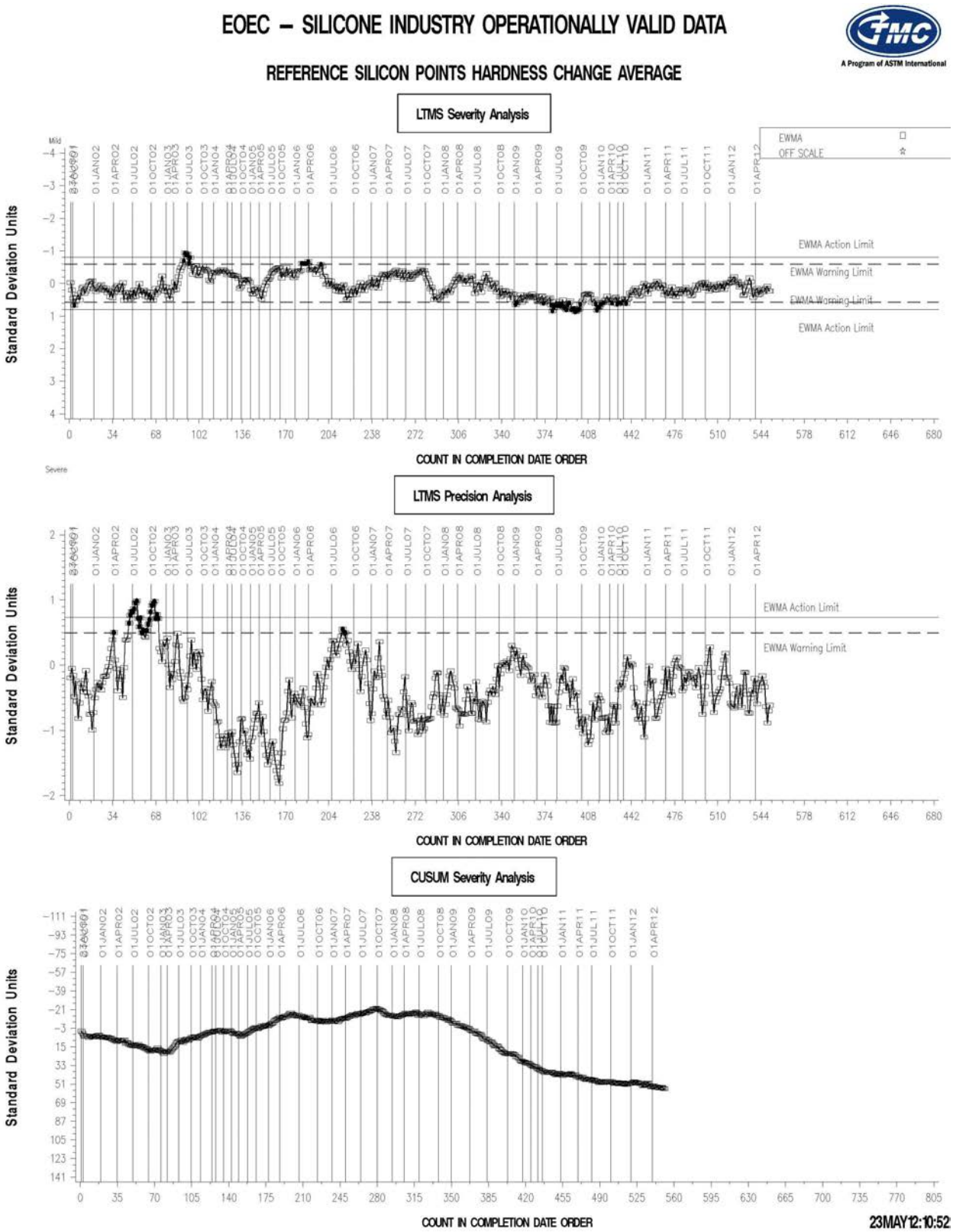

EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE SILICON VOLUME CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
23MAY12:10:52

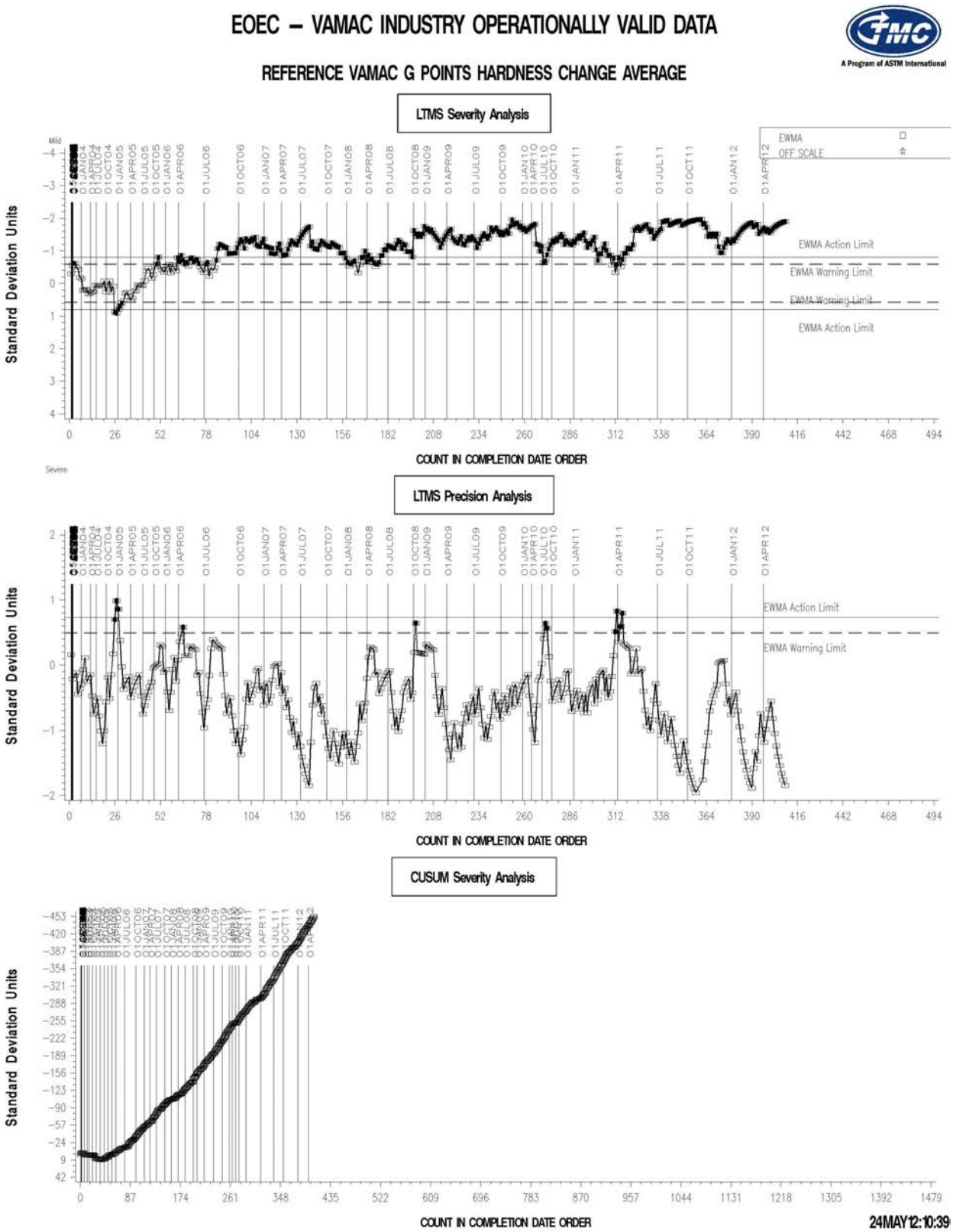

EOEC – VAMAC INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE VAMAC G VOLUME CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
24MAY12:10:39

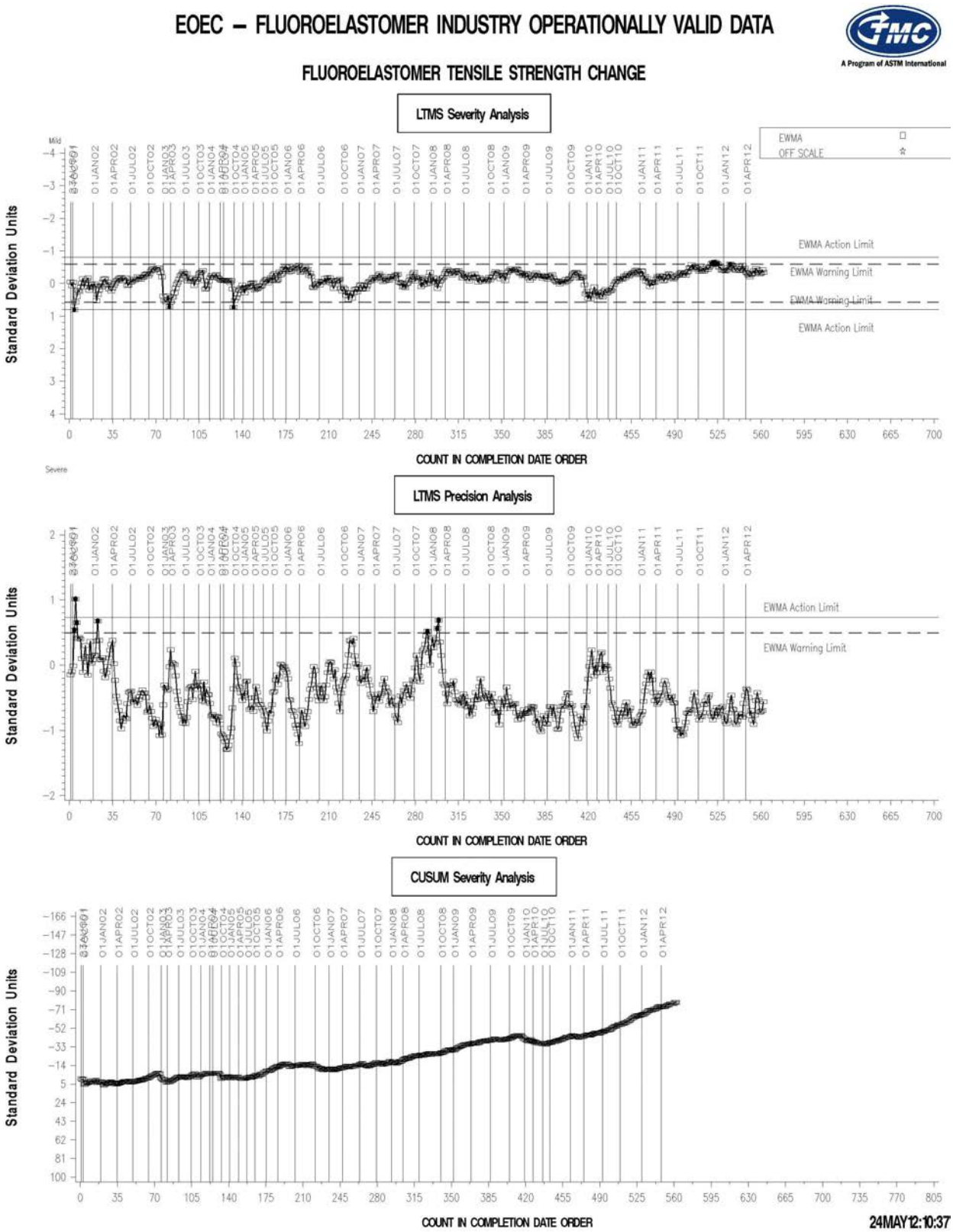

EOEC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
FLUOROELASTOMER POINTS HARDNESS CHANGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
24MAY12:10:37


EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE NITRILE POINTS HARDNESS CHANGE AVERAGE
LTMS Severity Analysis
Mild
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
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
23MAY12:10:37


EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE POLYACRYLATE POINTS HARDNESS CHANGE AVER
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
23MAY12:10:50


EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE SILICON POINTS HARDNESS CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
23MAY12:10:52

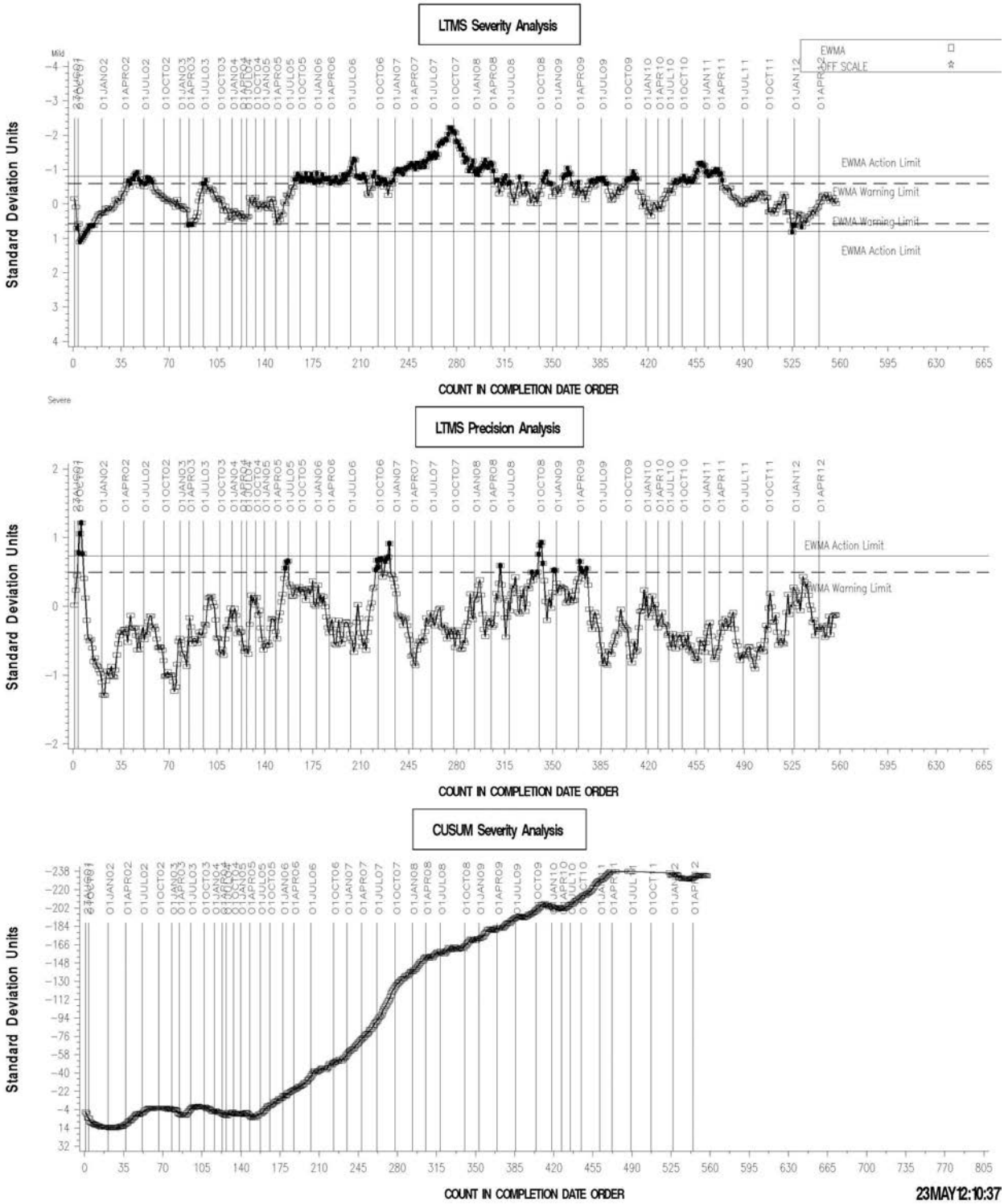

EOEC – VAMAC INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE VAMAC G POINTS HARDNESS CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
24MAY12:10:39

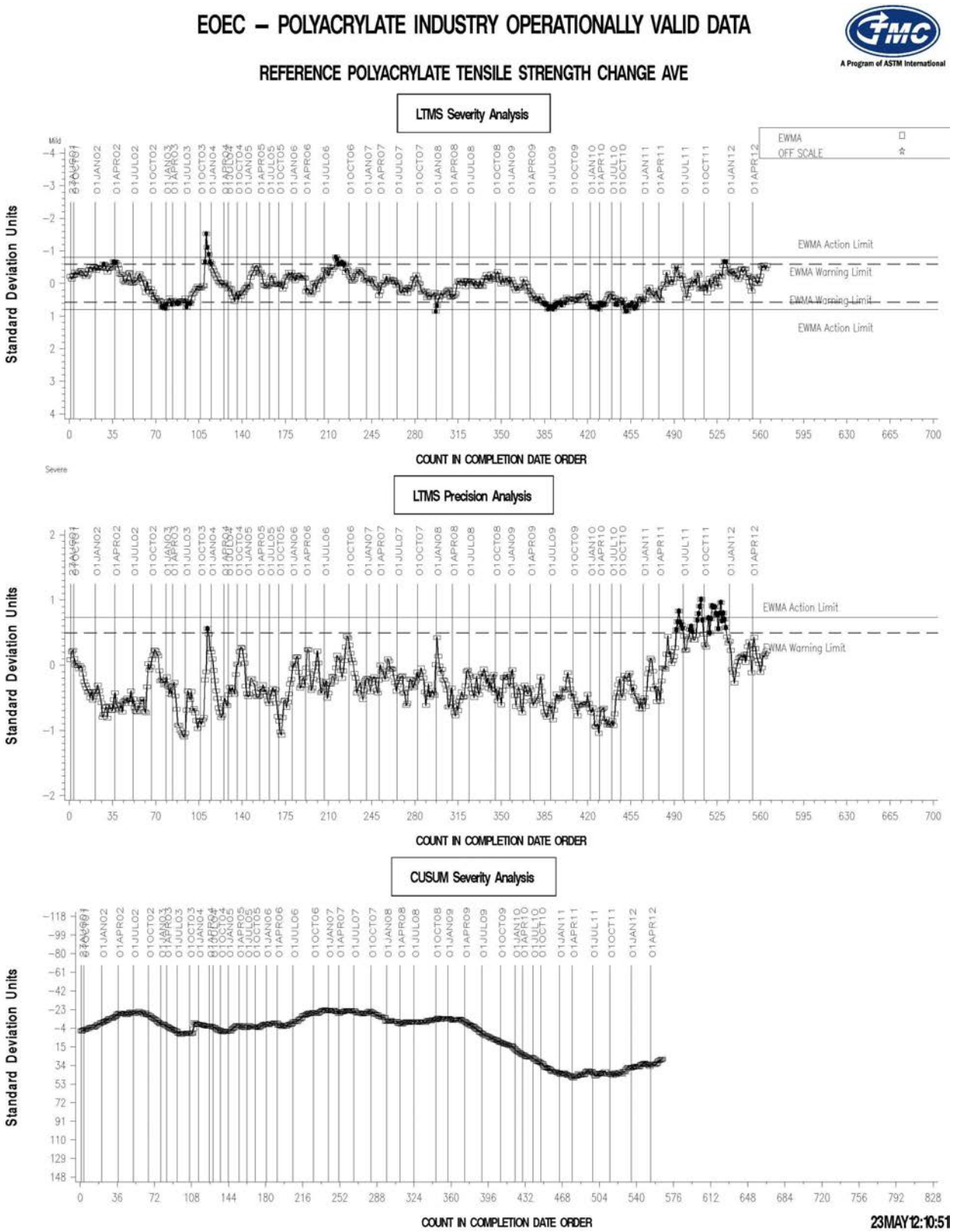

EOEC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
FLUOROELASTOMER TENSILE STRENGTH CHANGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
24MAY12:10:37

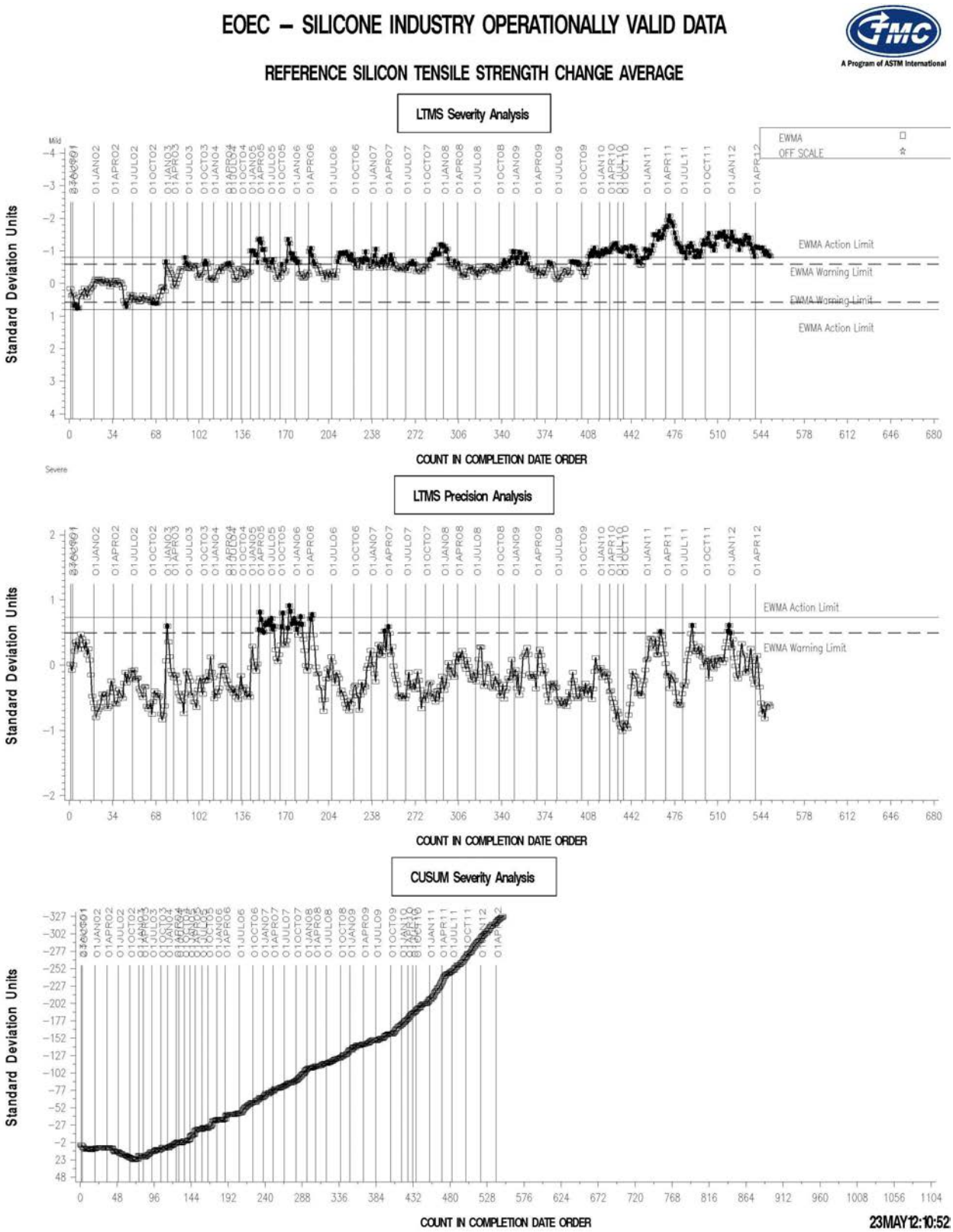
EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA

A Program of ASTM International

REFERENCE NITRILE TENSILE STRENGTH CHANGE AVERAGE




EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE POLYACRYLATE TENSILE STRENGTH CHANGE AVE
LTMS Severity Analysis
Mild
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
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
23MAY12:10:51

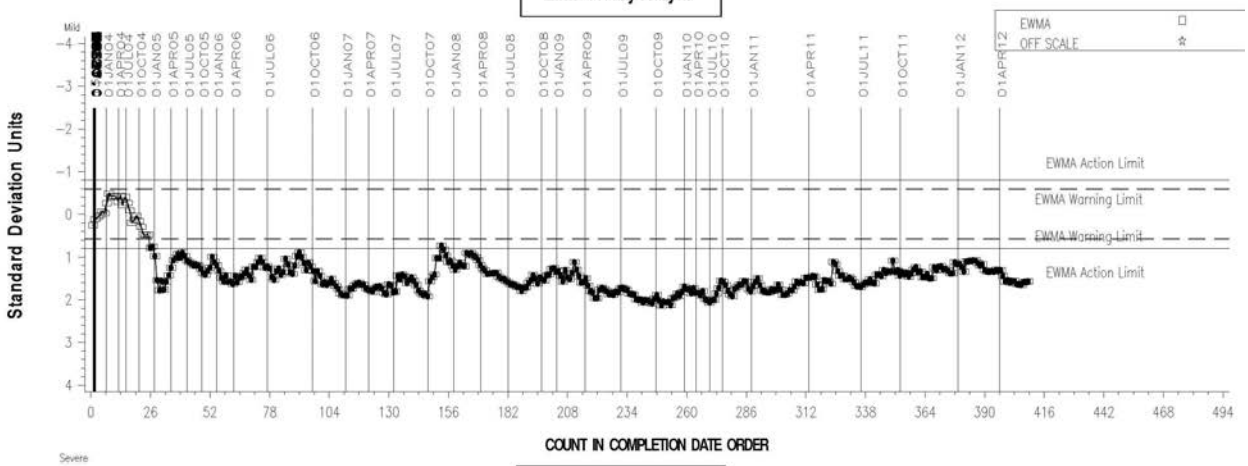

EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE SILICON TENSILE STRENGTH CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
23MAY12:10:52

EOEC – VAMAC INDUSTRY OPERATIONALLY VALID DATA

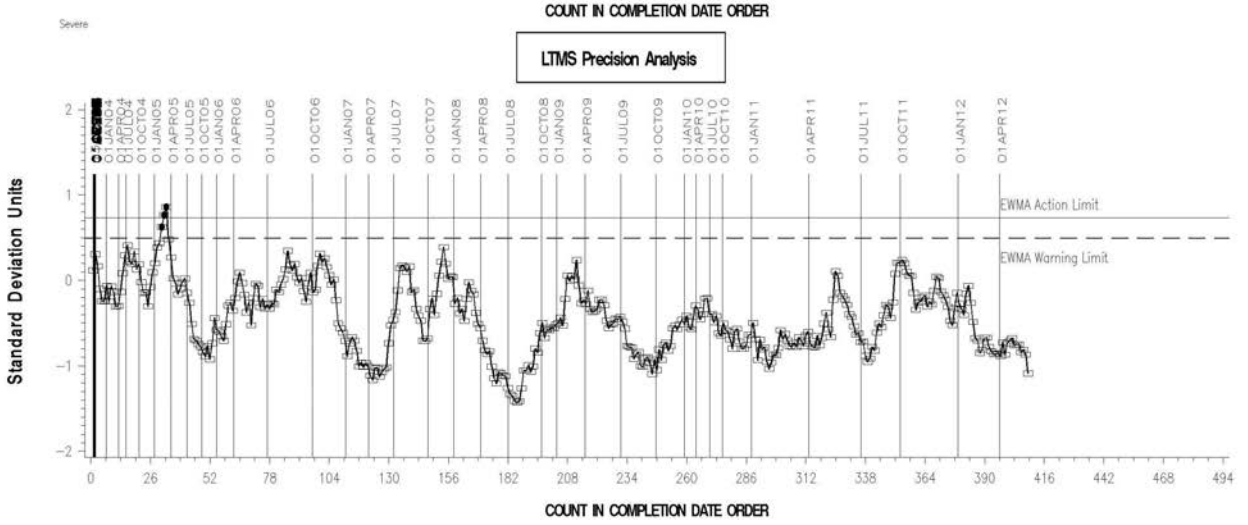
A Program of ASTM International

REFERENCE VAMAC G TENSILE STRENGTH CHANGE AVERAGE

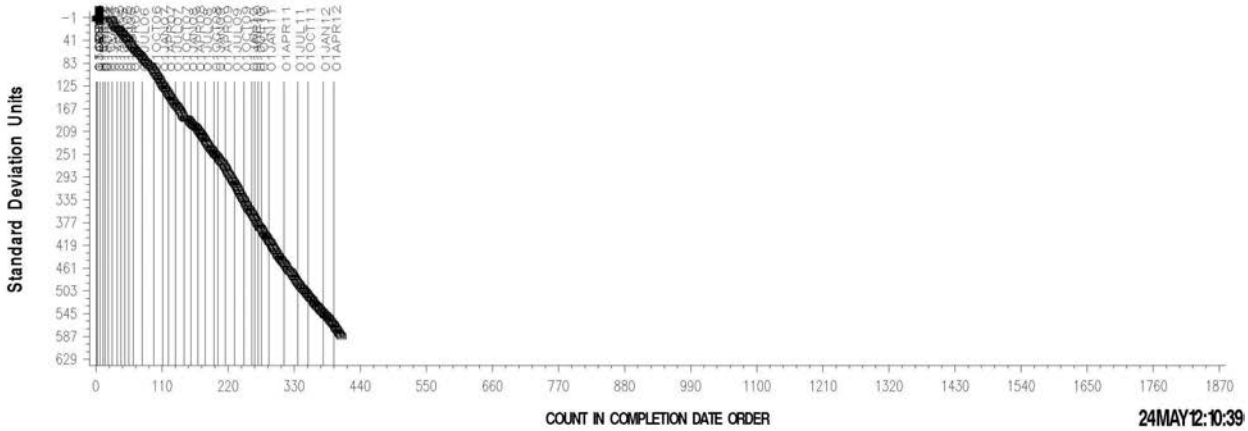
LTMS Severity Analysis



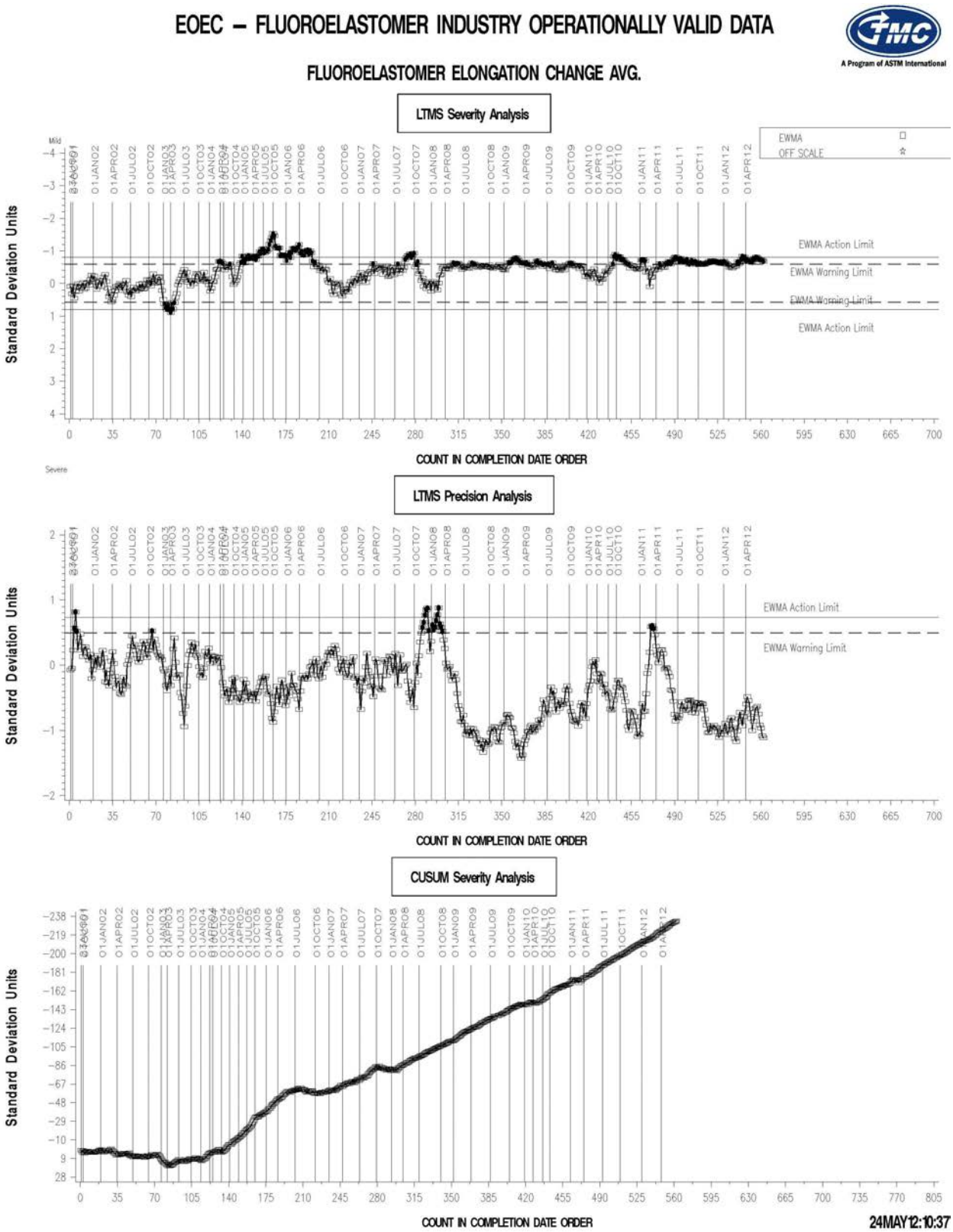
LTMS Precision Analysis

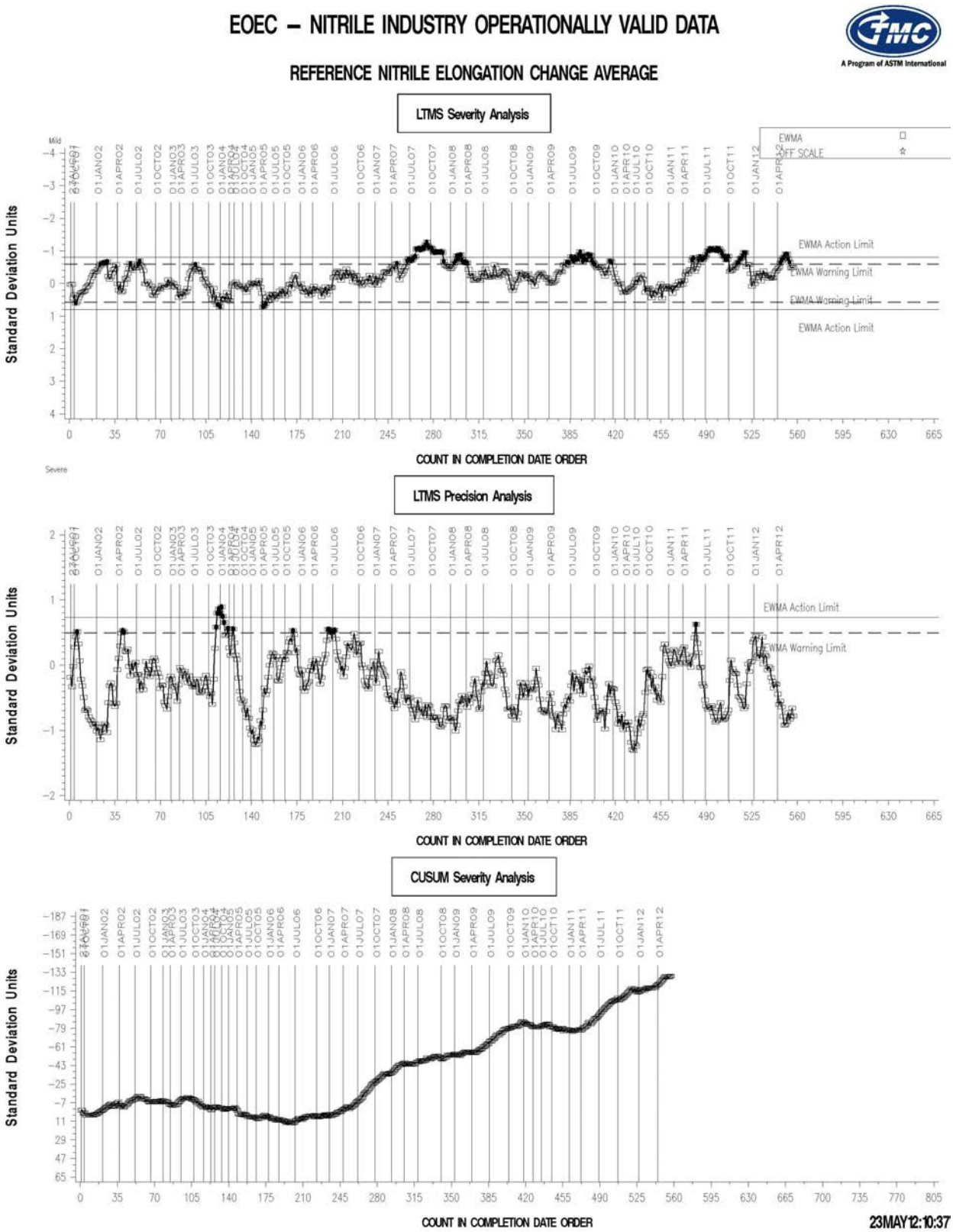


CUSUM Severity Analysis



24MAY12:10:39


EOEC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
FLUOROELASTOMER ELONGATION CHANGE AVG.
LTMS Severity Analysis
Mild
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
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
24MAY12:10:37

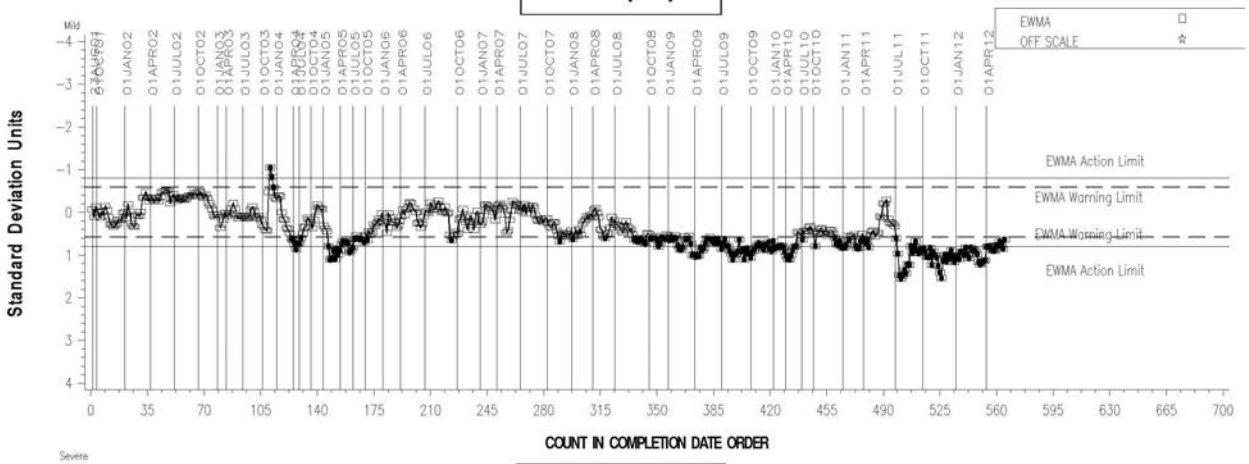

EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE NITRILE ELONGATION CHANGE AVERAGE
LTMS Severity Analysis
Mild
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
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
23MAY12:10:37

EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA

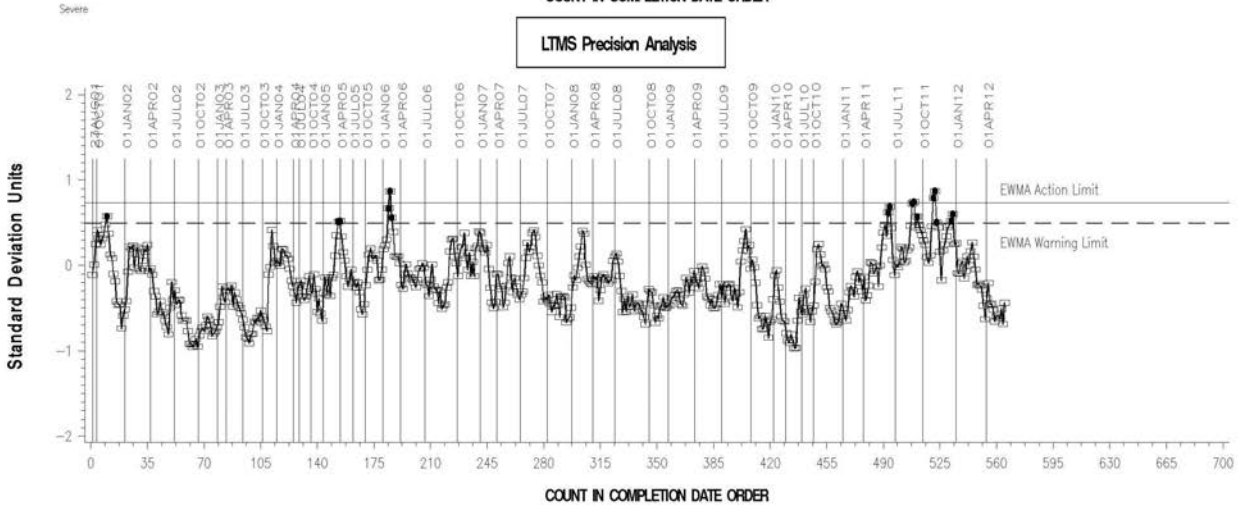
A Program of ASTM International

REFERENCE POLYACRYLATE ELONGATION CHANGE AVERAGE

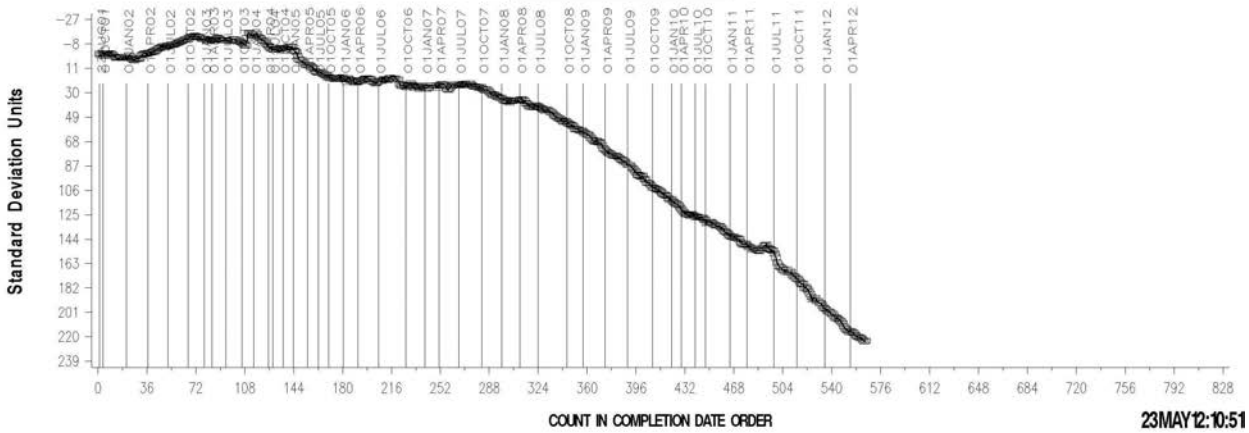
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis



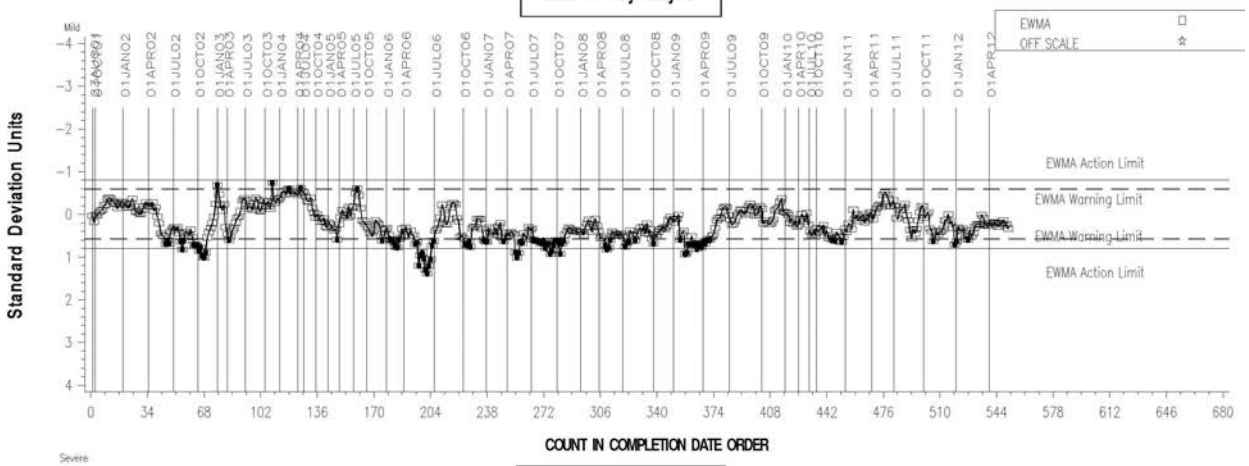
23MAY12:10:51

EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA

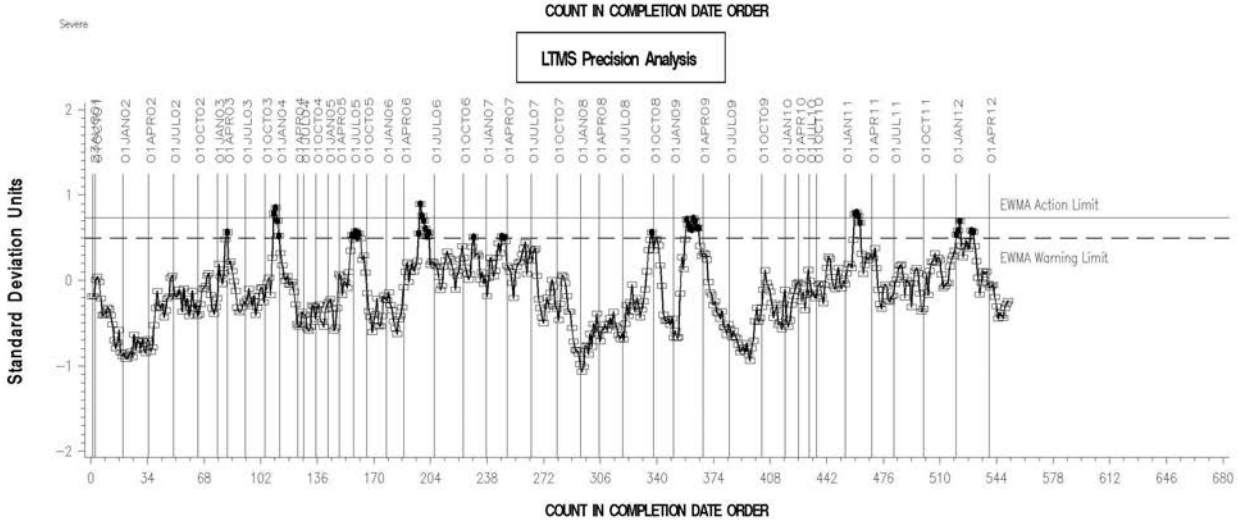
A Program of ASTM International

REFERENCE SILICON ELONGATION CHANGE AVERAGE

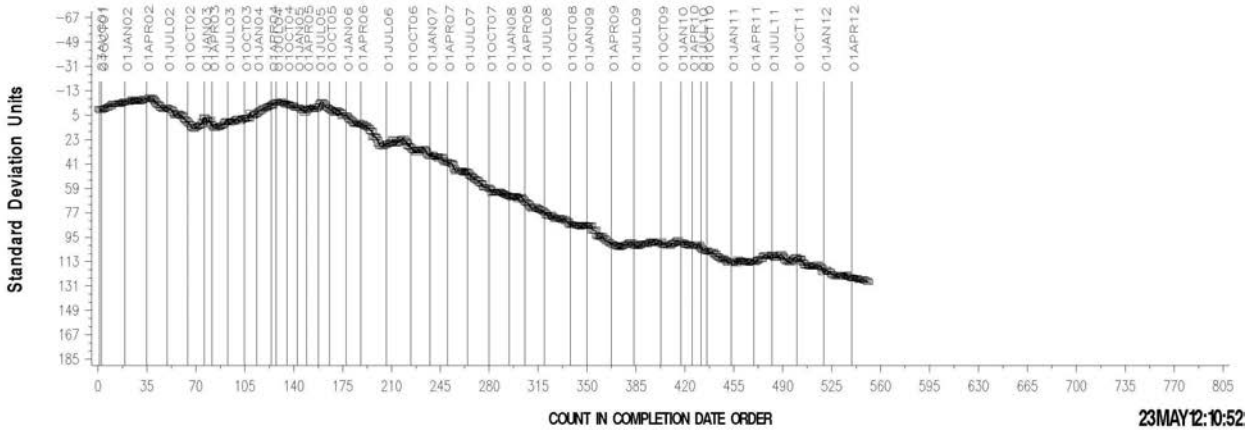
LTMS Severity Analysis



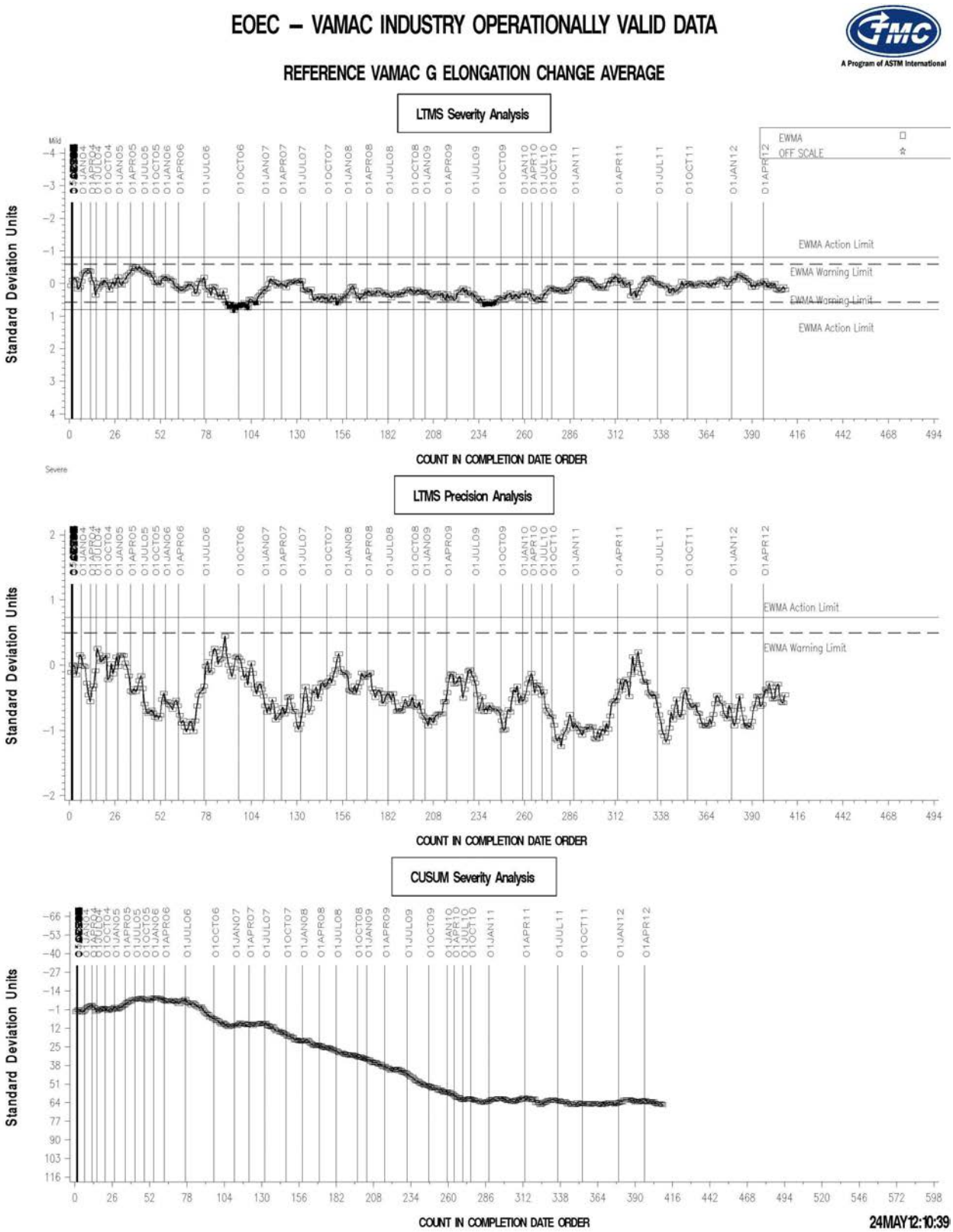
LTMS Precision Analysis



CUSUM Severity Analysis

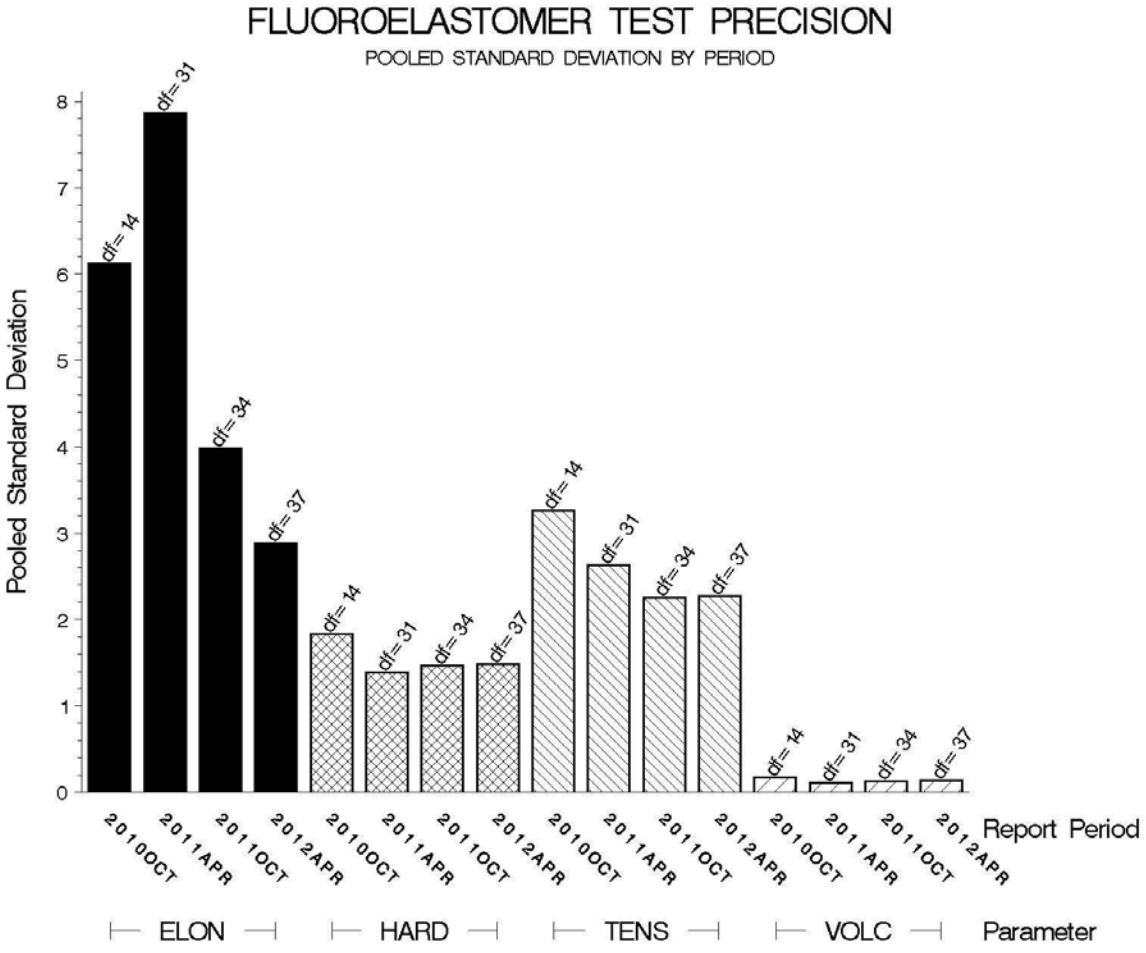


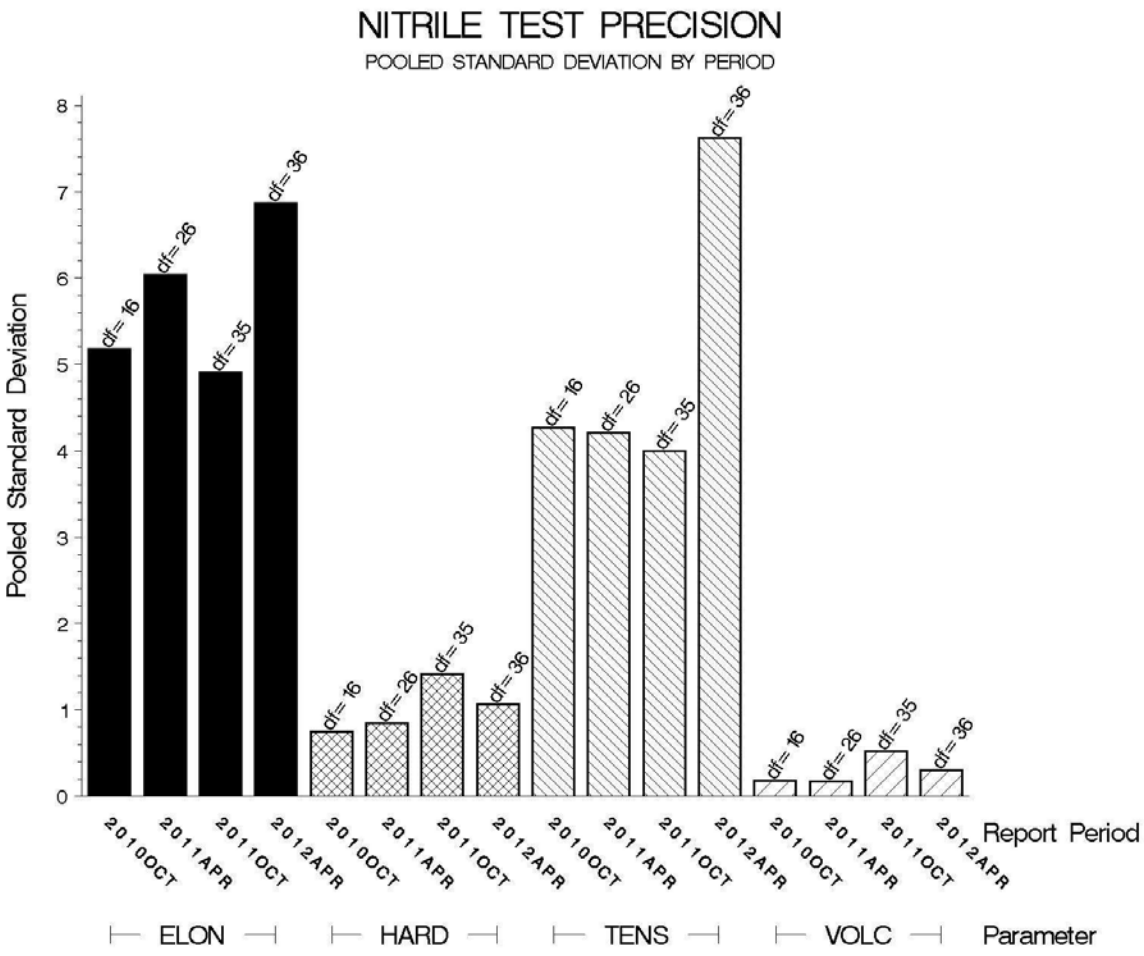
23MAY12:10:52

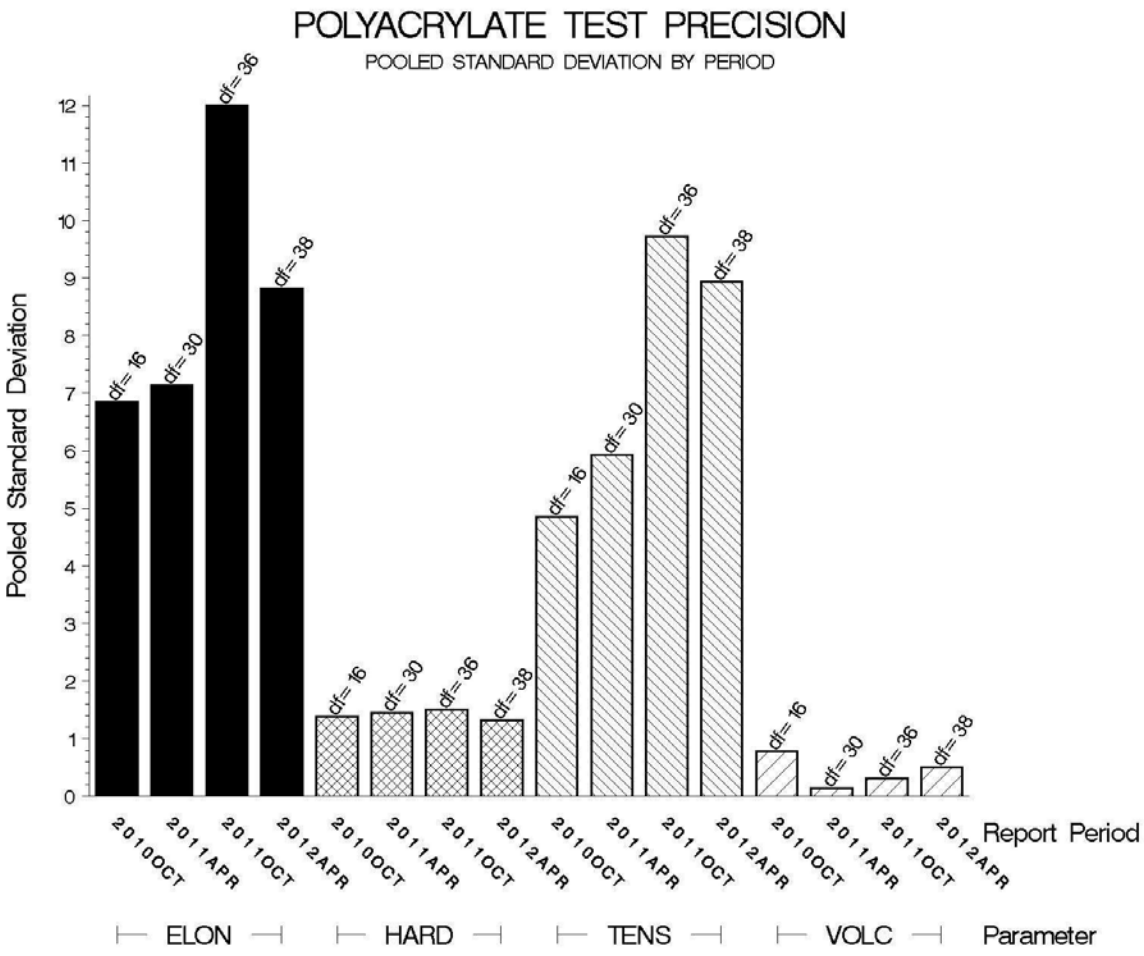

EOEC – VAMAC INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REFERENCE VAMAC G ELONGATION CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
24MAY12:10:39

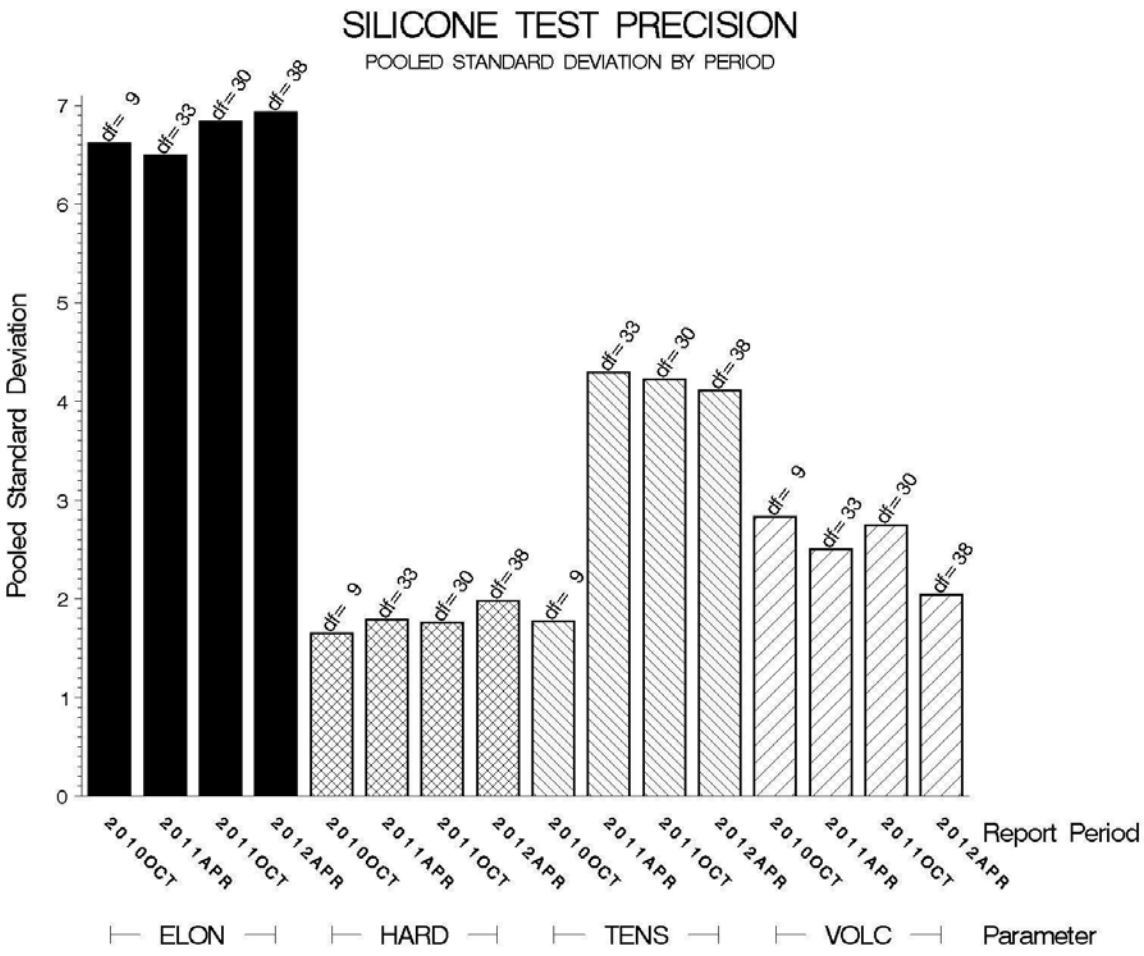
POOLED S:

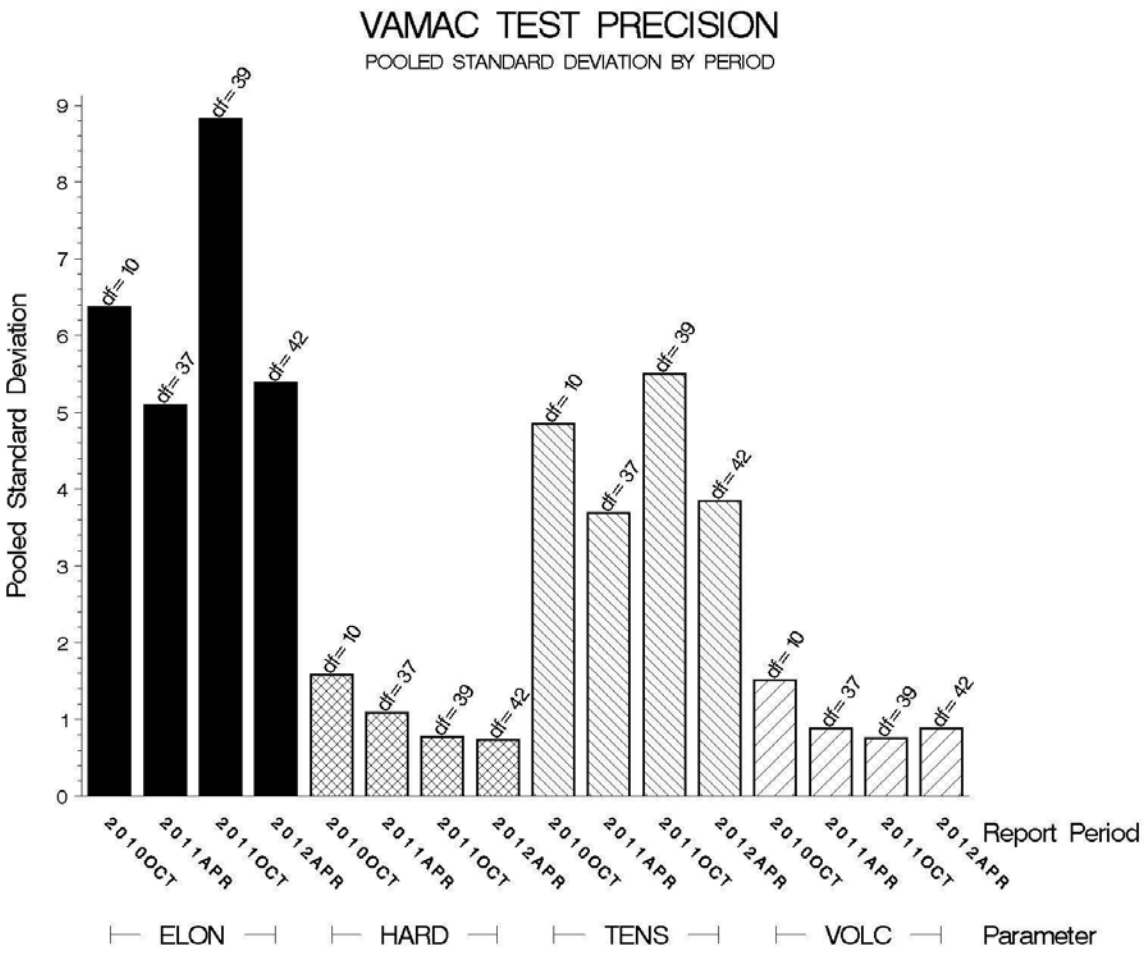
Shown below are bar charts comparing the pooled s values for the EOEC test parameters over the last four report periods.




NITRILE TEST PRECISION
POOLED STANDARD DEVIATION BY PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
6
7
8
df= 16
df= 26
df= 35
df= 36
2010OCT
2011APR
2011OCT
2012APR
Report Period
ELON
HARD
TENS
VOLC
Parameter


POLYACRYLATE TEST PRECISION
POOLED STANDARD DEVIATION BY PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
6
7
8
9
10
11
12
df= 16
df= 30
df= 36
df= 38
2010OCT
2011APR
2011OCT
2012APR
Report Period
ELON
HARD
TENS
VOLC
Parameter


SILICONE TEST PRECISION
POOLED STANDARD DEVIATION BY PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
6
7
df= 9
df=33
df=30
df=38
2010OCT
2011APR
2011OCT
2012APR
Report Period
ELON
HARD
TENS
VOLC
Parameter


VAMAC TEST PRECISION
POOLED STANDARD DEVIATION BY PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
6
7
8
9
df= 10
df= 37
df= 39
df= 42
df= 10
df= 37
df= 39
df= 42
df= 10
df= 37
df= 39
df= 42
df= 10
df= 37
df= 39
df= 42
2010OCT
2011APR
2011OCT
2012APR
2010OCT
2011APR
2011OCT
2012APR
2010OCT
2011APR
2011OCT
2012APR
2010OCT
2011APR
2011OCT
2012APR
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	191	7731	1532
Total	191	7731	1532

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:

No Information Letters were issued this period.

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**	**Severe**	Within limits	Within limits
Polyacrylate	**Severe**	Within limits	Within limits	**Severe**
Silicone	Within limits	Within limits	**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/astm0412.doc/mem12-020.mtk.doc

c: F. M. Farber
J. A. Clark
EOEC Surveillance Panel
ftp://ftp.astmtmc.cmu.edu/docs/bench/eoec/semiannualreports/eoec-04-2012.pdf

Distribution: email