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: 11-051

DATE: November 10, 2011

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

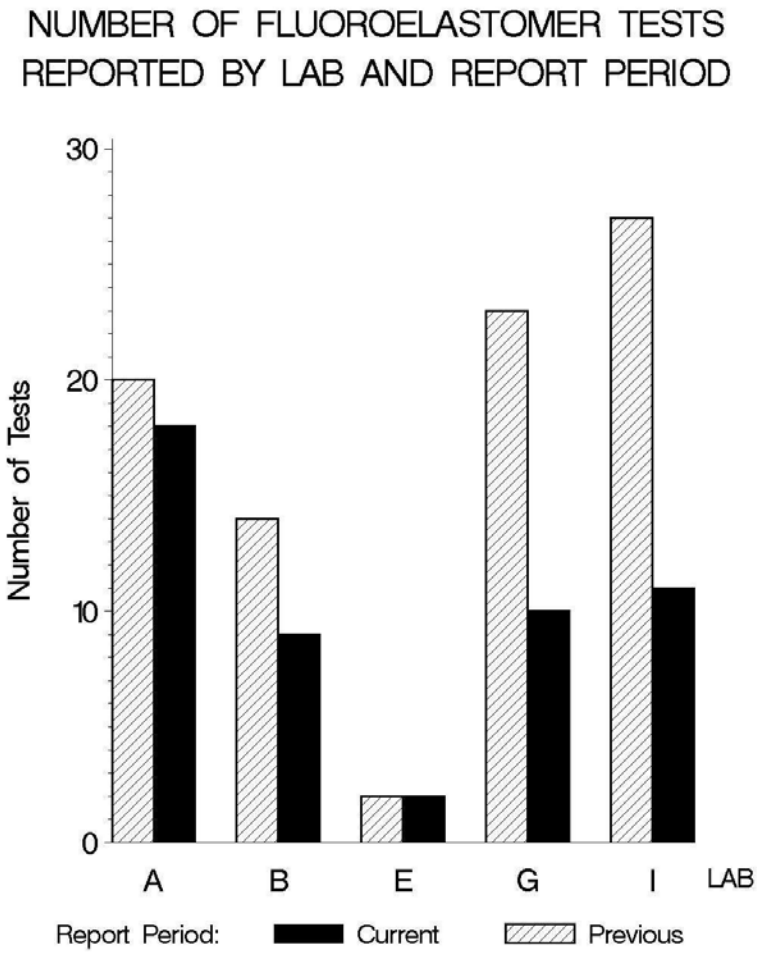
FROM: Michael T. Kasimirsky

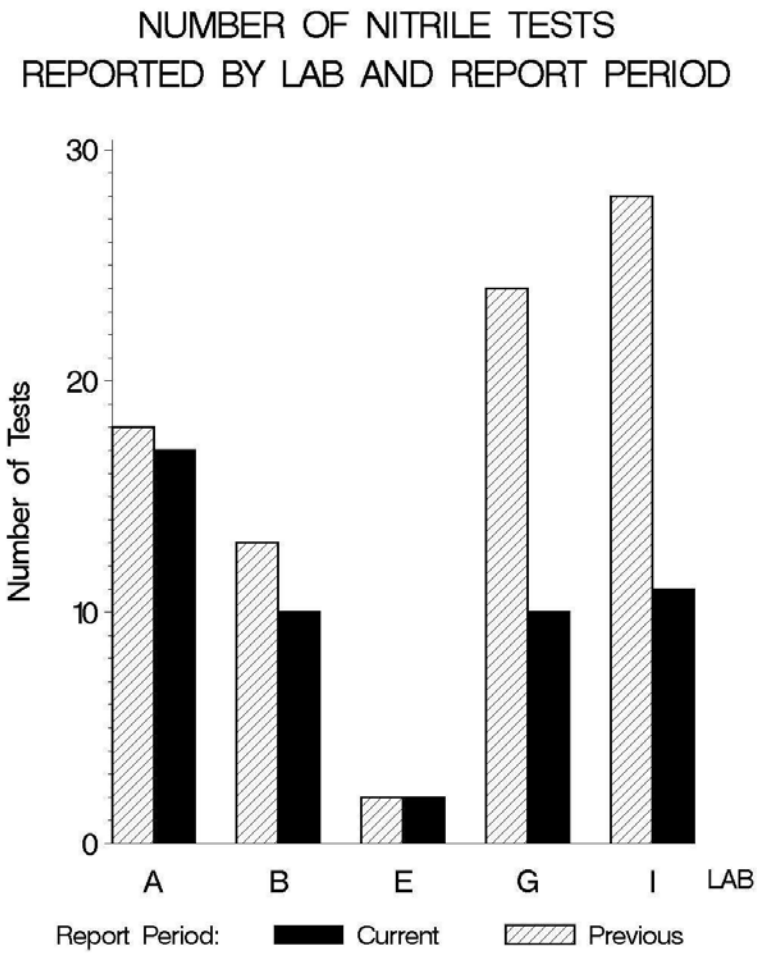
SUBJECT: LDEOC Testing from April 1, 2011 through September 30, 2011

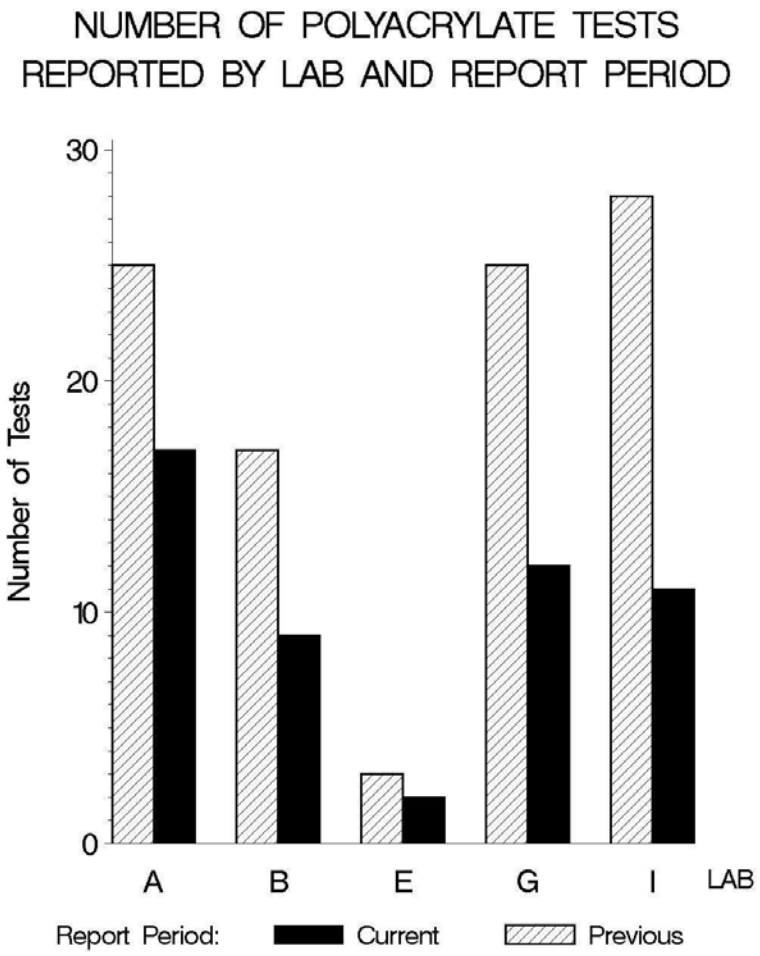
A total of 252 LDEOC tests were reported to the Test Monitoring Center during the period from April 1, 2011 through September 30, 2011. Following is a summary of testing activity this period.

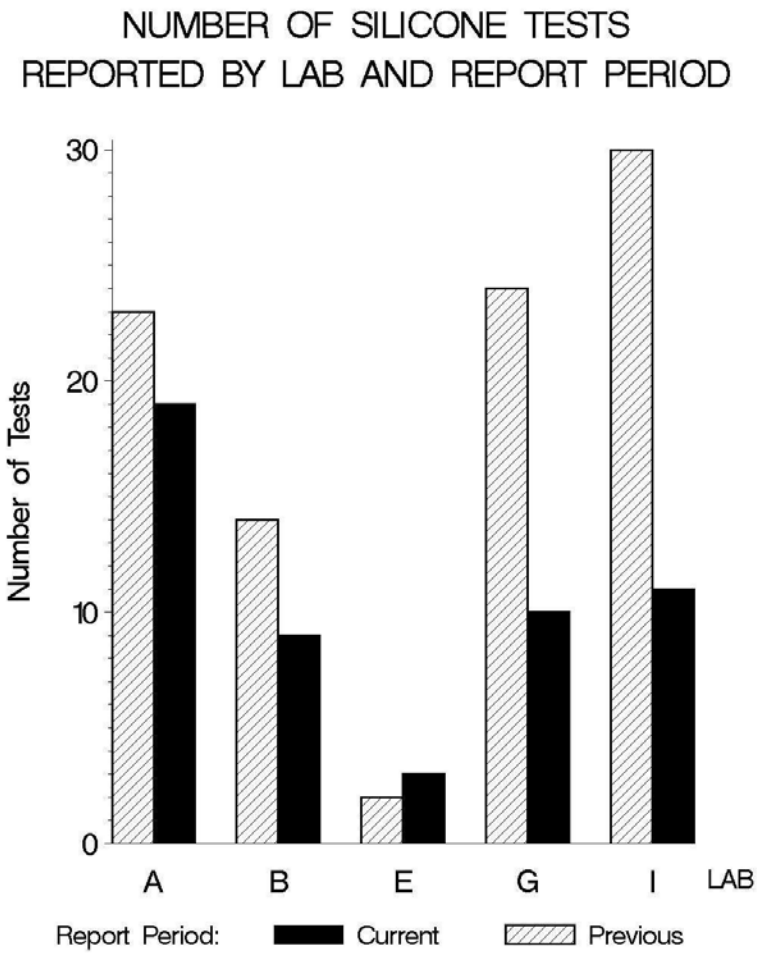
	Reporting Data
Number of Labs	5

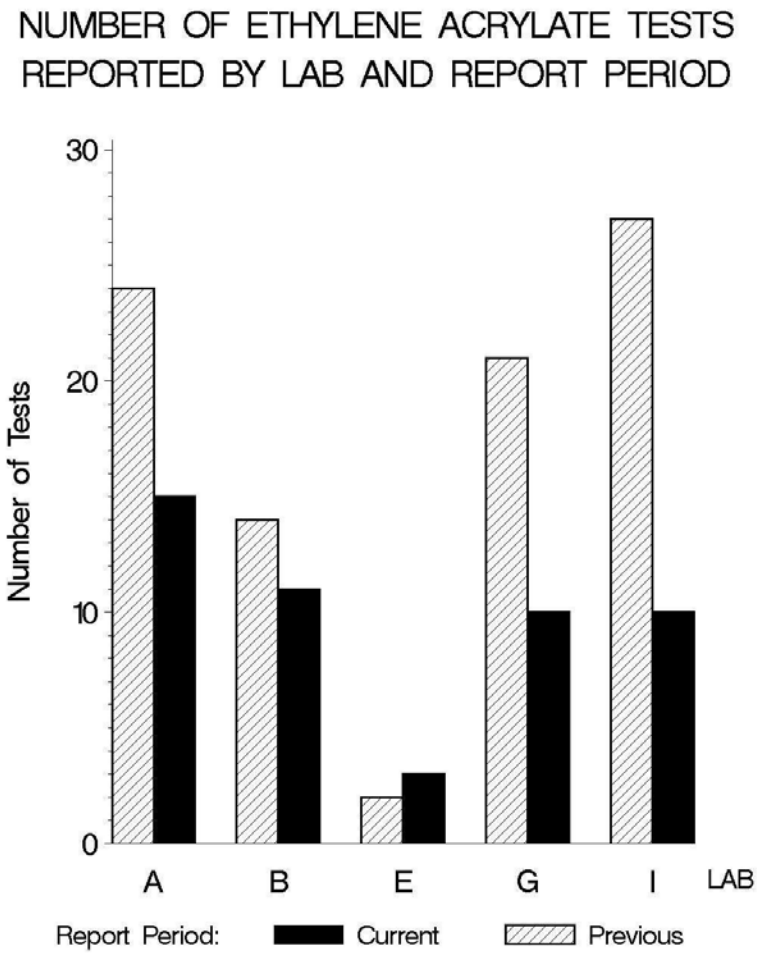
Tests reported this period were distributed as shown below:




NUMBER OF NITRILE TESTS
REPORTED BY LAB AND REPORT PERIOD
Number of Tests
30
20
10
0
A
B
E
G
I
LAB
Report Period:
Current
Previous

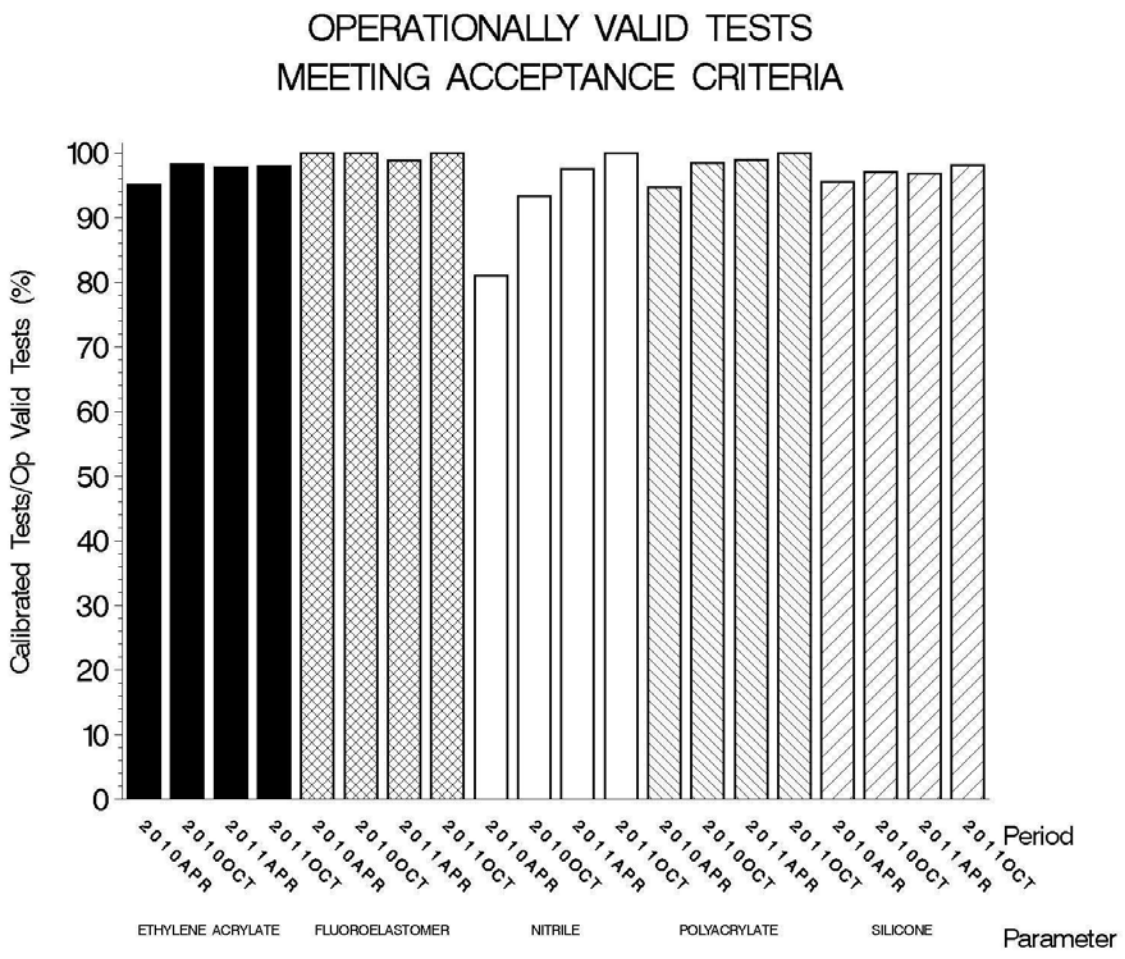

NUMBER OF POLYACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD
Number of Tests
30
20
10
0
A
B
E
G
I
LAB
Report Period:
Current
Previous


NUMBER OF SILICONE TESTS
REPORTED BY LAB AND REPORT PERIOD
Number of Tests
30
20
10
0
A
B
E
G
I
LAB
Report Period:
Current
Previous


NUMBER OF ETHYLENE ACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD
Number of Tests
30
20
10
0
A
B
E
G
I
LAB
Report Period:
Current
Previous

Test Distribution by Oil and Validity

		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Totals	
							This Period	Last Period
Accepted for Calibration	AC	48	48	50	49	51	246	422
Rejected	OC	1	0	0	0	1	2	9
Acceptable Donated Test	AG	0	0	0	0	0	0	8
Unacceptable Donated Test	MI	0	0	0	0	0	0	2
Operationally Invalid (lab)	LC	0	2	0	1	0	3	6
Operationally Invalid (lab/TMC)	RC	0	0	0	1	0	1	0
Aborted Calibration	XC	0	0	0	0	0	0	3
Total		49	50	50	51	52	252	450



The above chart shows the percentage of accepted operationally valid tests. This period one ethylene acrylate test and one silicone test failed to meet the acceptance criteria.

Lost Tests per Start by Lab and Elastomer Type

	Ethylene Acrylate			**Fluoroelastomer**			**Nitrile**			**Polyacrylate**			**Silicone**			Total		
Lab	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A	0	15	0	0	18	0	0	17	0	0	19	0	0	19	0	0	86	0
B	0	11	0	0	9	0	0	10	0	0	9	0	0	9	0	0	48	0
E	0	3	0	0	2	0	0	2	0	0	2	0	0	3	0	0	12	0
G	0	10	0	2	10	20	0	10	0	2	12	16.7	0	10	0	4	52	7.7
I	0	10	0	0	11	0	0	11	0	0	11	0	0	11	0	0	54	0
Total	0	49	0	2	50	4	0	50	0	2	51	3.9	0	52	0	4	252	1.6

Lost tests are those that were aborted or operationally invalid.

Causes for Lost Tests

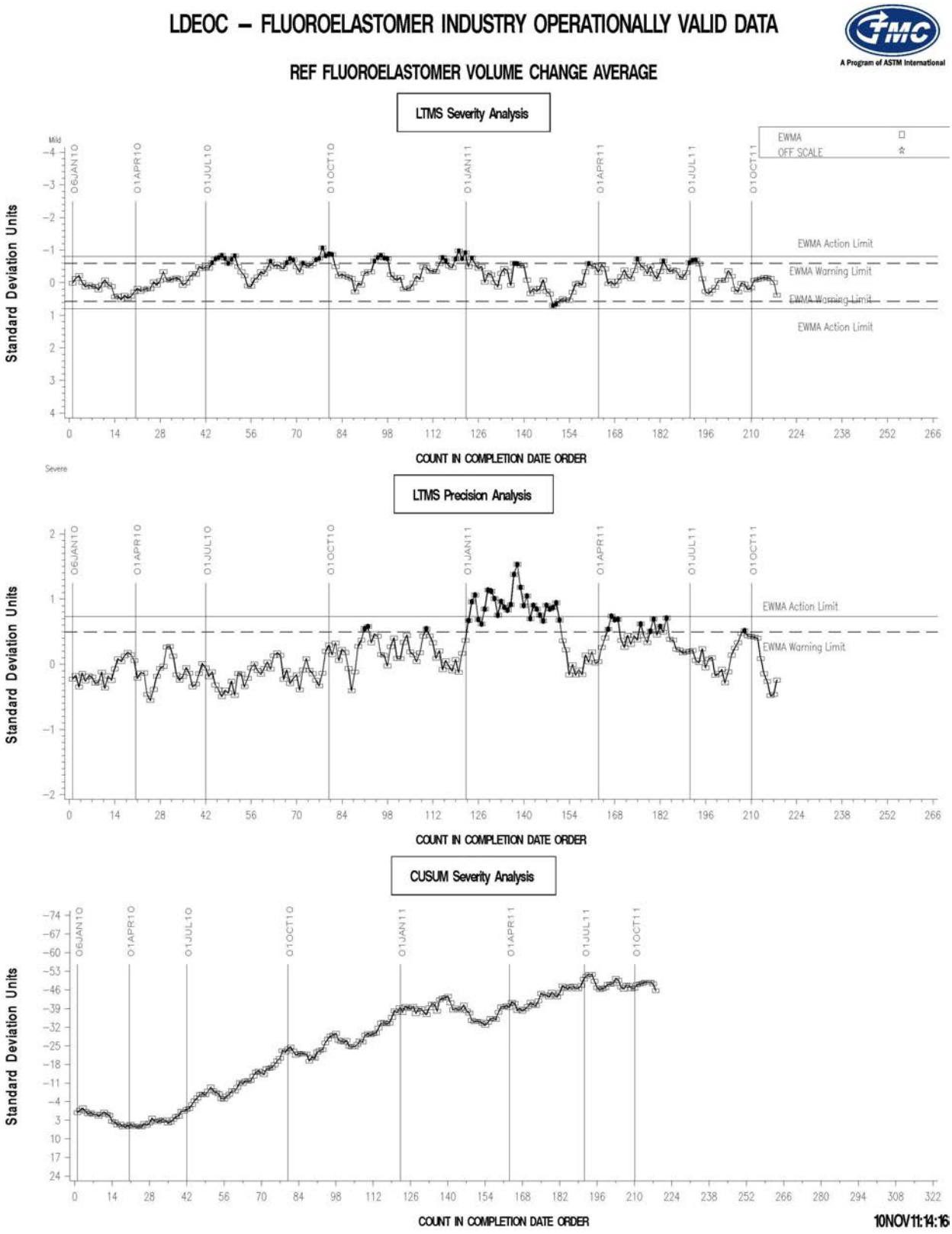
			Elastomer					Validity			Loss Rate		
Lab	Cause		Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Ethylene Acrylayte	LC	RC	XC	Lost	Starts	%
G	Initial Weights Incorrect		●		●			●			3	252	1.6
	Bath Failure								●		1		
		Lost	2	0	2	0	0	3	1	0			
		Starts	49	50	50	51	52	252	252	252			
		%	4.1	0	4	0	0	4	1.2	0			

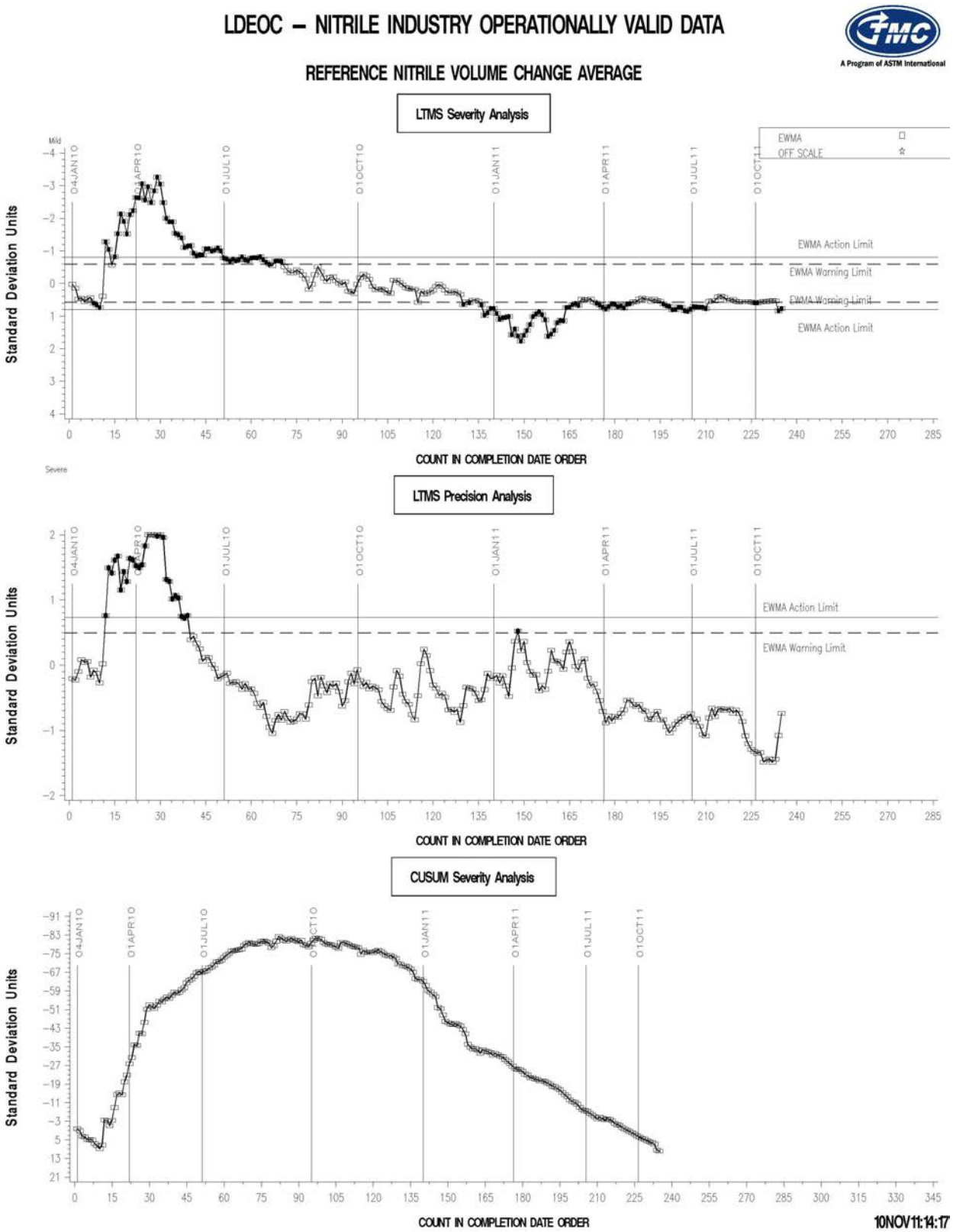
Average Δ/s by Lab					
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI
Ethylene Acrylate	A	15	-0.429	-0.993	-0.457
	B	11	0.587	-1.825	-0.258
	E	3	-0.926	-3.190	-0.276
	G	10	0.134	0.363	0.052
	I	10	1.062	-1.066	-0.065
	Industry	49	0.188	-1.052	-0.217
Fluoroelastomer	A	18	0.248	0.525	-0.961
	B	9	-1.244	0.525	0.011
	E	2	-0.867	-0.465	-0.945
	G	8	0.225	-0.342	0.488
	I	11	0.012	0.345	0.645
	Industry	48	-0.136	0.298	-0.169
Nitrile	A	17	0.741	-0.030	-0.926
	B	10	0.355	0.517	-0.784
	E	2	0.558	0.172	-1.452
	G	10	0.608	0.517	-0.965
	I	11	0.603	0.590	-0.870
	Industry	50	0.600	0.333	-0.914
Polyacrylate	A	17	0.142	-0.728	-0.832
	B	9	-0.315	-0.622	-0.683
	E	2	-0.727	-2.714	-0.944
	G	10	-0.039	-0.182	-0.818
	I	11	1.014	-0.707	-0.660
	Industry	49	0.181	-0.673	-0.768
Silicone	A	19	-1.459	-0.370	1.891
	B	9	0.662	-0.542	1.080
	E	3	-0.414	1.418	2.535
	G	10	0.470	1.598	0.364
	I	11	-0.581	0.007	0.352
	Industry	52	-0.475	0.161	1.168

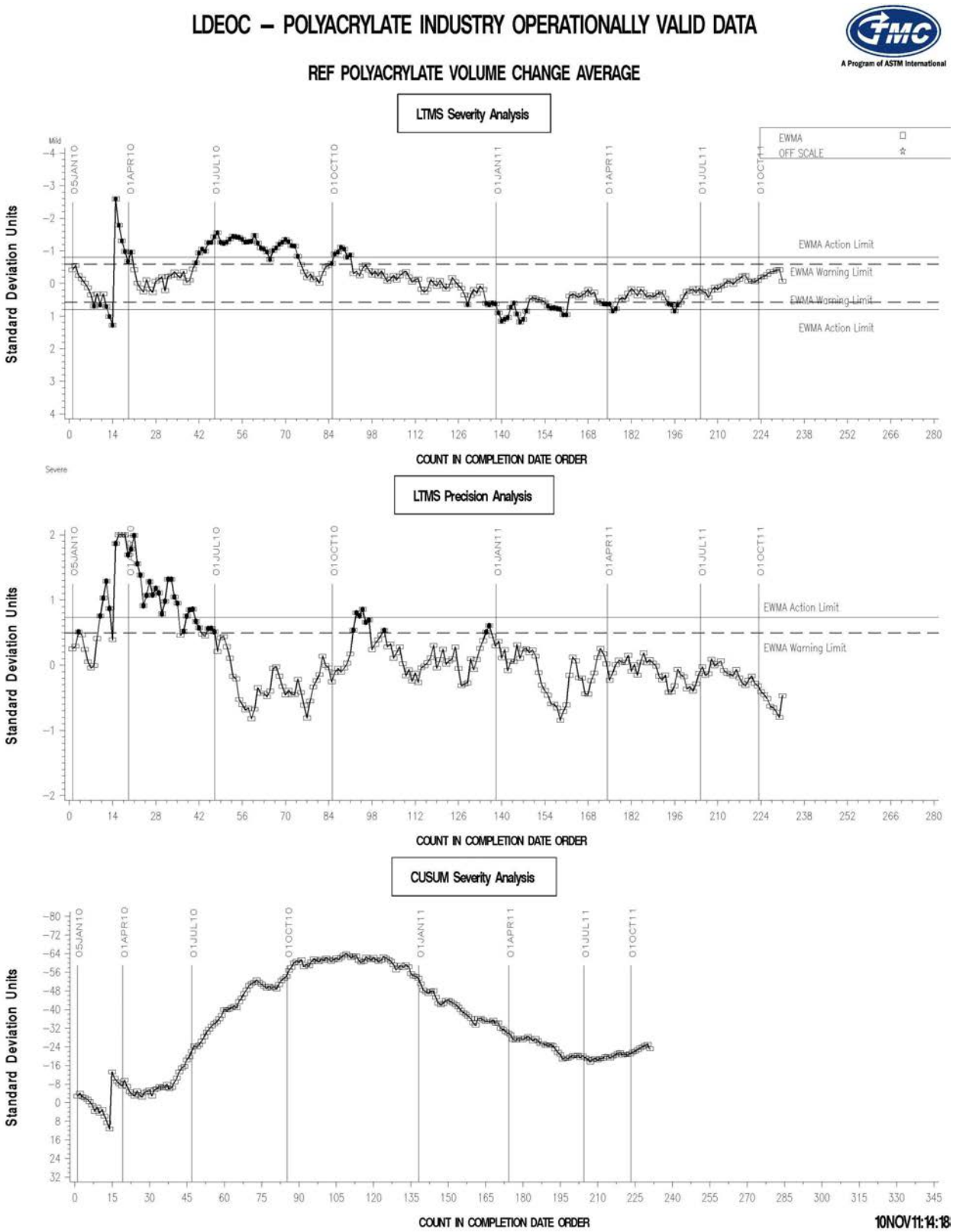
Individual test results can be viewed at the links shown in the following table:

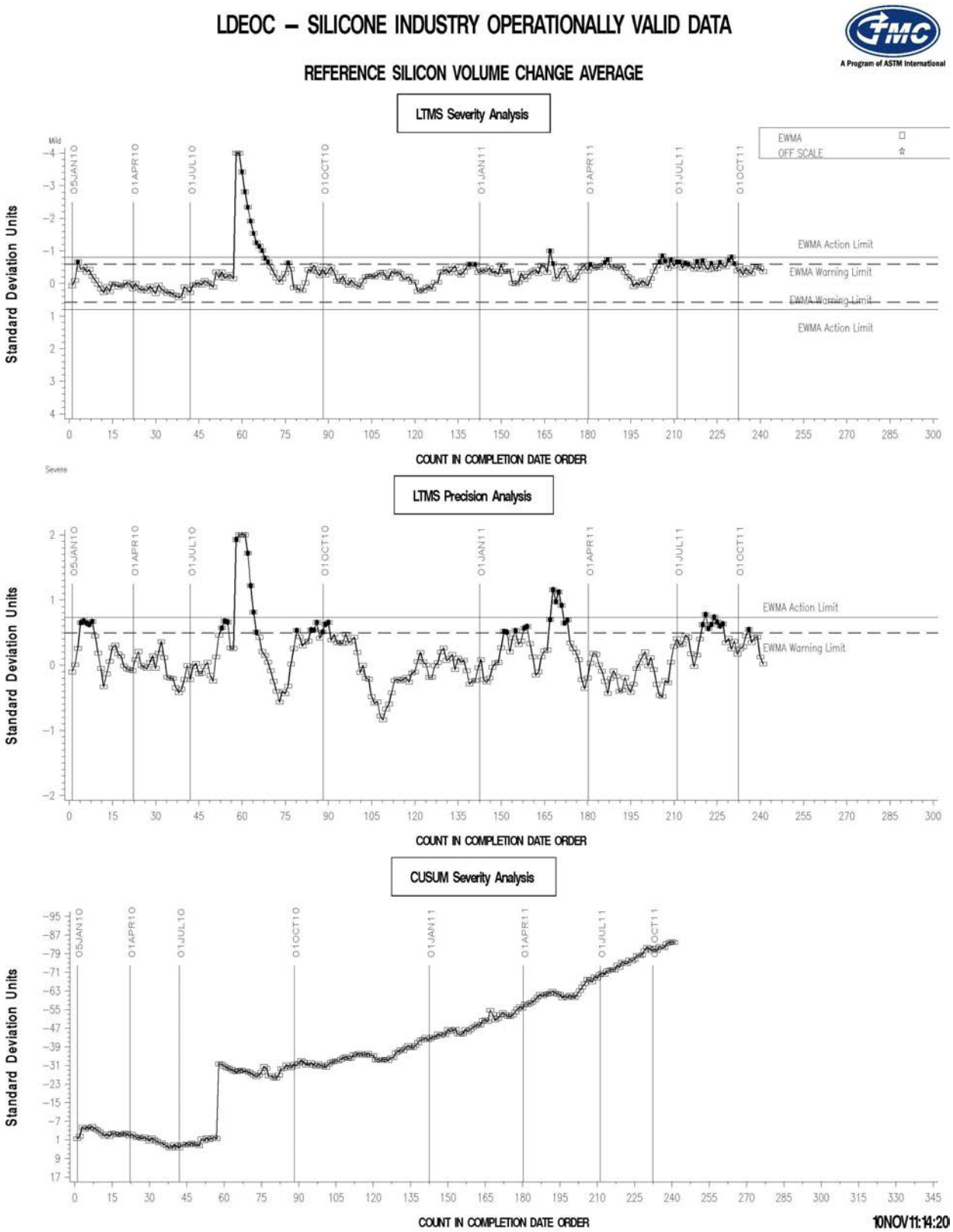
Links to Individual Test Result Data	
Elastomer Type	**Web Link to Data**
Fluoroelastomer	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeocf/data/
Nitrile	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeocn/data/
Polyacrylate	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeoep/data/
Silicone	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeocs/data/
Ethylene Acrylate	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeoea/data/

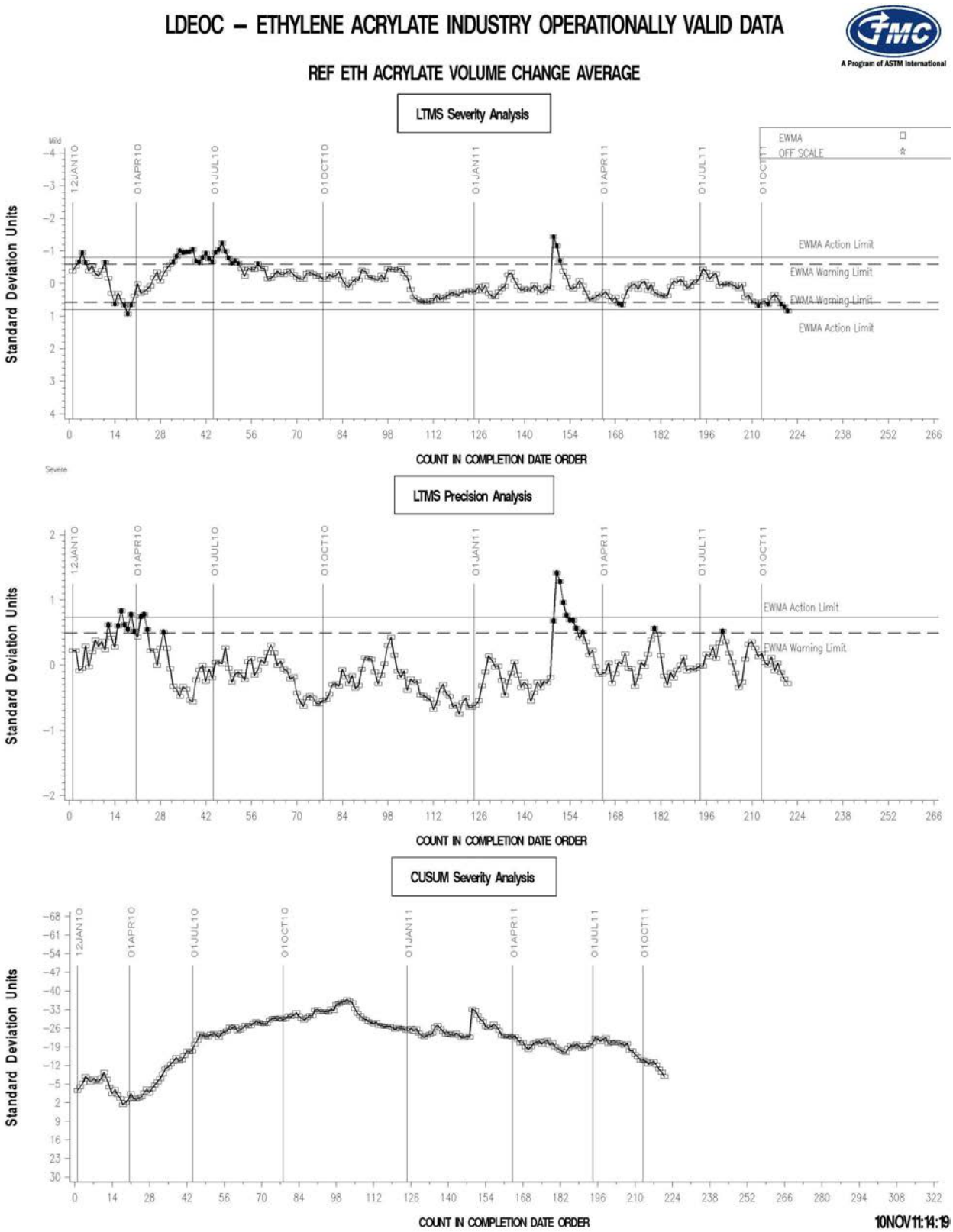
LTMS CONTROL CHARTS

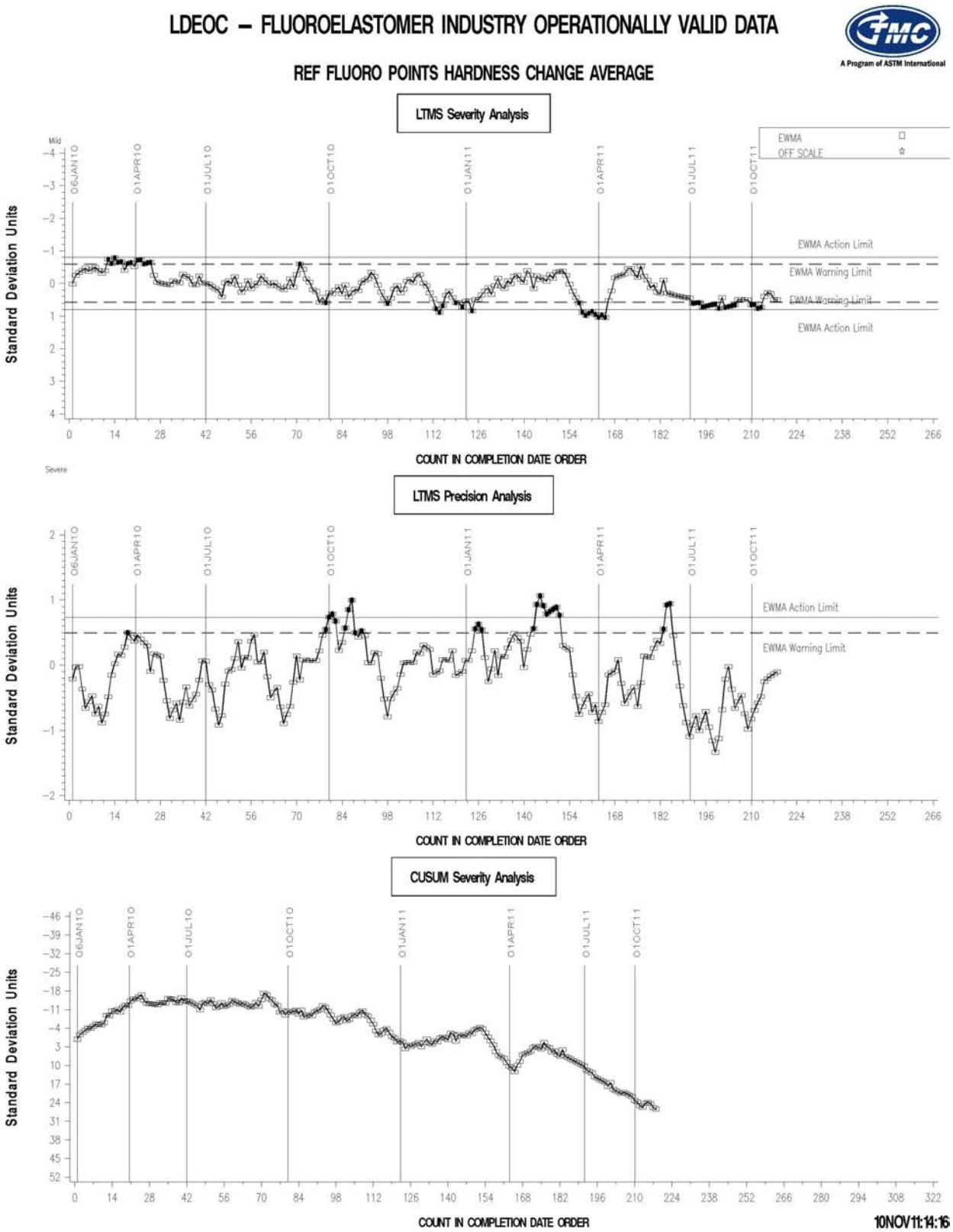


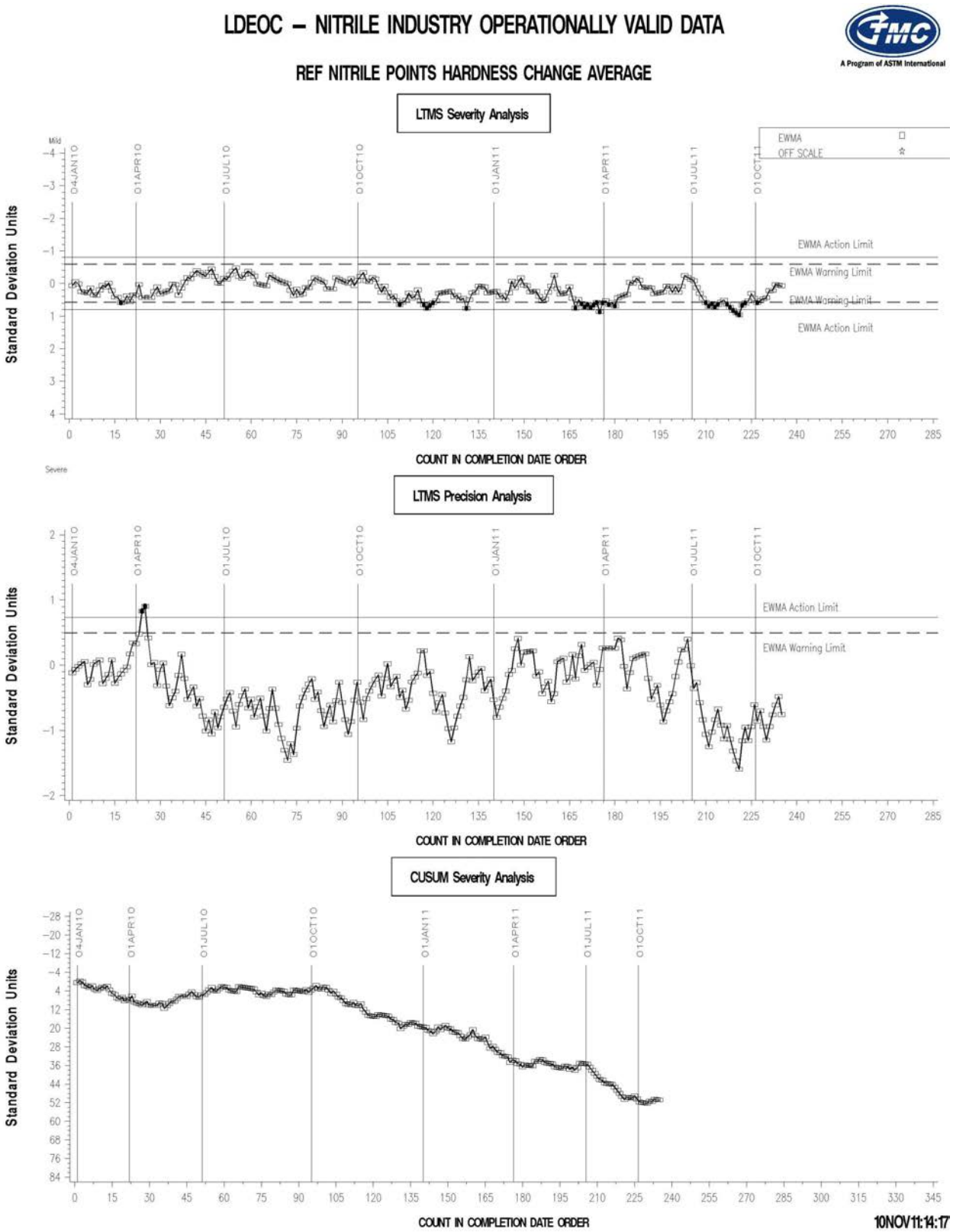

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA
REFERENCE NITRILE VOLUME CHANGE AVERAGE
A Program of ASTM International
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
04JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
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
10NOV11:14:17

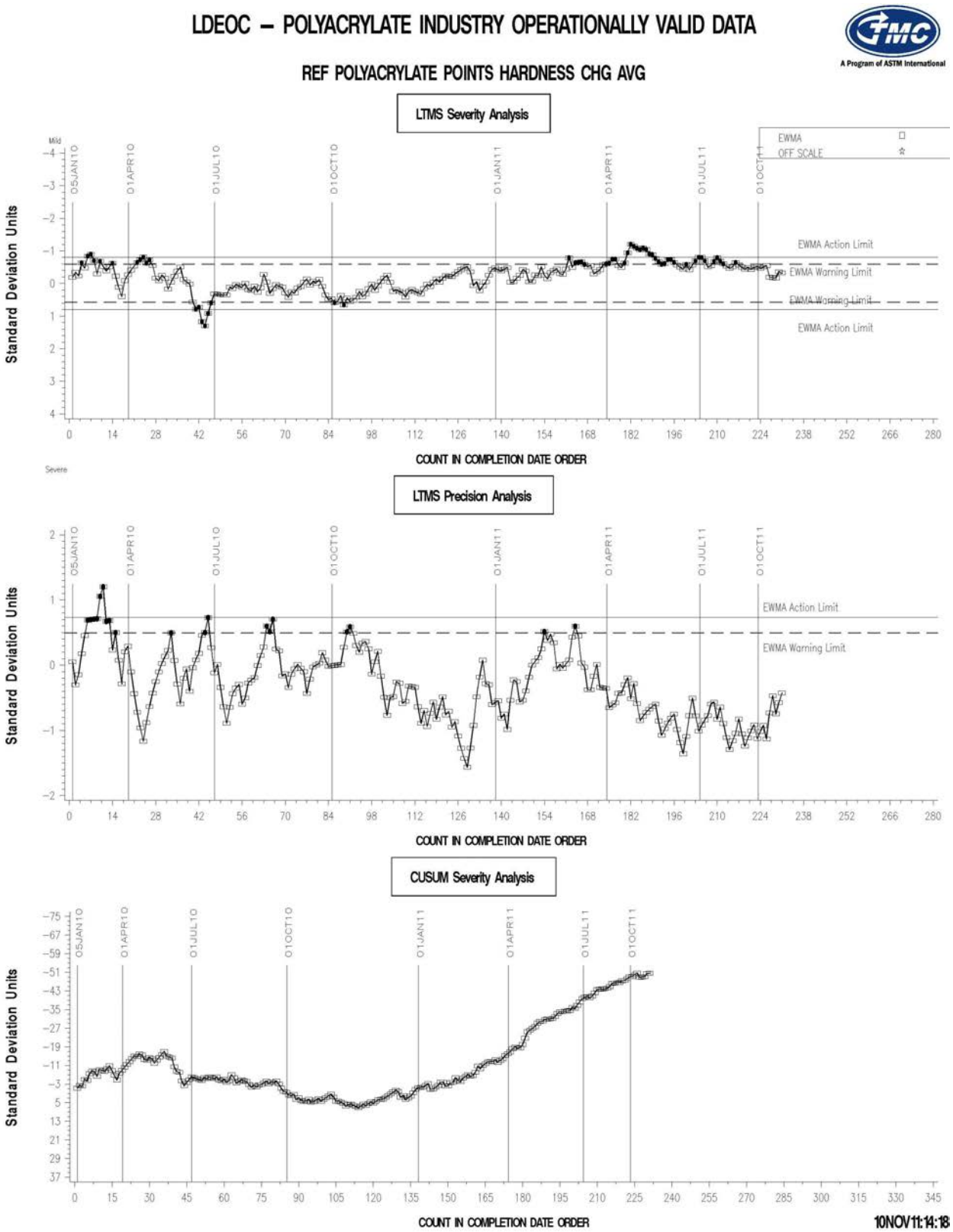

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
REF POLYACRYLATE VOLUME CHANGE AVERAGE
A Program of ASTM International
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
05JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
CUSUM Severity Analysis
10NOV11:14:18

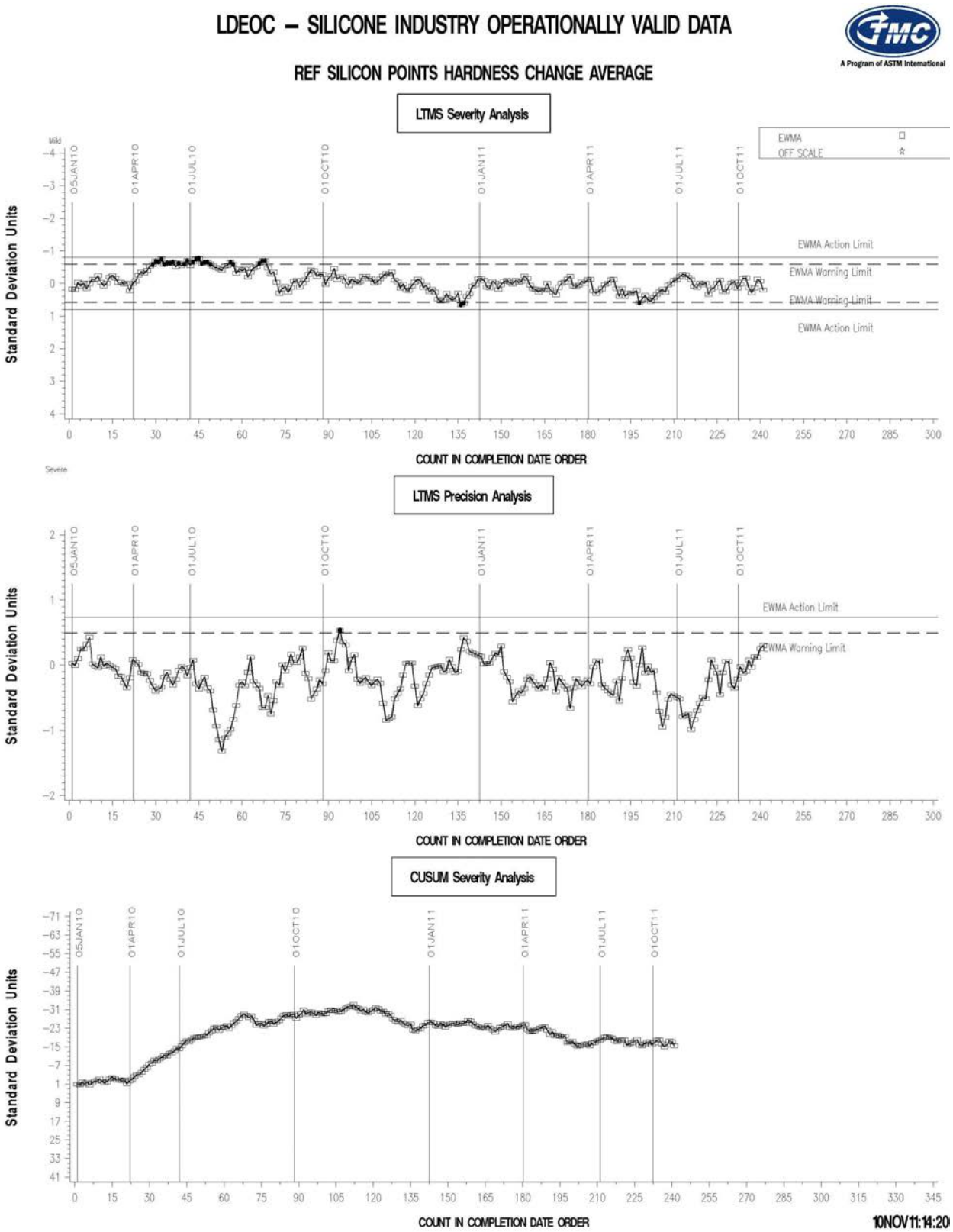

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
REFERENCE SILICON VOLUME CHANGE AVERAGE
A Program of ASTM International
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
05JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
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
10NOV11:14:20

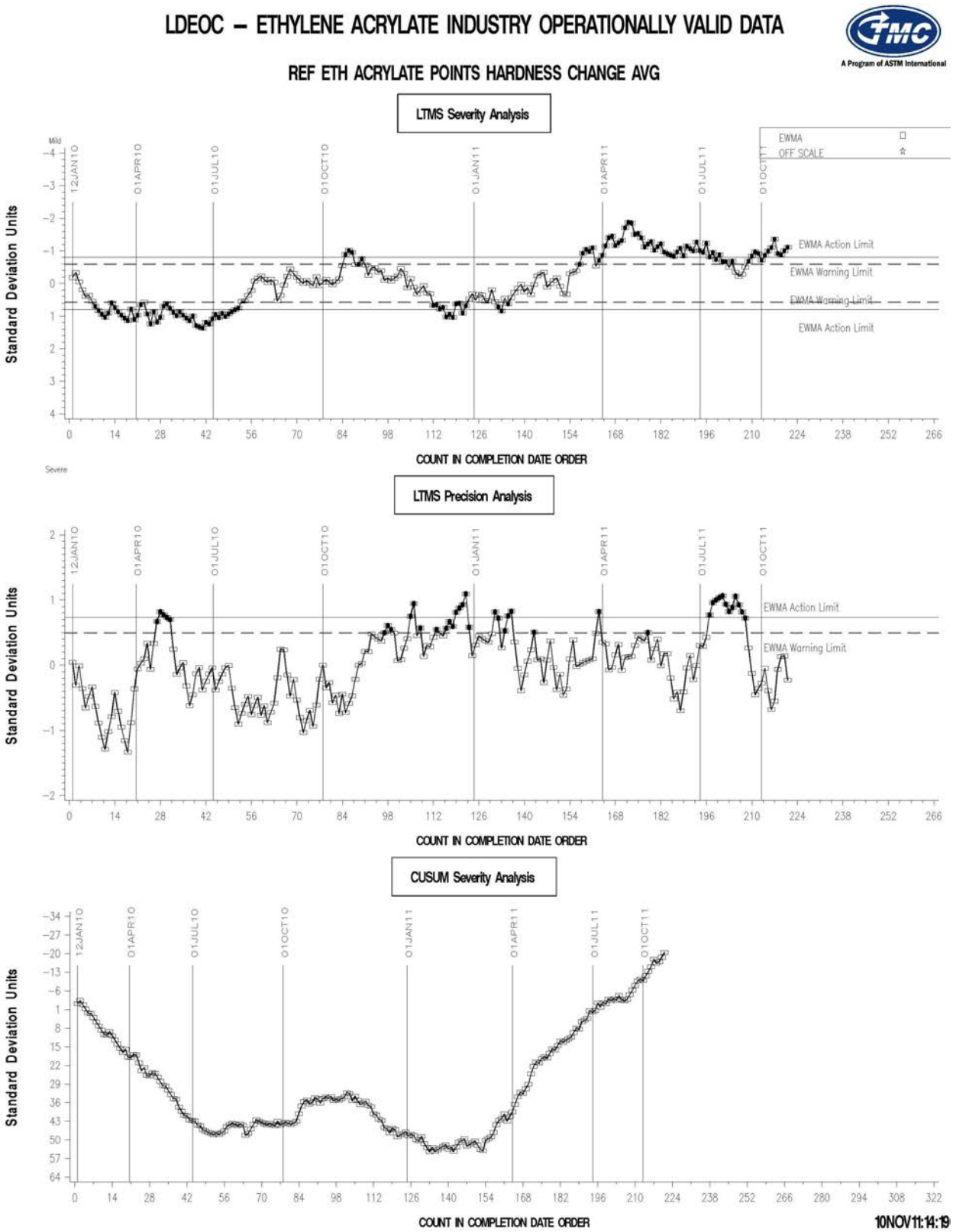

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF ETH ACRYLATE VOLUME CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
12JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
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
10NOV11:14:19

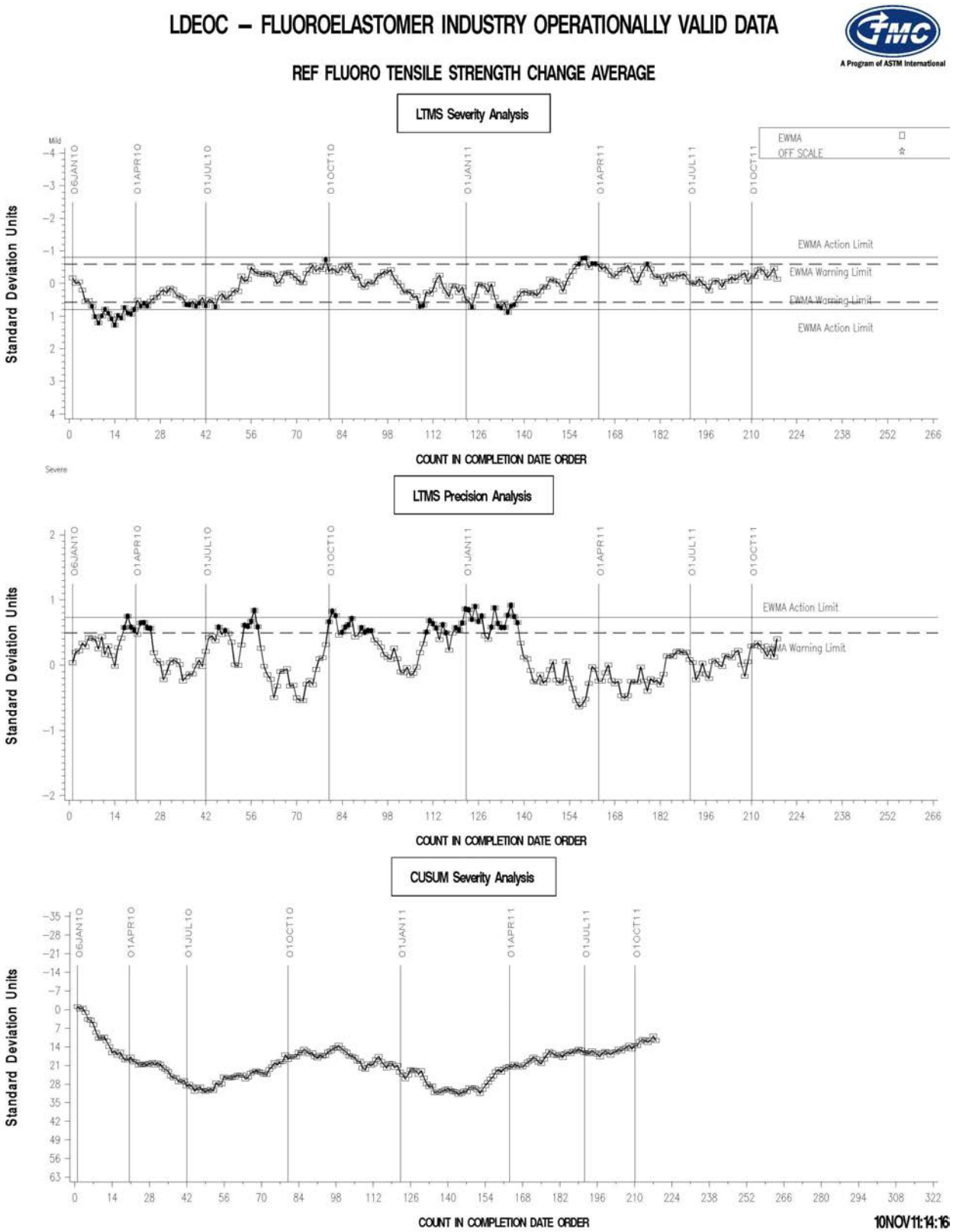

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF FLUORO POINTS HARDNESS CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
06JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
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
10NOV11:14:16

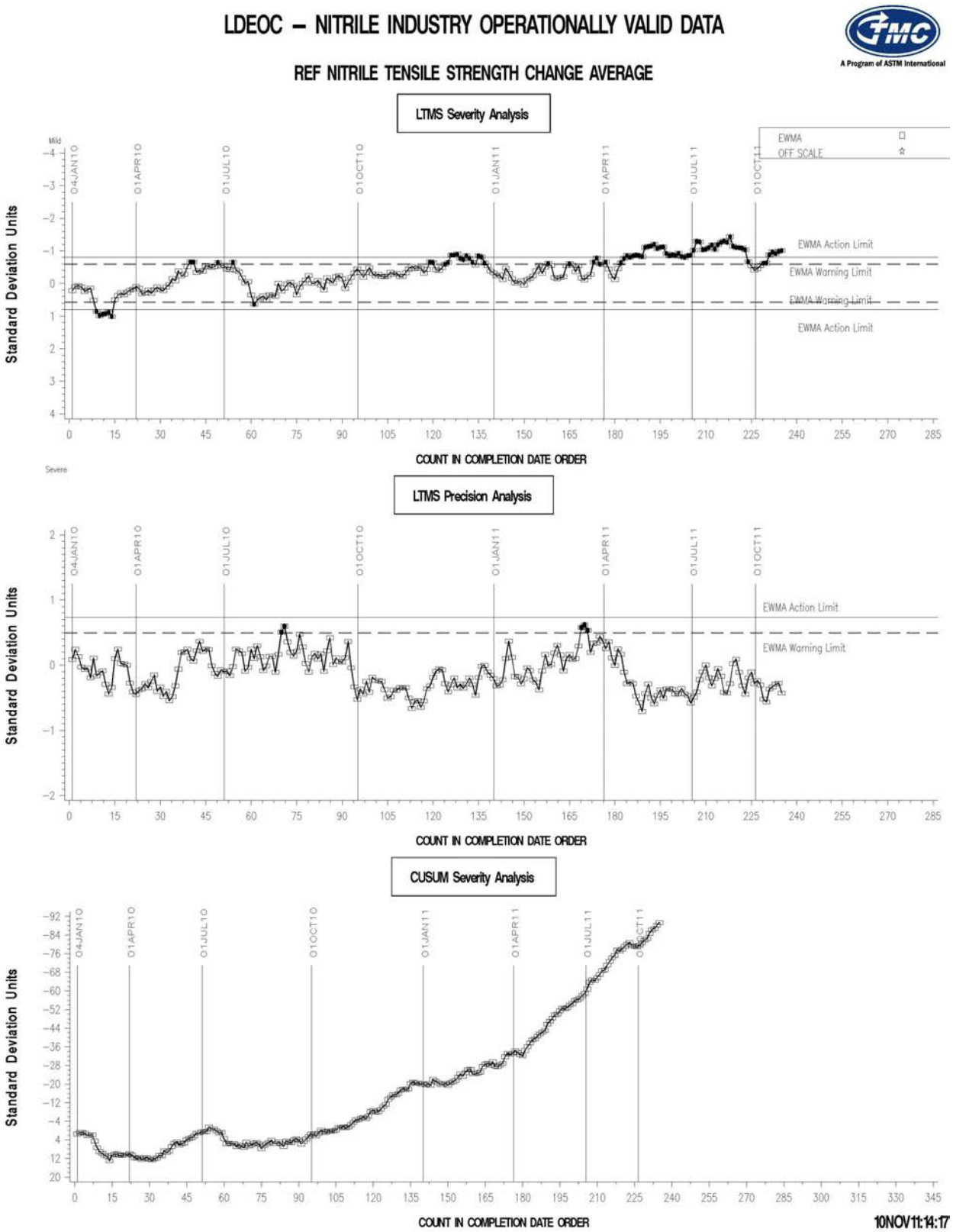

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF NITRILE POINTS HARDNESS CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
04JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
CUSUM Severity Analysis
10NOV11:14:17

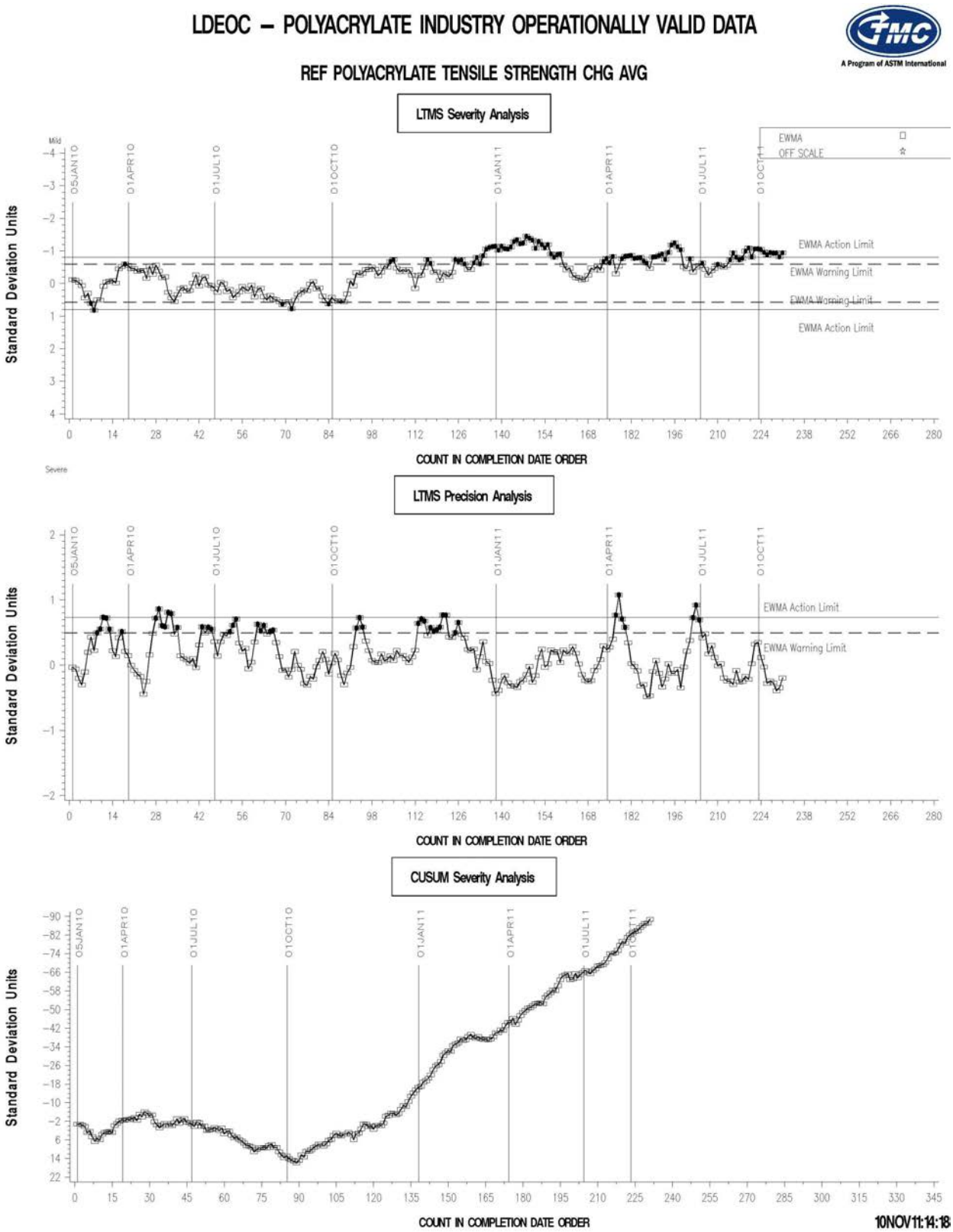

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF POLYACRYLATE POINTS HARDNESS CHG AVG
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
05JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
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
10NOV11:14:18

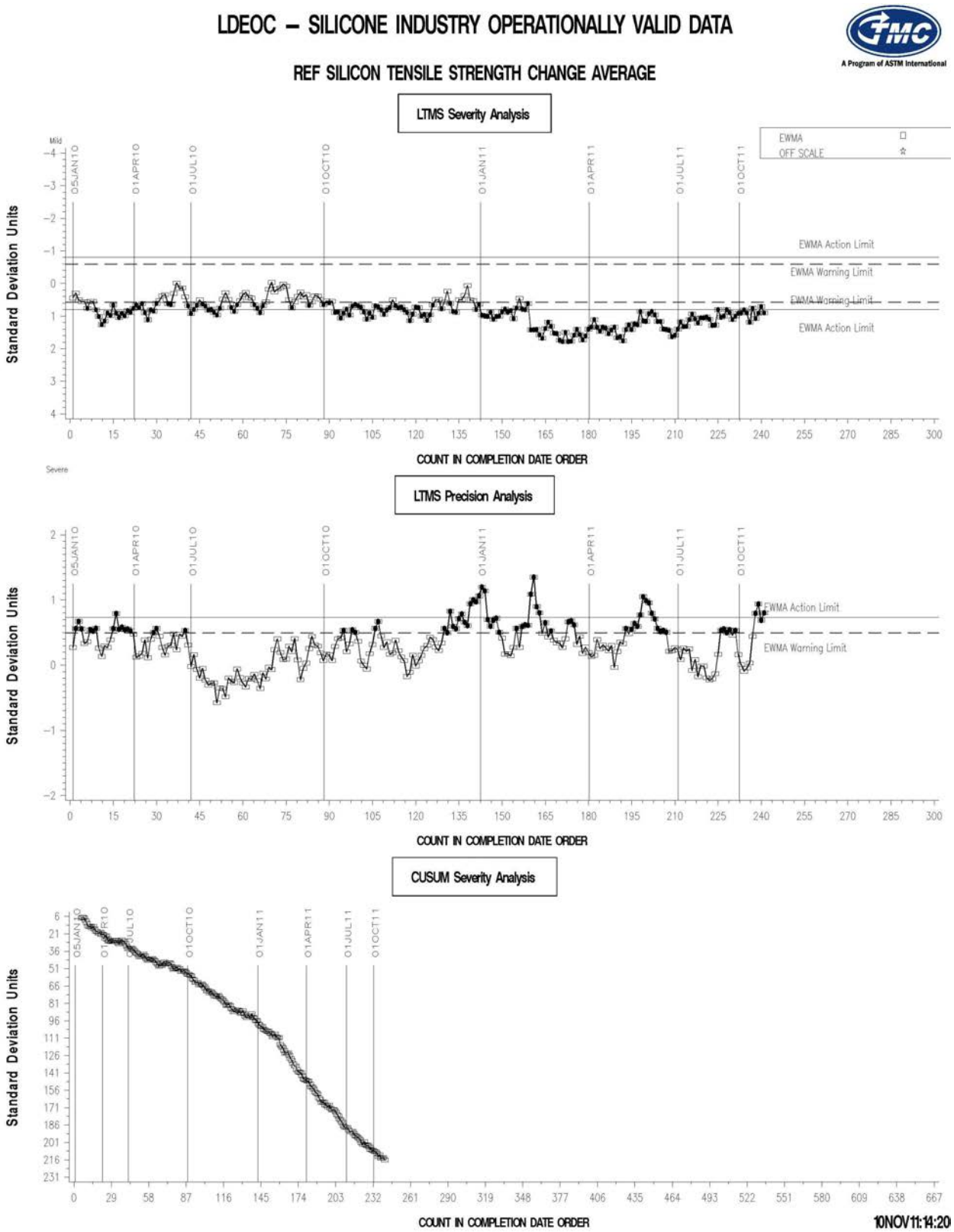

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF SILICON POINTS HARDNESS CHANGE AVERAGE
LTMS Severity Analysis
Mild
EWMA
OFF SCALE
05JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
Severe
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
10NOV11:14:20

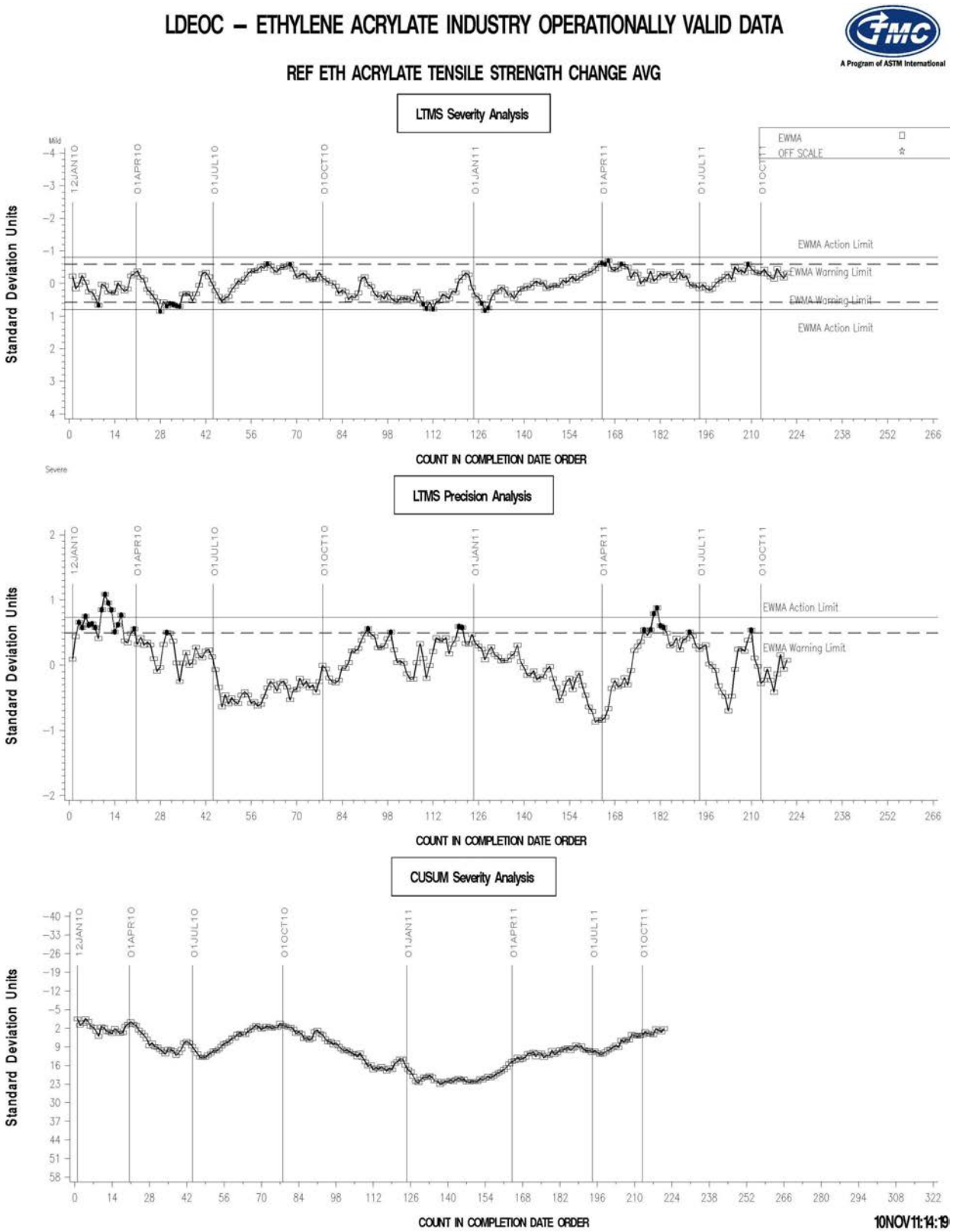

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF ETH ACRYLATE POINTS HARDNESS CHANGE AVG
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
12JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
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
10NOV11:14:19


LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF FLUORO 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
06JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
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
10NOV11:14:16


LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF NITRILE TENSILE STRENGTH CHANGE AVERAGE
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
04JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
CUSUM Severity Analysis
10NOV11:14:17

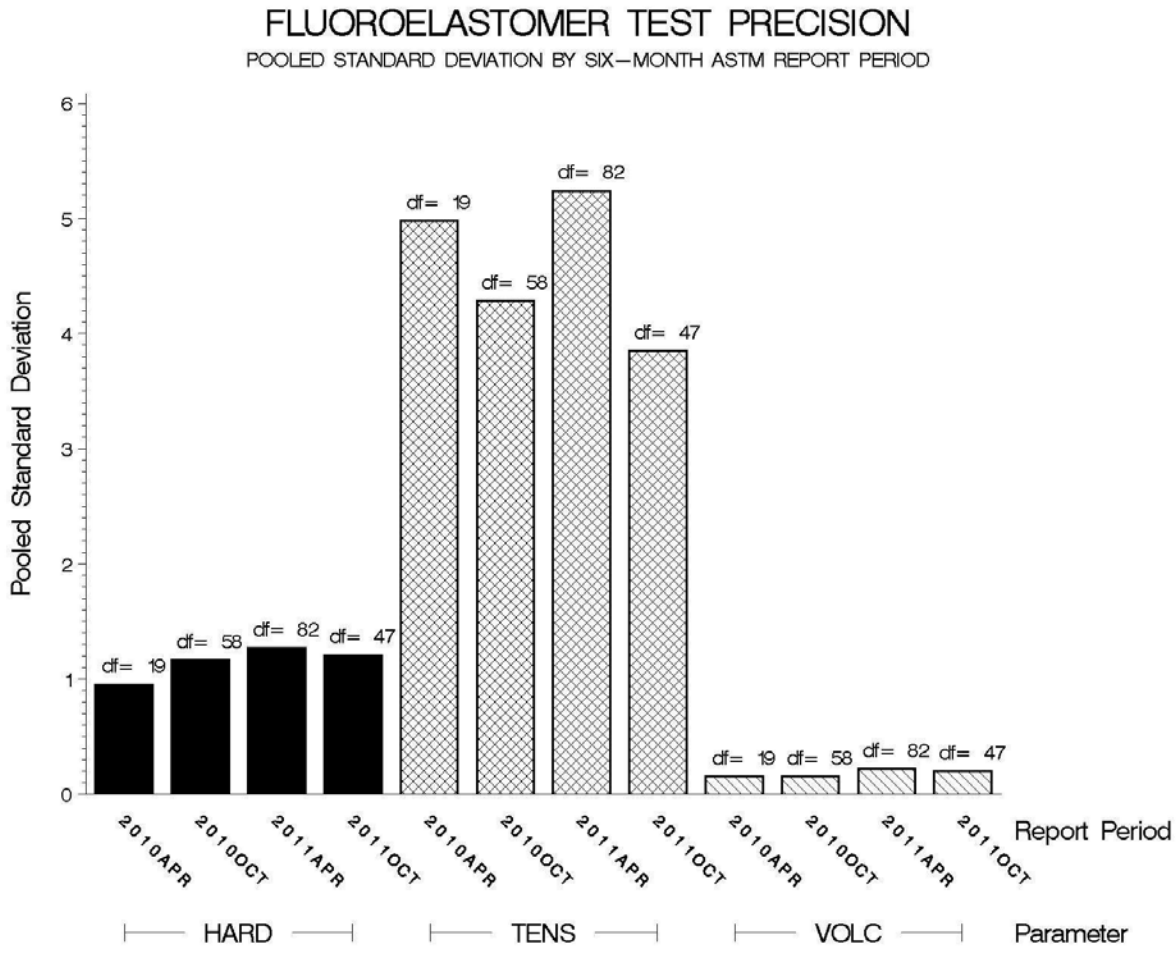

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF POLYACRYLATE TENSILE STRENGTH CHG AVG
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
05JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
CUSUM Severity Analysis
10NOV11:14:18

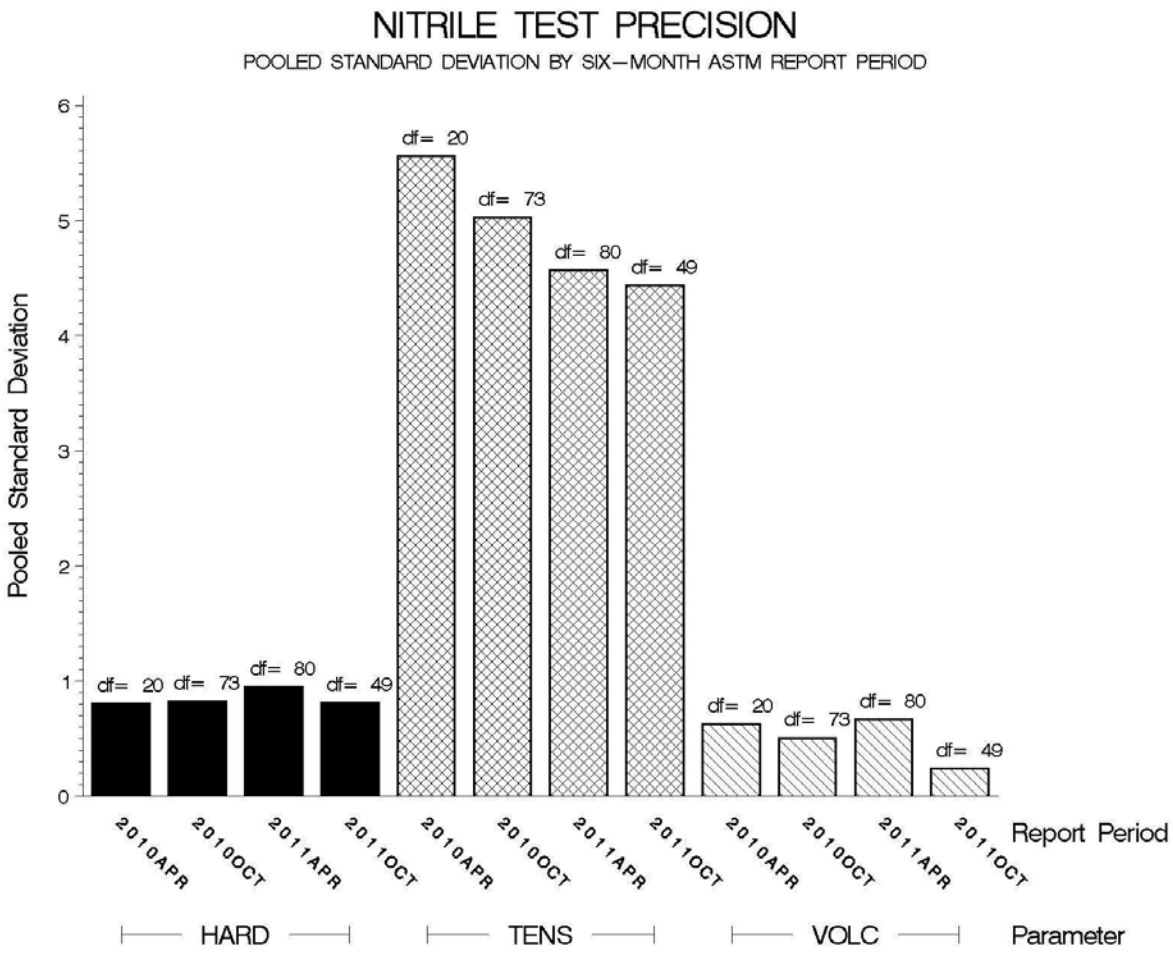

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF SILICON TENSILE STRENGTH CHANGE AVERAGE
LTMS Severity Analysis
Mild
EWMA
OFF SCALE
05JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
Severe
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
10NOV11:14:20

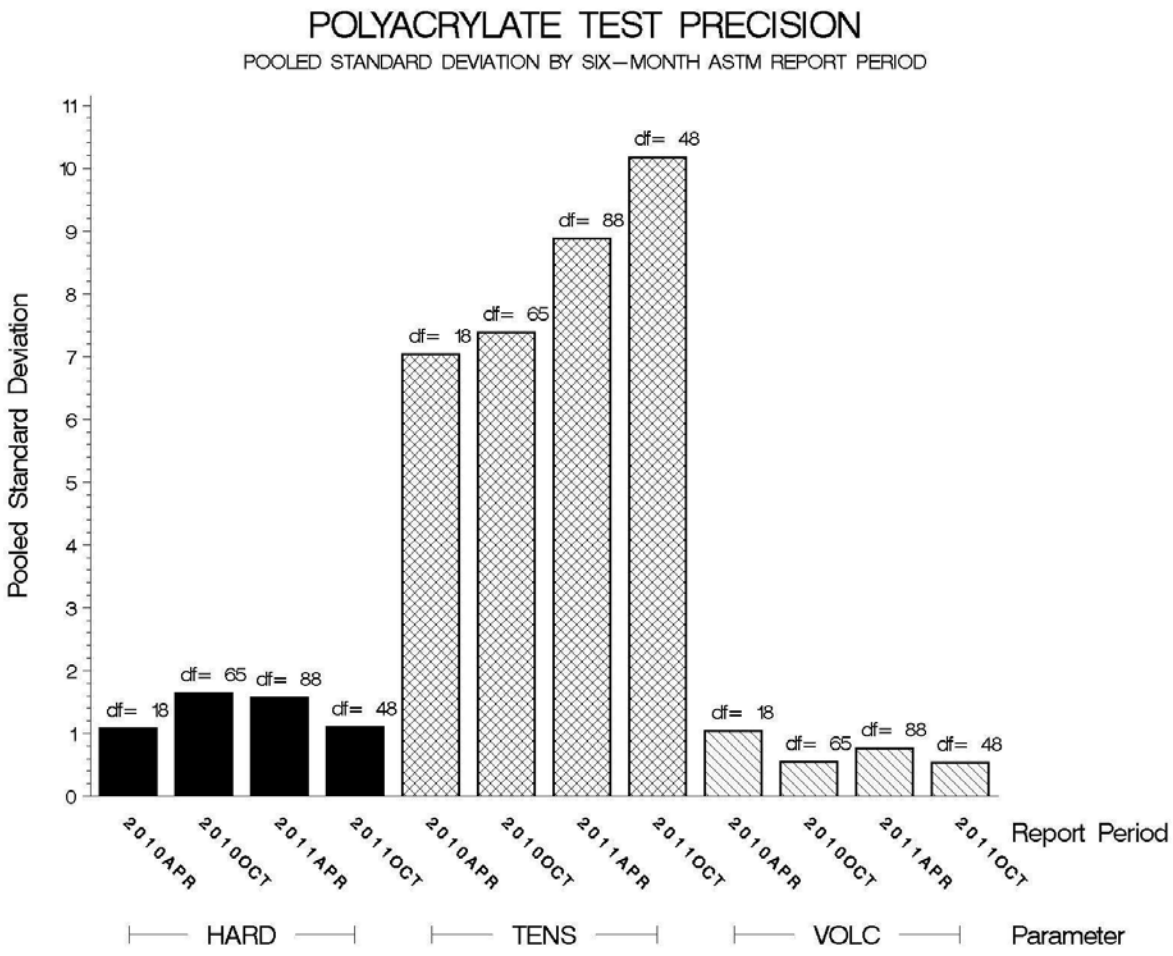

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA
A Program of ASTM International
REF ETH ACRYLATE TENSILE STRENGTH CHANGE AVG
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
12JAN10
01APR10
01JUL10
01OCT10
01JAN11
01APR11
01JUL11
01OCT11
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
10NOV11:14:19

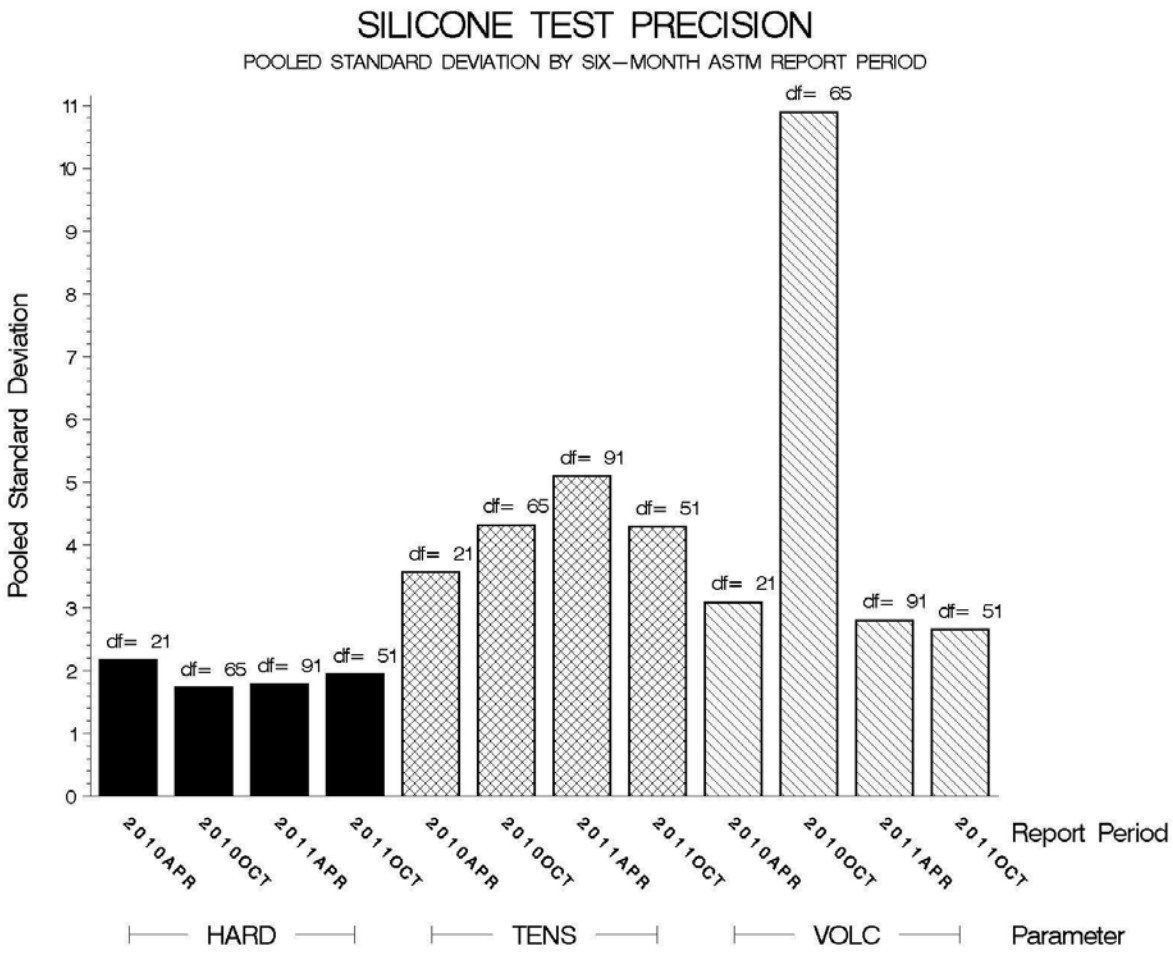
POOLED S:

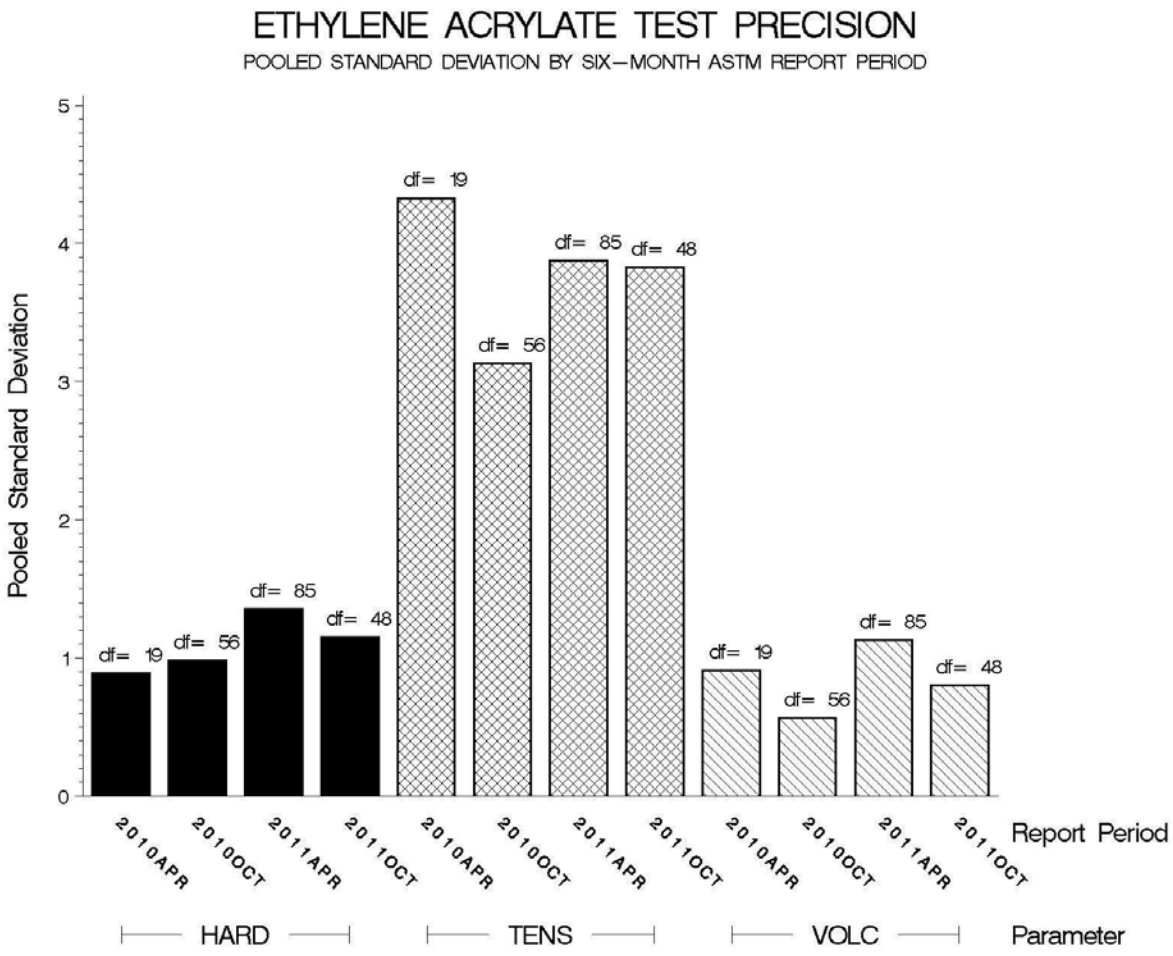
Shown below are bar charts comparing the pooled s values for the LDEOC test parameters over the last four report periods.




NITRILE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX–MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
6
df= 20
df= 73
df= 80
df= 49
df= 20
df= 73
df= 80
df= 49
df= 20
df= 73
df= 80
df= 49
2010APR
2010OCT
2011APR
2011OCT
2010APR
2010OCT
2011APR
2011OCT
2010APR
2010OCT
2011APR
2011OCT
Report Period
HARD
TENS
VOLC
Parameter


POLYACRYLATE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX–MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
6
7
8
9
10
11
df= 18
df= 65
df= 88
df= 48
df= 18
df= 65
df= 88
df= 48
df= 18
df= 65
df= 88
df= 48
2010APR
2010OCT
2011APR
2011OCT
2010APR
2010OCT
2011APR
2011OCT
2010APR
2010OCT
2011APR
2011OCT
Report Period
HARD
TENS
VOLC
Parameter


SILICONE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX–MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
6
7
8
9
10
11
df= 21
df= 65
df= 91
df= 51
df= 21
df= 65
df= 91
df= 51
df= 21
df= 65
df= 91
df= 51
2010APR
2010OCT
2011APR
2011OCT
2010APR
2010OCT
2011APR
2011OCT
2010APR
2010OCT
2011APR
2011OCT
Report Period
HARD
TENS
VOLC
Parameter


ETHYLENE ACRYLATE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX–MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
0
1
2
3
4
5
df= 19
df= 56
df= 85
df= 48
df= 19
df= 56
df= 85
df= 48
df= 19
df= 56
df= 85
df= 48
2010APR
2010OCT
2011APR
2011OCT
Report Period
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	234	8554	1695
Total	234	8554	1695

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
Fluoroelastomer	Within limits	Within limits	Within limits
Nitrile	**Severe**	Within limits	**Mild**
Polyacrylate	Within limits	Within limits	**Mild**
Silicone	Within limits	Within limits	**Severe**
Ethylene Acrylate	**Mild**	**Mild**	Within limits

Summary of Precision
as Measured by LTMS Control Charting

Elastomer	VOLC	HARD	TENS
Fluoroelastomer	Within limits	Within limits	Within limits
Nitrile	Within limits	Within limits	Within limits
Polyacrylate	Within limits	Within limits	Within limits
Silicone	Within limits	Within limits	**Action**
Ethylene Acrylate	Within limits	Within limits	Within limits

MTK/mtk/astm1011.doc/mem11-051.mtk.doc

c: F. M. Farber
J. A. Clark
EOEC Surveillance Panel
ftp://ftp.astmtmc.cmu.edu/docs/bench/ldeoc/semiannualreports/ldeoc-10-2011.pdf

Distribution: email