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: 10-025

DATE: May 27, 2010

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

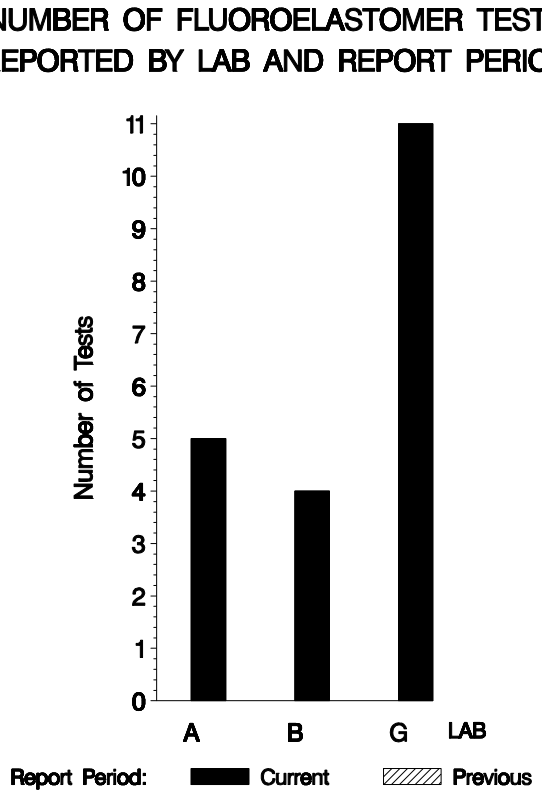
FROM: Michael T. Kasimirsky

SUBJECT: LDEOC Testing from October 1, 2009 through March 31, 2010

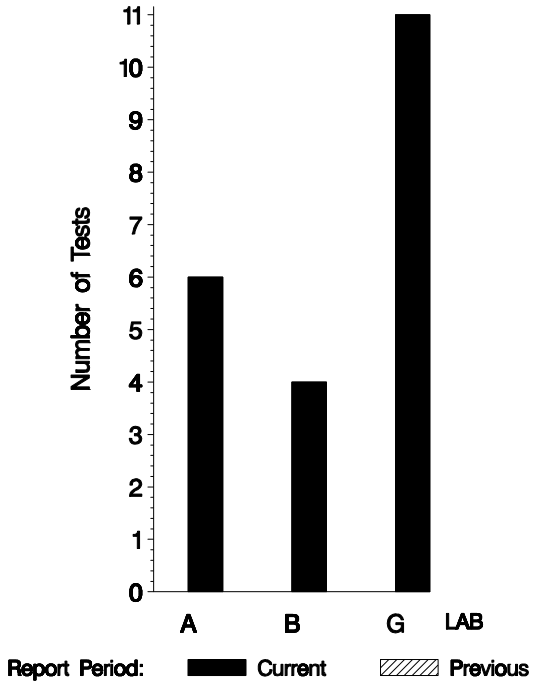
A total of 101 LDEOC tests were reported to the Test Monitoring Center during the period from October 1, 2009 through March 31, 2010. Following is a summary of testing activity this period.

	Reporting Data
Number of Labs	3

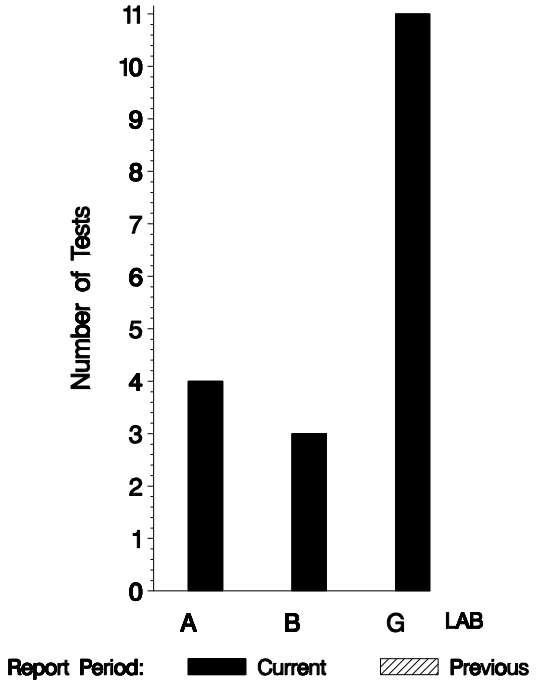
Tests reported this period were distributed as shown below:



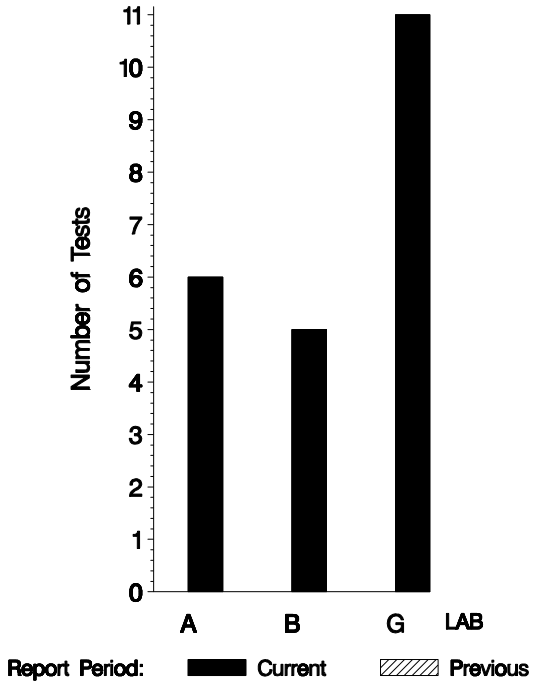
NUMBER OF NITRILE TESTS
REPORTED BY LAB AND REPORT PERIOD



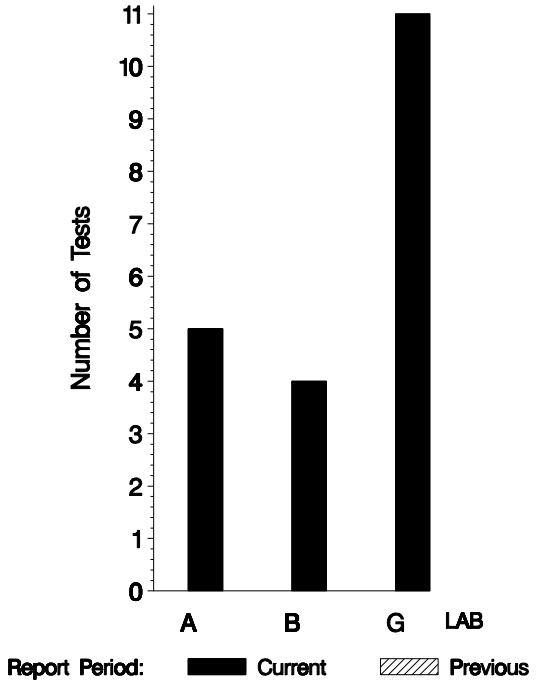
NUMBER OF POLYACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



NUMBER OF SILICONE TESTS
REPORTED BY LAB AND REPORT PERIOD

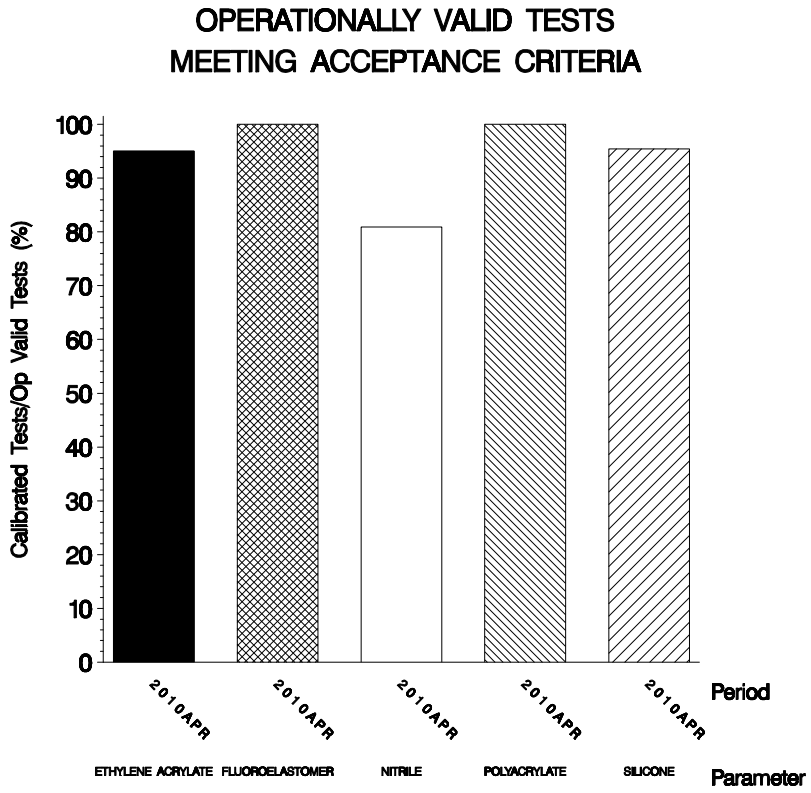


NUMBER OF ETHYLENE ACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



Test Distribution by Oil and Validity

		Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Ethylene Acrylate	Totals This Period	Last Period
Accepted for Calibration	AC	20	17	18	21	19	95	0
Rejected	OC	0	4	0	1	1	6	0
Information Run (not for calibration)	NI	0	0	0	0	0	0	0
Operationally Invalid (lab)	LC	0	0	0	0	0	0	0
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0	0	0
Aborted Calibration	XC	0	0	0	0	0	0	0
Total		20	21	18	22	20	101	0



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

Lost Tests per Start by Lab and Elastomer Type

	Fluoroelastomer			**Nitrile**			**Polyacrylate**			**Silicone**			**Ethylene Acrylate**			Total		
Lab	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A	0	5	0	0	6	0	0	4	0	0	6	0	0	5	0	0	26	0
B	0	4	0	0	4	0	0	3	0	0	5	0	0	4	0	0	20	0
G	0	11	0	0	11	0	0	11	0	0	11	0	0	11	0	0	55	0
Total	0	20	0	0	21	0	0	18	0	0	22	0	0	20	0	0	101	0

Lost tests are those that were aborted or operationally invalid.

Causes for Lost Tests

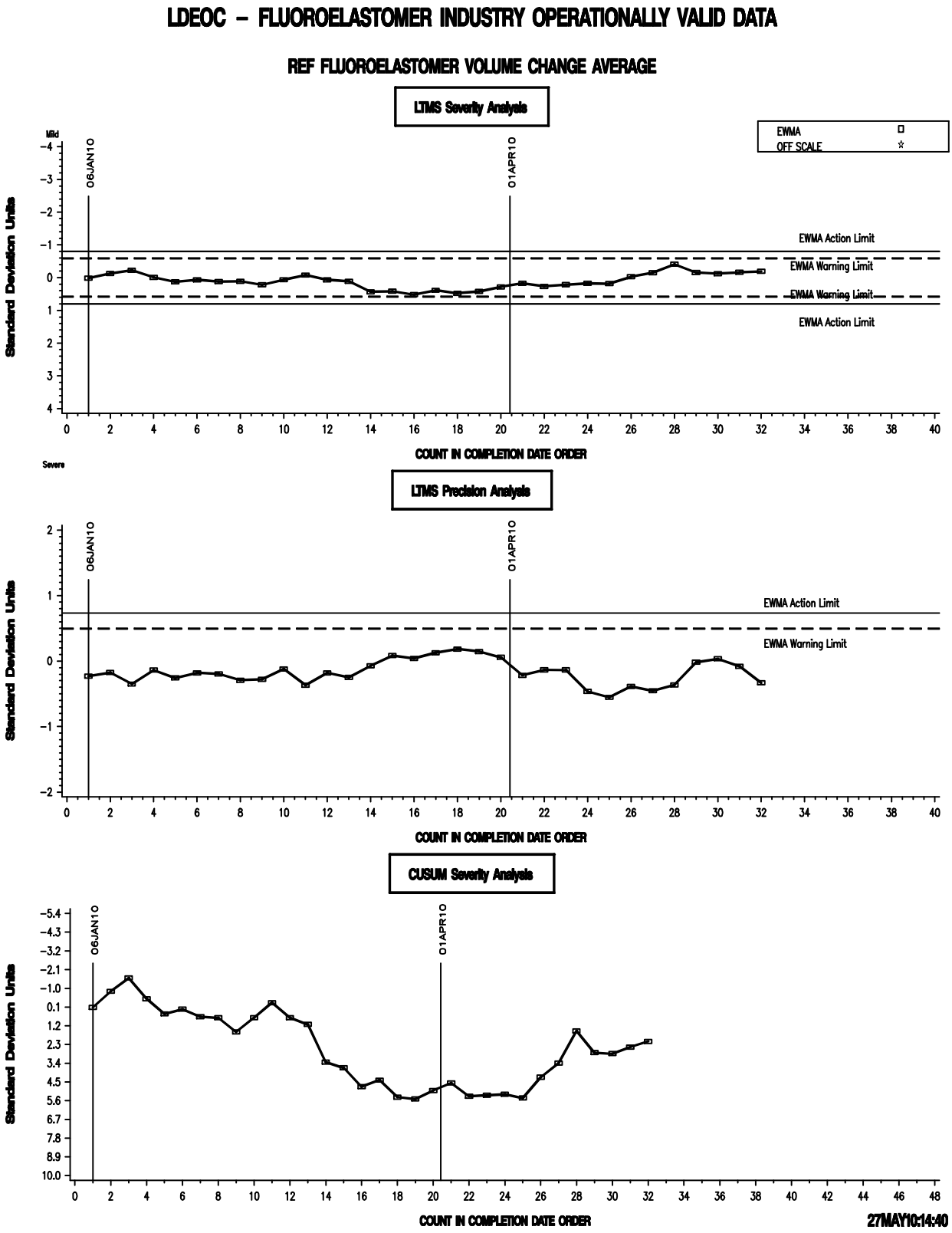
Lab	Cause		Elastomer: Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Ethylene Acrylayte	Validity: LC	RC	XC	Loss Rate: Lost	Starts	%
-	No lost tests this period										0	101	0%
		Lost	0	0	0	0	0	0	0	0			
		Starts	20	21	18	22	20	101	101	101			
		%	0%	0%	0%	0%	0%	0%	0%	0%			

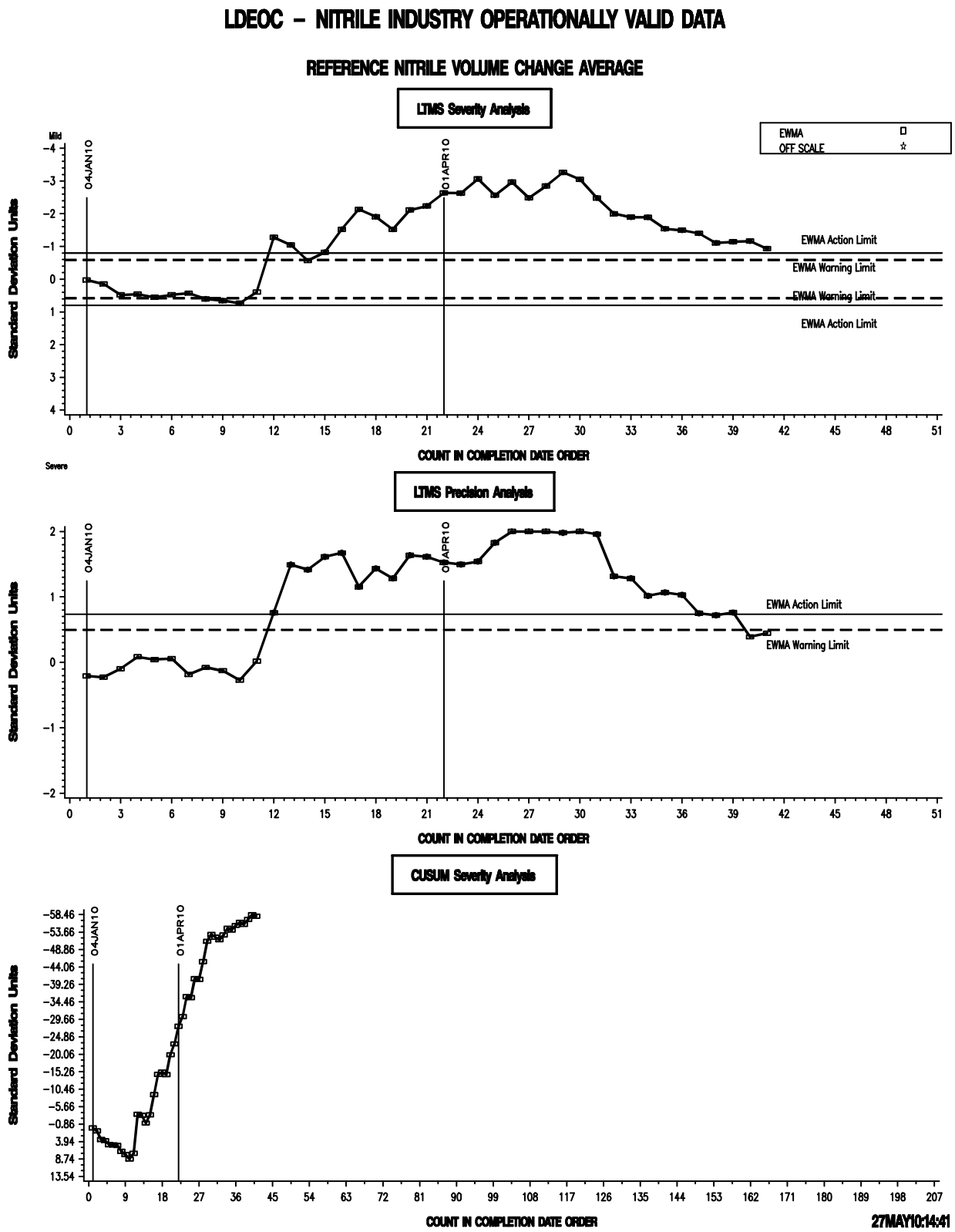
Average Δ/s by Lab					
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI
Fluoroelastomer	A	5	-0.311	0.144	-0.685
	B	4	-0.653	-0.577	0.223
	G	11	0.833	-0.992	1.951
	Industry	20	0.250	-0.625	0.946
Nitrile	A	6	0.316	-0.161	0.648
	B	4	-0.105	-0.161	0.137
	G	11	-2.215	0.832	0.538
	Industry	21	-1.090	0.359	0.493
Polyacrylate	A	4	-1.882	-0.016	-1.102
	B	3	0.765	-2.885	-0.309
	G	11	2.059	-0.203	0.225
	Industry	18	0.967	-0.608	-0.159
Silicone	A	6	-0.949	-0.356	-0.415
	B	5	0.011	-1.123	1.199
	G	11	0.456	0.666	1.649
	Industry	22	-0.028	-0.019	0.984
Ethylene Acrylate	A	5	-1.890	0.458	-1.450
	B	4	-1.388	1.917	-1.175
	G	11	1.429	0.812	1.133
	Industry	20	0.036	0.944	0.026

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
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LTMS Severity Analysis
Mild
EWMA
OFF SCALE
04JAN10
01APR10
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
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COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
04JAN10
01APR10
Standard Deviation Units
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CUSUM Severity Analysis
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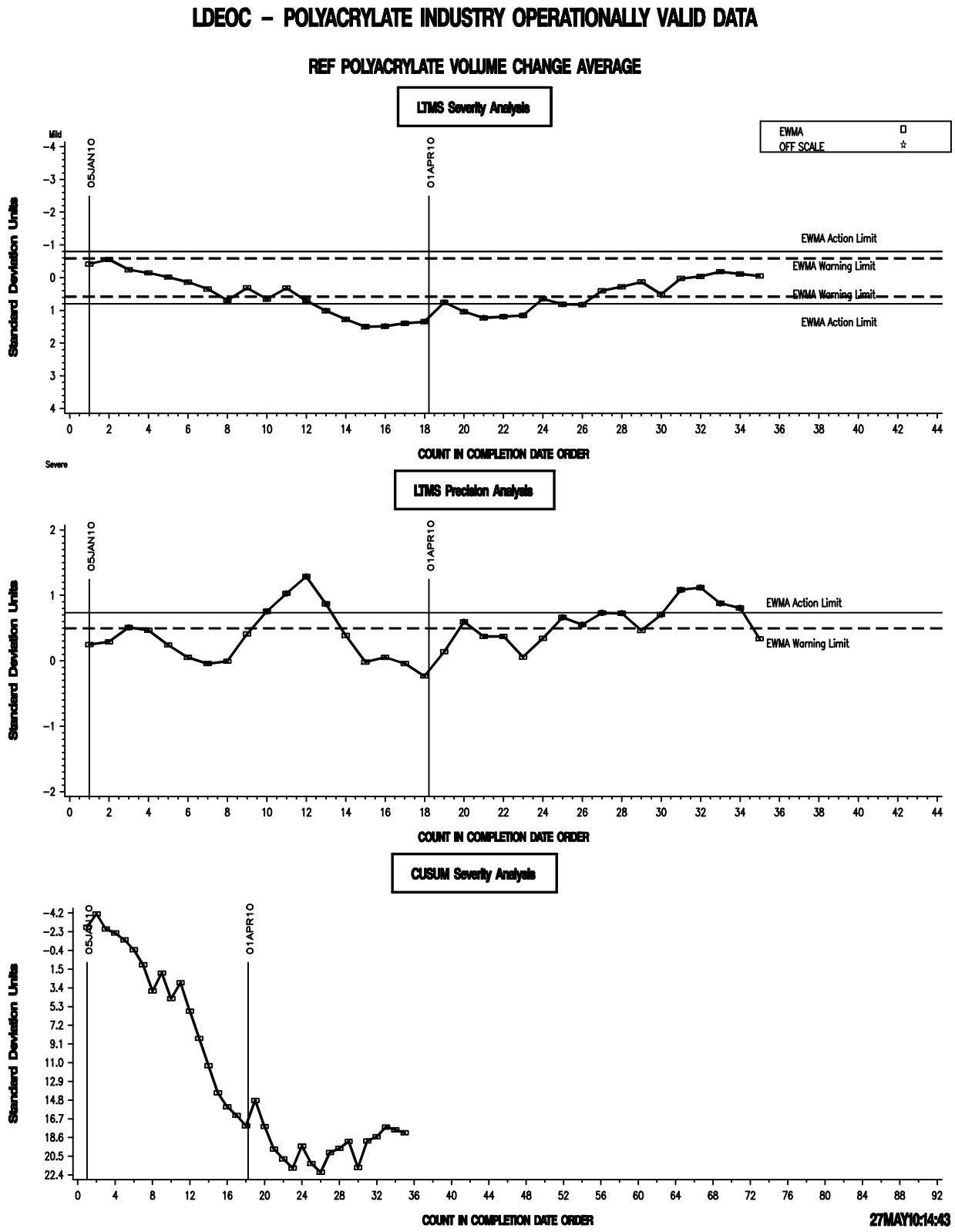
LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
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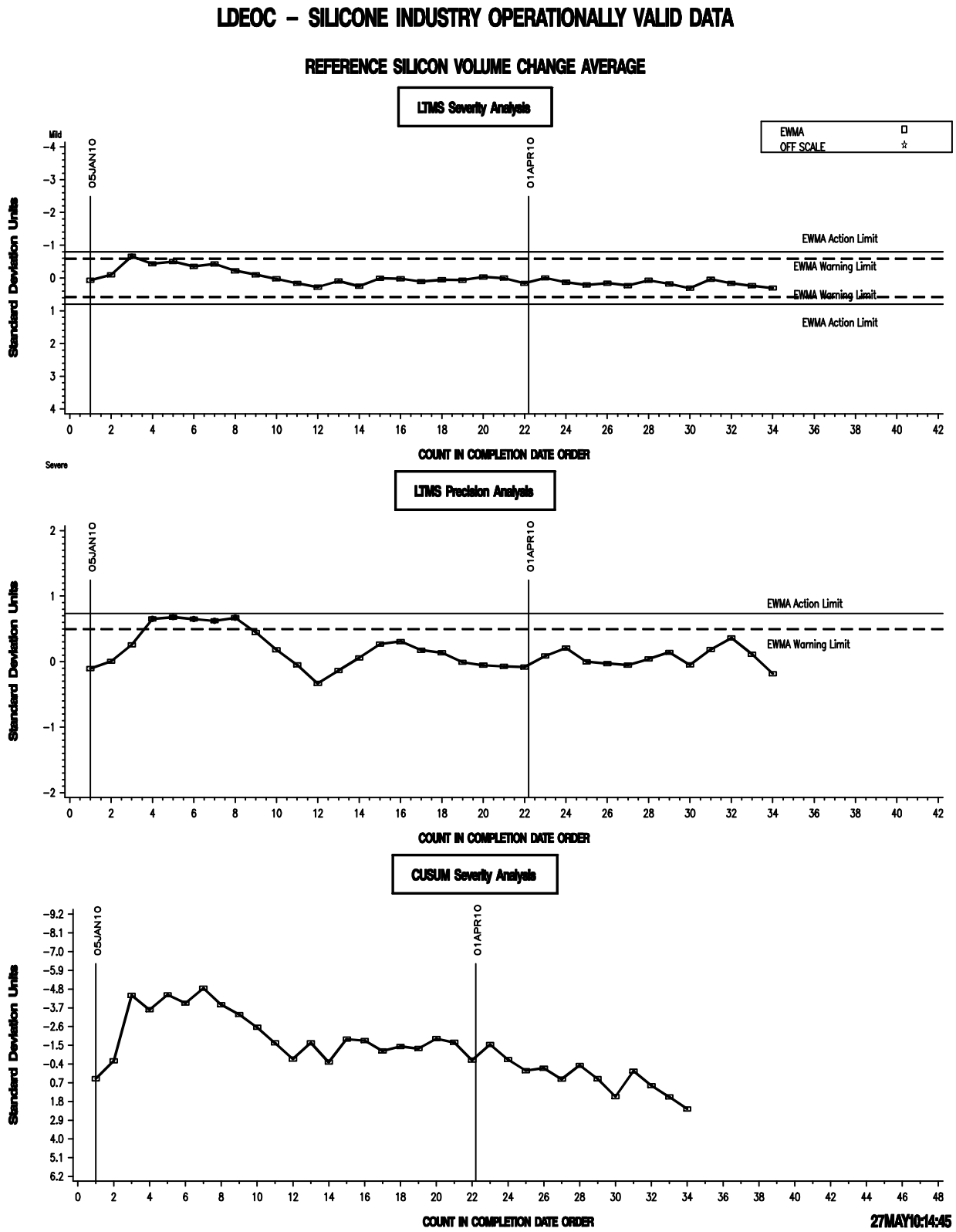
LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA
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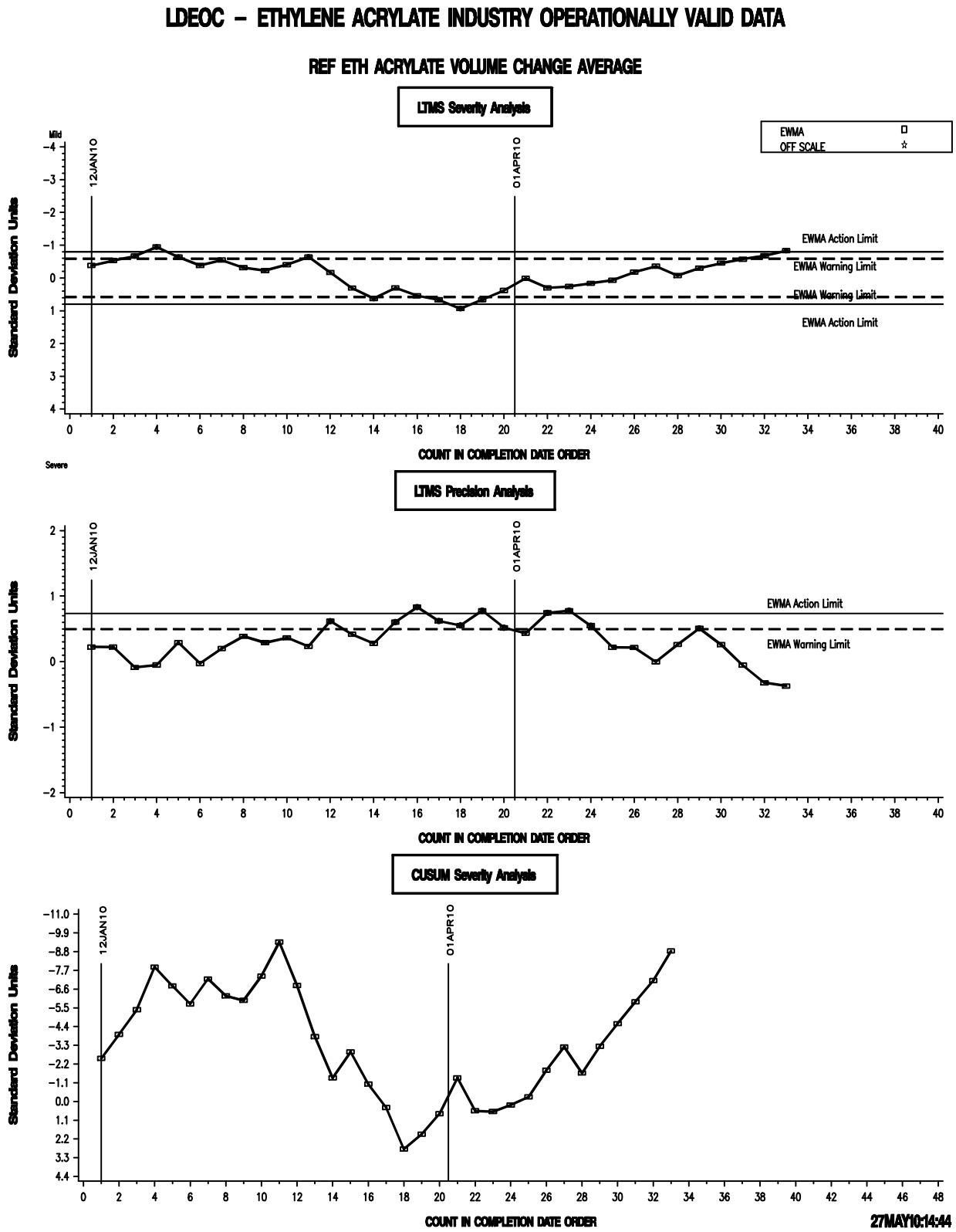
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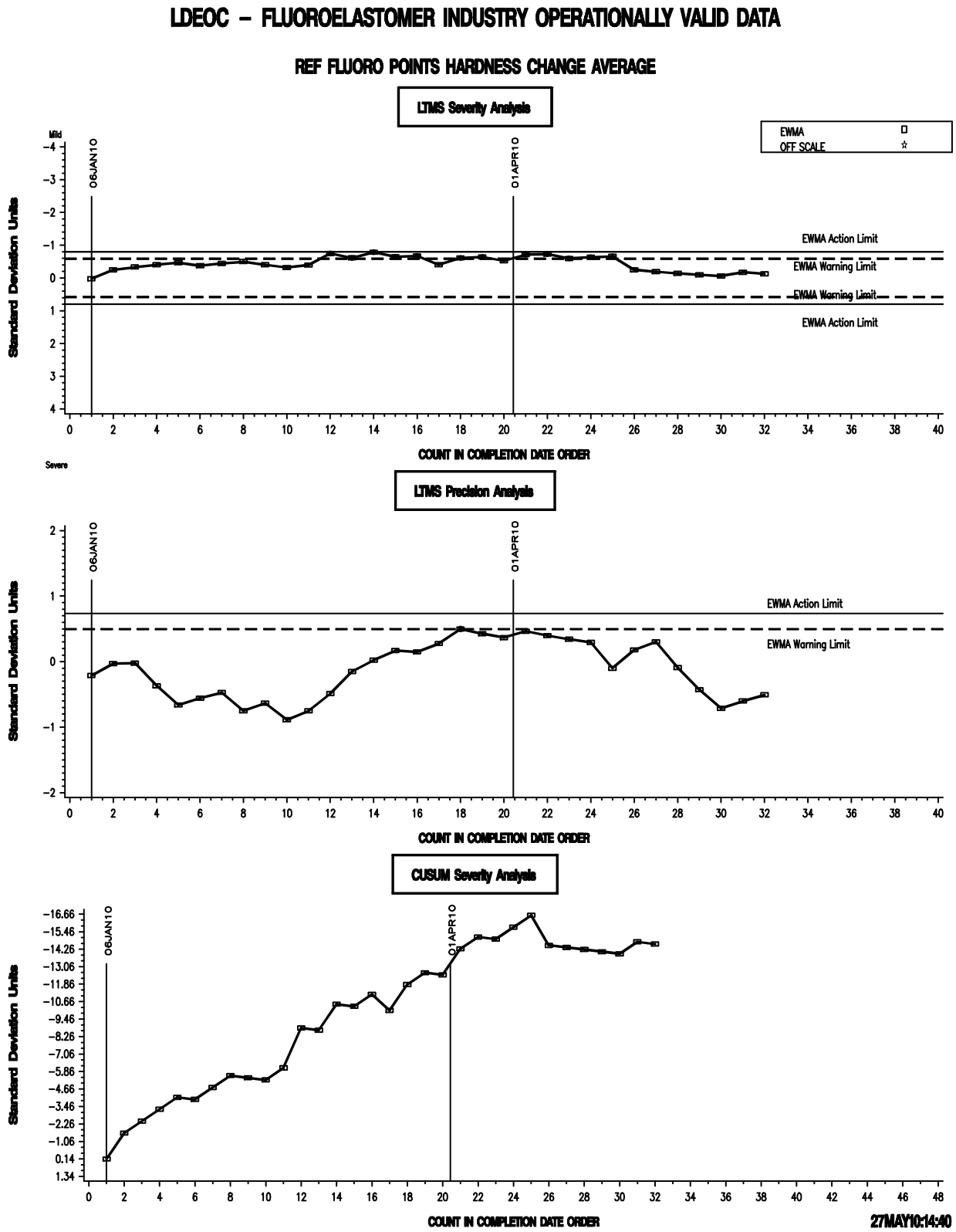
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LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA

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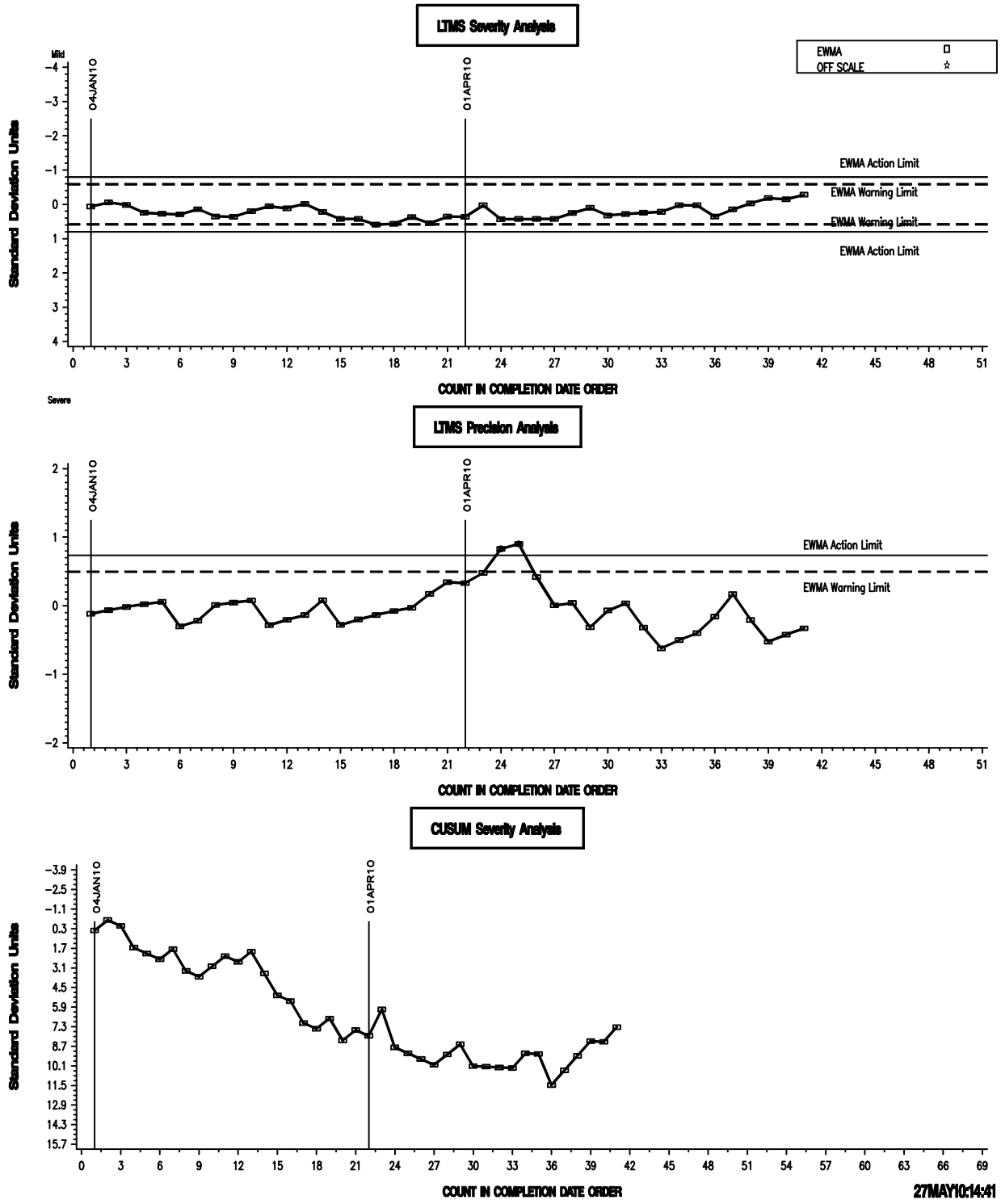

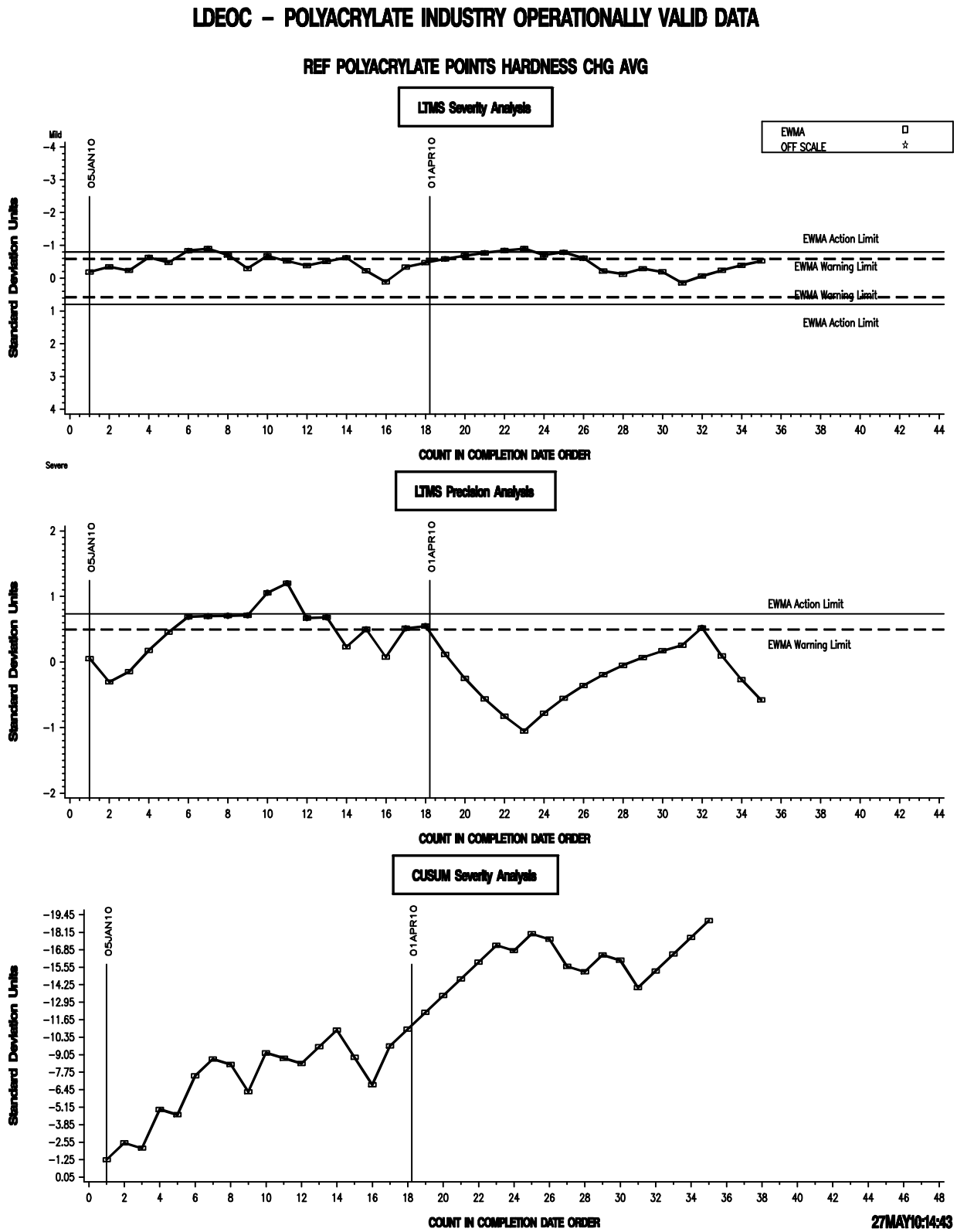
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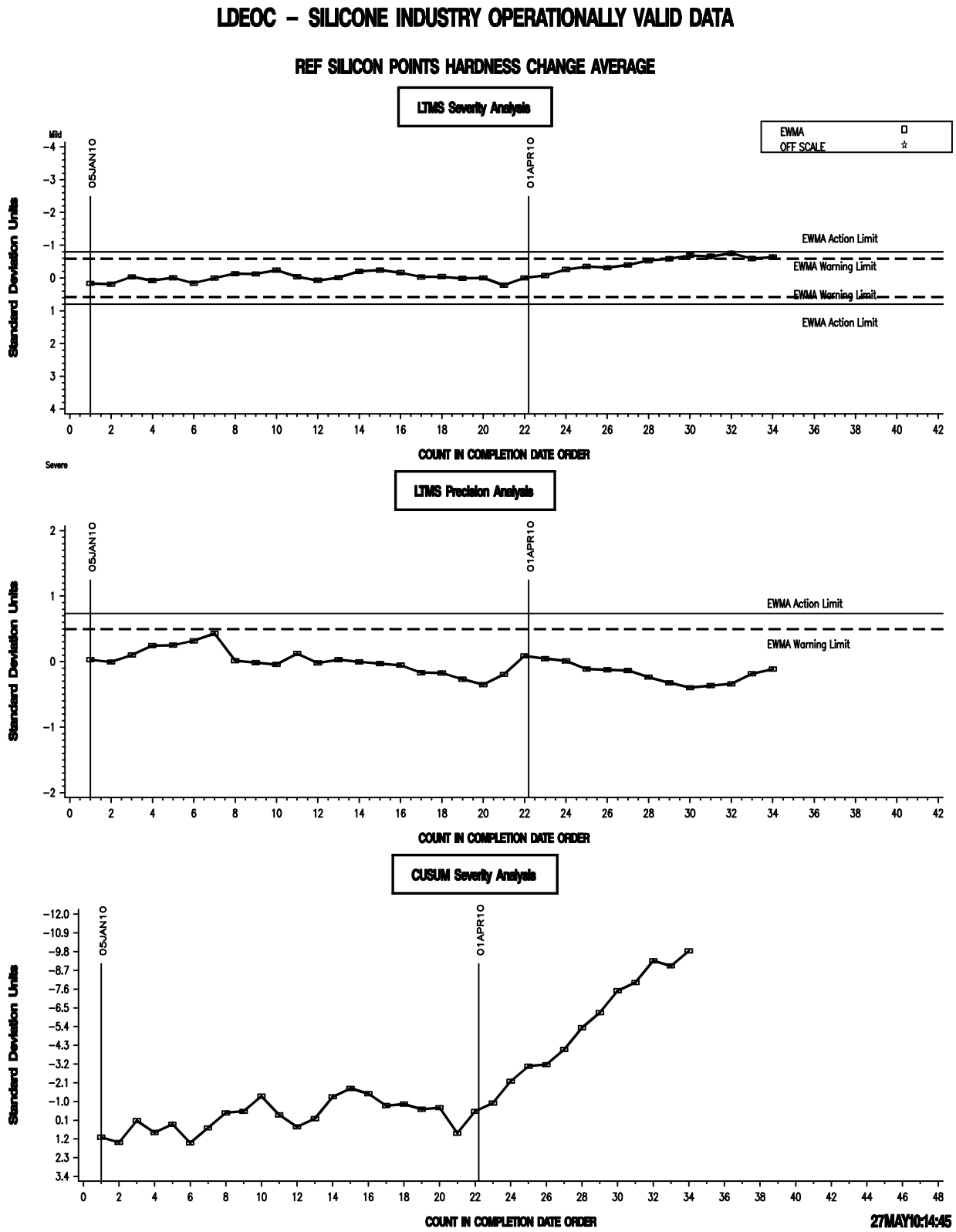
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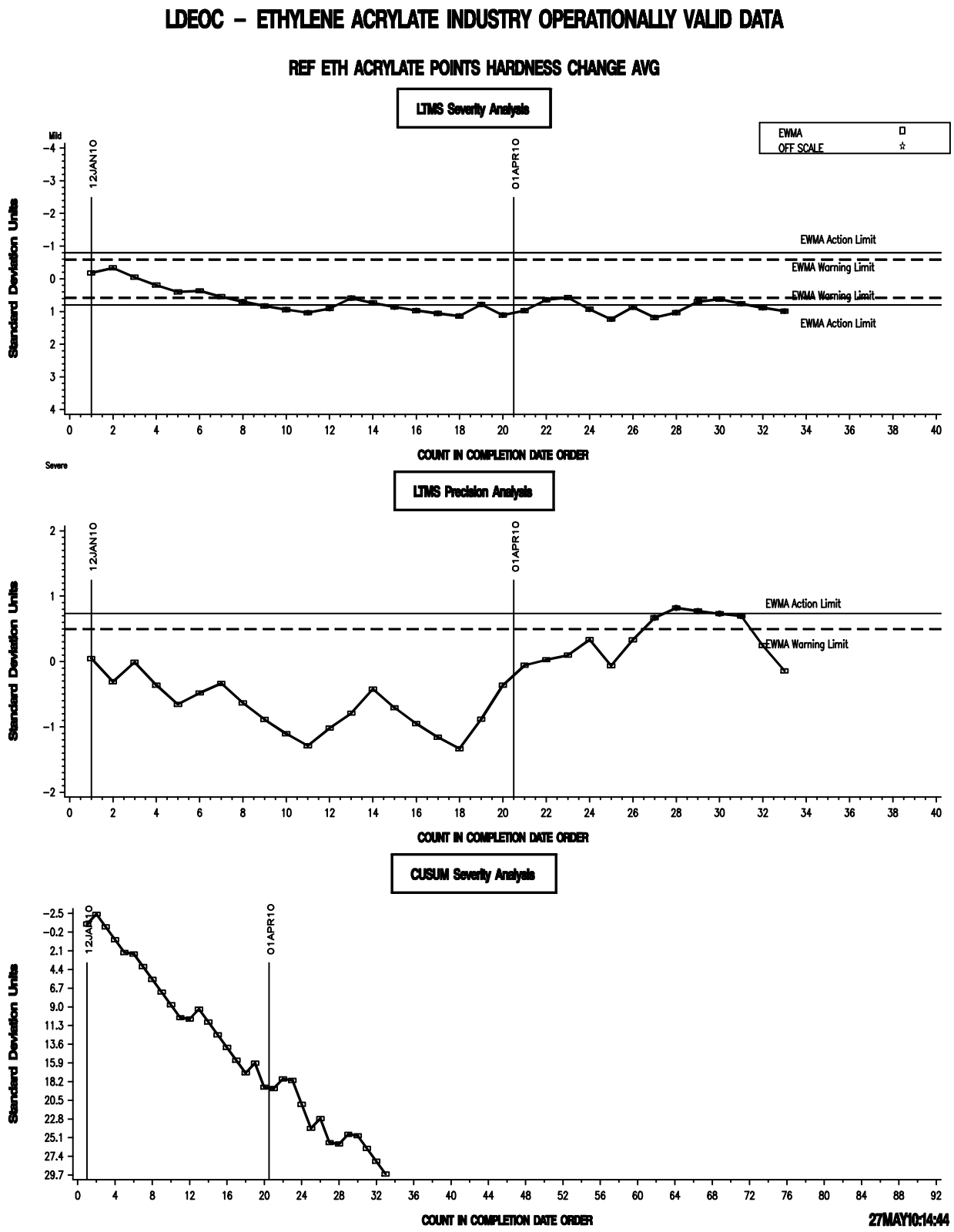
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Standard Deviation Units
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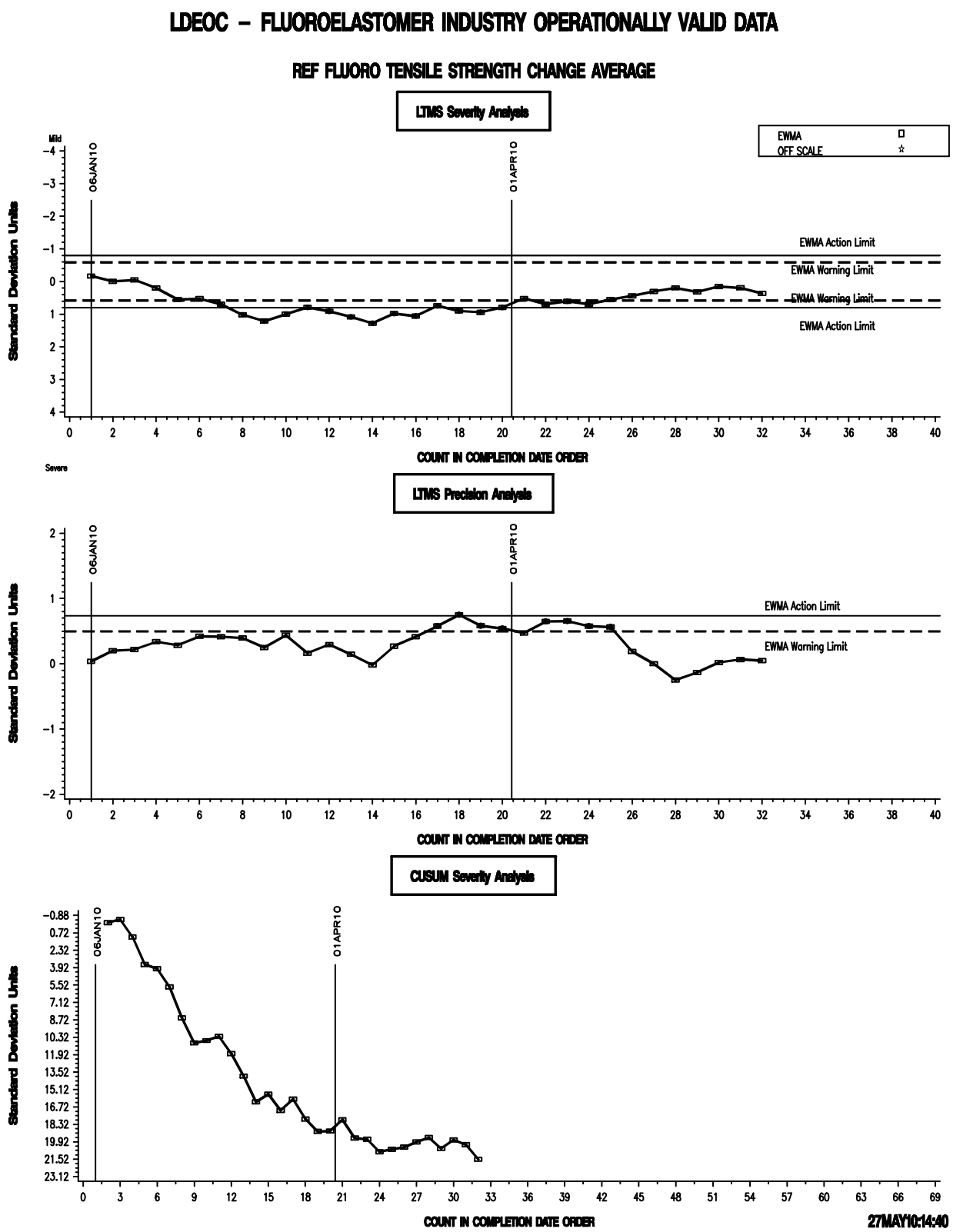
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06JAN10
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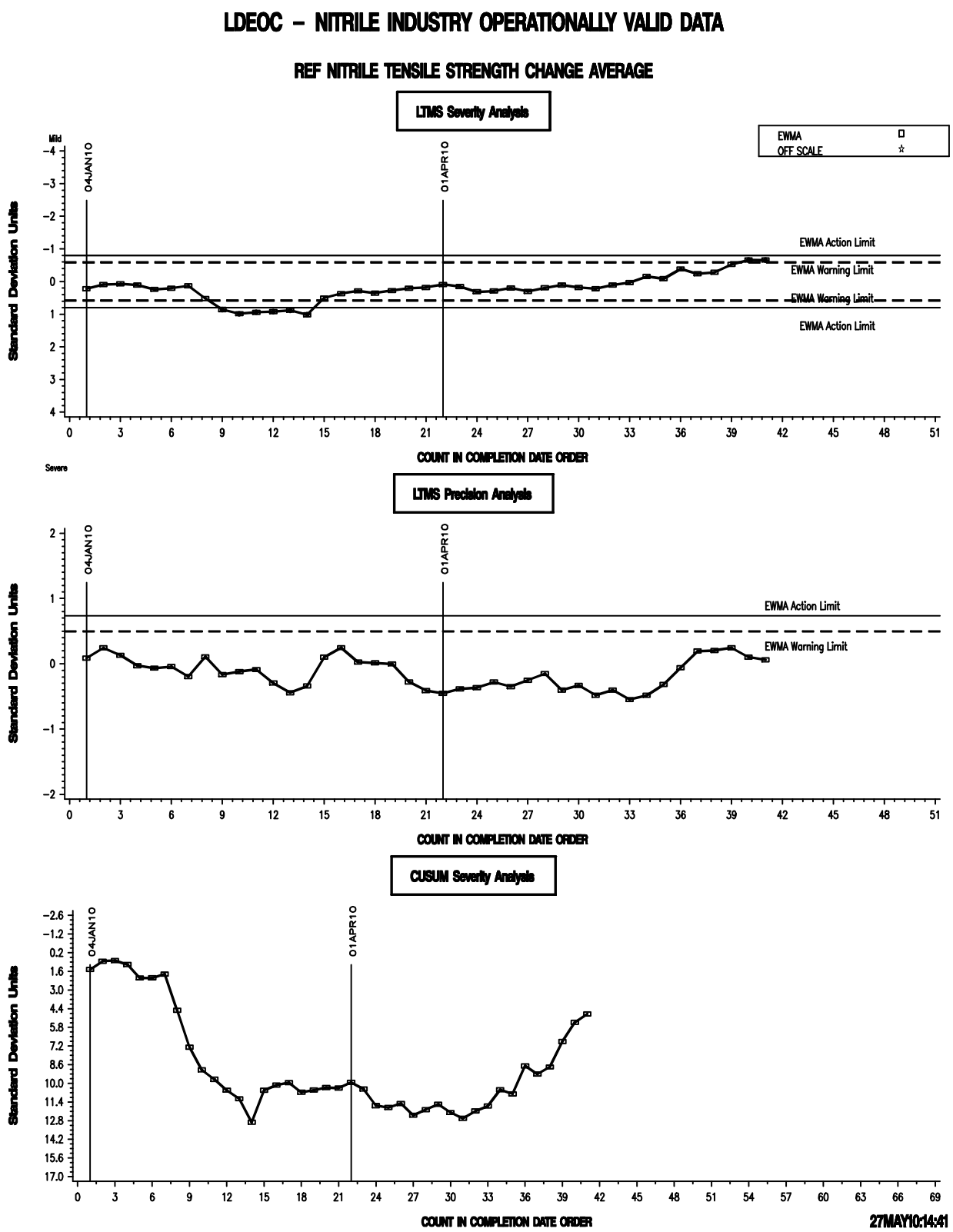
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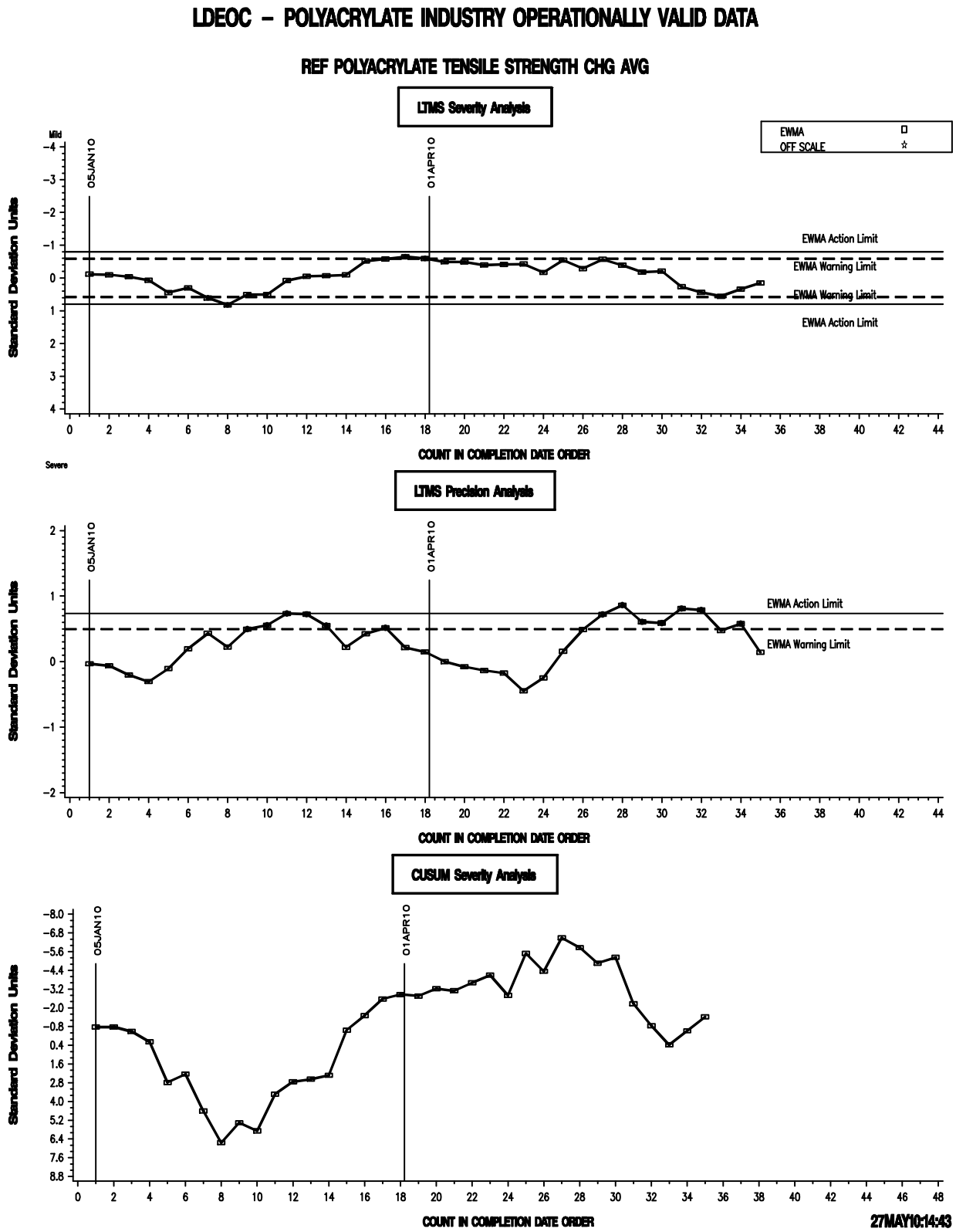
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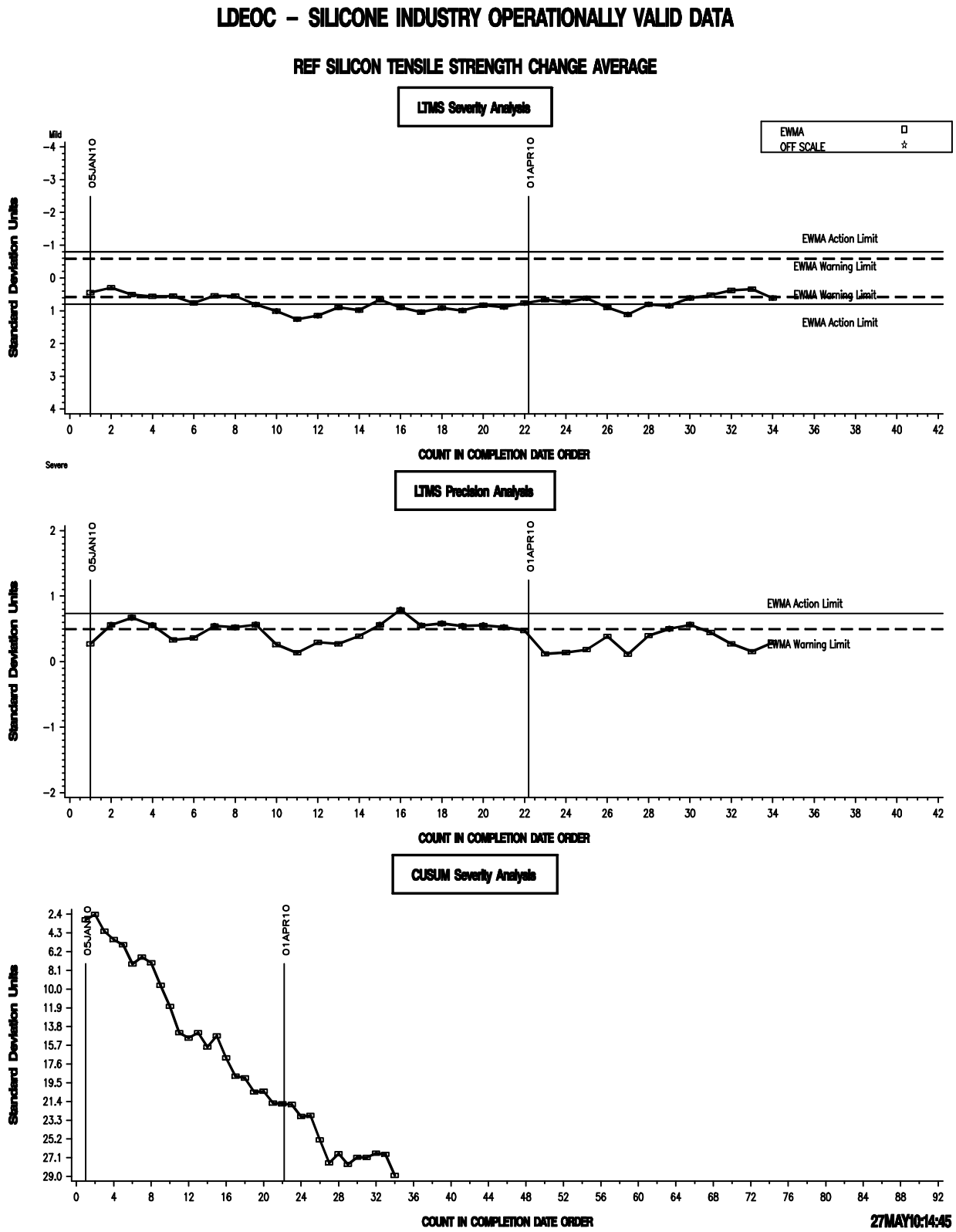
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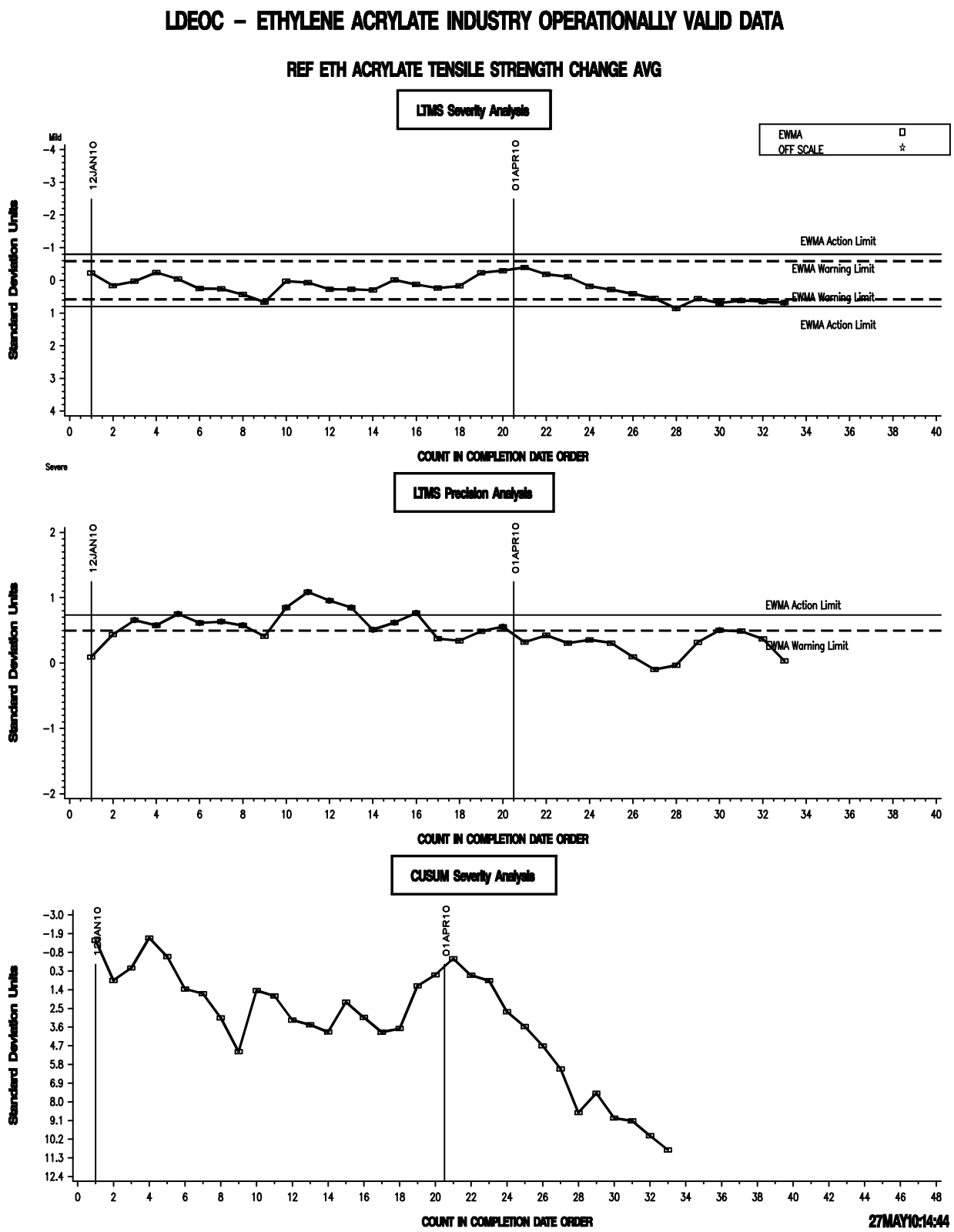
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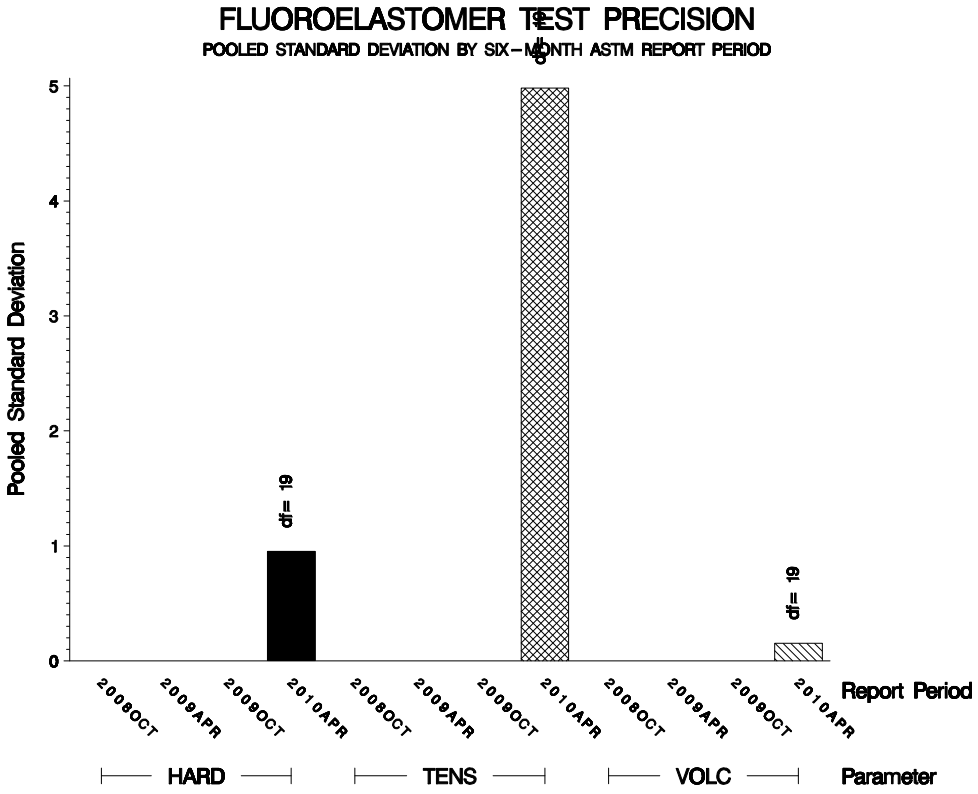
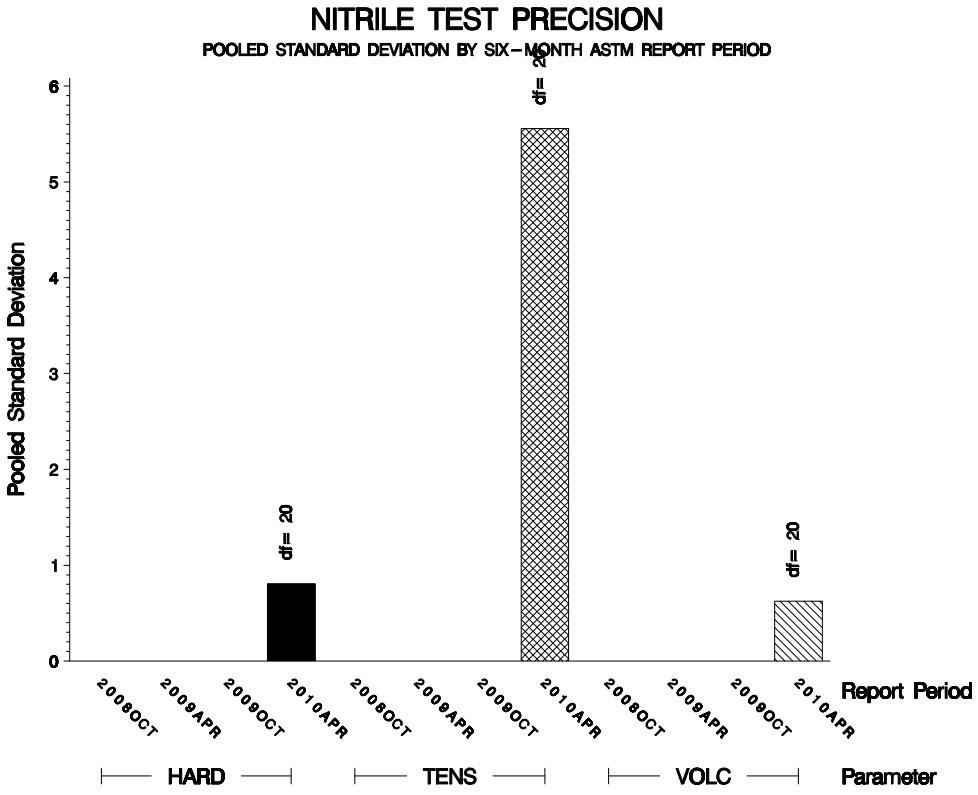
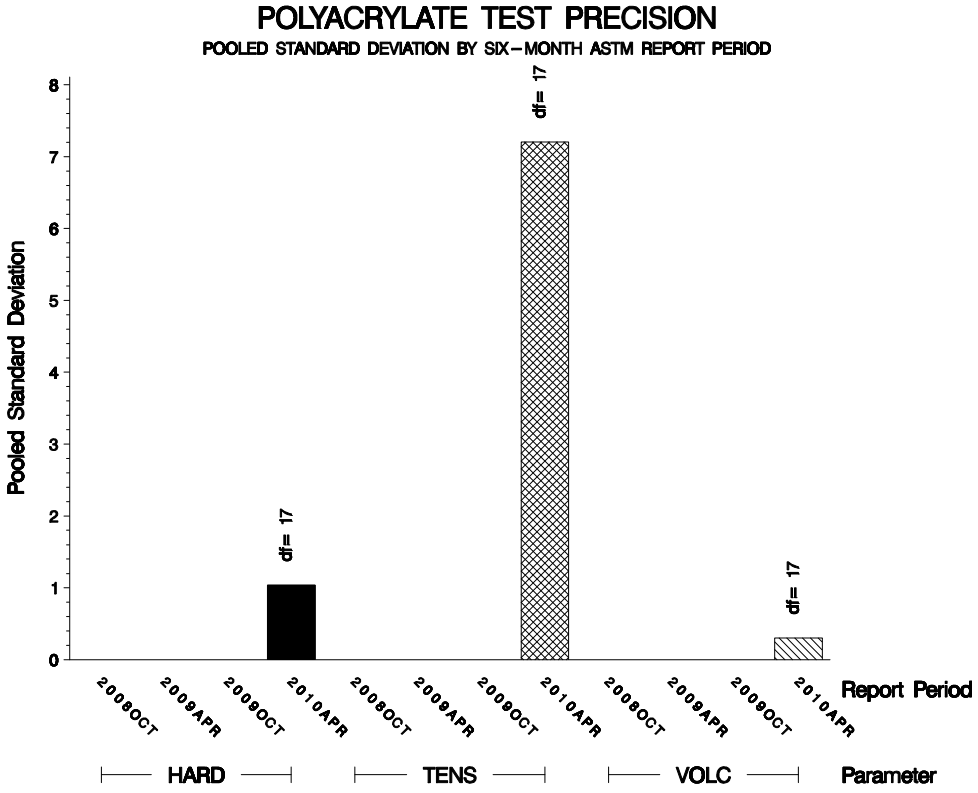
POOLED S:

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






POLYACRYLATE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
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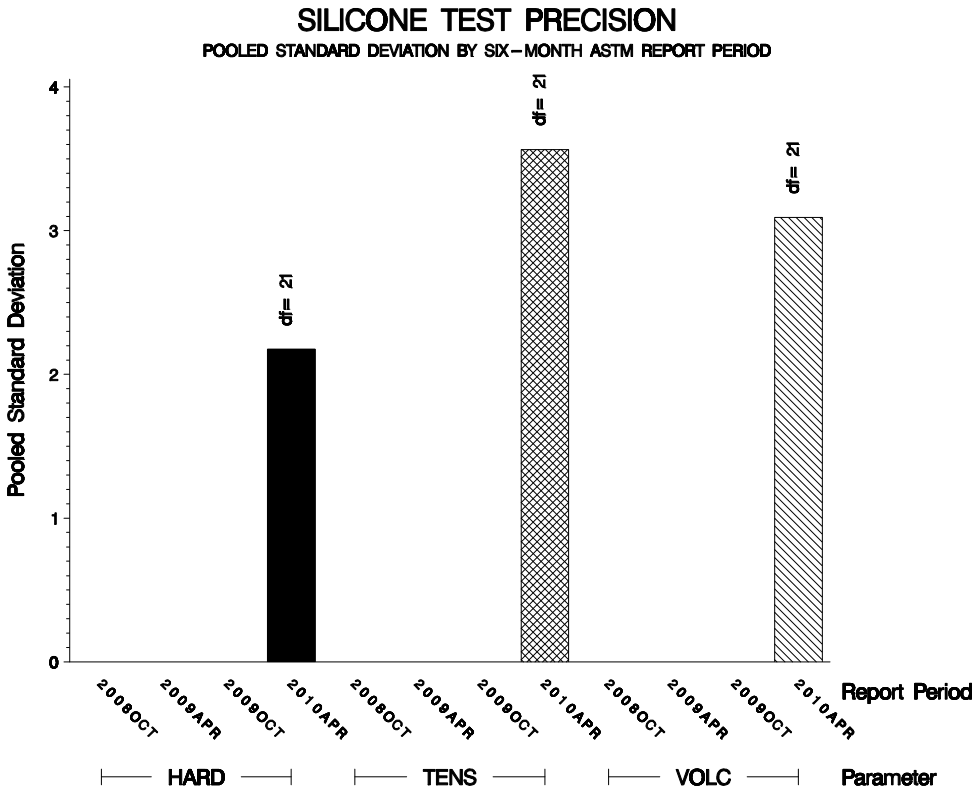
df= 17
df= 17
2008OCT
2009APR
2009OCT
2010APR
Report Period
HARD
TENS
VOLC
Parameter


SILICONE TEST PRECISION
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD
Pooled Standard Deviation
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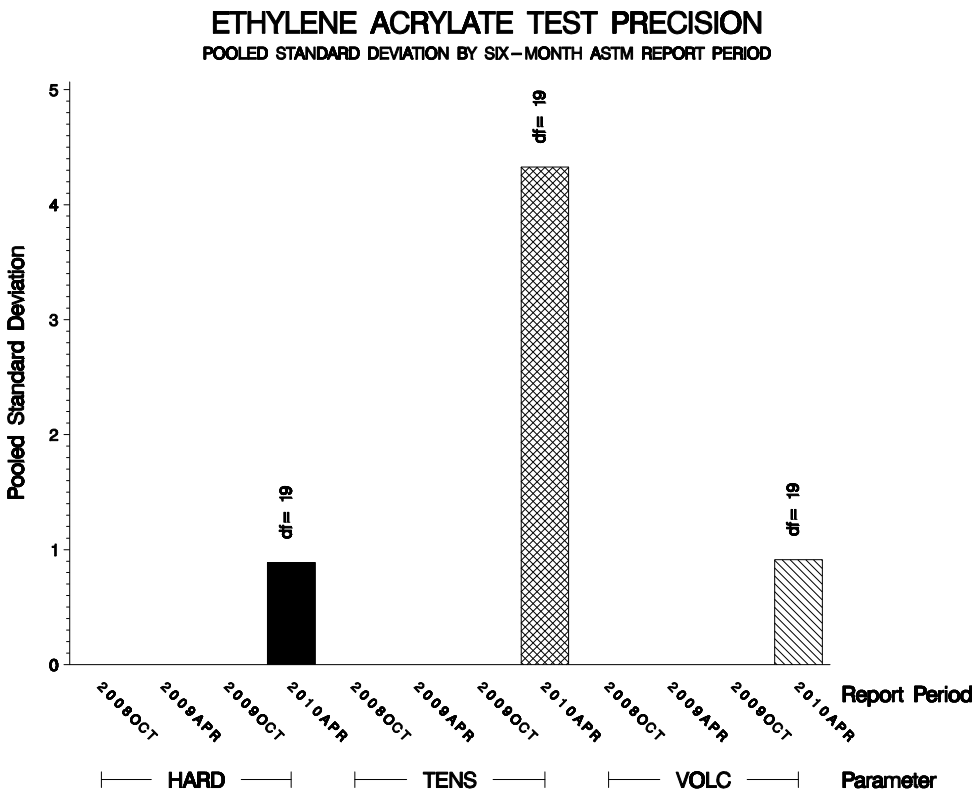
df= 21
df= 21
2008OCT
2009APR
2009OCT
2010APR
Report Period
HARD
TENS
VOLC
Parameter


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= 19
df= 19
2008OCT
2009APR
2009OCT
2010APR
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	77	11402	2260
Total	77	11402	2260

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

During the April 23, 2010 teleconference, the EOEC Surveillance Panel approved an update to the LDEOC test targets used for tests conducted on the hydrogenated nitrile elastomer material using Reference Oil 1006-1. The updated test targets are shown in Table 1, below:

Table 1: Reference Oil 1006-1 Updated Test Targets (N=28)
Hydrogenated Nitrile Elastomer Material only

Parameter	Mean	Standard Deviation
Volume Change	1.29	0.60
Hardness	-1.04	0.92
Tensile Stress	-0.90	5.00

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	**Mild**	Within limits	Within limits
Polyacrylate	Within limits	Within limits	Within limits
Silicone	Within limits	**Mild**	**Severe**
VAMAC	Within limits	**Severe**	Within limits

Summary of Precision
as Measured by LTMS Control Charting

Elastomer	VOLC	HARD	TENS
Fluoroelastomer	Within limits	Within limits	Within limits
Nitrile	**Alarm**	Within limits	Within limits
Polyacrylate	Within limits	Within limits	Within limits
Silicone	Within limits	Within limits	Within limits
VAMAC	Within limits	Within limits	Within limits

MTK/mtk/astm0410.doc/mem10-025.mtk.doc

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ftp://ftp.astmtmc.cmu.edu/docs/bench/ldeoc/semiannualreports/ldeoc-04-2010.pdf

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