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: 13-070

DATE: November 21, 2013

TO: Mike Birke,
Chairman, Engine Oil Elastomer Compatibility Surveillance Panel

FROM: Michael T. Kasimirsky

SUBJECT: LDEOC Testing from April 1, 2013 through September 30, 2013

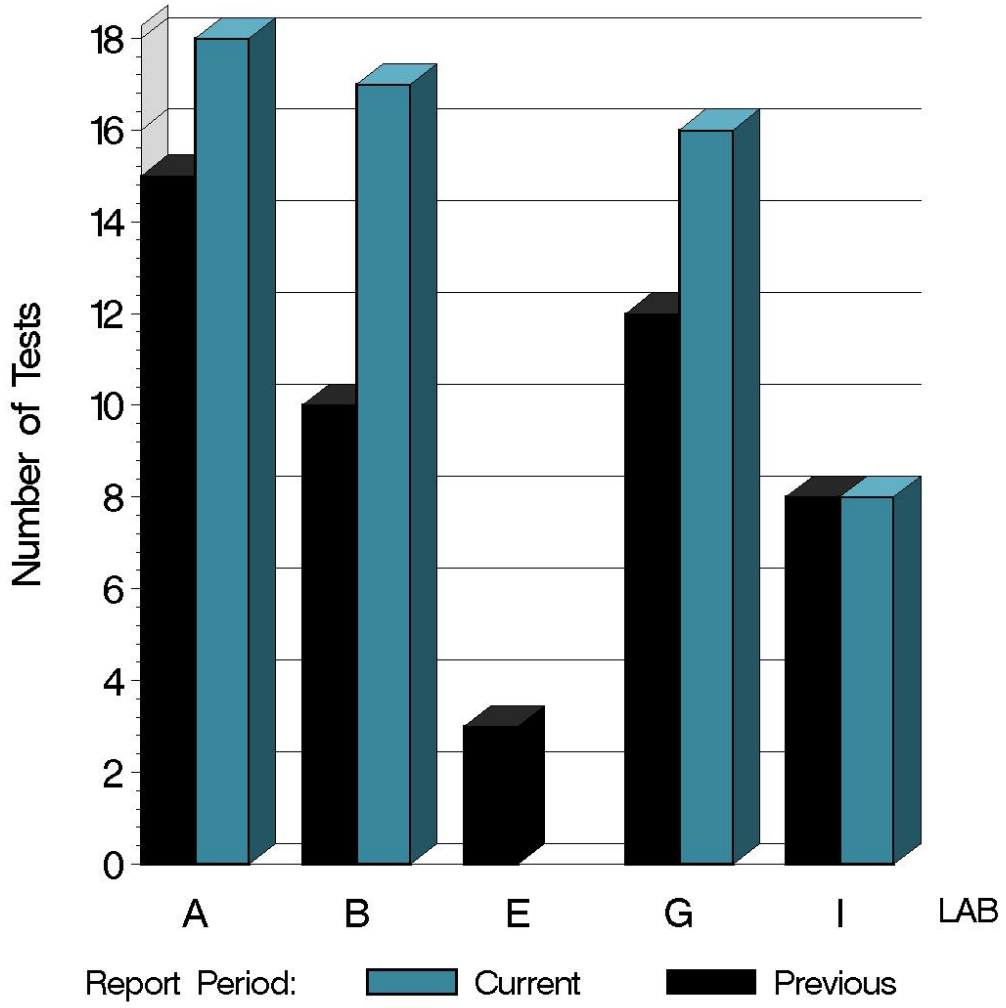
A total of 290 LDEOC tests were reported from 4 labs to the Test Monitoring Center during the period from April 1, 2013 through September 30, 2013.

Please find attached a summary of testing activity this period.

MTK/mtk/mem13-070.mtk.doc
cc: Frank Farber
Jeff Clark
EOEC Surveillance Panel
ftp://ftp.astmtmc.cmu.edu/docs/bench/ldeoc/semiannualreports/ldeoc-10-2013.pdf

Distribution: email

LDEOC (D 7216)



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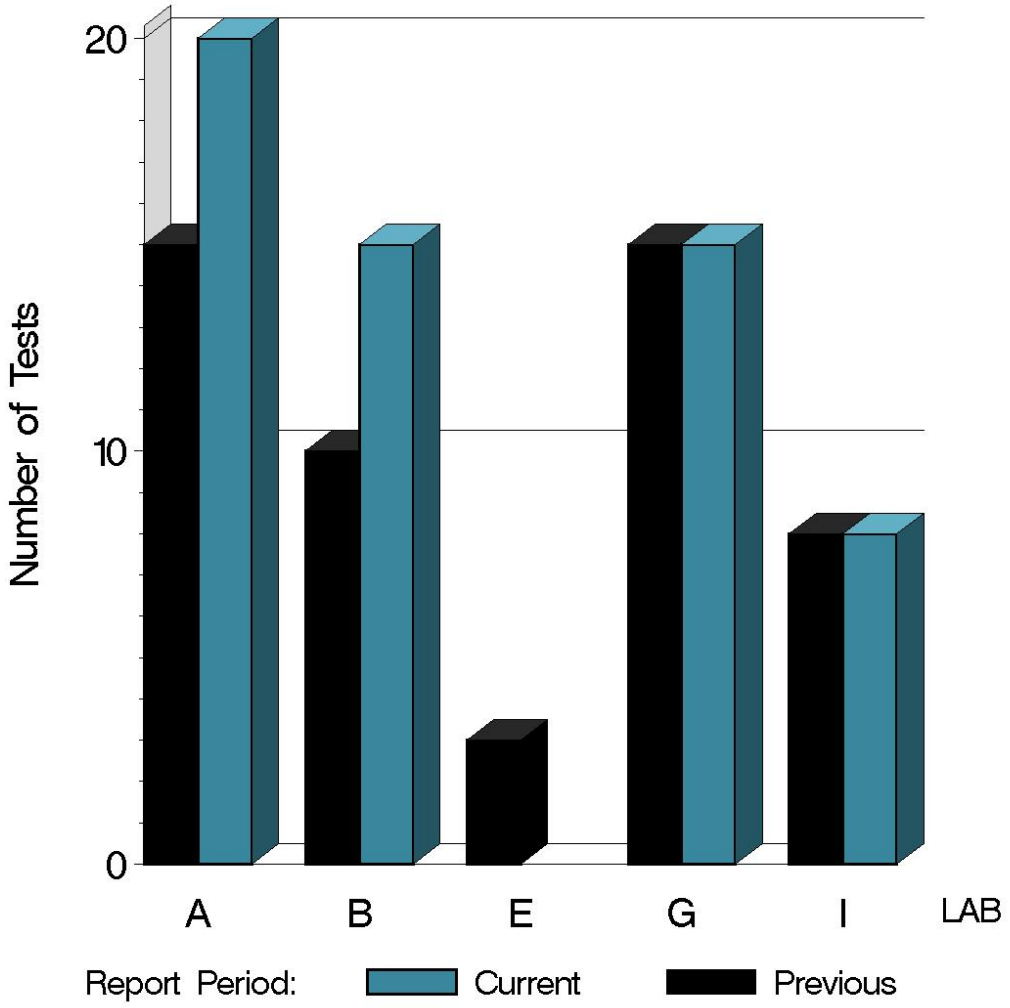
LDEOC (D 7216)



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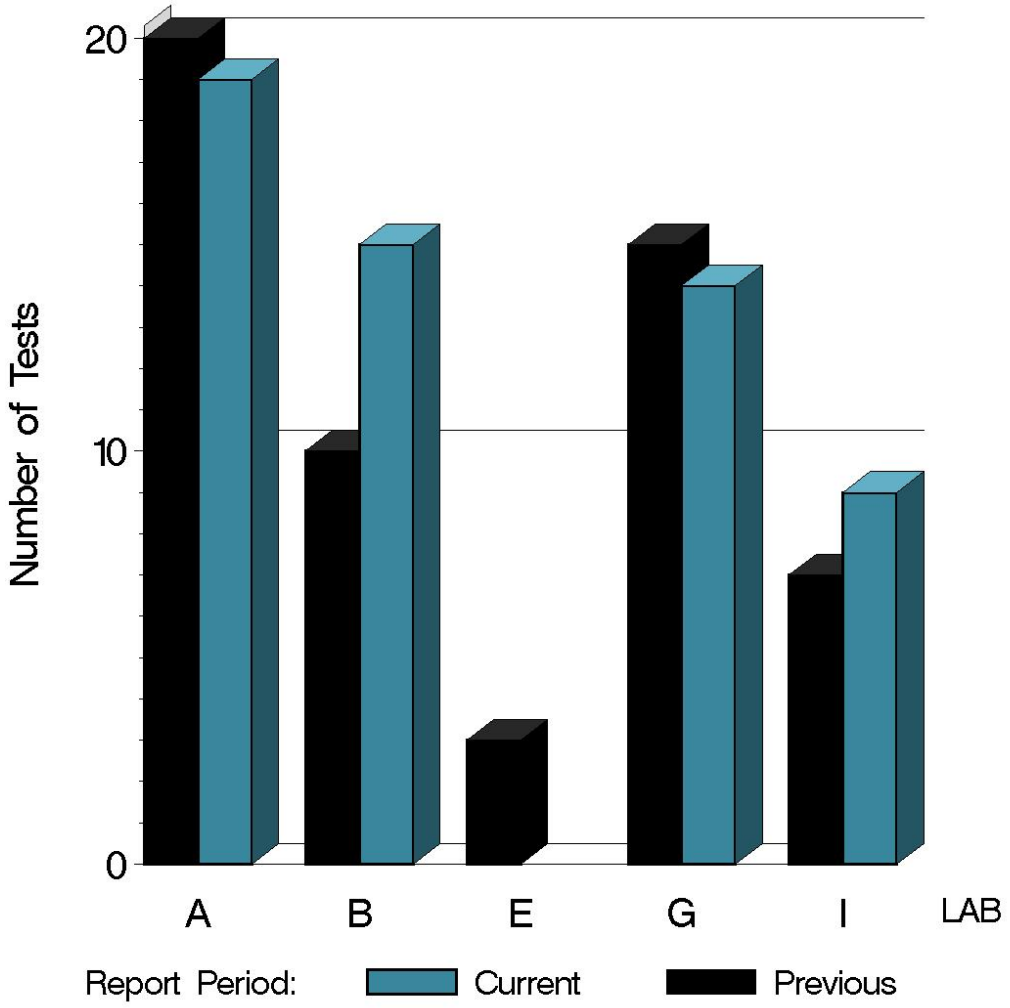
LDEOC (D 7216)



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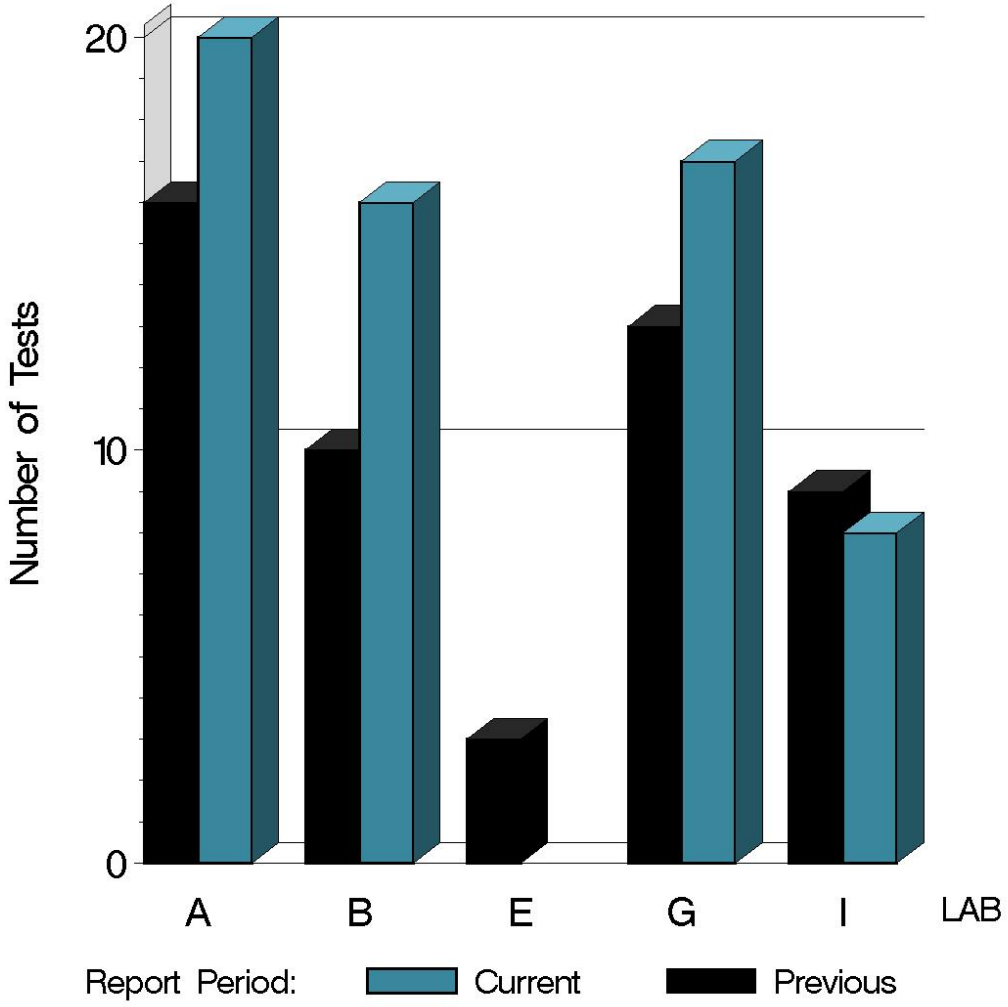
LDEOC (D 7216)

NUMBER OF POLYACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



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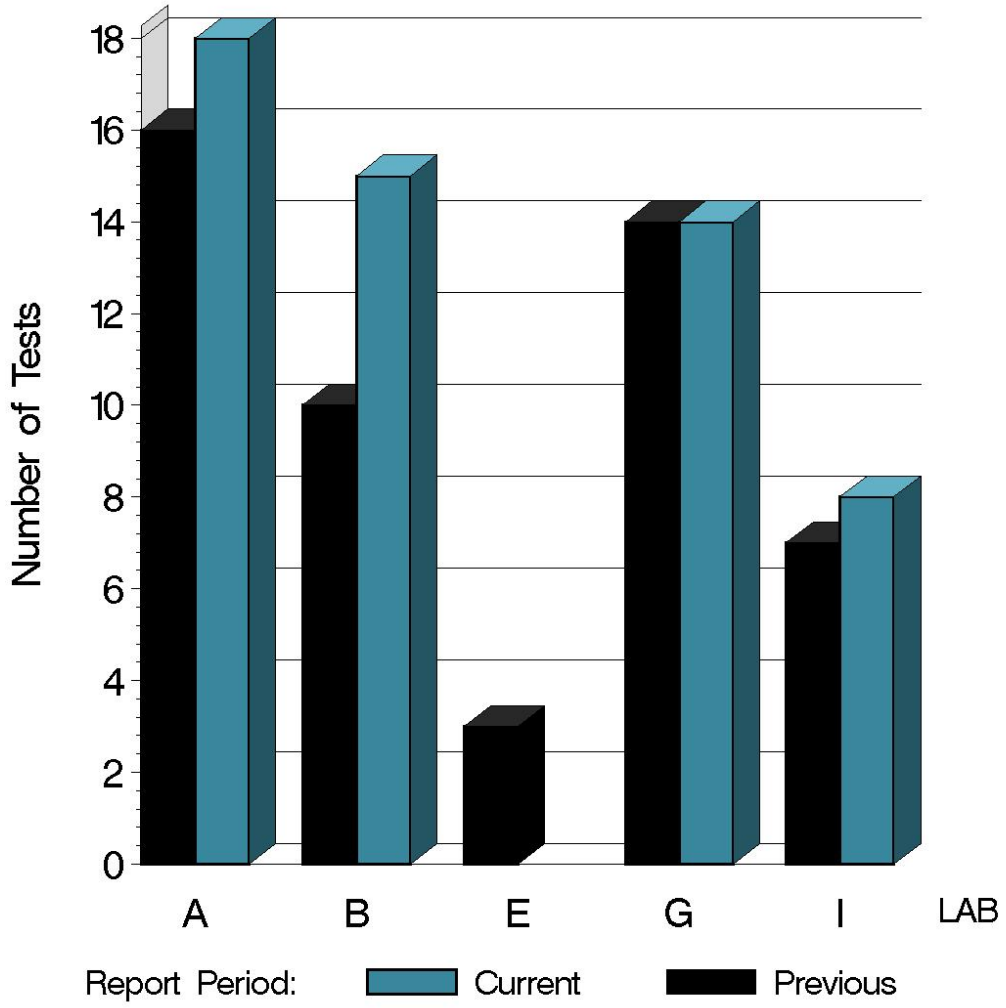
LDEOC (D 7216)



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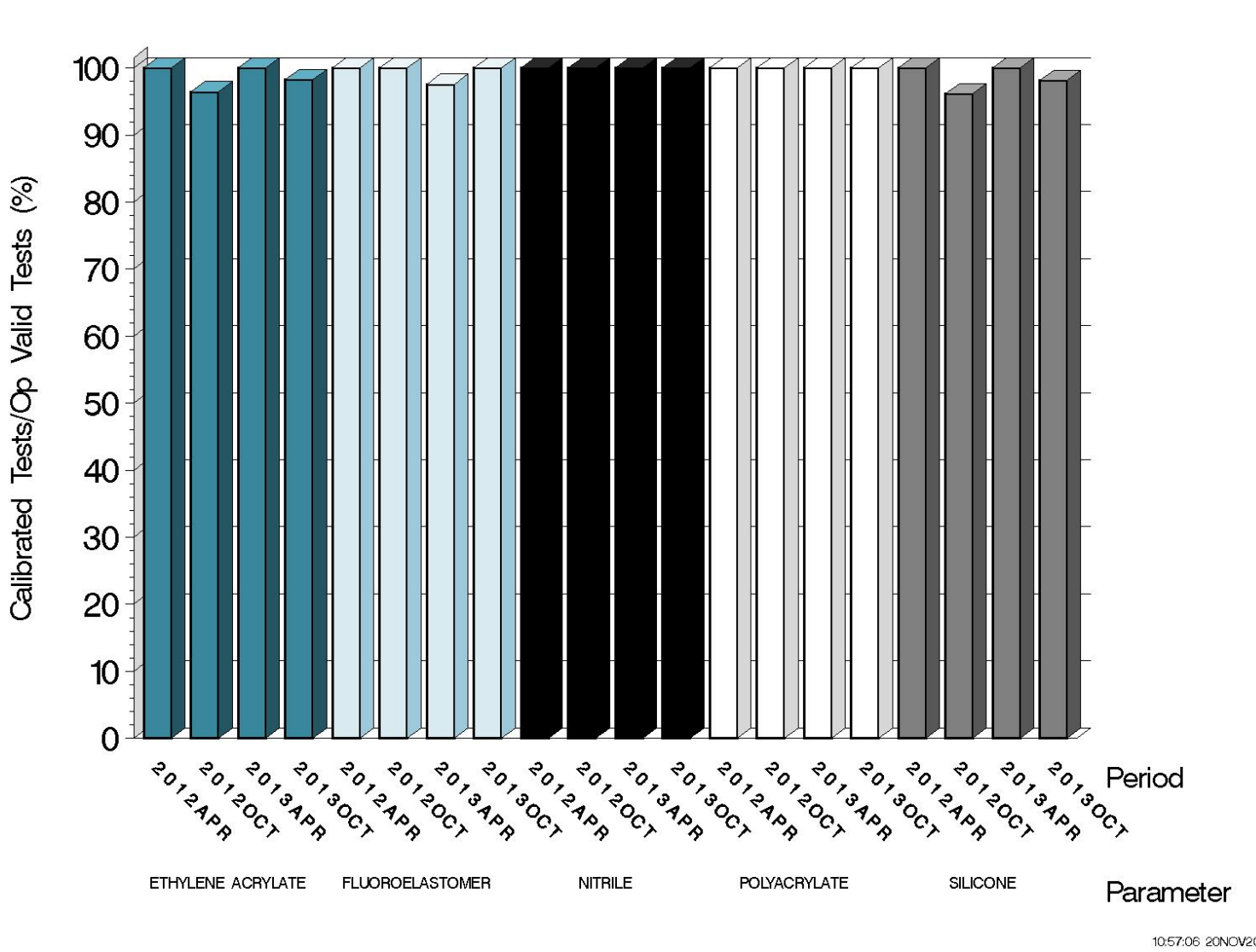
LDEOC (D 7216)

Test Distribution by Oil and Validity

		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	This Period	Last Period
Accepted for Calibration	AC	56	57	57	60	52	282	204
Rejected	OC	1	0	0	0	1	2	1
Information Run	NI	0	0	0	0	0	0	50
Operationally Invalid (lab)	LC	0	0	0	0	1	1	0
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0	0	0
Aborted Calibration	XC	2	1	0	1	1	5	0
Total		59	58	57	61	55	290	255

LDEOC (D 7216)


OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA
Calibrated Tests/Op Valid Tests (%)
100
90
80
70
60
50
40
30
20
10
0
2012APR
2012OCT
2013APR
2013OCT
Period
ETHYLENE ACRYLATE
FLUOROELASTOMER
NITRILE
POLYACRYLATE
SILICONE
Parameter
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LDEOC (D 7216)

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	18	0	0	20	0	0	19	0	0	20	0	0	18	0	0	95	0
B	1	17	6	0	15	0	0	15	0	1	16	6	1	15	7	3	78	4
G	1	16	6	1	15	7	0	14	0	0	17	0	1	14	7	3	76	4
I	0	8	0	0	8	0	0	9	0	0	8	0	0	8	0	0	41	0
Total	2	59	3	1	58	2	0	57	0	1	61	2	2	55	4	6	290	2

LDEOC (D 7216)

CAUSES FOR LOST TESTS

			Elastomer					Validity			Loss Rate		
Lab	Cause		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	LC	RC	XC	Lost	Starts	%
B	Customer Request		●			●				●	2	78	3
	Bath Failure						●			●	1		1
G	Bath Failure		●	●						●	2	76	3
	Exceeded Time Limit						●	●			1		1
		Lost	2	1	0	1	2	1	0	5			
		Starts	59	58	57	61	55	290	290	290			
		%	3	3	0	2	4	0.3	0	2			

Lost tests are calibration attempts that were either aborted or operationally invalid

LDEOC (D 7216)

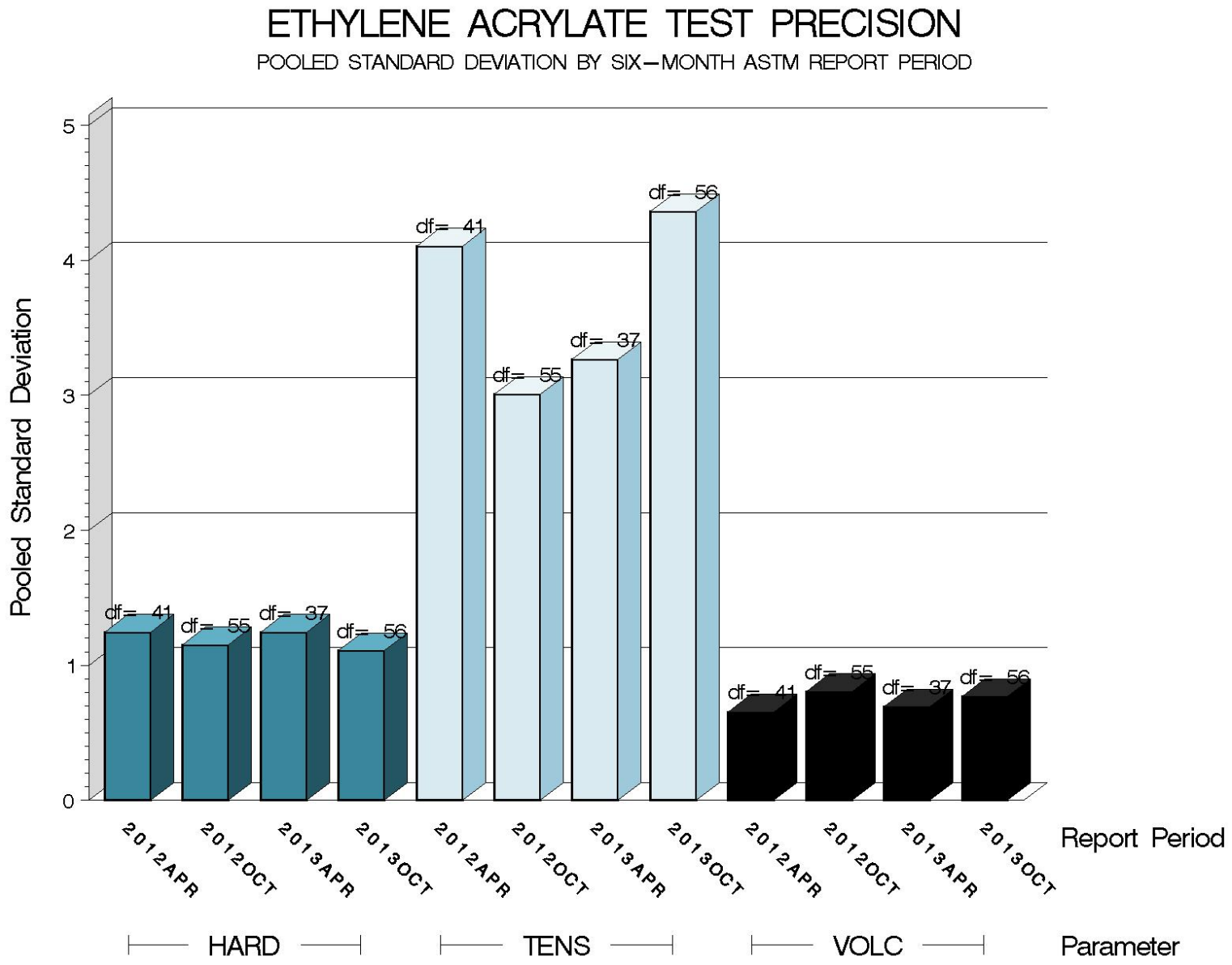
Average Δ/s by Lab					
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI
Ethylene Acrylate	A	18	0.131	-2.092	0.151
	B	16	1.212	-1.382	-0.431
	E	0	-	-	-
	G	15	0.932	-0.333	0.405
	I	8	1.795	-2.275	-0.888
	Industry	57	0.879	-1.455	-0.092
Fluoroelastomer	A	20	-0.487	0.871	-0.461
	B	15	-0.907	-0.267	0.229
	E	0	-	-	-
	G	14	-0.433	0.100	0.744
	I	8	1.117	0.030	1.067
	Industry	57	-0.359	0.264	0.231
Nitrile	A	19	0.857	-0.977	-0.373
	B	15	1.301	-0.134	-0.831
	E	0	-	-	-
	G	14	1.085	0.665	-0.657
	I	9	0.246	-0.977	-0.134
	Industry	57	0.933	-0.352	-0.525
Polyacrylate	A	20	0.040	-1.058	-0.937
	B	15	0.519	-0.810	-1.056
	E	0	-	-	-
	G	17	-0.456	0.800	-1.100
	I	8	-0.015	-0.604	-1.078
	Industry	60	0.012	-0.409	-1.032
Silicone	A	18	-1.017	-0.733	1.414
	B	14	0.140	0.310	1.054
	E	0	-	-	-
	G	13	0.625	1.707	1.495
	I	8	-0.842	-0.216	0.468
	Industry	53	-0.282	0.219	1.196

LDEOC (D 7216)

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**
Ethylene Acrylate	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeoca/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/ldeocp/data/
Silicone	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeocs/data/

LDEOC (D 7216)



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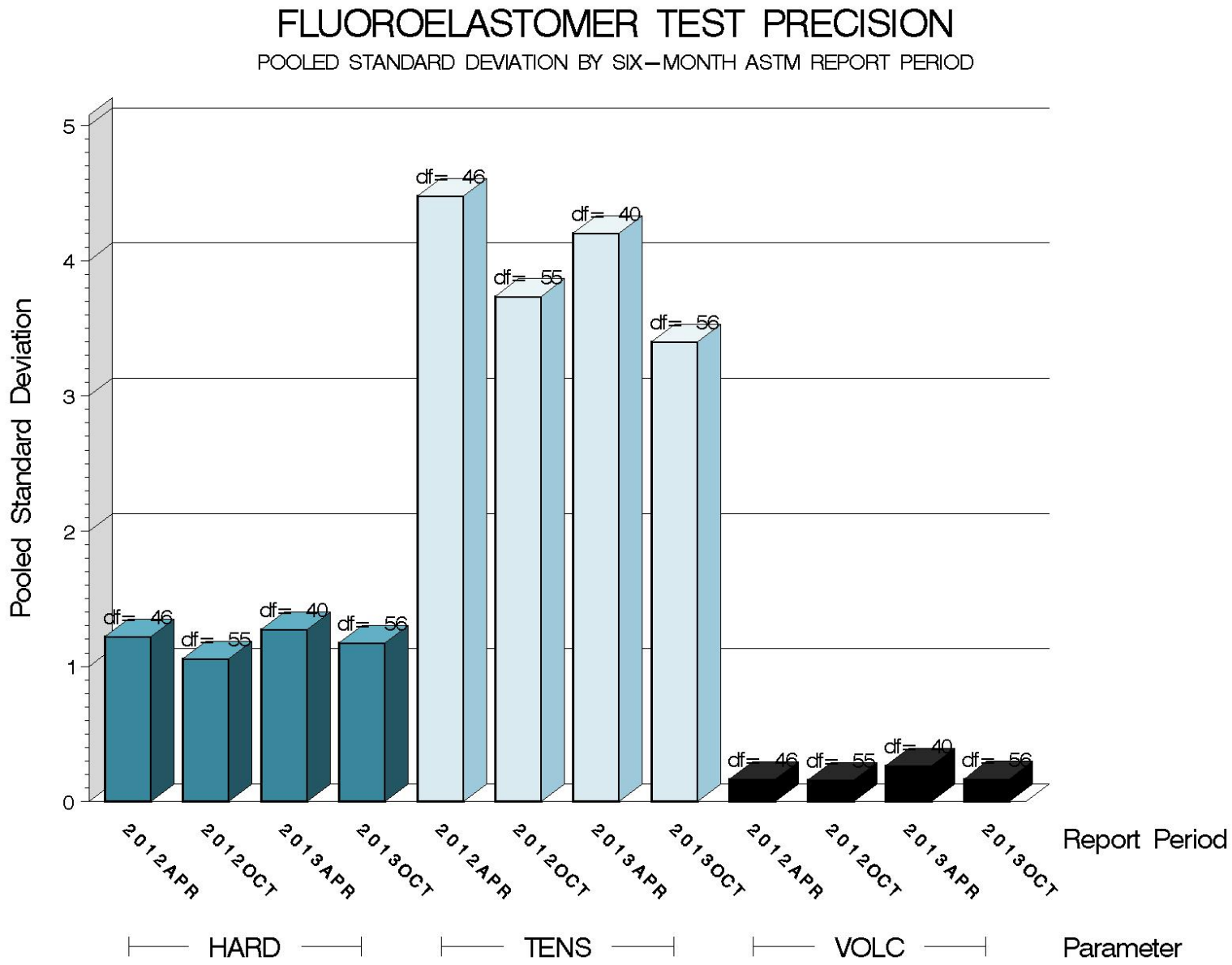
LDEOC (D 7216)



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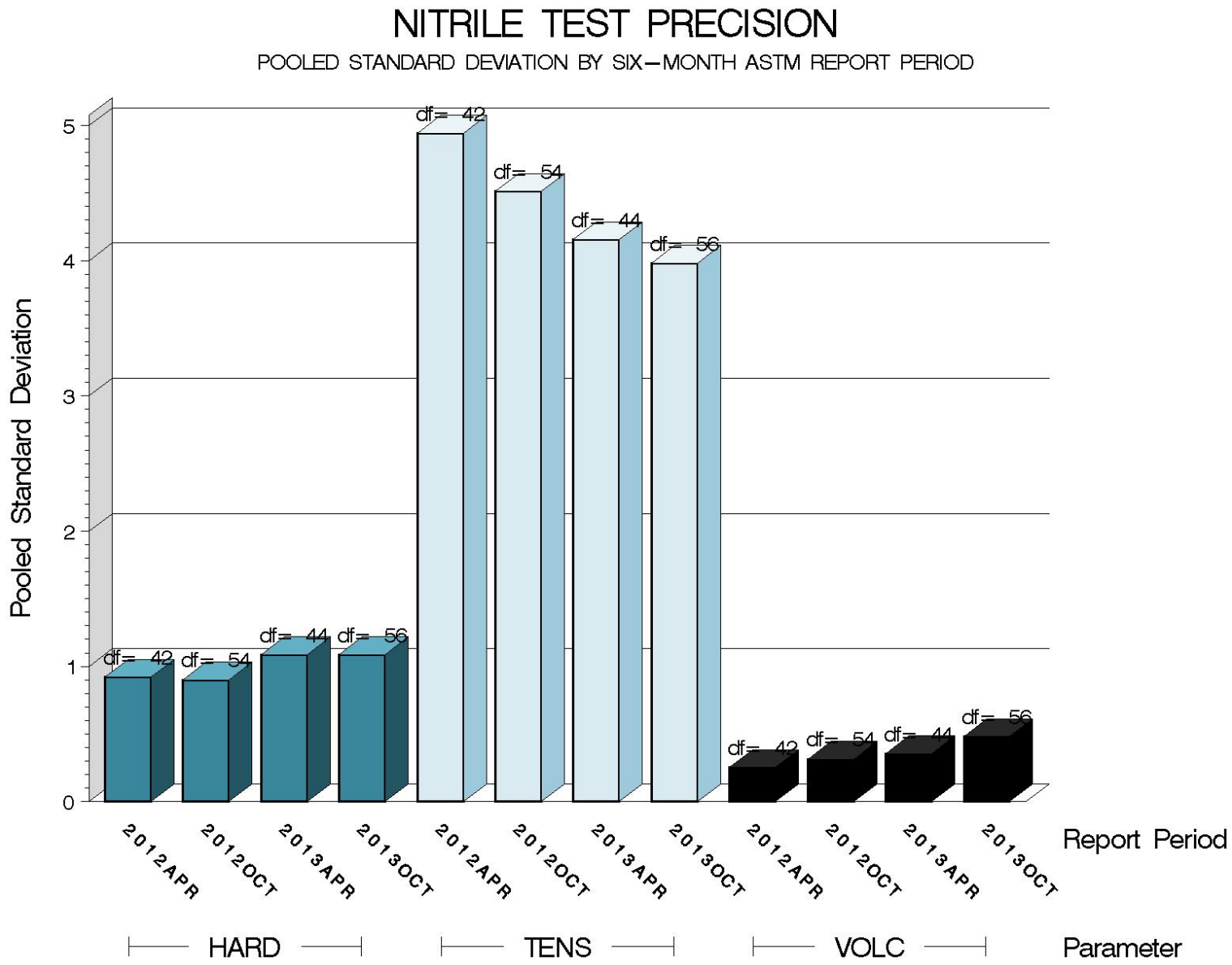

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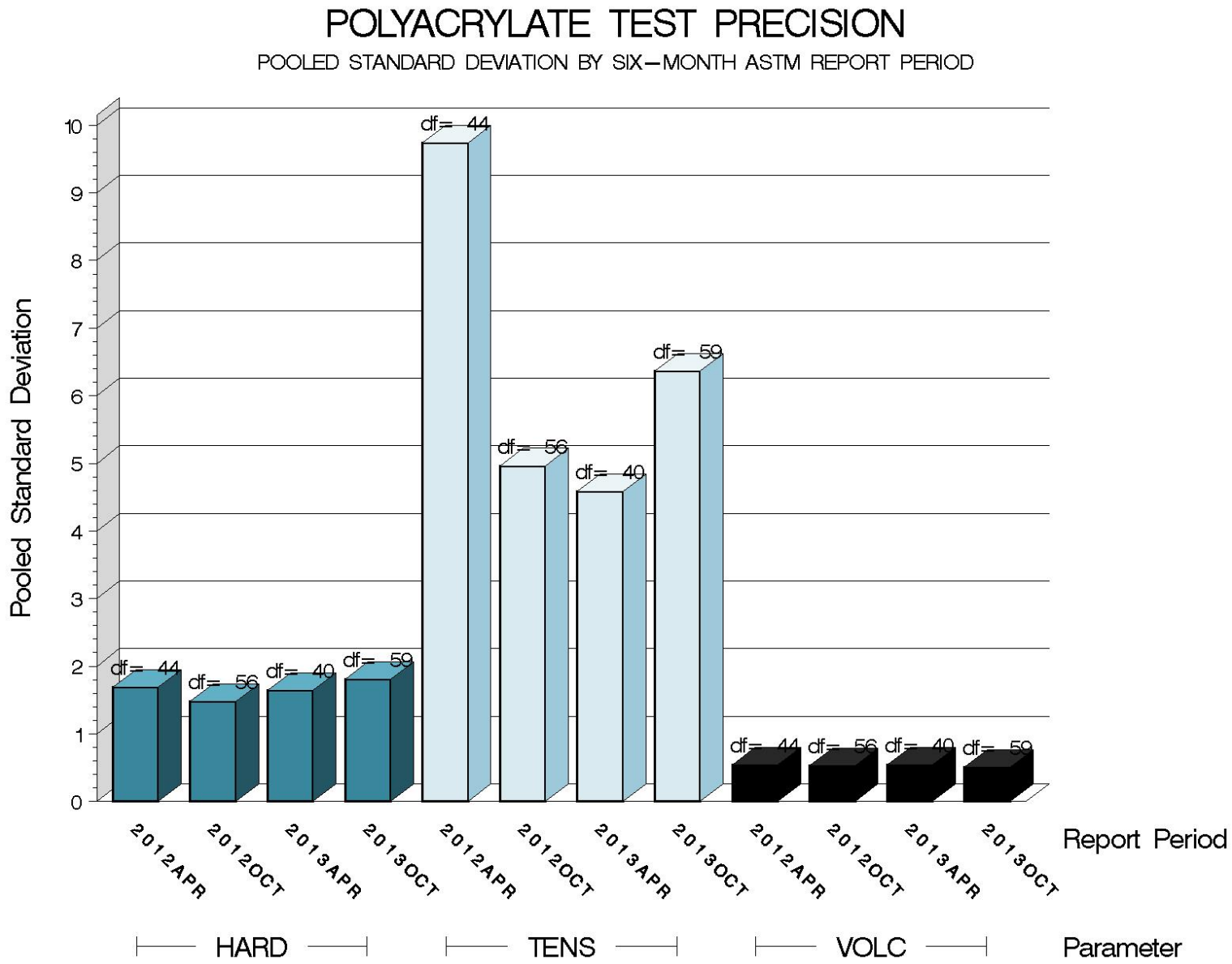

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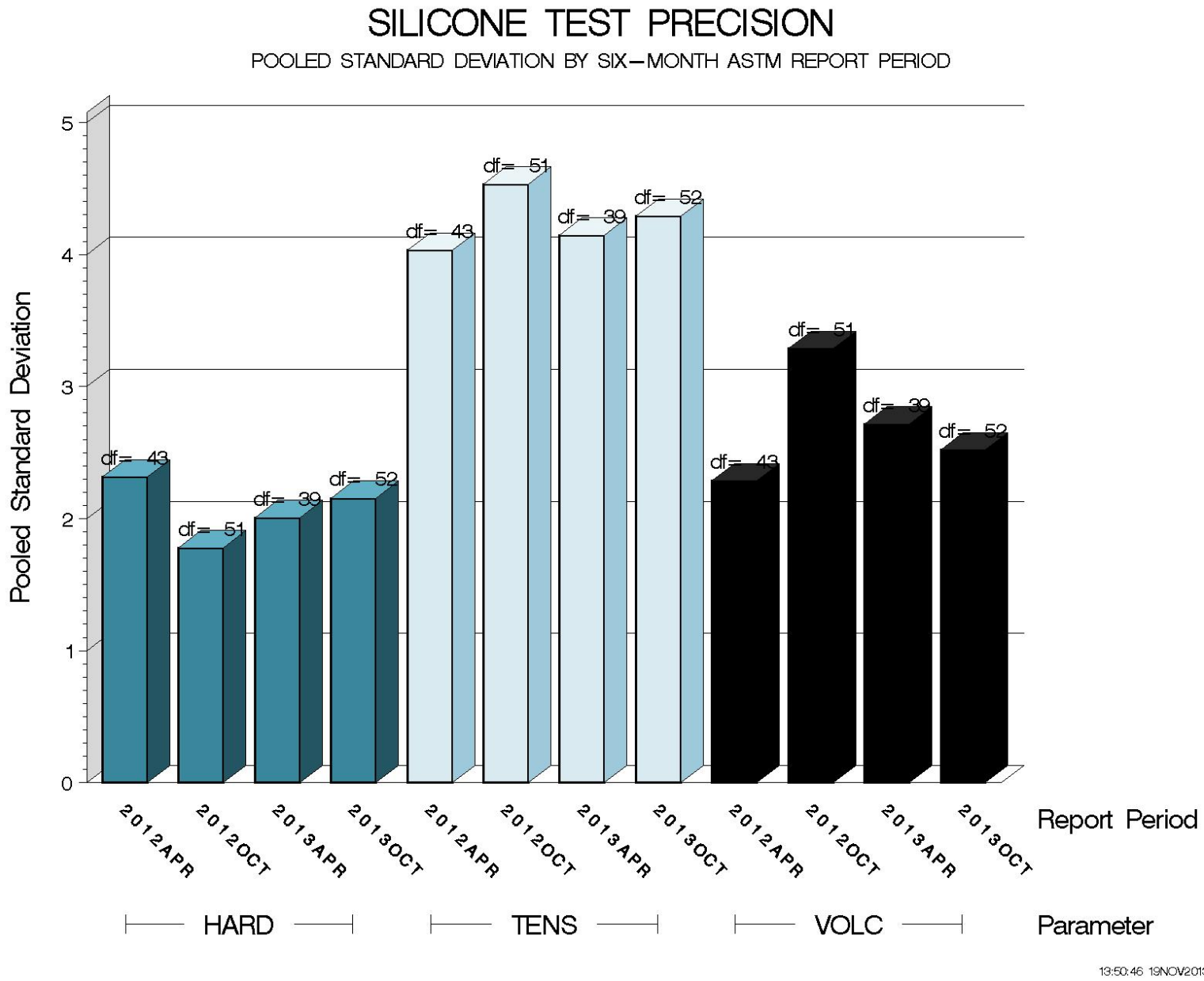
LDEOC (D 7216)



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LDEOC (D 7216)

SUMMARY OF SEVERITY & PRECISION

Summary of Severity as Measured by LTMS Control Charting			
Elastomer	**VOLC**	**HARD**	**TENS**
Ethylene Acrylate	**Severe**	**Mild**	Within limits
Fluoroelastomer	Within limits	Within limits	Within limits
Nitrile	**Severe**	Within limits	Within limits
Polyacrylate	Within limits	Within limits	**Mild**
Silicone	Within limits	Within limits	**Severe**

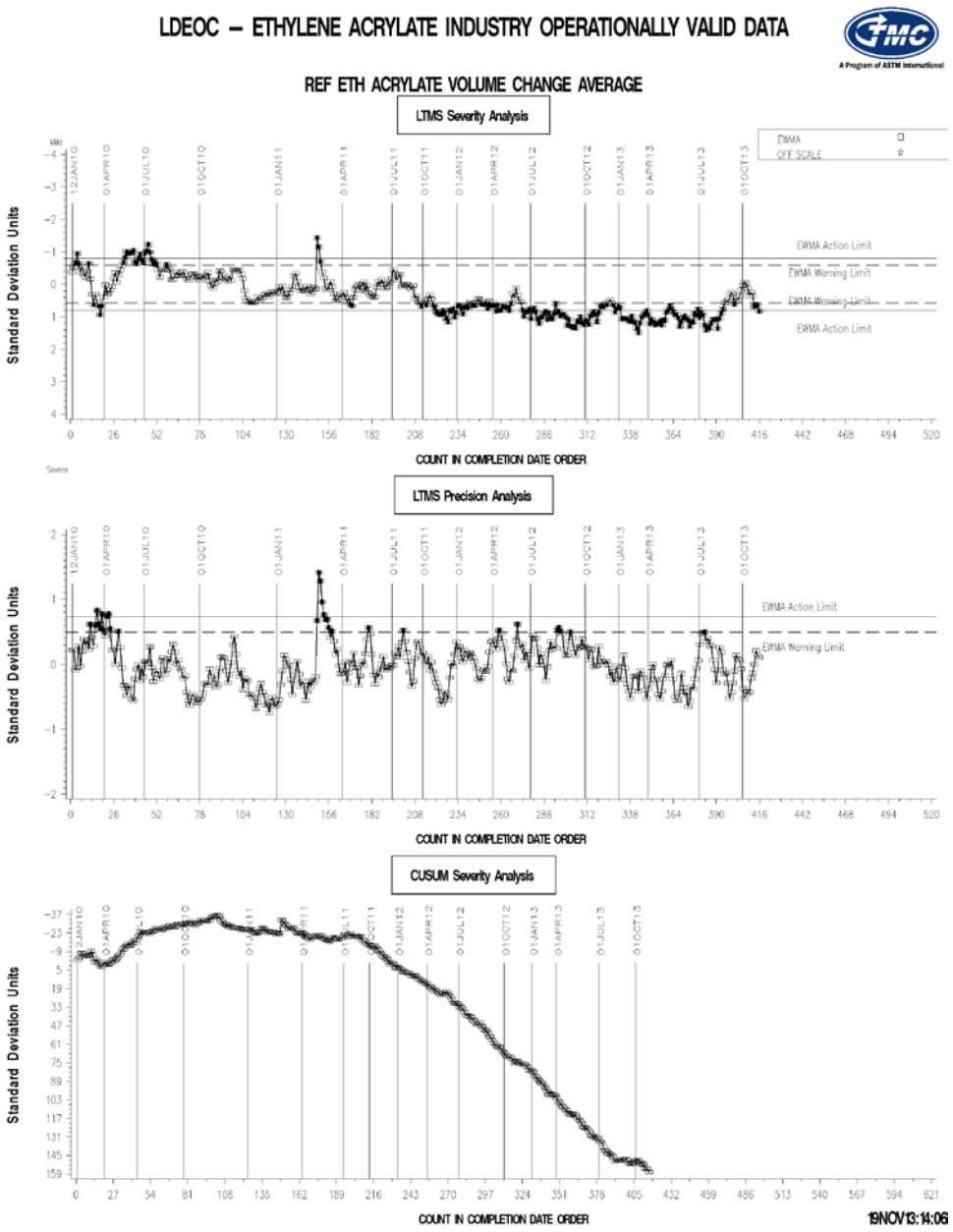
LDEOC (D 7216)

SUMMARY OF SEVERITY & PRECISION (continued)

Summary of Precision as Measured by LTMS Control Charting			
Elastomer	**VOLC**	**HARD**	**TENS**
Ethylene Acrylate	Within limits	Within limits	Within limits
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	Within limits

Industry control charts follow.

LDEOC (D 7216)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A Program of ASTM International
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EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
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EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
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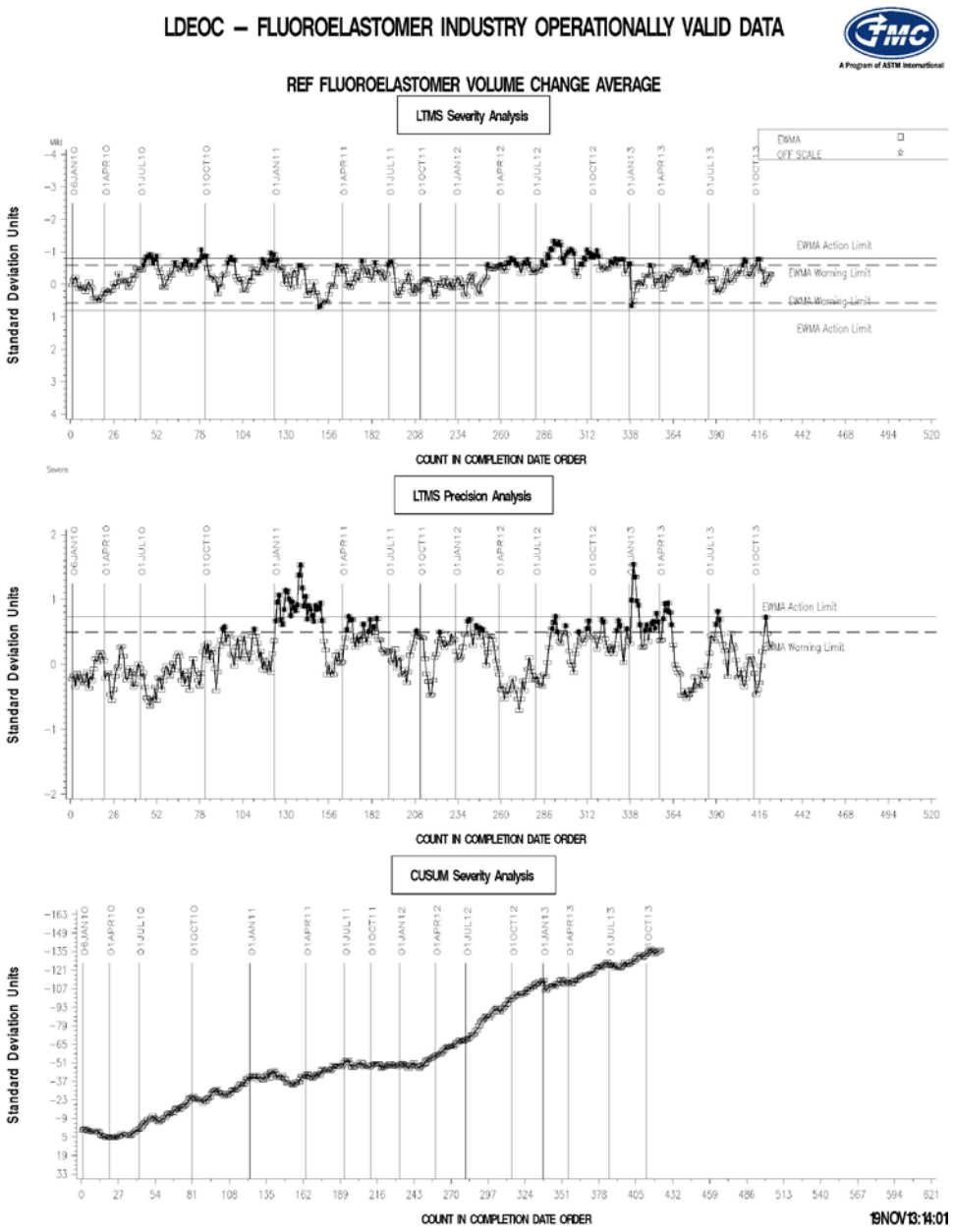
LDEOC (D 7216)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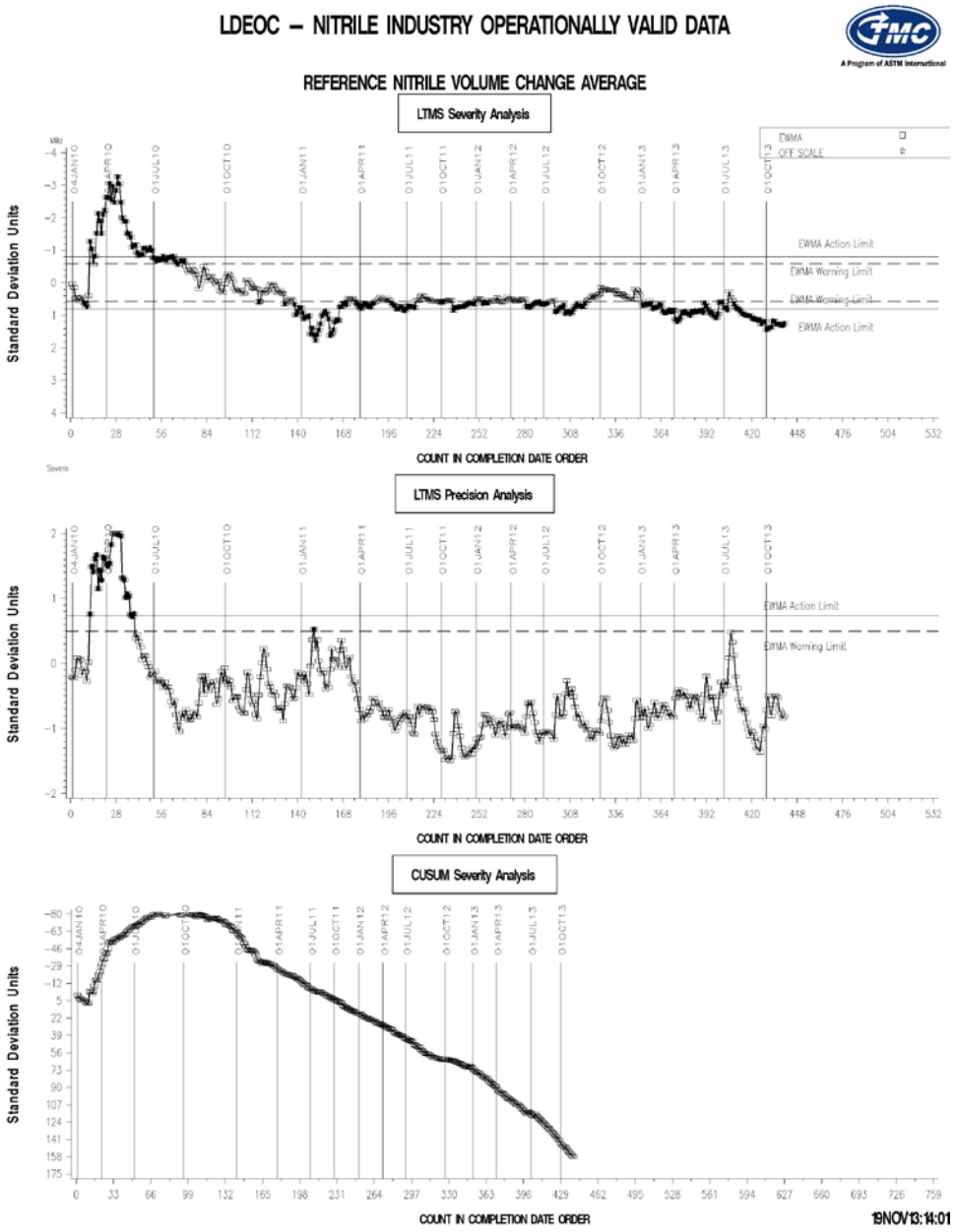
LDEOC (D 7216)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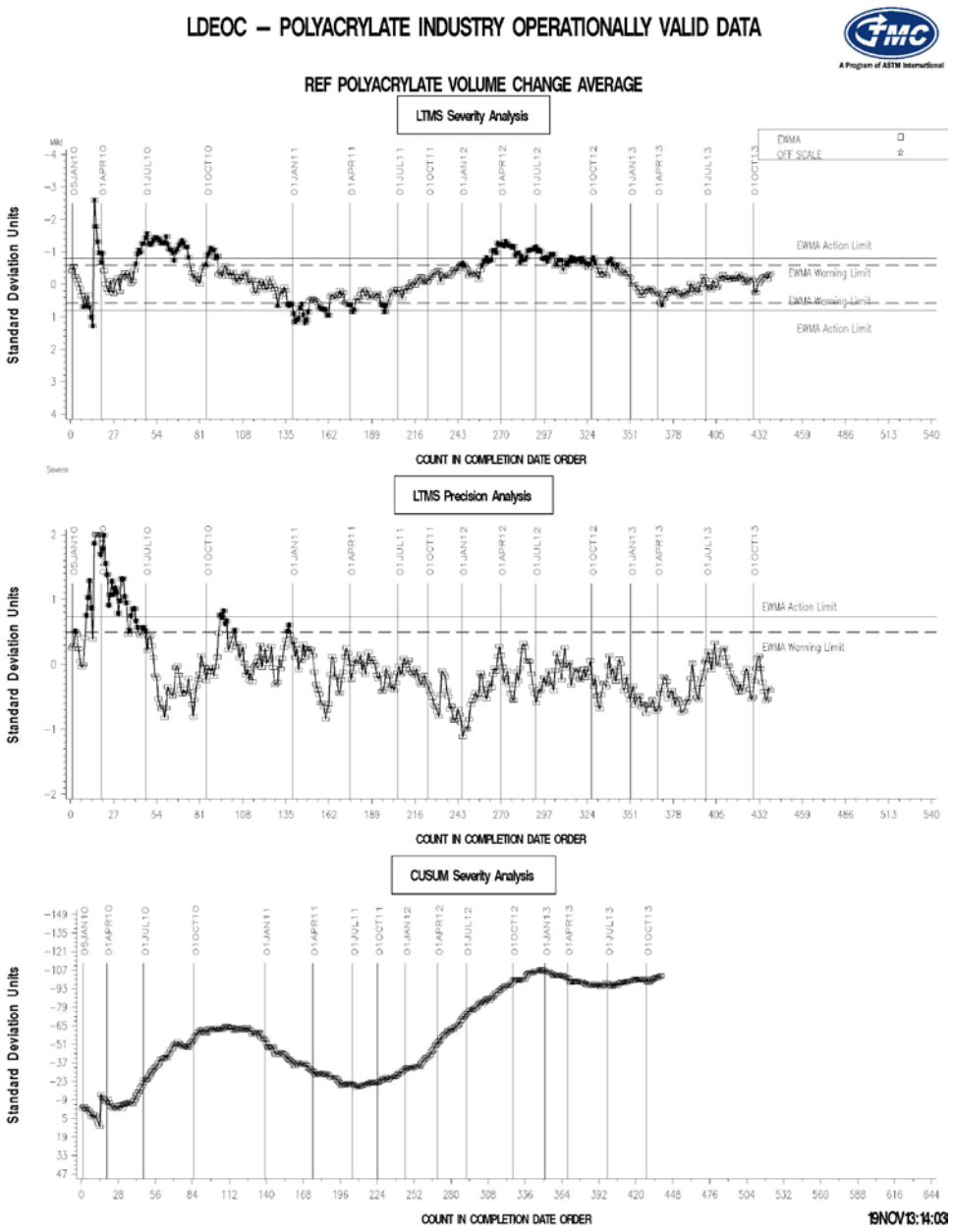
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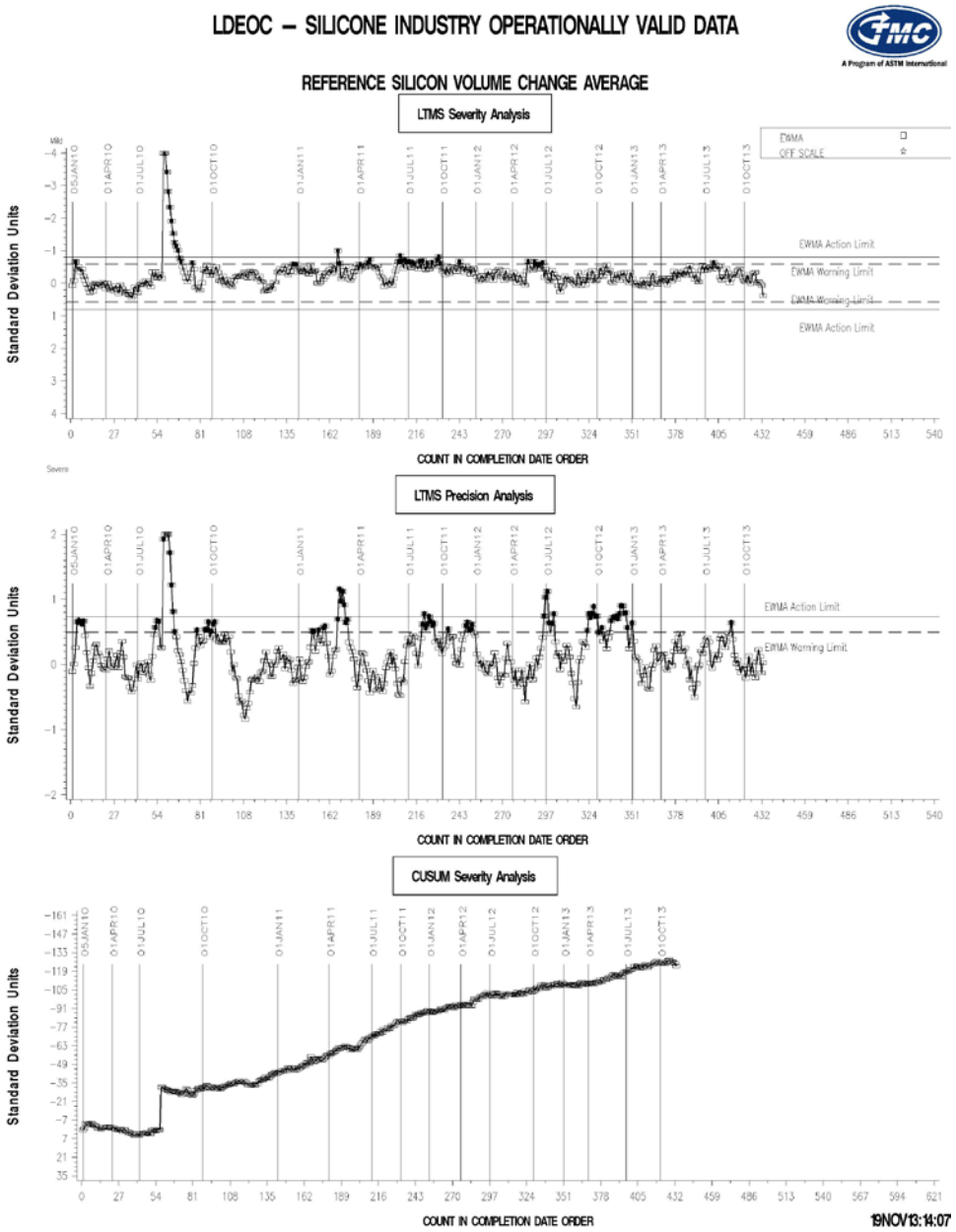
LDEOC (D 7216)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A Program of ASTM International
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Standard Deviation Units
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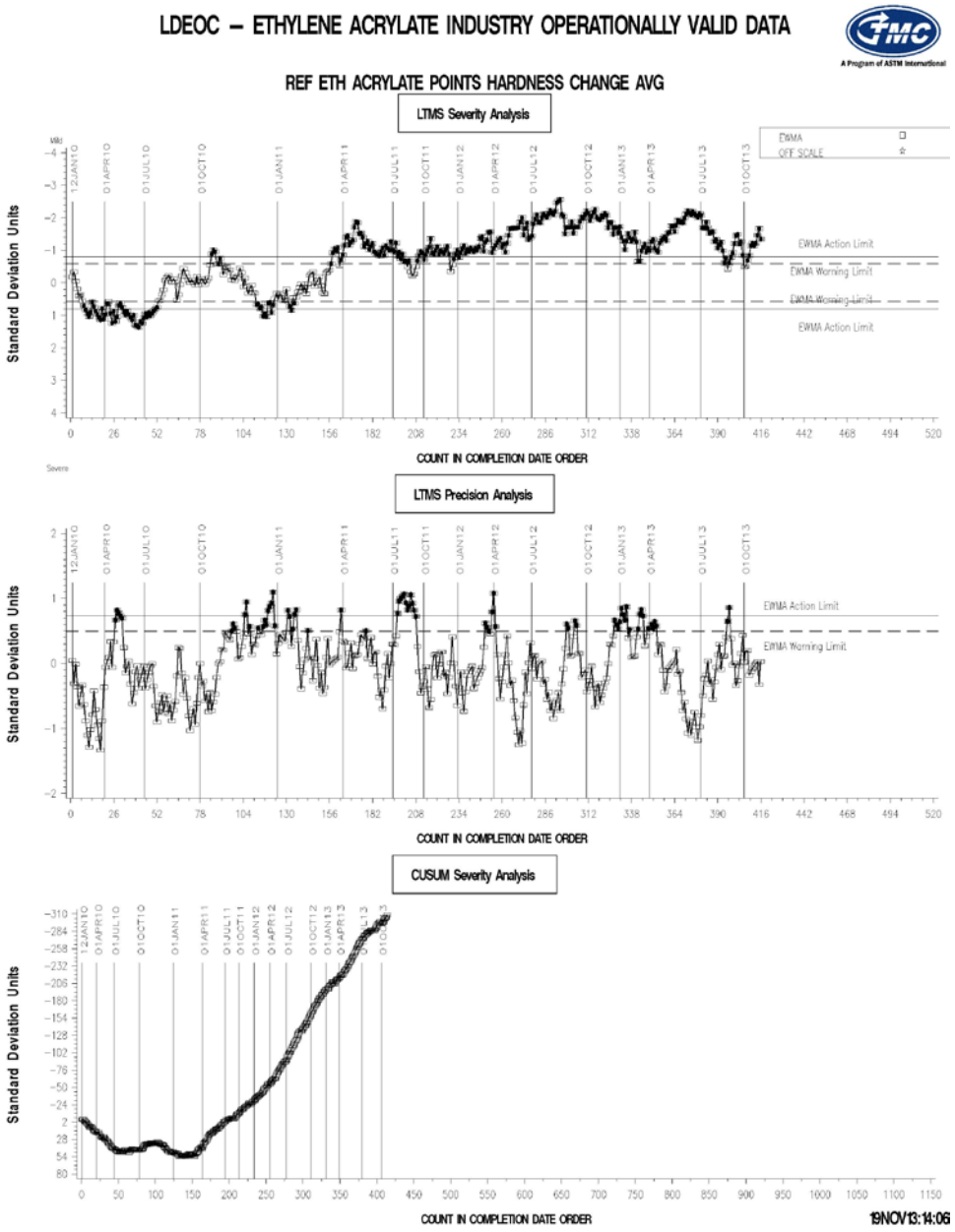
LDEOC (D 7216)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A Program of ASTM International
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Standard Deviation Units
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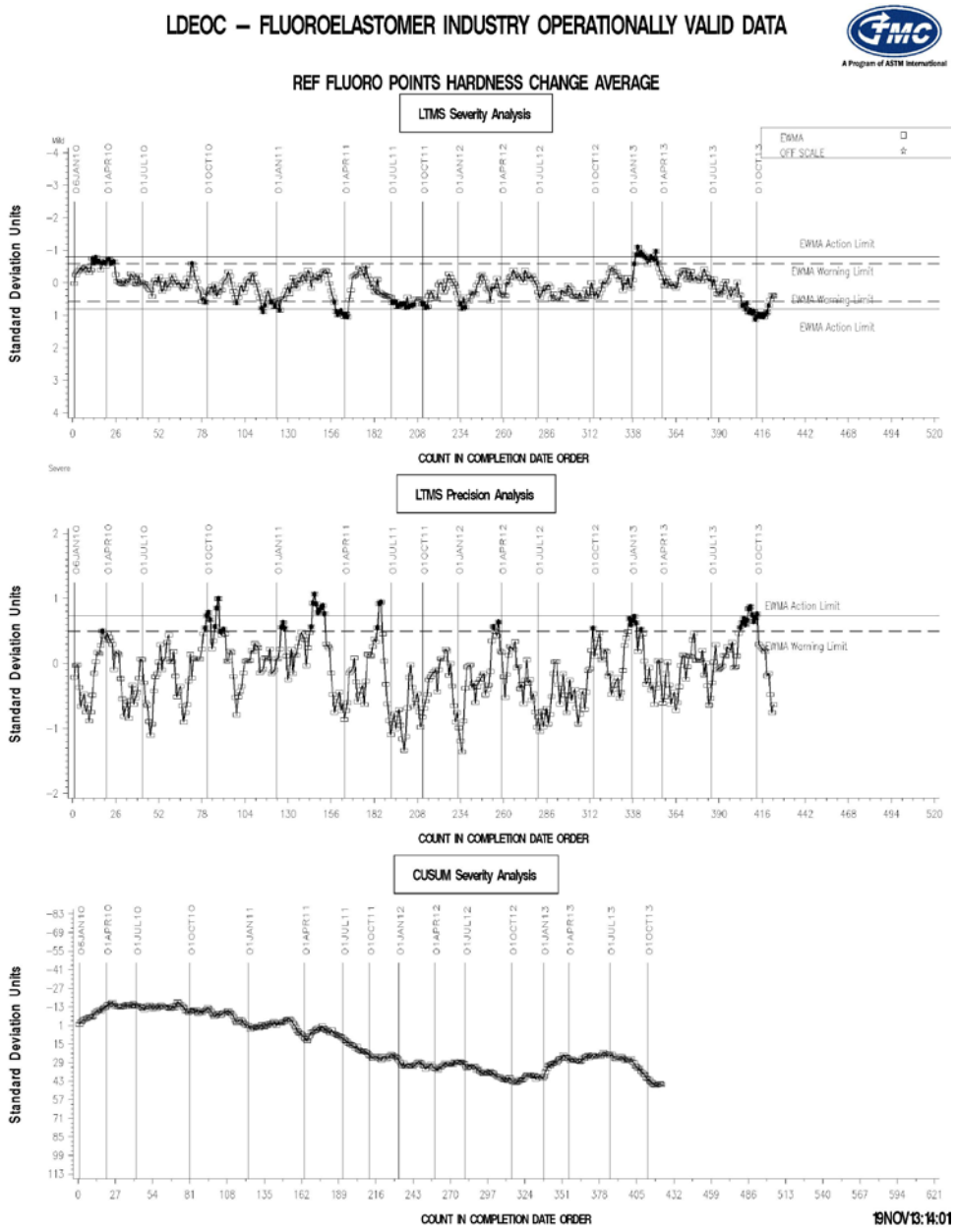
LDEOC (D 7216)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A Program of ASTM International
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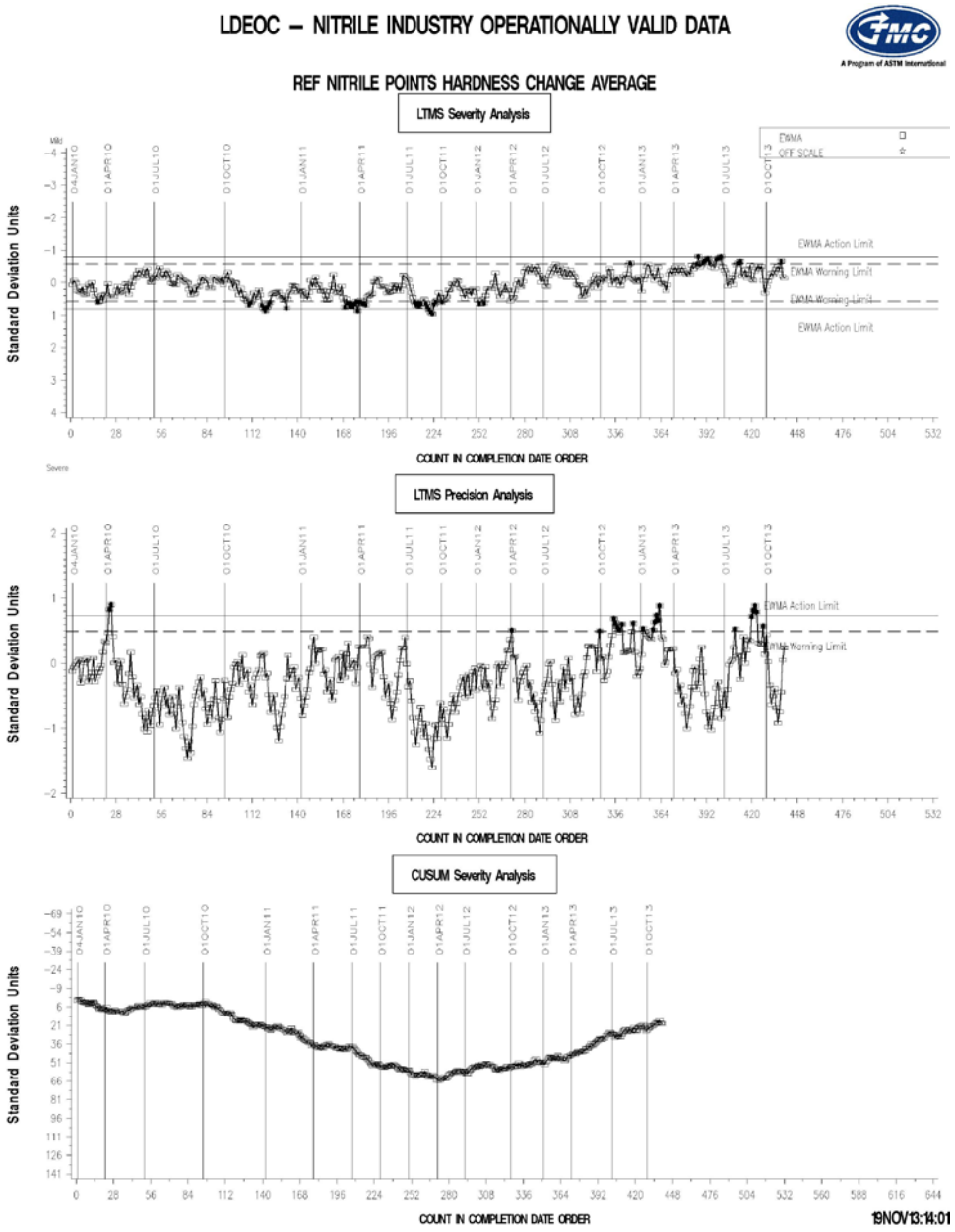
LDEOC (D 7216)



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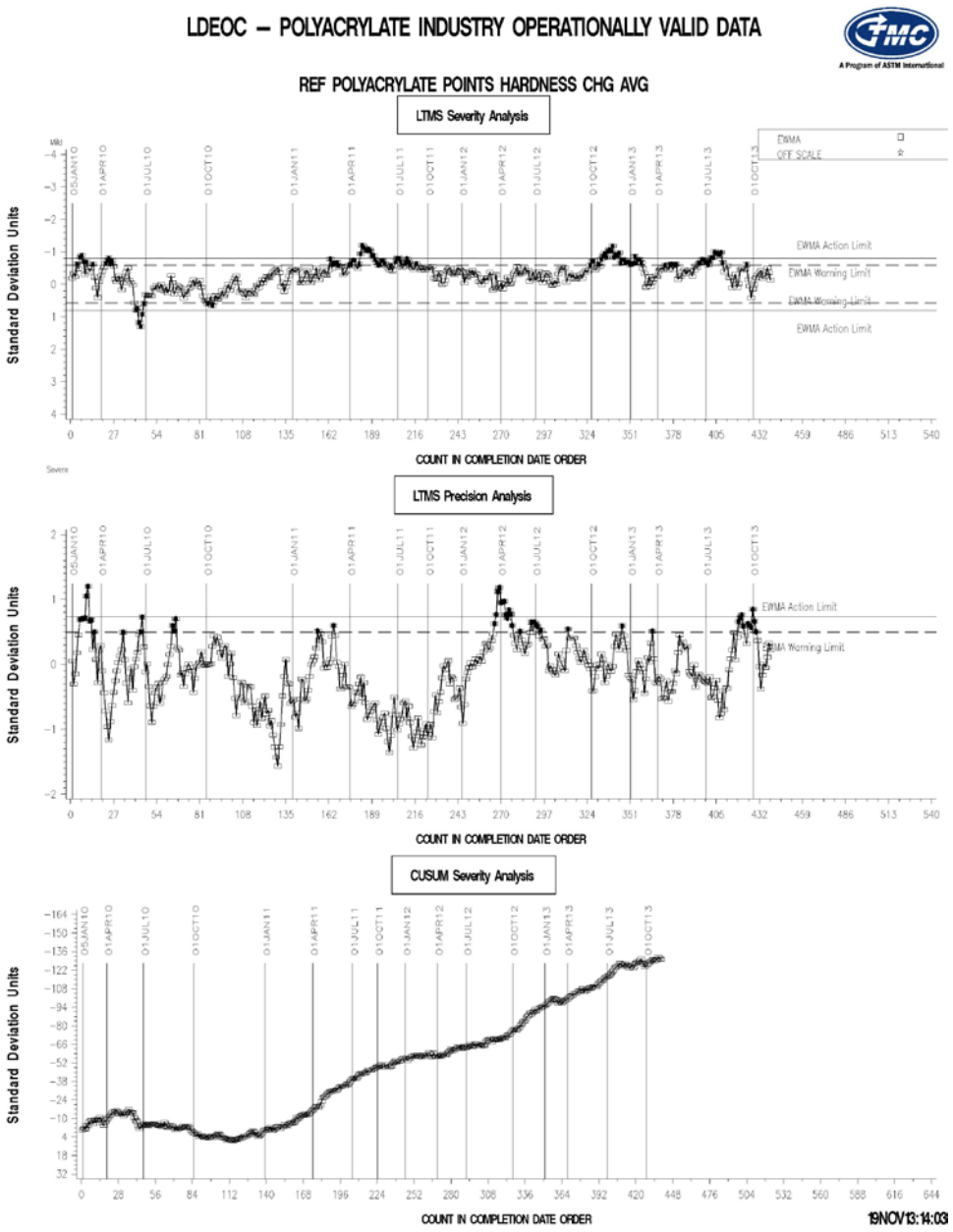
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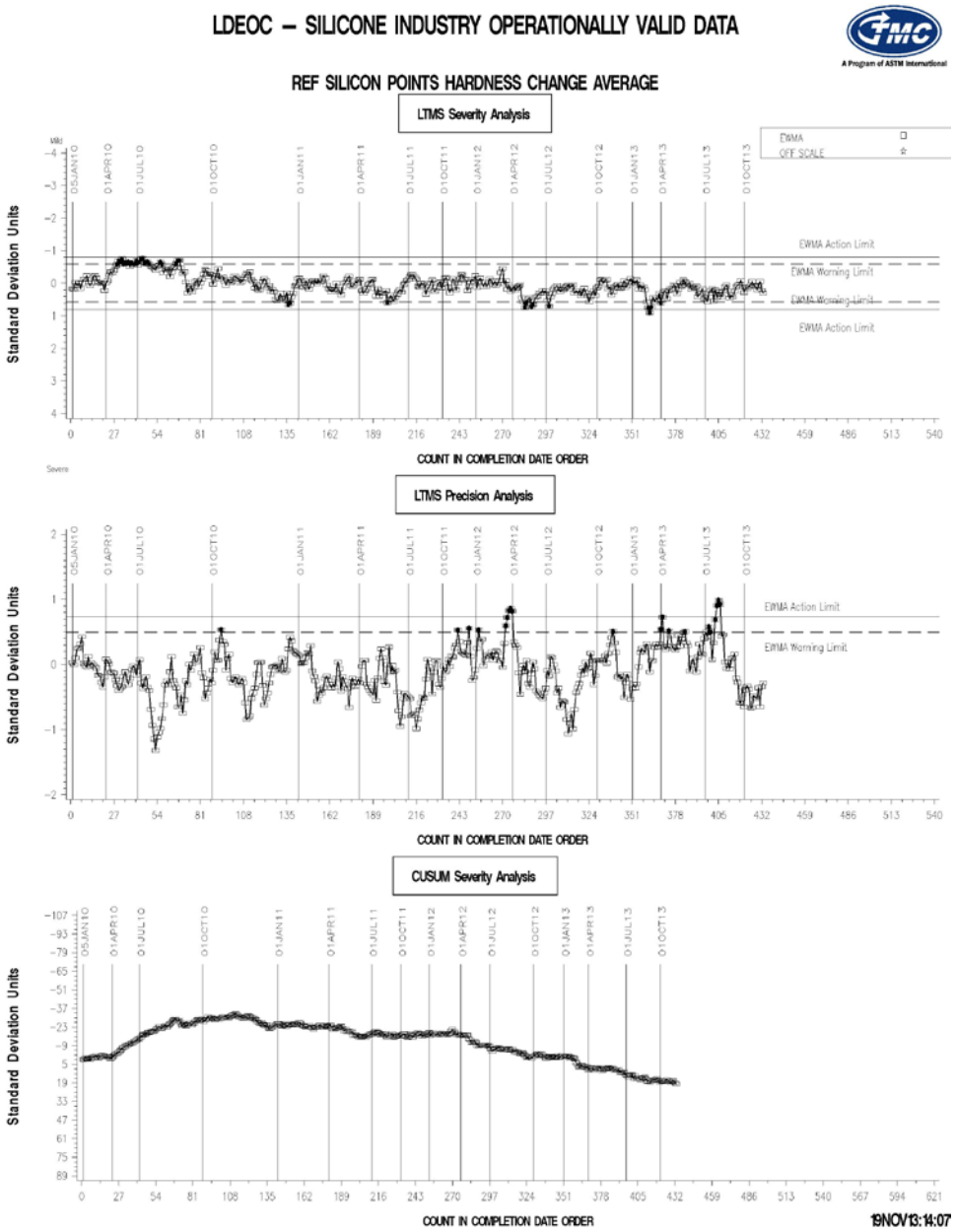
LDEOC (D 7216)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A Program of ASTM International
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Standard Deviation Units
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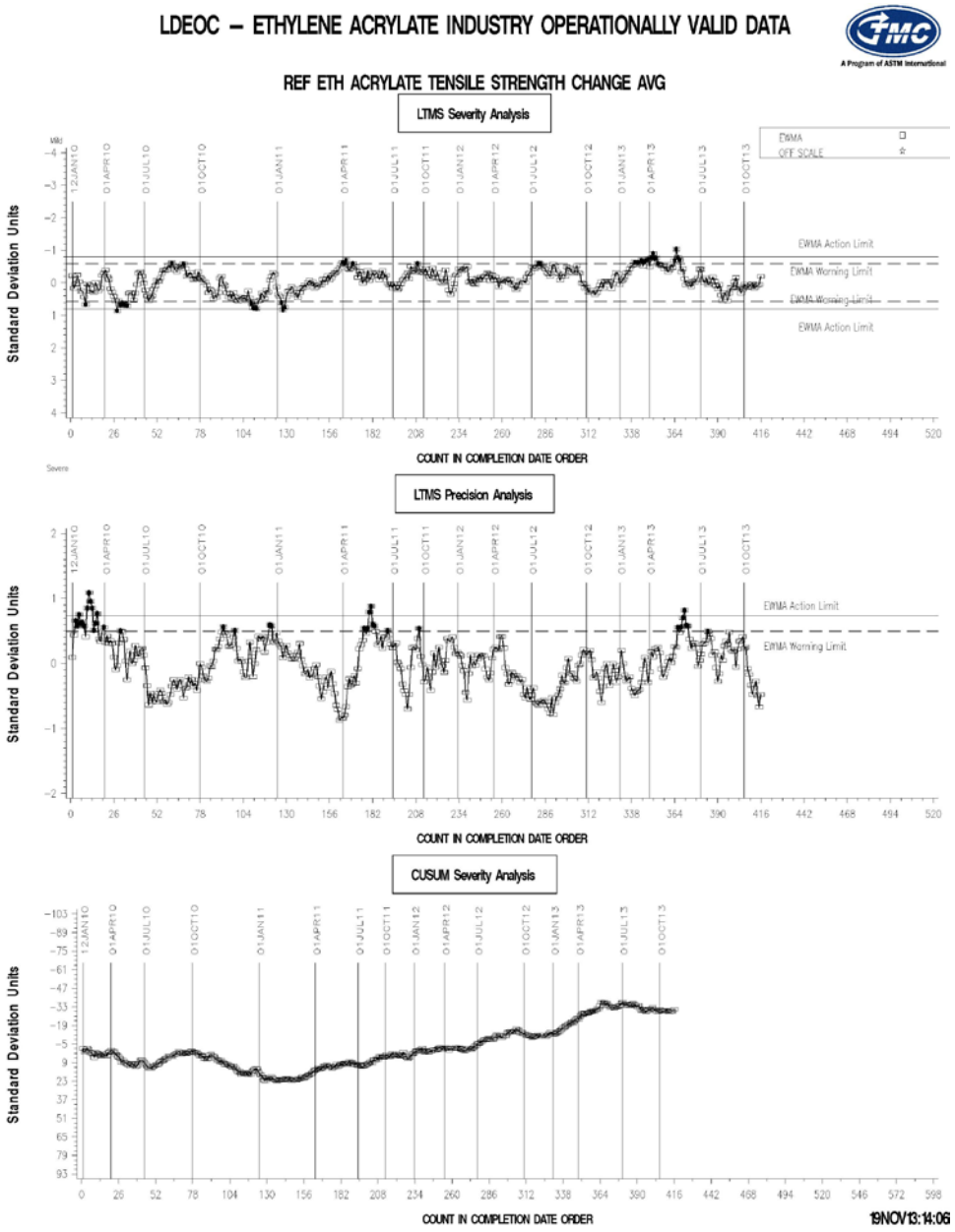
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A Program of ASTM International
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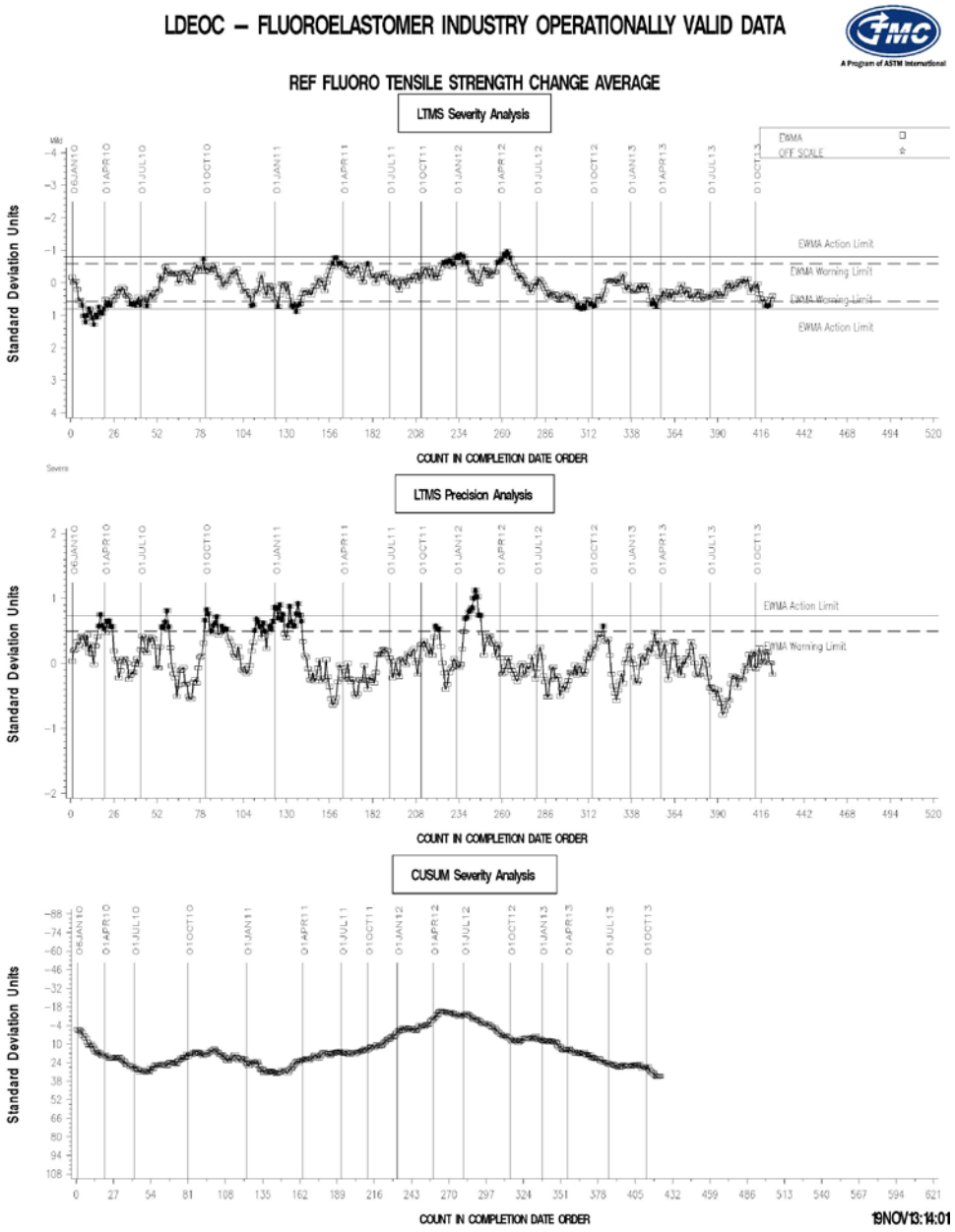
LDEOC (D 7216)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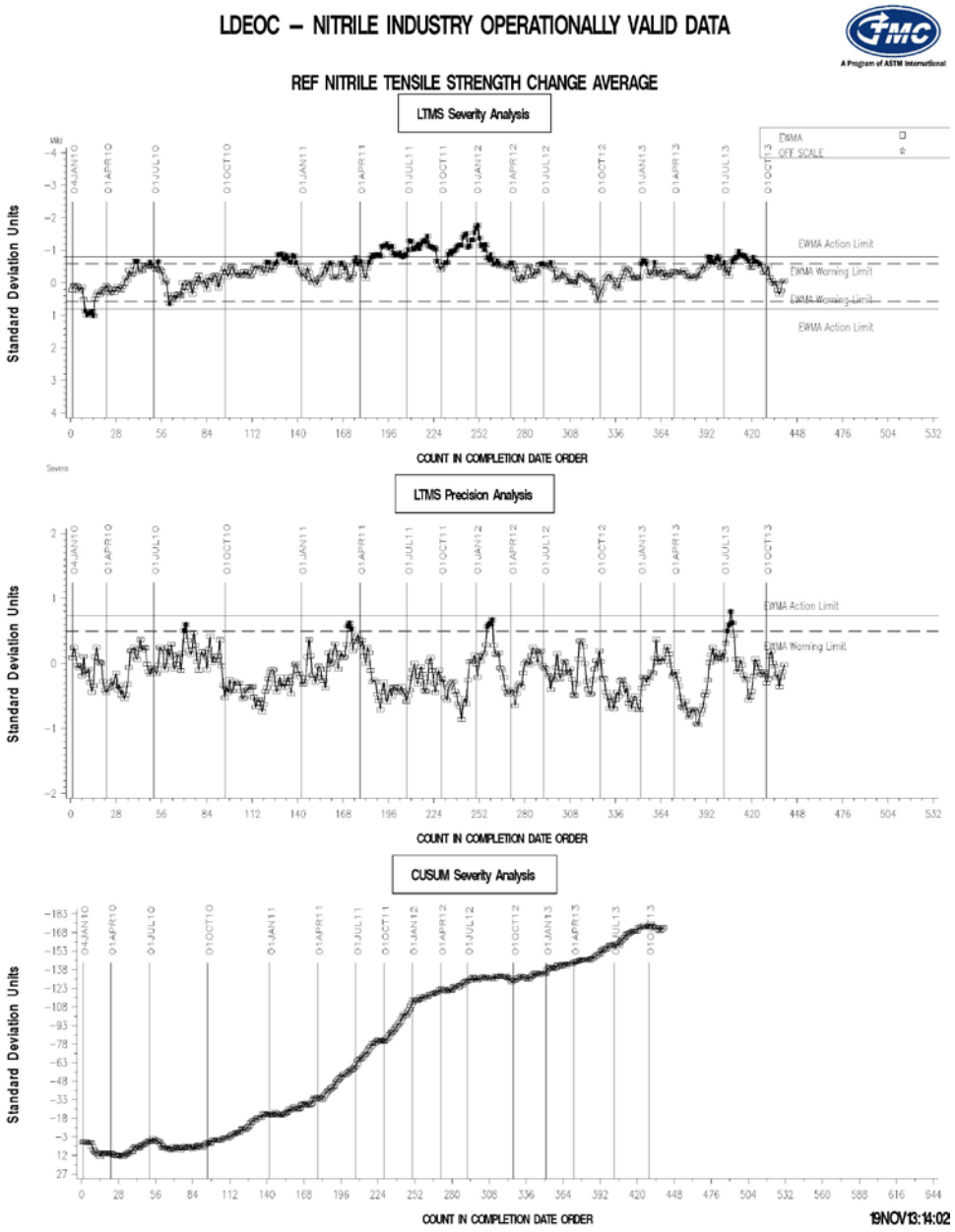
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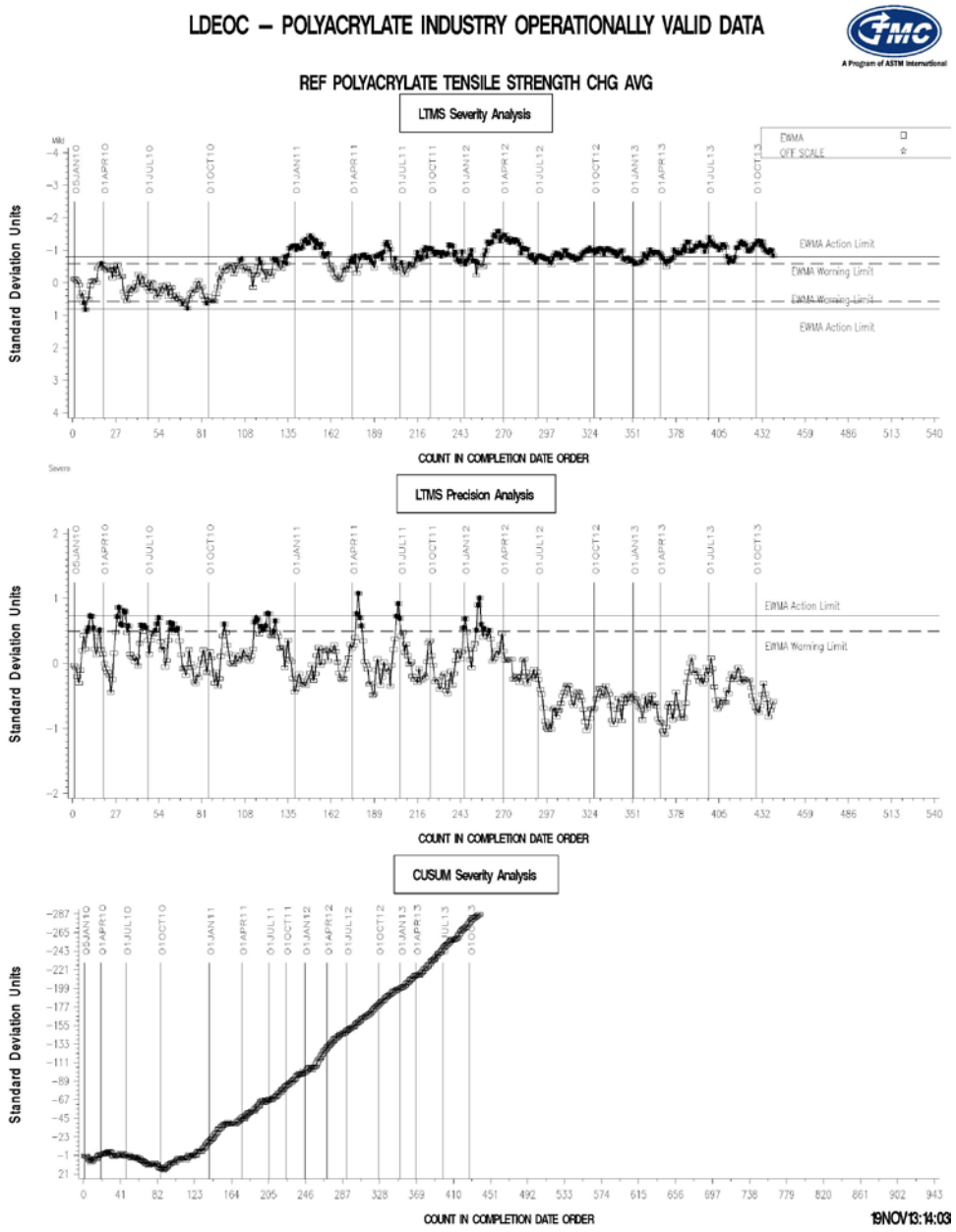
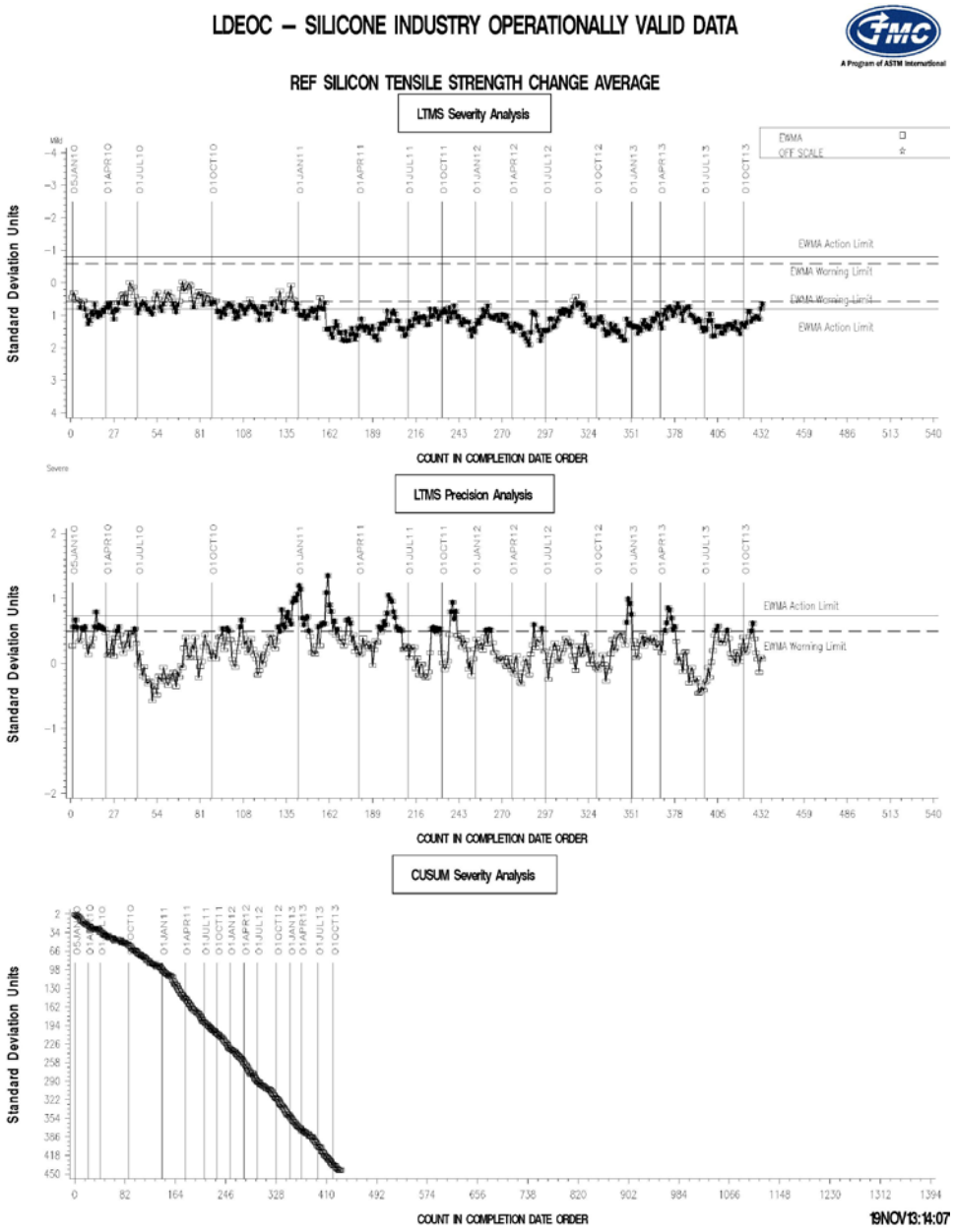
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
19NOV13:14:02

LDEOC (D 7216)


LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA
REF POLYACRYLATE TENSILE STRENGTH CHG AVG
LTMS Severity Analysis
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
19NOV13:14:03

LDEOC (D 7216)



Test Monitoring Center

http://astmtmc.cmu.edu

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LDEOC (D 7216)

INFORMATION LETTERS
No Information Letters were issued this period.

LDEOC (D 7216)

STATUS OF REFERENCE OIL SUPPLY

		@ TMC	
Oil	Samples @ Labs	Samples (750 mL)	Gallons
1006-1	197	5011	993
Total	197	5011	993