



Test Monitoring Center

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

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

MEMORANDUM: 14-038

DATE: November 21, 2014

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

FROM: Michael T. Kasimirsky *Michael T. Kasimirsky*

SUBJECT: LDEOC Testing from April 1, 2014 through September 30, 2014

A total of 278 LDEOC tests were reported from 5 labs to the Test Monitoring Center during the period from April 1, 2014 through September 30, 2014.

Please find attached a summary of testing activity this period.

MTK/mtk/mem14-038.mtk.doc

cc: Frank Farber

Jeff Clark

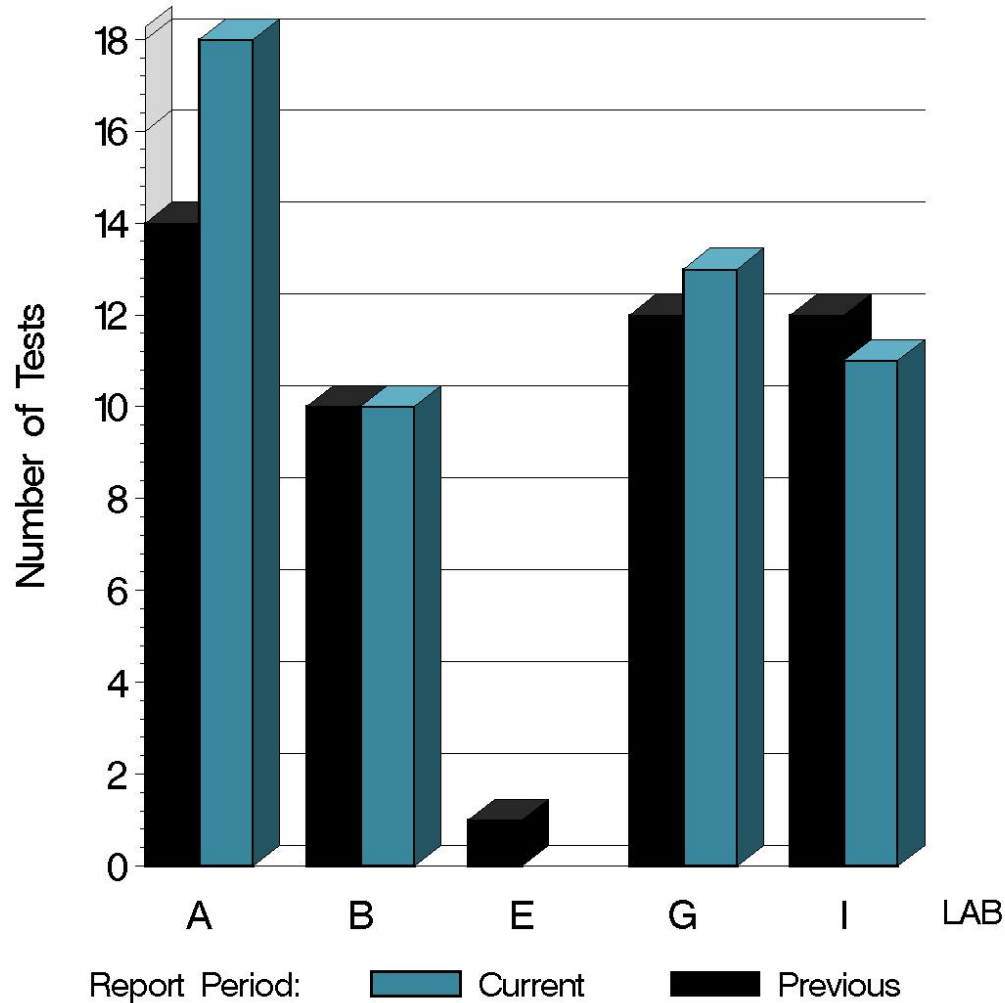
EOEC Surveillance Panel

<ftp://ftp.astmtmc.cmu.edu/docs/bench/ldeoc/semiannualreports/ldeoc-10-2014.pdf>

Distribution: email

LDEOC (D 7216)

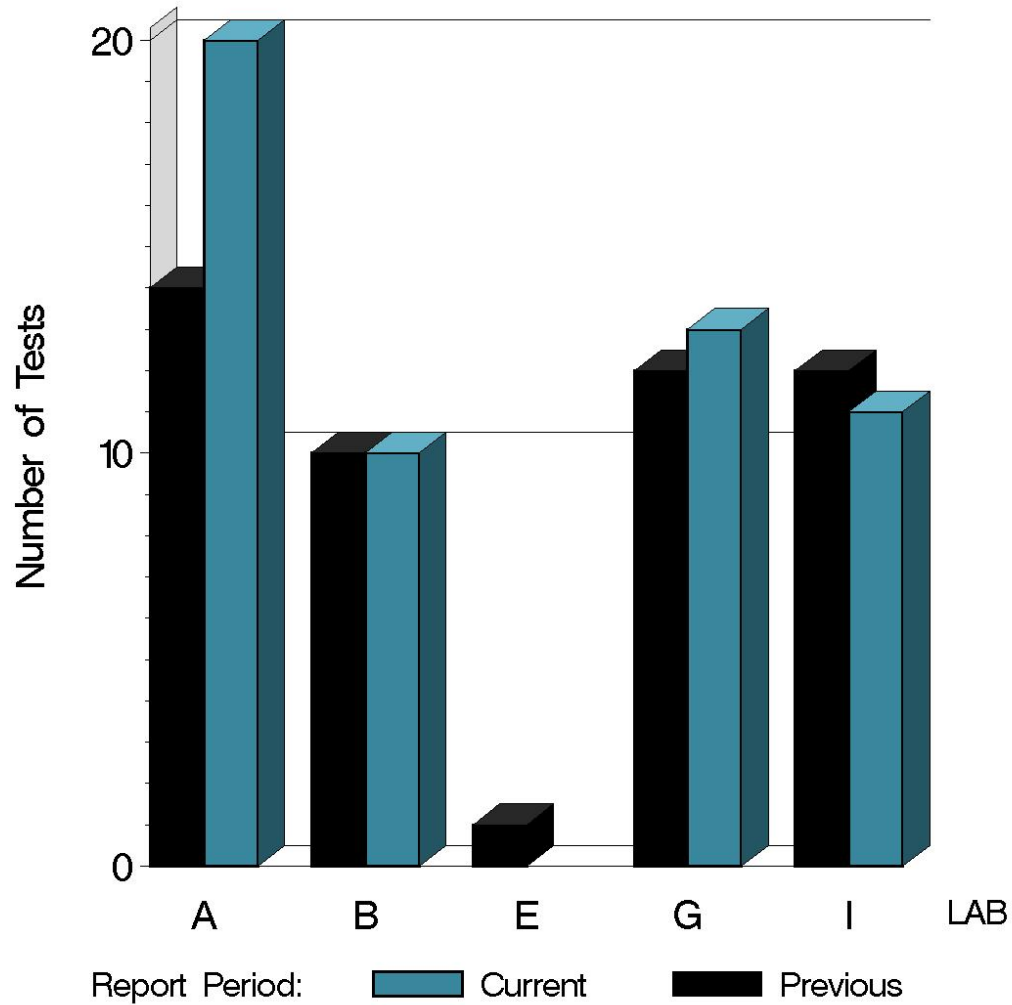
NUMBER OF ETHYLENE ACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



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LDEOC (D 7216)

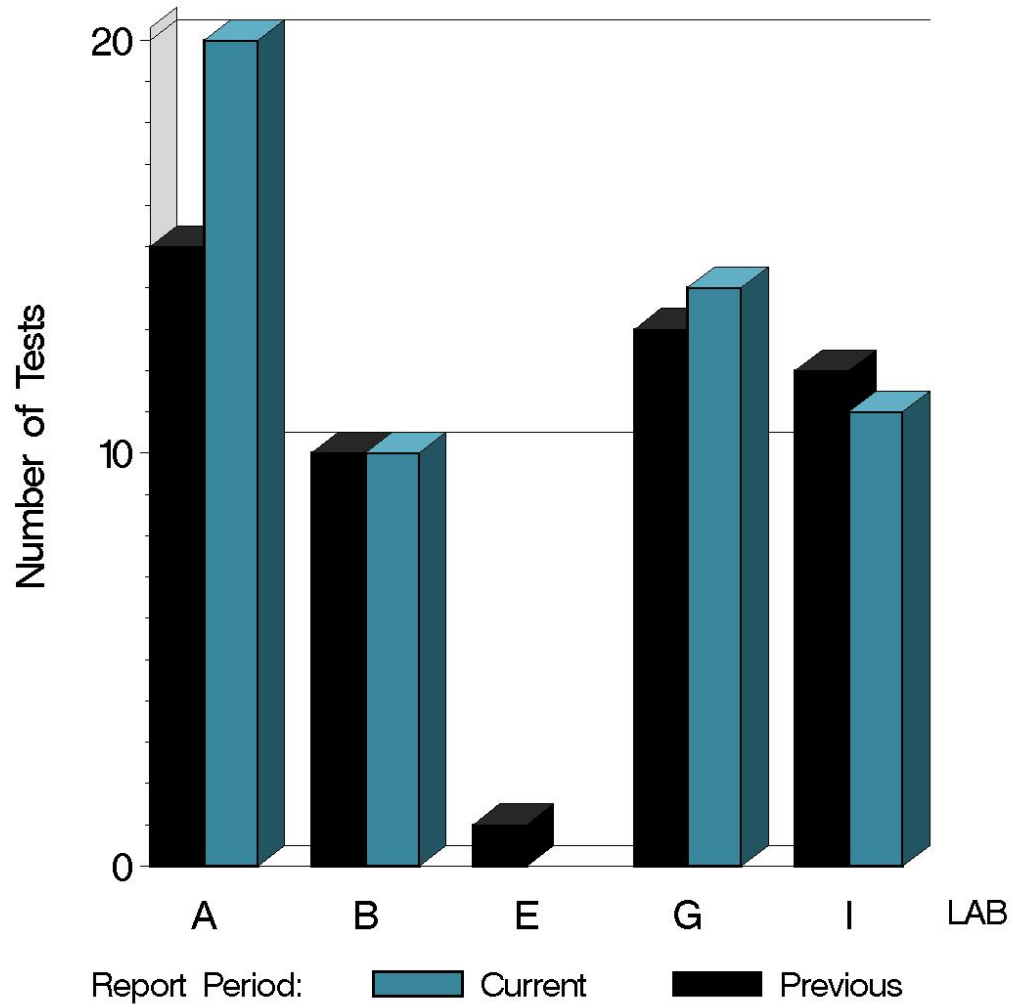
NUMBER OF FLUOROELASTOMER TESTS
REPORTED BY LAB AND REPORT PERIOD



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LDEOC (D 7216)

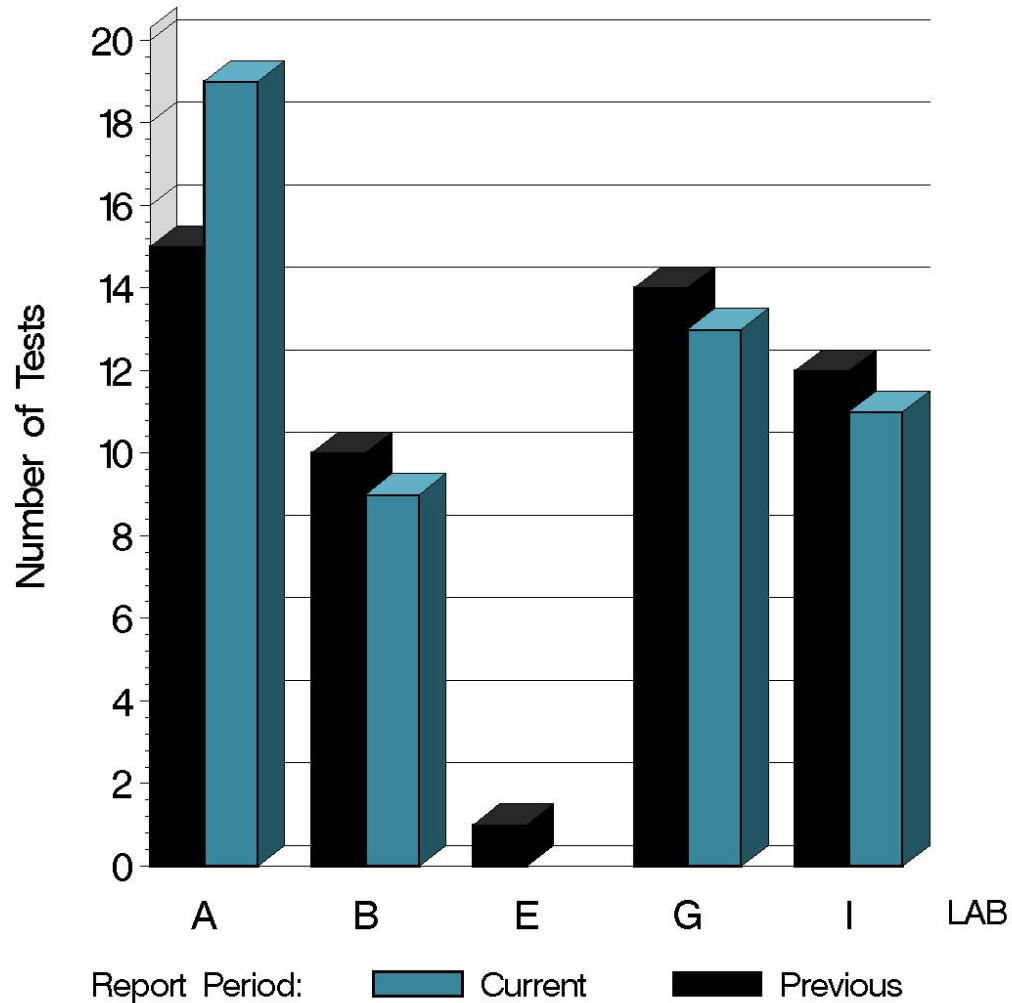
NUMBER OF NITRILE TESTS REPORTED BY LAB AND REPORT PERIOD



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LDEOC (D 7216)

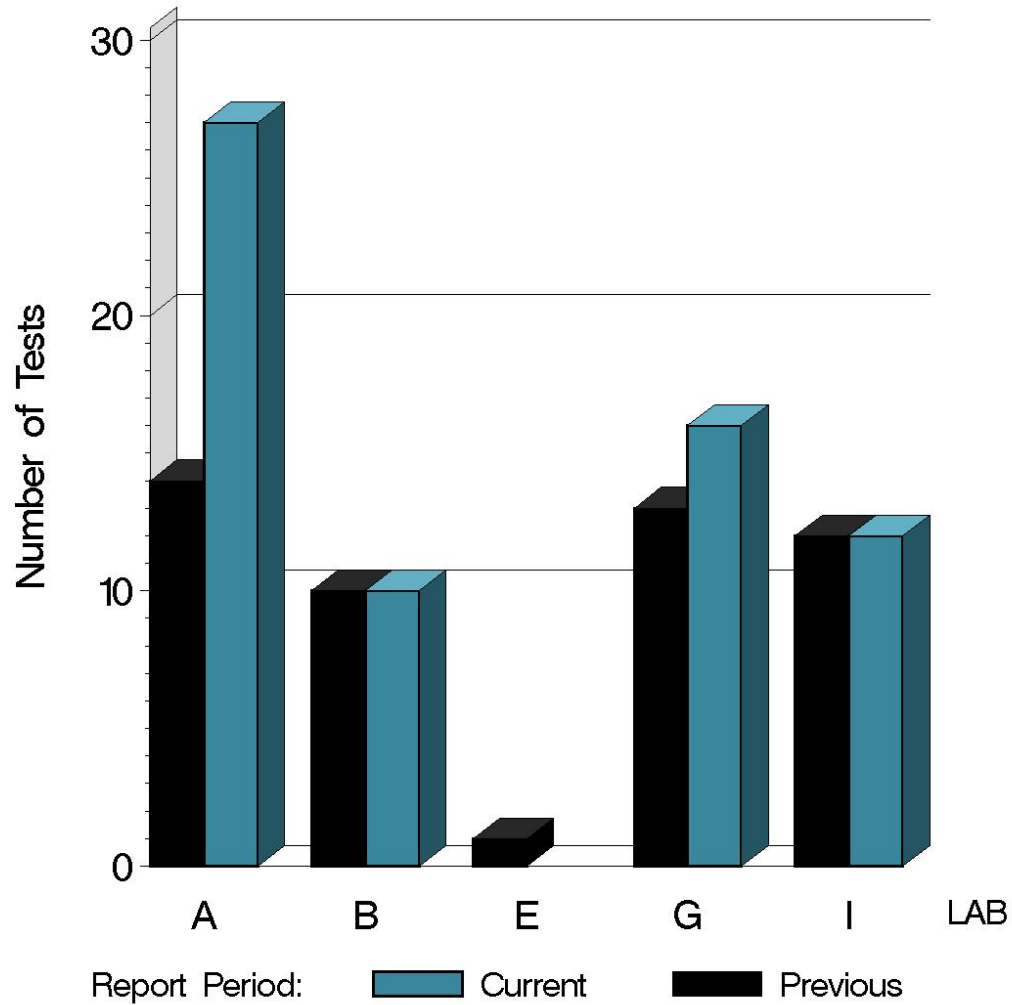
NUMBER OF POLYACRYLATE TESTS REPORTED BY LAB AND REPORT PERIOD



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LDEOC (D 7216)

NUMBER OF SILICONE TESTS REPORTED BY LAB AND REPORT PERIOD



16:27:21 19NOV2014

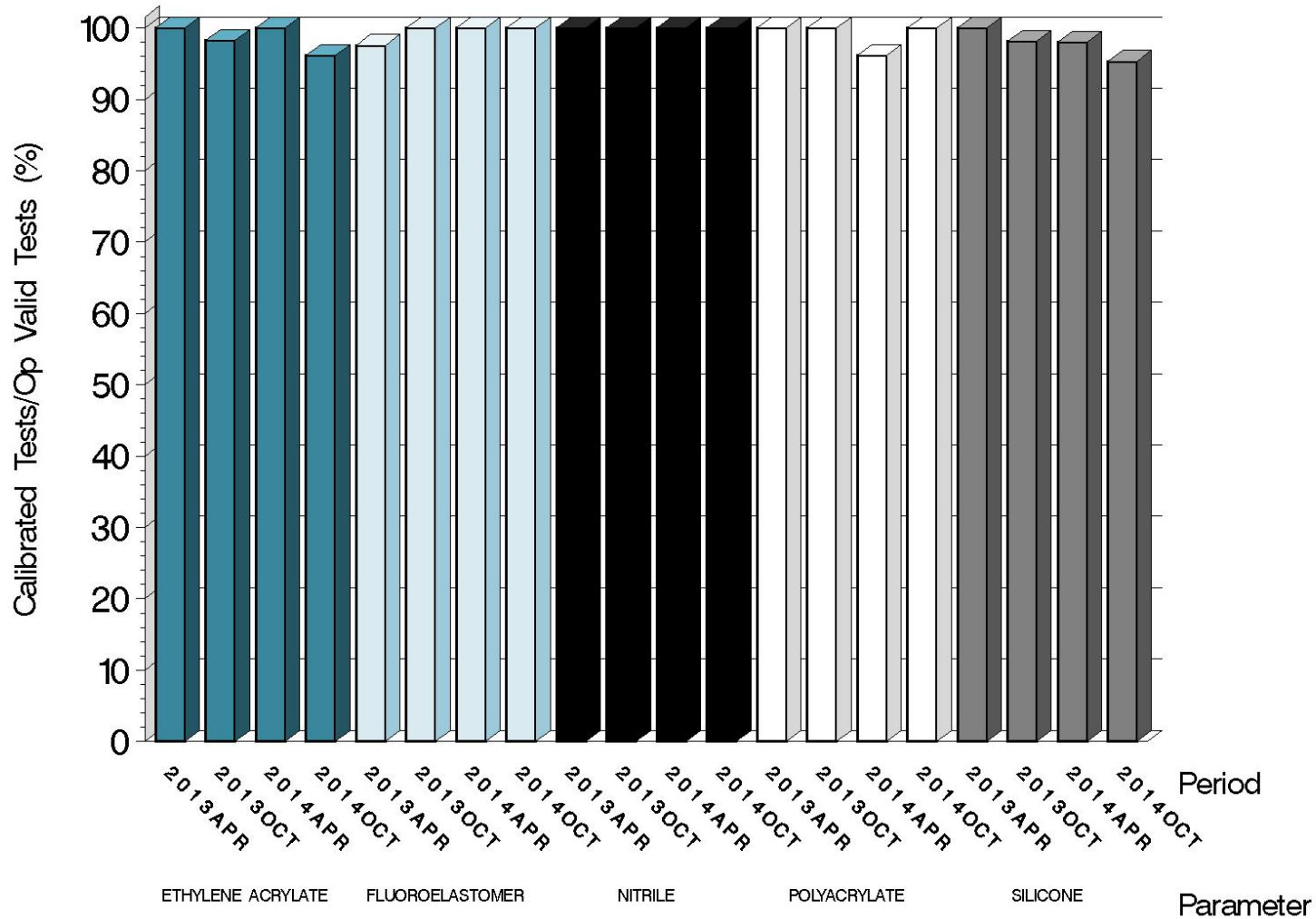
LDEOC (D 7216)

Test Distribution by Oil and Validity

		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	This Period	Last Period
Accepted for Calibration	AC	50	54	54	52	61	271	248
Rejected	OC	2	0	0	0	3	5	3
Information Run	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	1	0	1	2	0
Total		52	54	55	52	65	278	251

LDEOC (D 7216)

OPERATIONALLY VALID TESTS MEETING ACCEPTANCE CRITERIA



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LDEOC (D 7216)

LOST TESTS PER START BY LAB AND ELASTOMER TYPE

Lab	Ethylene Acrylate			Fluoroelastomer			Nitrile			Polyacrylate			Silicone			Total		
	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A	0	18	0	0	20	0	1	20	5	0	19	0	1	27	4	2	104	2
B	0	10	0	0	10	0	0	10	0	0	9	0	0	10	0	0	49	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0	13	0	0	13	0	0	14	0	0	13	0	0	16	0	0	69	0
I	0	11	0	0	11	0	0	11	0	0	11	0	0	12	0	0	56	0
Total	0	52	0	0	54	0	1	55	2	0	52	0	1	65	2	2	278	1

LDEOC (D 7216)

CAUSES FOR LOST TESTS

Lab	Cause	Elastomer					Validity			Loss Rate		
		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	LC	RC	XC	Lost	Starts	%
A	Bath Temperature Control	0	0	1	0	1	0	0	2	2	104	2%
	Lost	0	0	1	0	1	0	0	2			
	Starts	52	54	55	52	65	278	278	278			
	%	0%	0%	2%	0%	2%	0%	0%	1%			

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	-0.711	-2.153	0.010
	B	10	0.197	-2.824	-0.331
	E	0	-	-	-
	G	13	0.340	0.388	-0.320
	I	11	-0.223	-1.525	-1.268
	Industry	52	-0.171	-1.514	-0.408
Fluoroelastomer	A	20	0.200	1.020	-0.809
	B	10	-1.120	-0.564	0.081
	E	0	-	-	-
	G	13	-0.631	-0.237	1.055
	I	11	-0.836	0.525	1.013
	Industry	54	-0.456	0.323	0.176
Nitrile	A	19	1.198	-0.977	-0.245
	B	10	1.385	-1.092	-0.441
	E	0	-	-	-
	G	14	0.490	0.172	-0.365
	I	11	1.071	-0.246	-0.280
	Industry	54	1.023	-0.551	-0.320
Polyacrylate	A	19	0.602	-1.313	-0.943
	B	9	0.759	-1.848	-1.119
	E	0	-	-	-
	G	13	0.573	0.133	-1.026
	I	11	1.040	-0.648	-0.927
	Industry	52	0.715	-0.904	-0.991
Silicone	A	26	-1.452	-0.536	2.075
	B	10	0.402	-0.510	1.926
	E	0	-	-	-
	G	16	0.763	1.071	0.834
	I	12	-0.615	-0.052	0.675
	Industry	64	-0.452	-0.040	1.479

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LDEOC (D 7216)

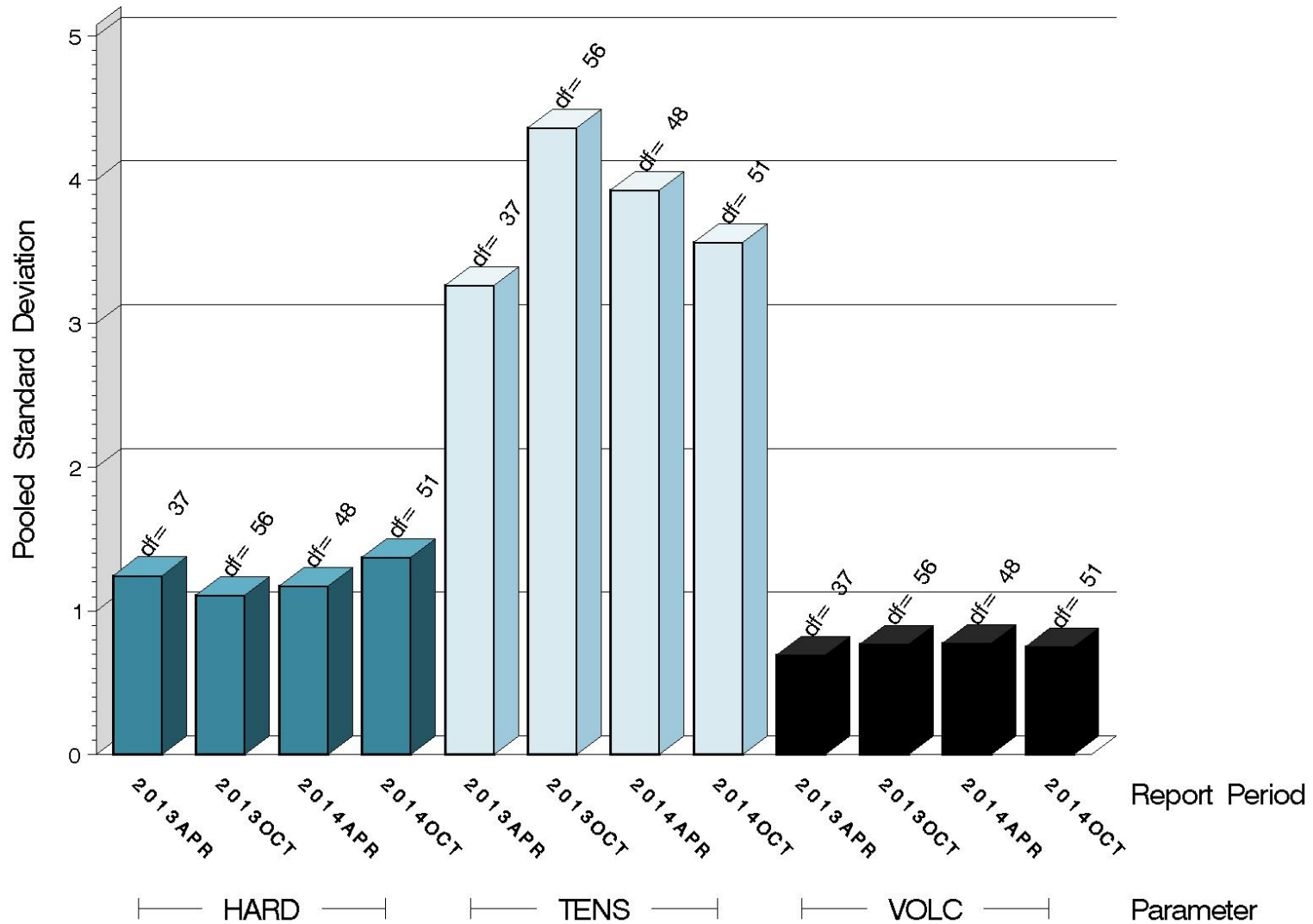
Individual test results can be viewed at the links shown in the following table:

<i>Links to Individual Test Result Data</i>	
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)

ETHYLENE ACRYLATE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

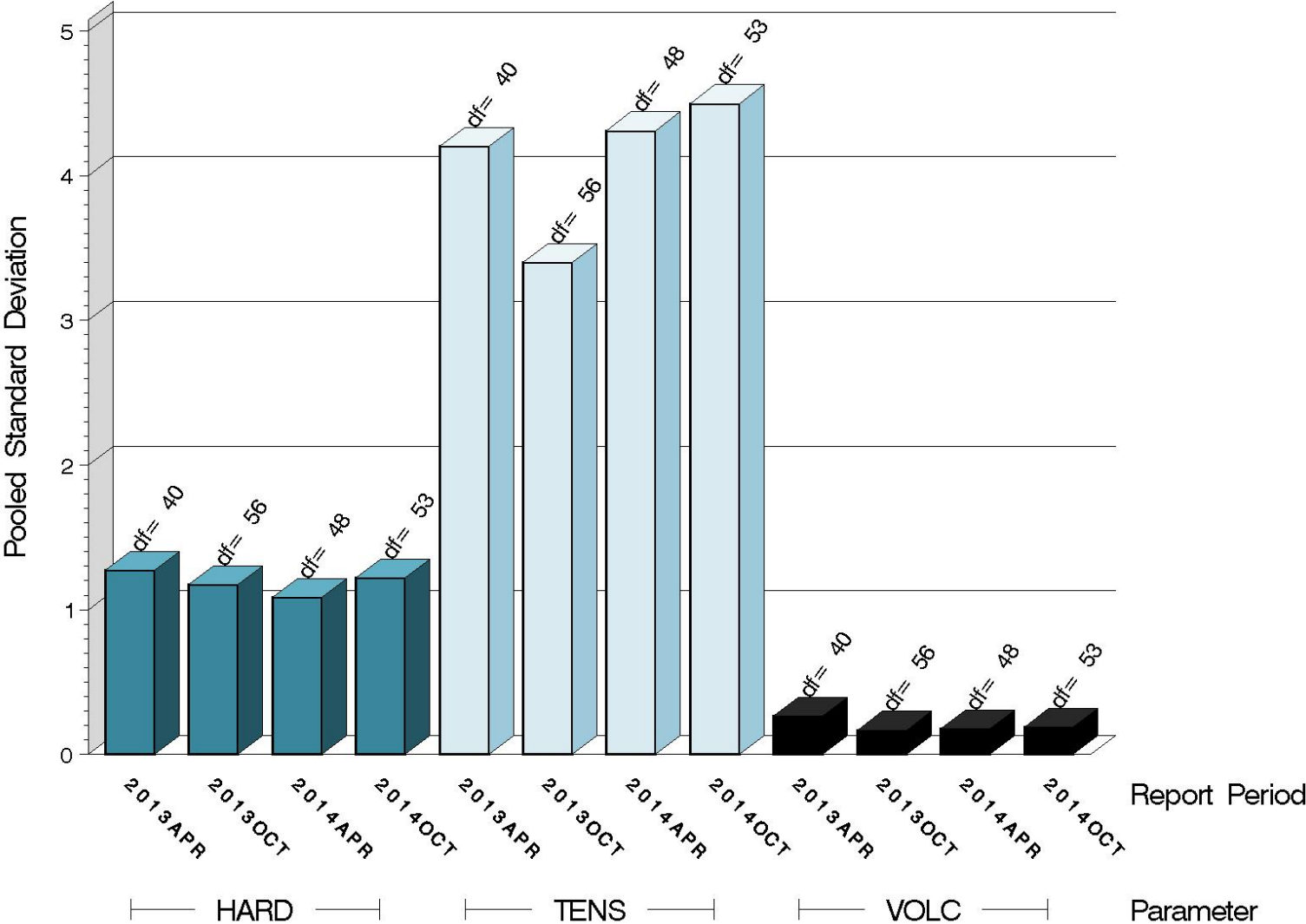


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LDEOC (D 7216)

FLUOROELASTOMER TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



16:27:21 19NOV2014

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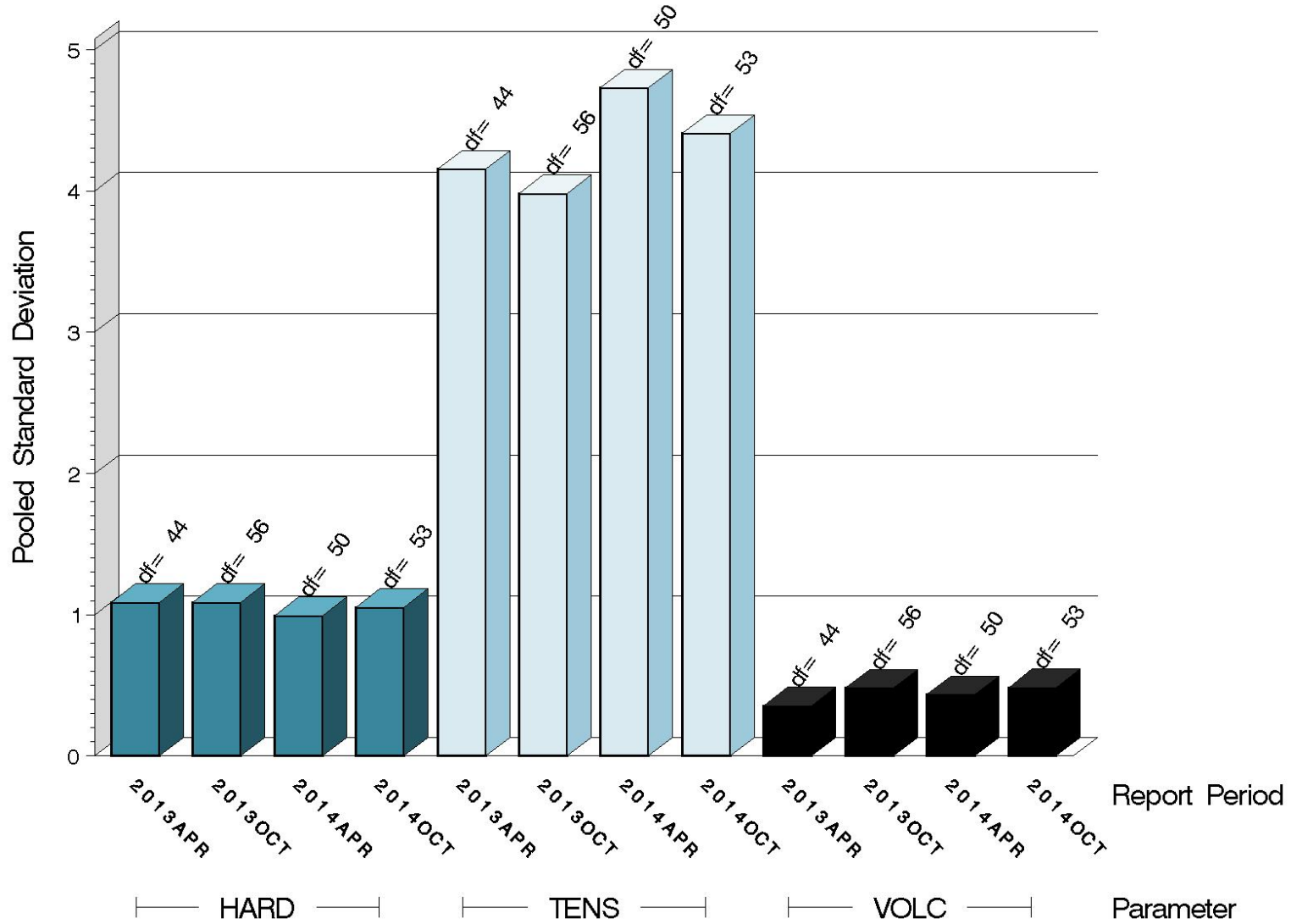


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LDEOC (D 7216)

NITRILE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

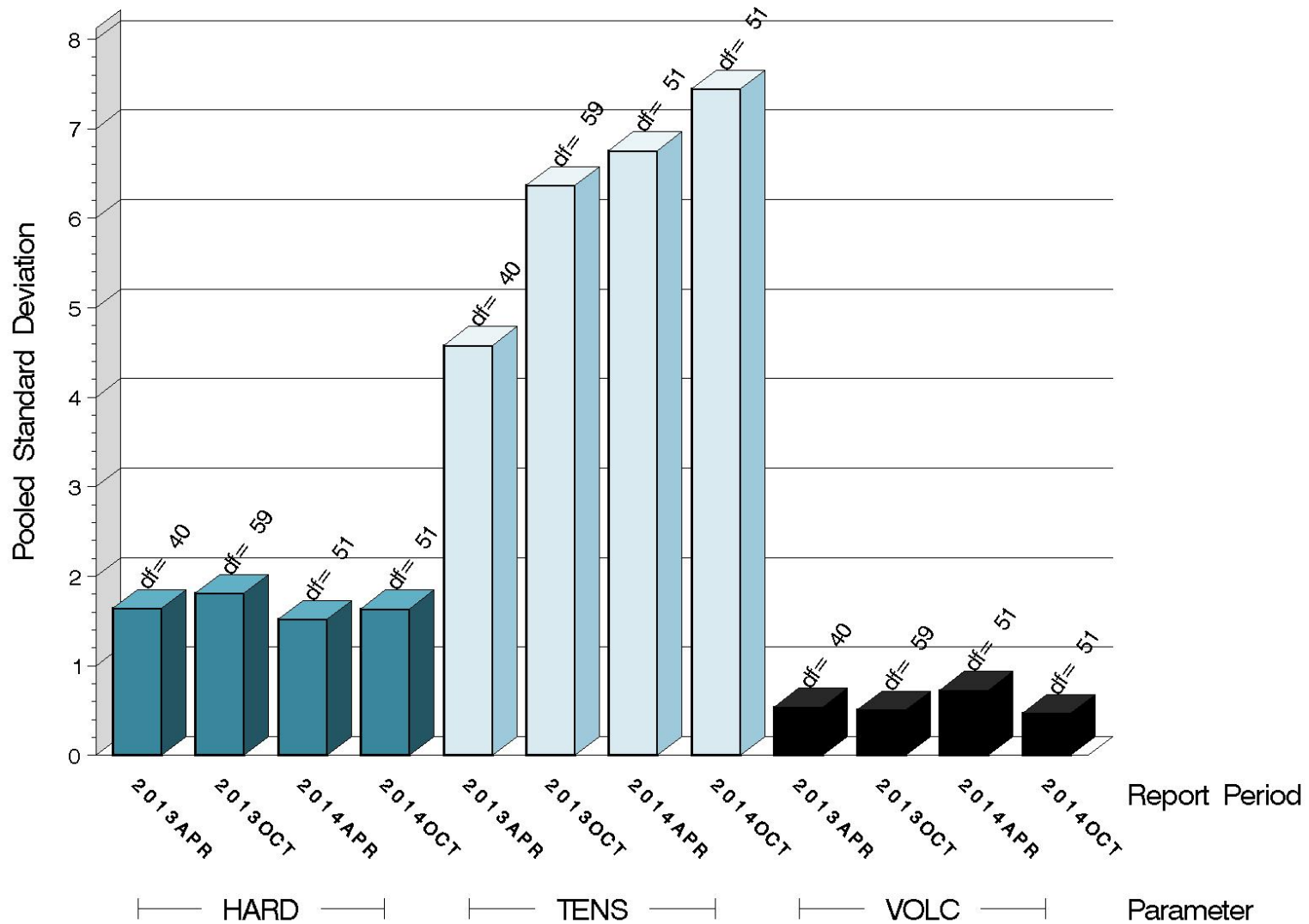


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LDEOC (D 7216)

POLYACRYLATE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

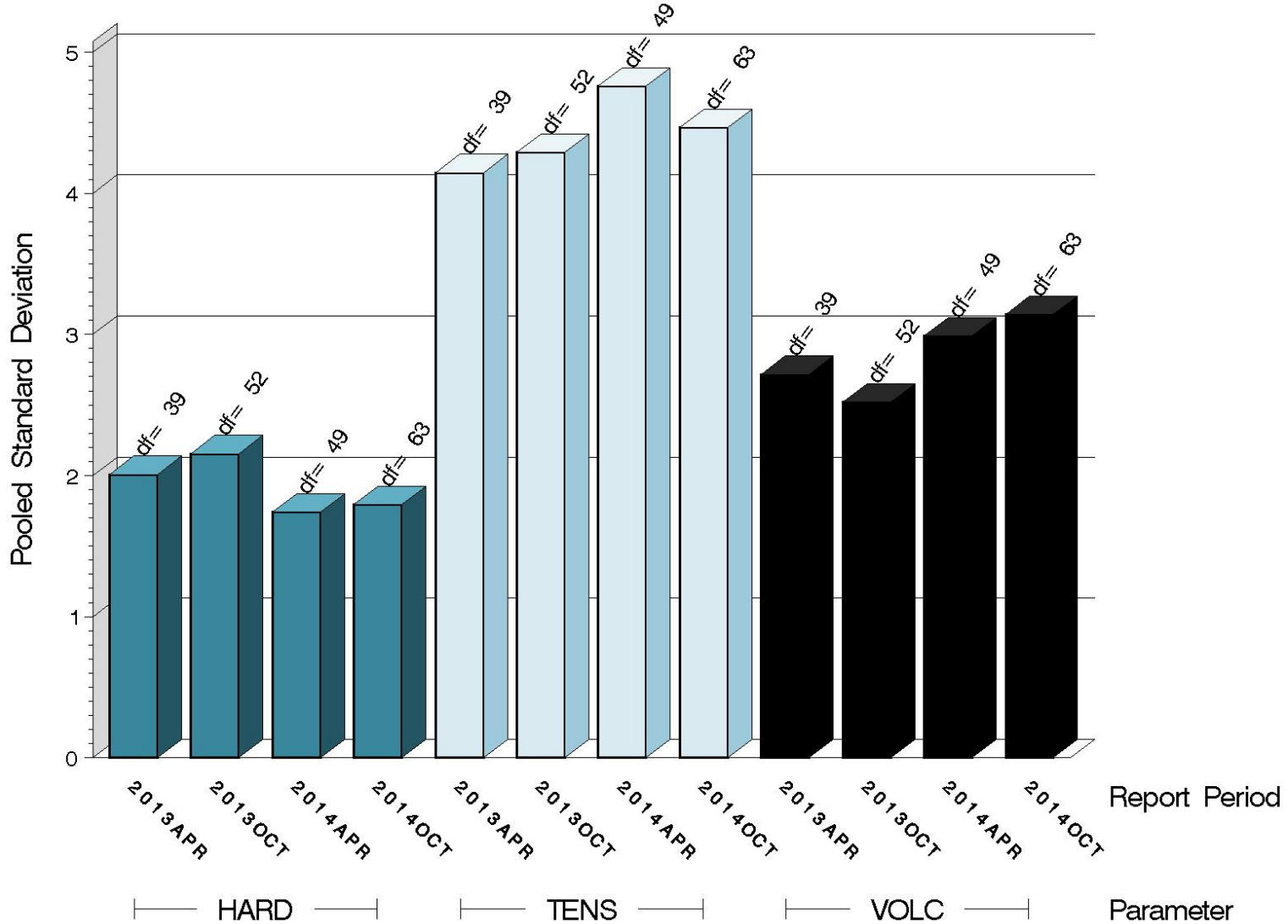


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LDEOC (D 7216)

SILICONE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



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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	Within limits	Mild	Within limits
Fluoroelastomer	Mild	Within limits	Within limits
Nitrile	Within limits	Within limits	Within limits
Polyacrylate	Within limits	Mild	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

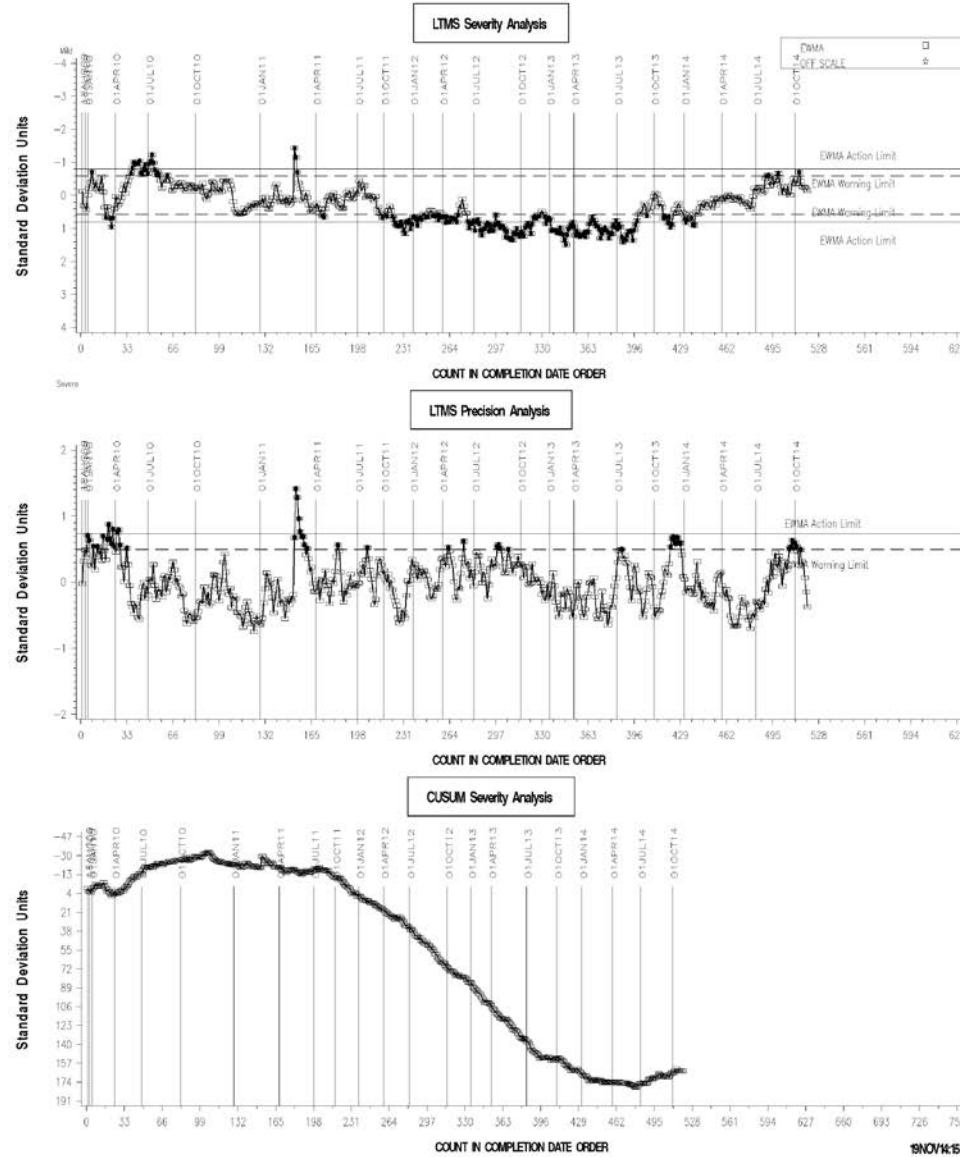
Industry control charts follow.

LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE VOLUME CHANGE AVERAGE



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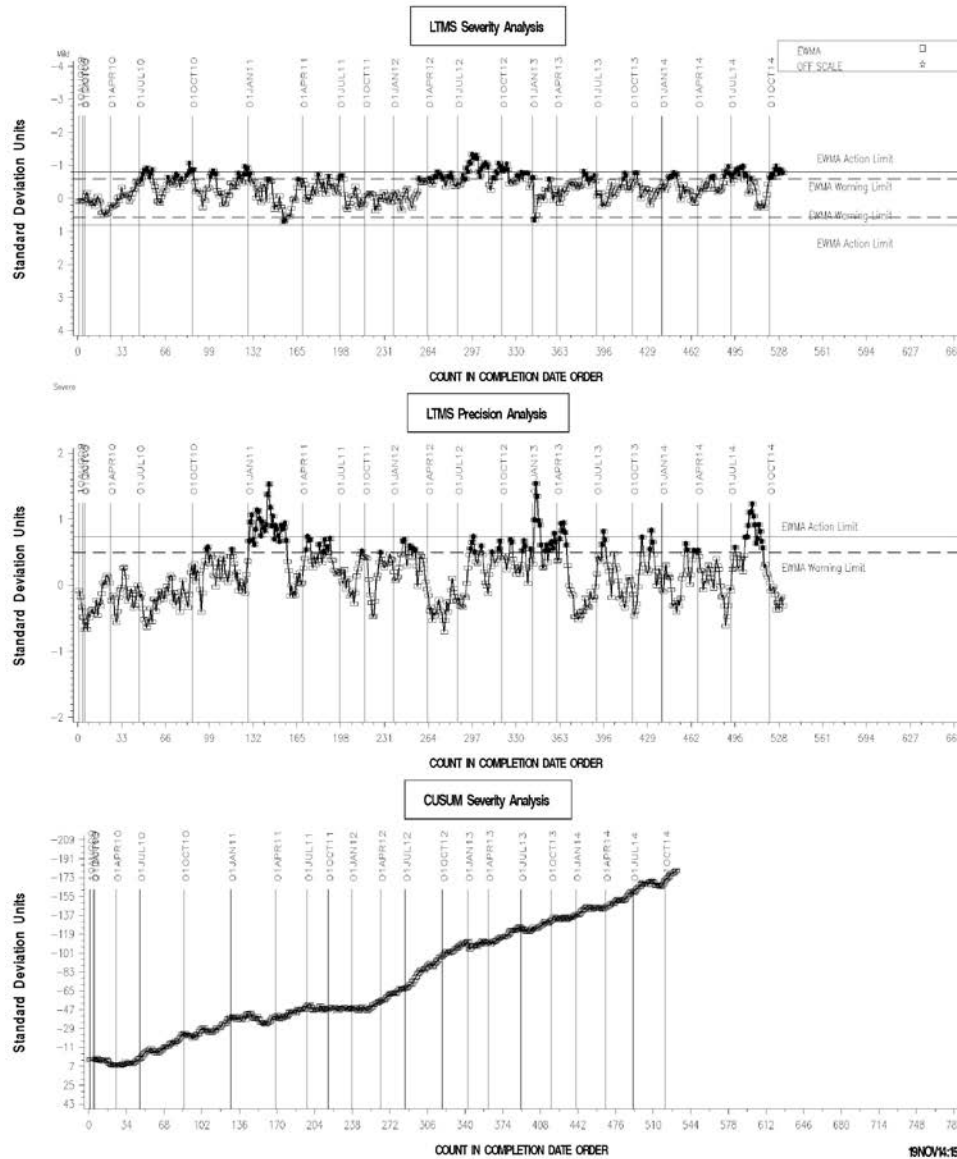


LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



REF FLUROELASTOMER VOLUME CHANGE AVERAGE

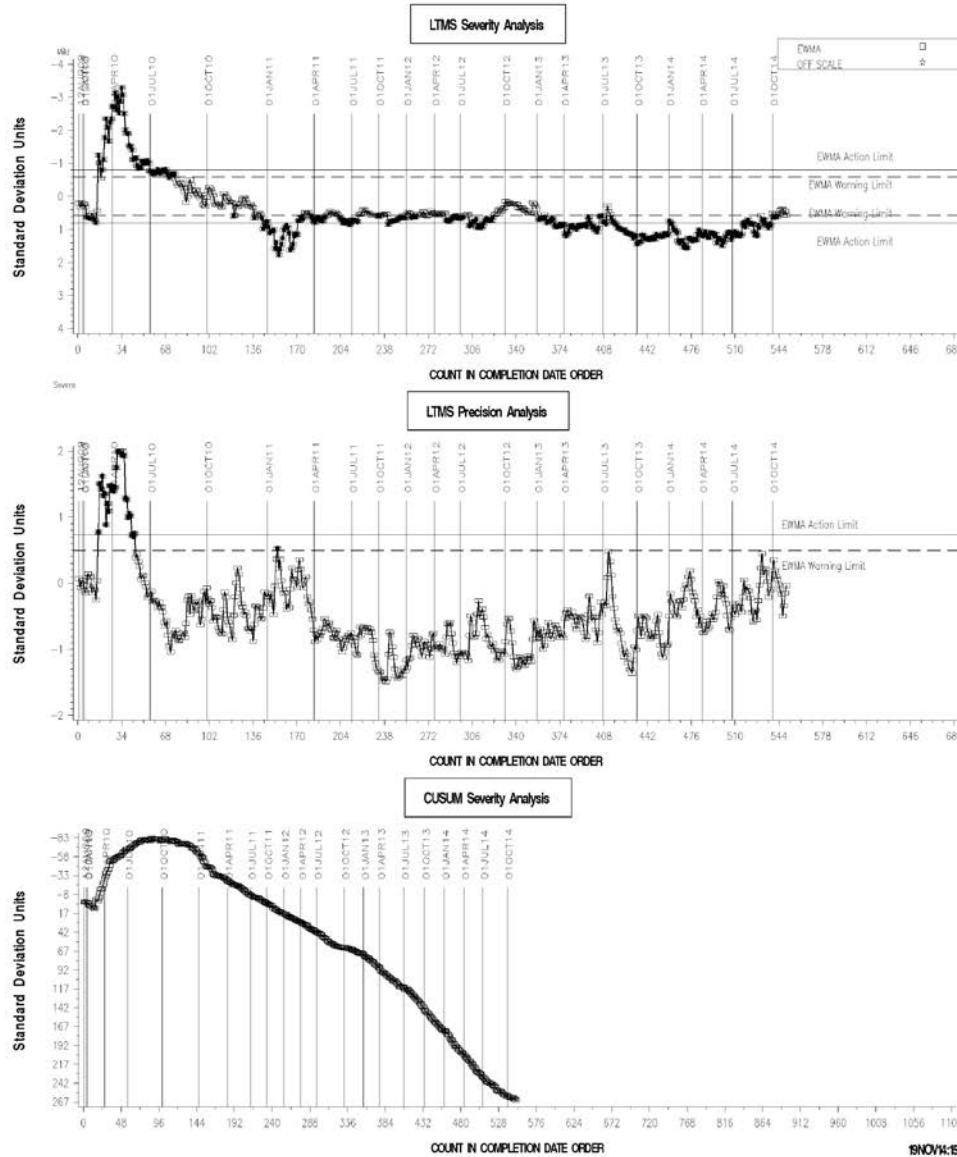


LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



REFERENCE NITRILE VOLUME CHANGE AVERAGE



Test Monitoring Center
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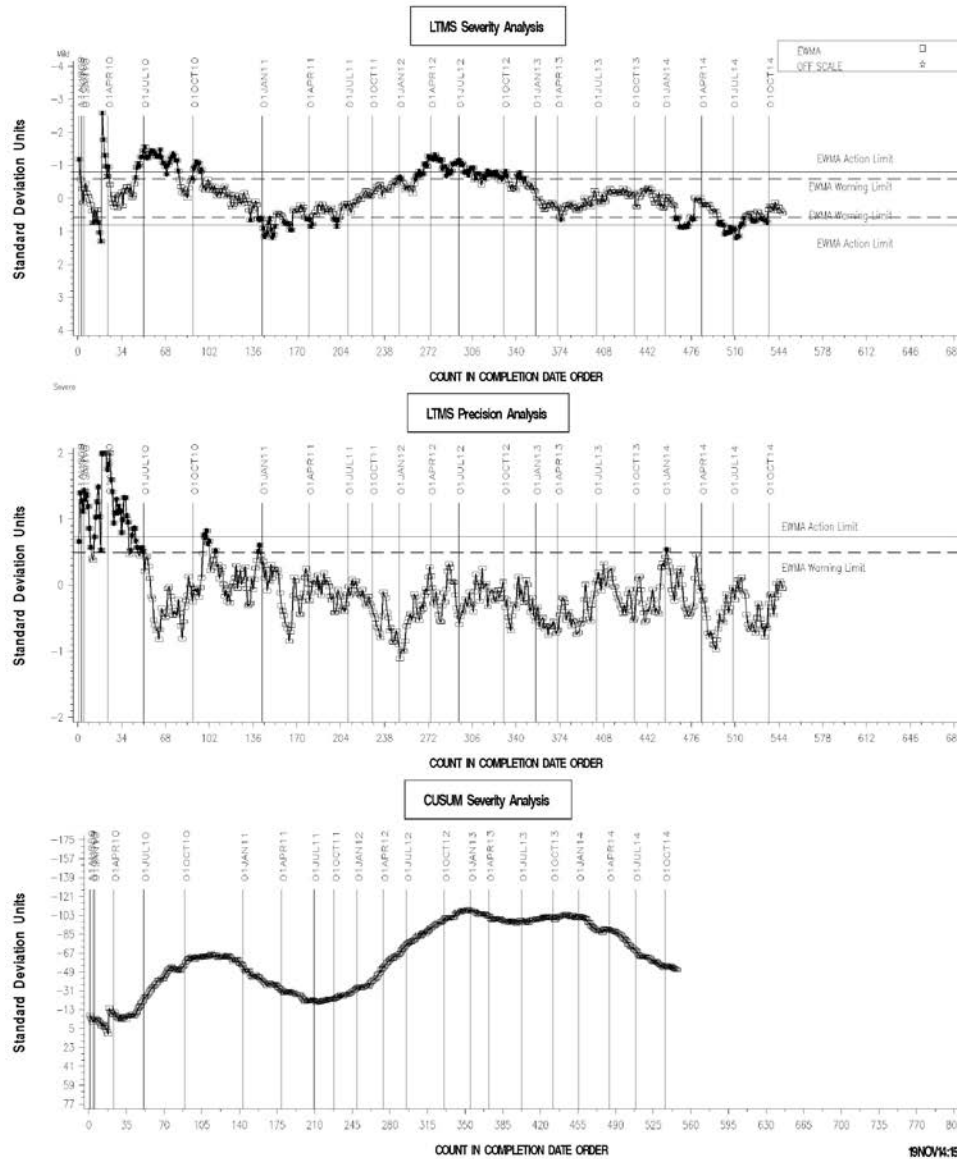


LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF POLYACRYLATE VOLUME CHANGE AVERAGE



Test Monitoring Center
<http://astmtmc.cmu.edu>



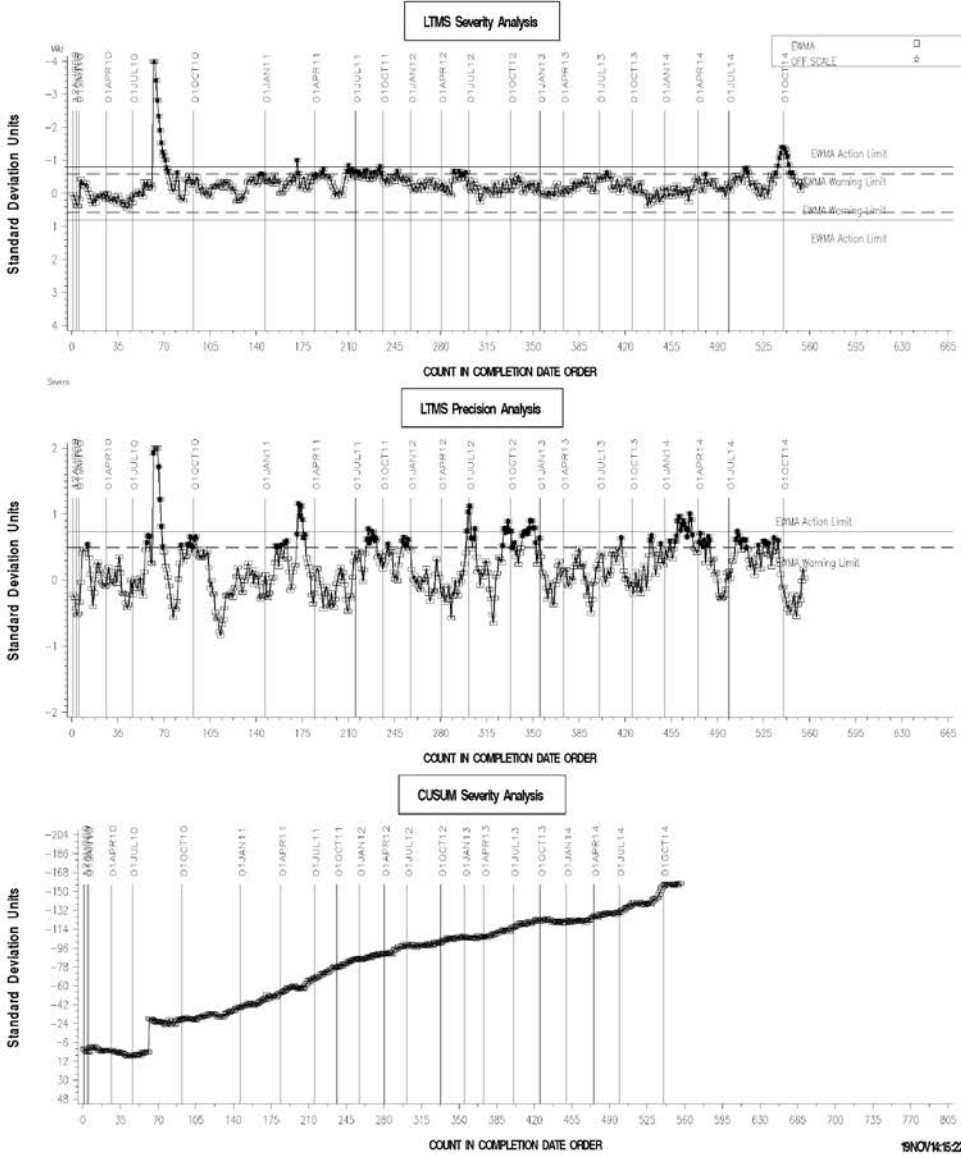
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LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REFERENCE SILICON VOLUME CHANGE AVERAGE

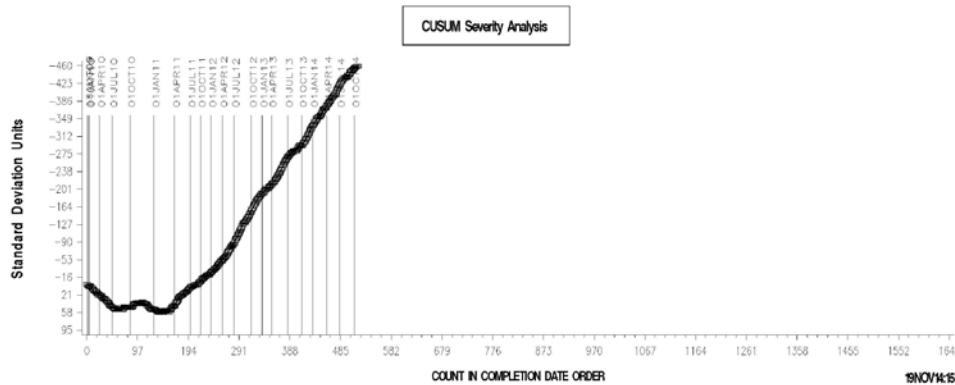
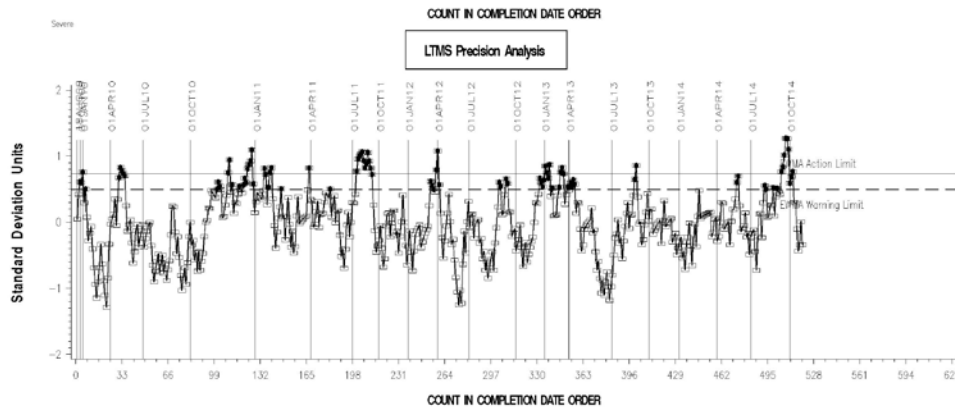
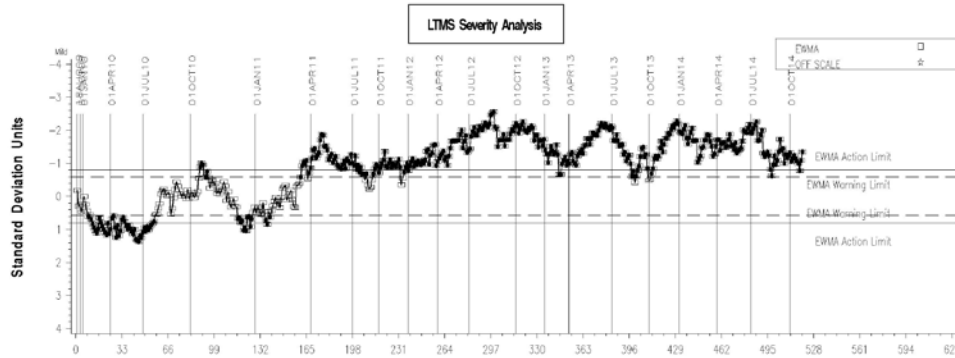


LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE POINTS HARDNESS CHANGE AVG



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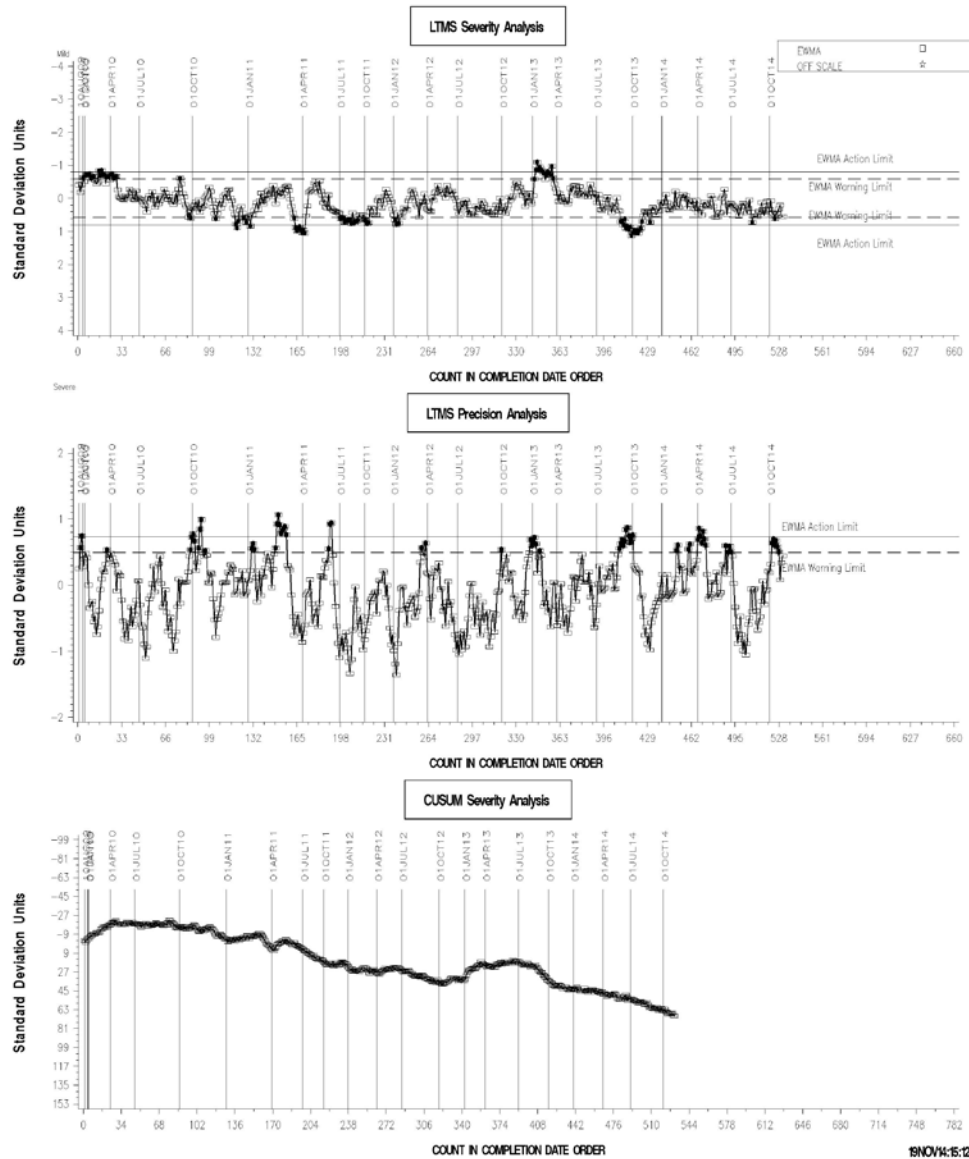
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LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



REF FLUORO POINTS HARDNESS CHANGE AVERAGE



Test Monitoring Center
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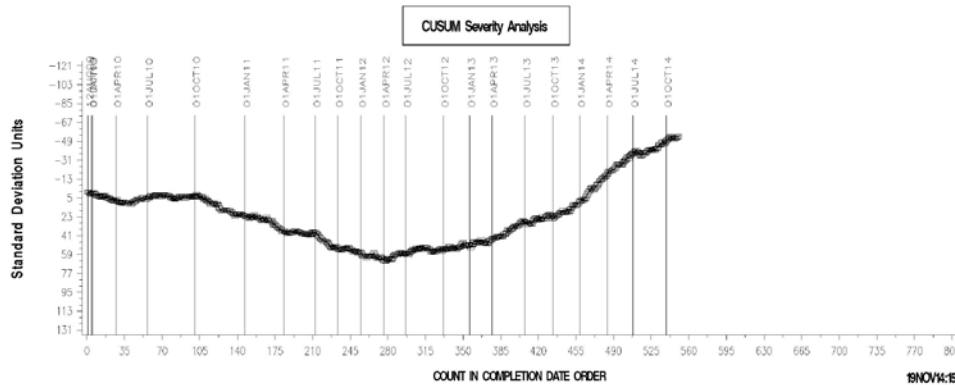
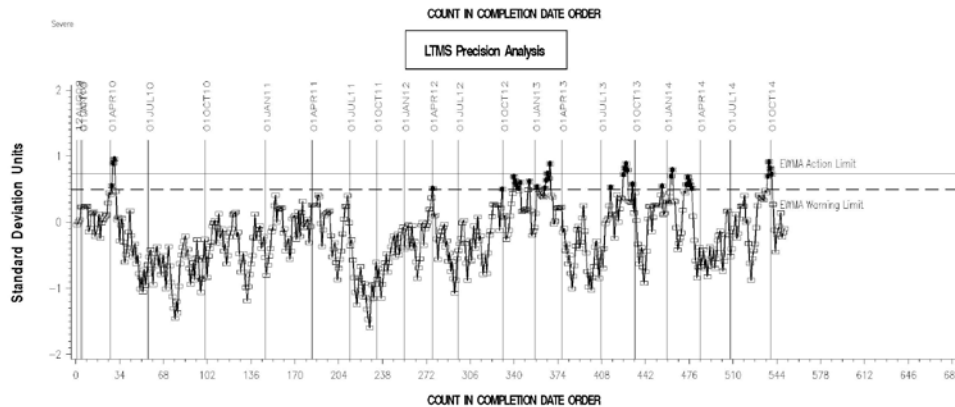
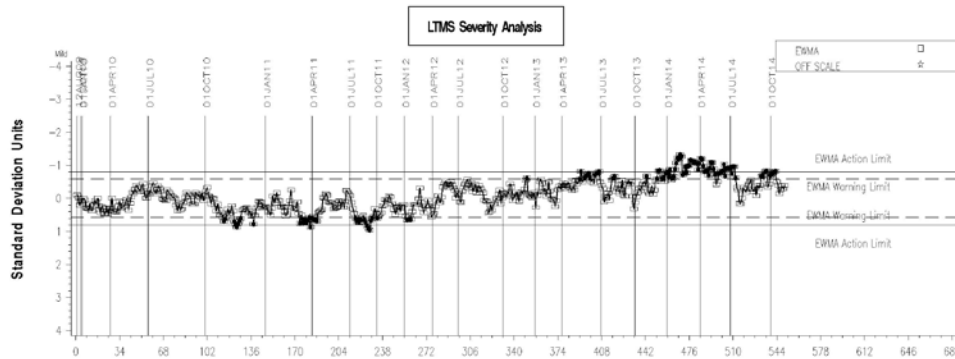
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LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



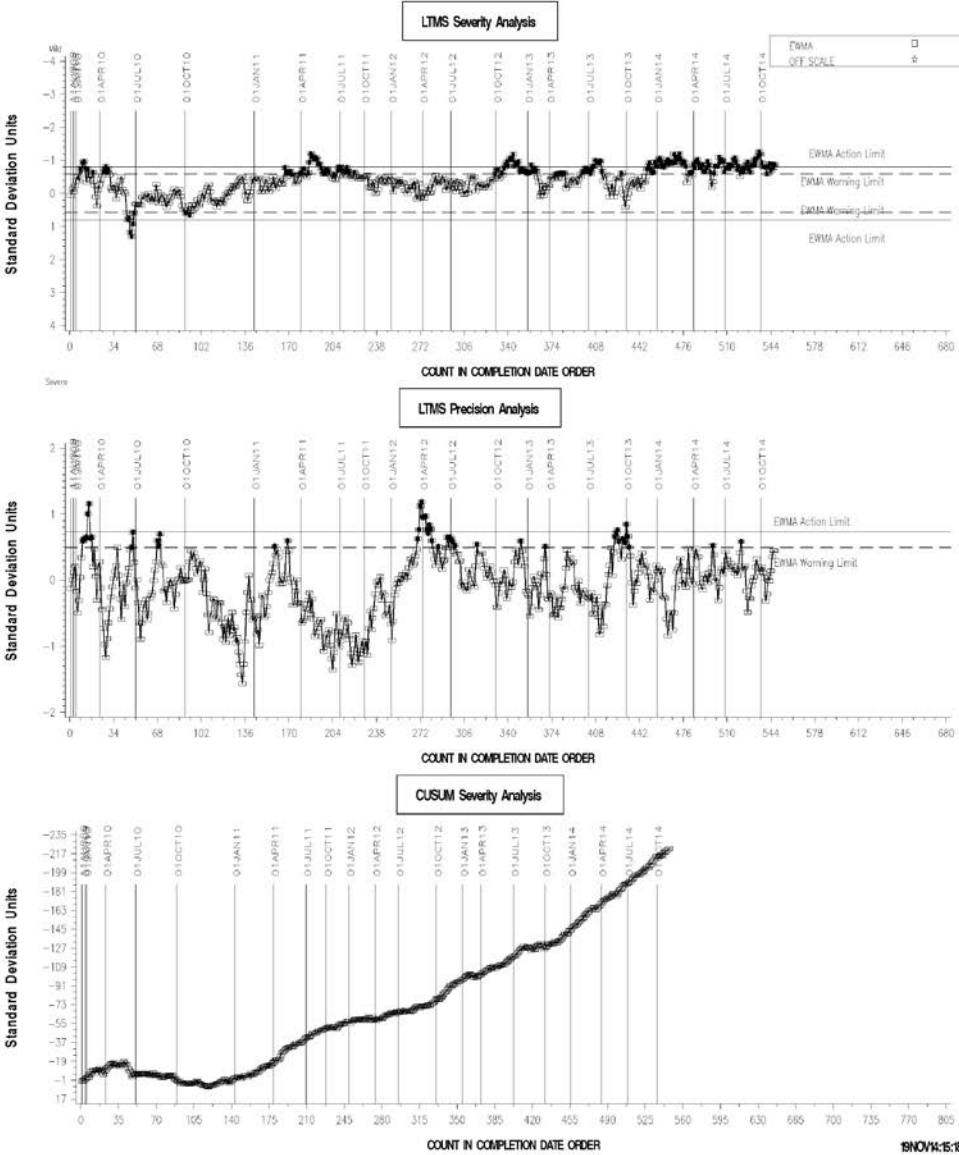
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LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA

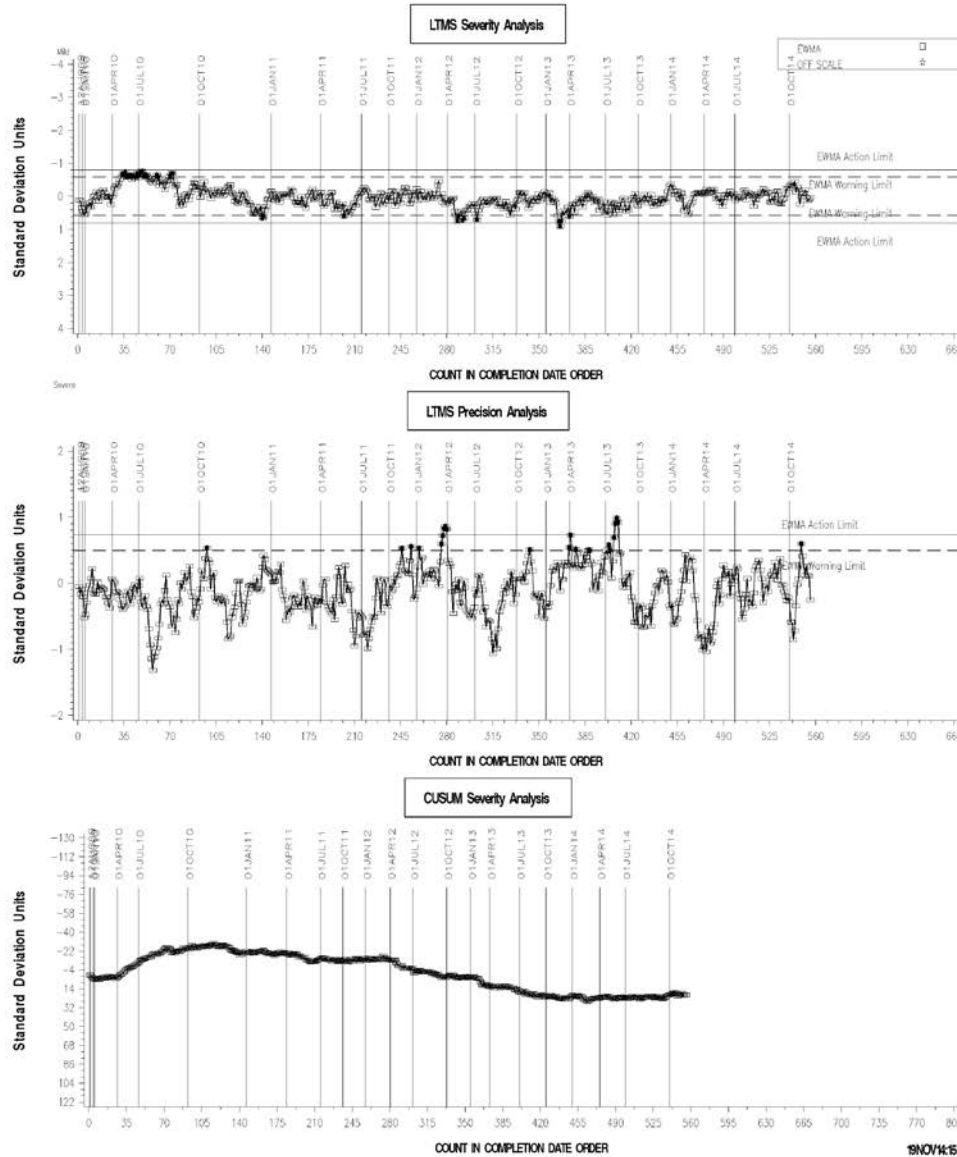
REF POLYACRYLATE POINTS HARDNESS CHG AVG



LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA

REF SILICON POINTS HARDNESS CHANGE AVERAGE

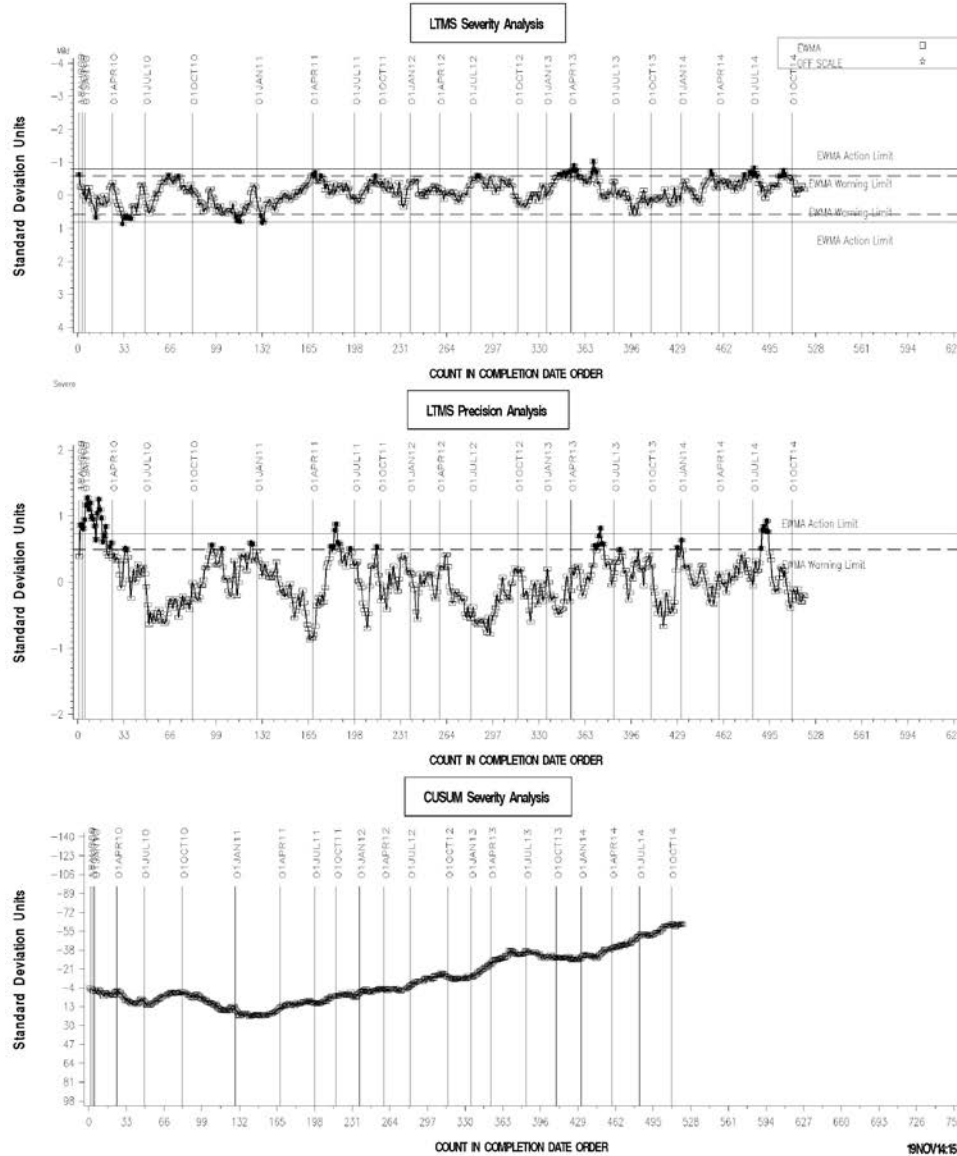


LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE TENSILE STRENGTH CHANGE AVG

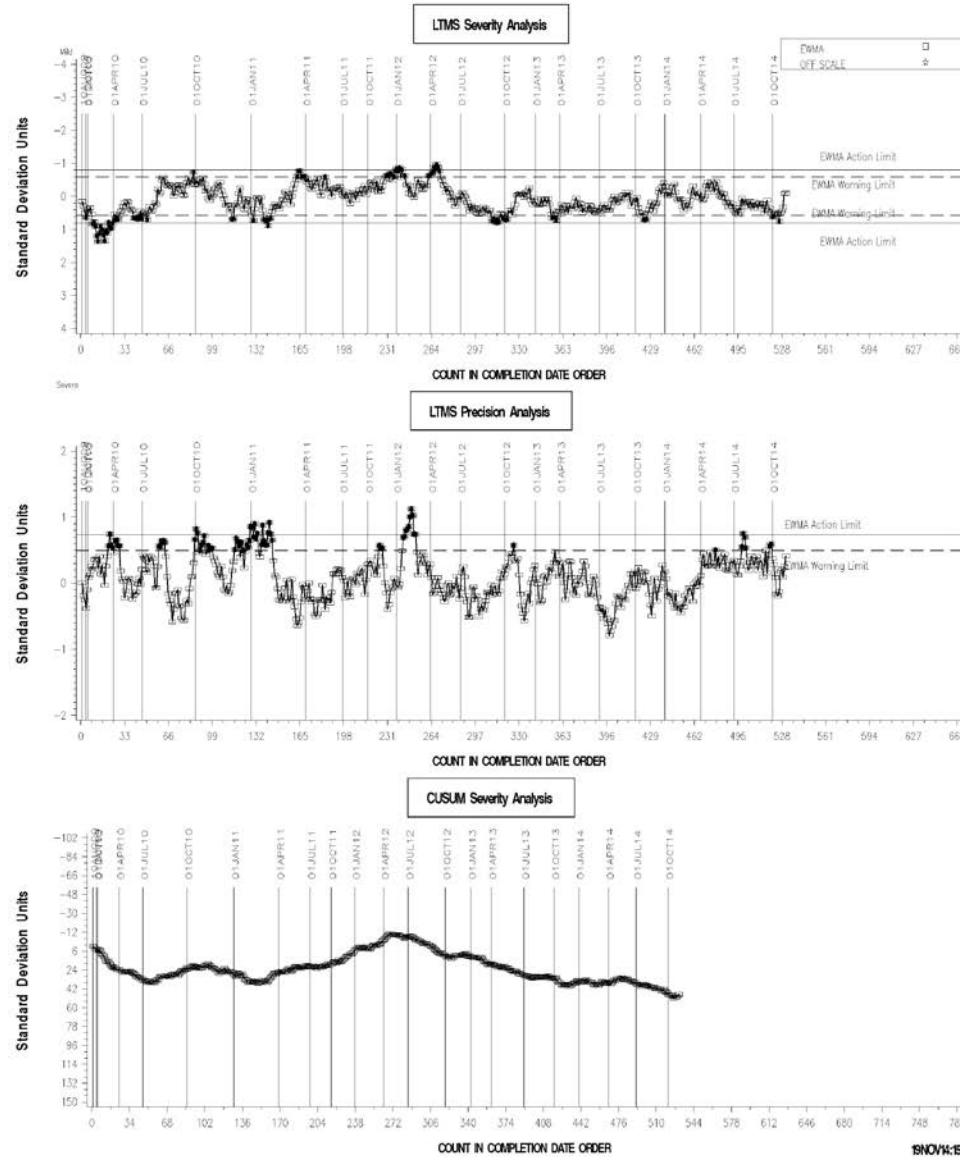


LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



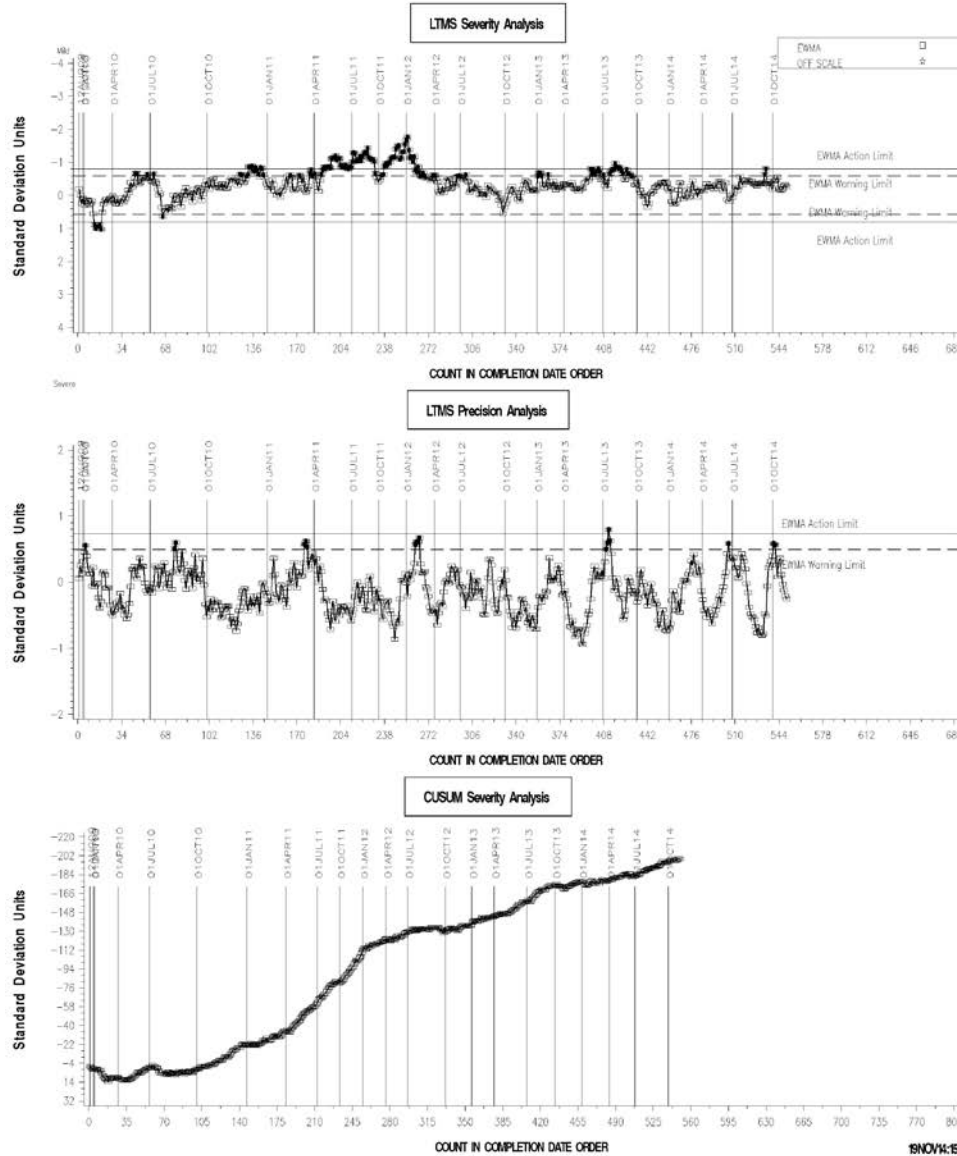
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LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA

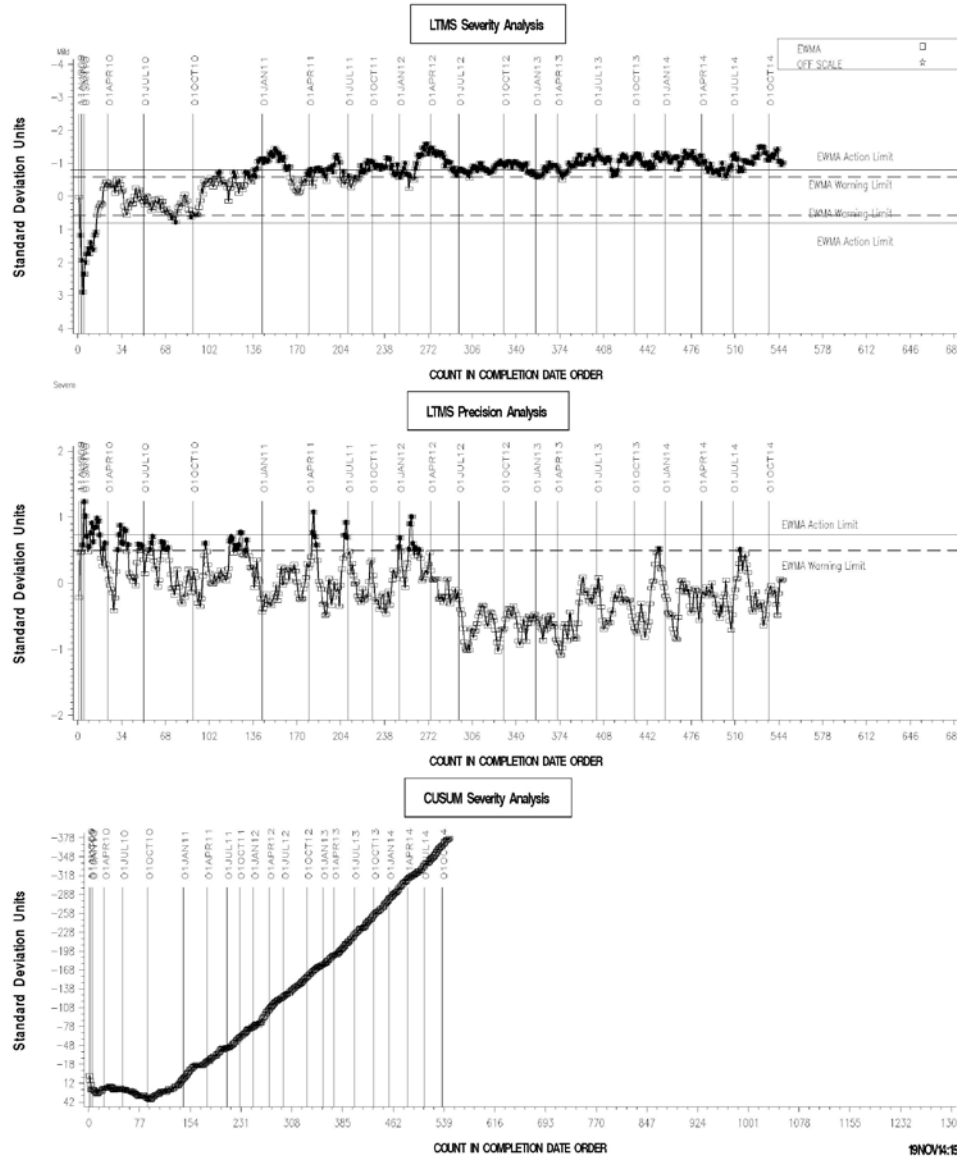
REF NITRILE TENSILE STRENGTH CHANGE AVERAGE



LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA

REF POLYACRYLATE TENSILE STRENGTH CHG AVG

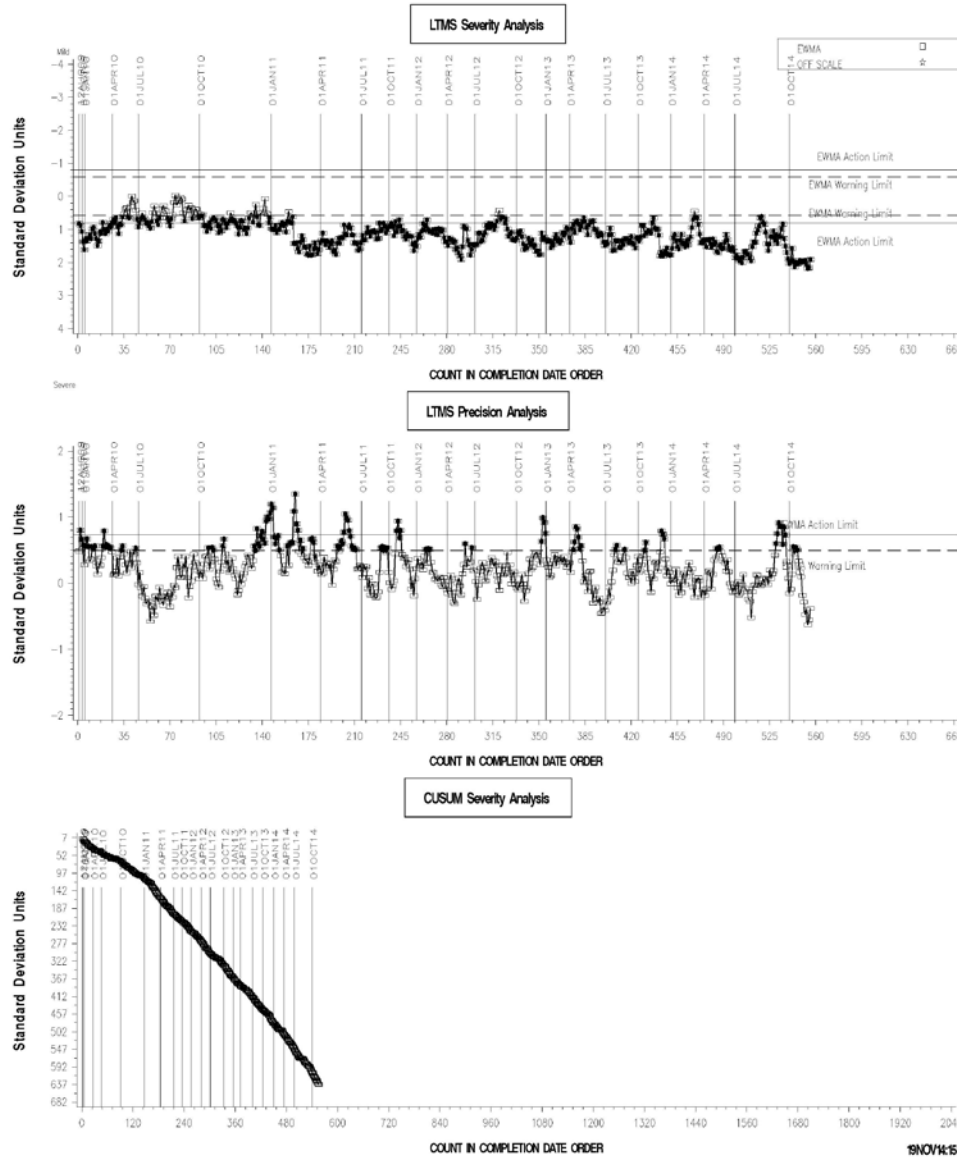


LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REF SILICON TENSILE STRENGTH CHANGE AVERAGE



LDEOC (D 7216)

INFORMATION LETTERS

EOEC Information Letter 14-1, Sequence No. 5, dated September 18, 2014

- New Heavy Duty Silicone Elastomer Material
- New Elastomer Batch Reporting Requirements
- Editorial Correction

LDEOC (D 7216)

STATUS OF REFERENCE OIL SUPPLY

Oil	Samples @ Labs	@ TMC	
		Samples (750 mL)	Gallons
1006-1	201	3,335	661
Total	201	3,335	661