



Test Monitoring Center

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

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

MEMORANDUM: 15-022

DATE: June 3, 2015

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

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

SUBJECT: LDEOC Testing from October 1, 2014 through March 31, 2015

A total of 286 LDEOC tests were reported from 5 labs to the Test Monitoring Center during the period from October 1, 2014 through March 31, 2015.

Please find attached a summary of testing activity this period.

MTK/mtk/mem15-022.mtk.doc

cc: Frank Farber

Jeff Clark

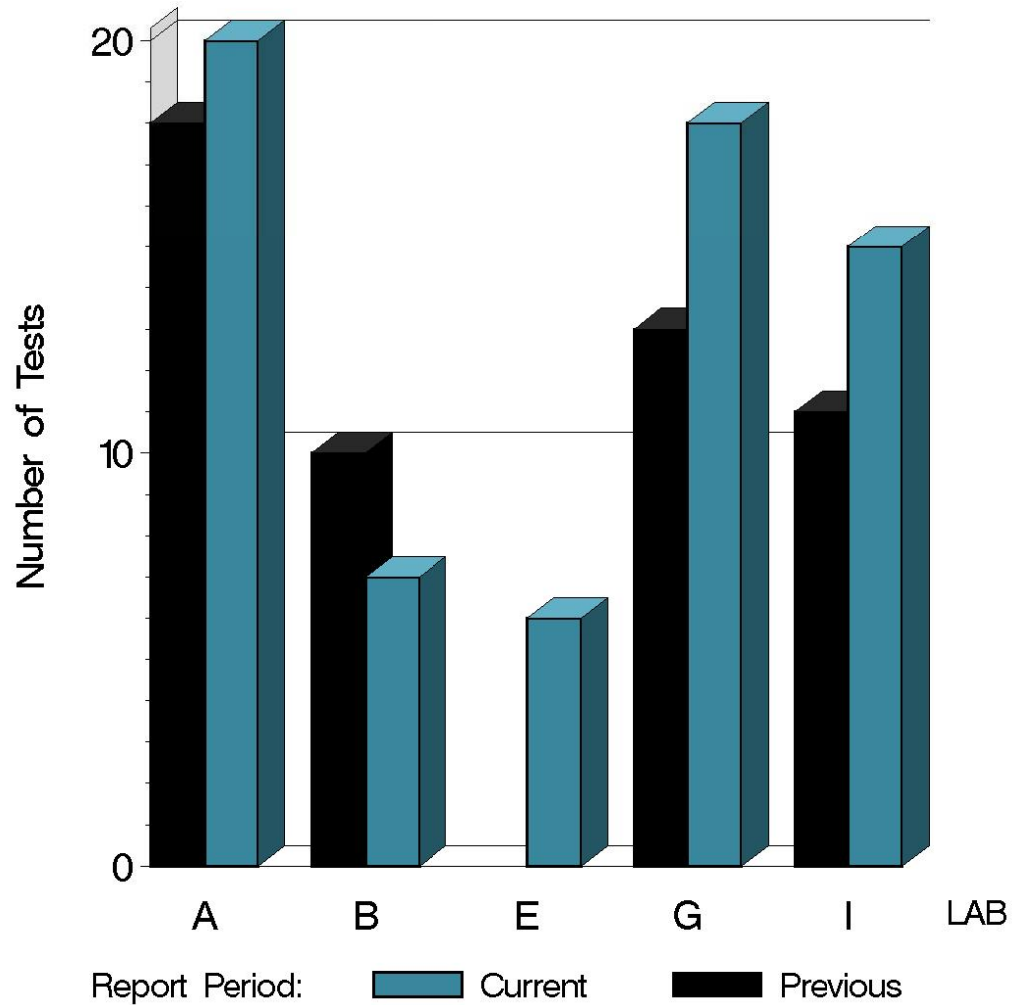
EOEC Surveillance Panel

<ftp://ftp.astmtmc.cmu.edu/docs/bench/ldeoc/semiannualreports/ldeoc-04-2015.pdf>

Distribution: email

LDEOC (D 7216)

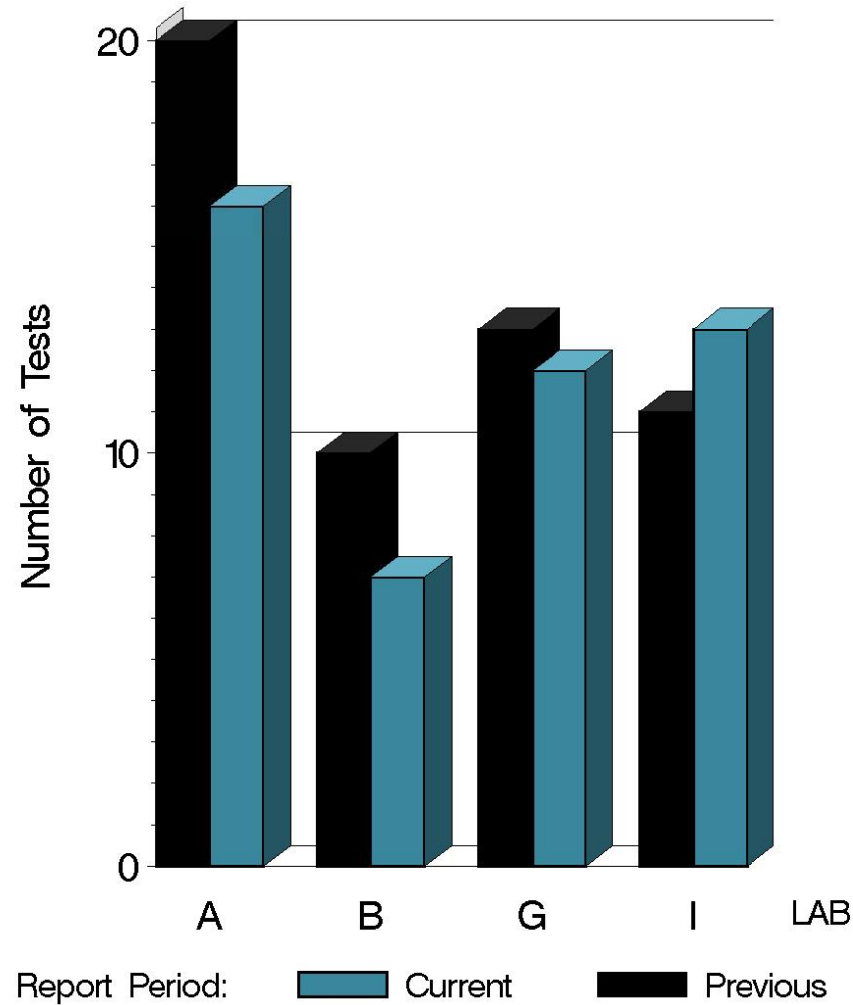
NUMBER OF ETHYLENE ACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



11:12:20 03JUN2015

LDEOC (D 7216)

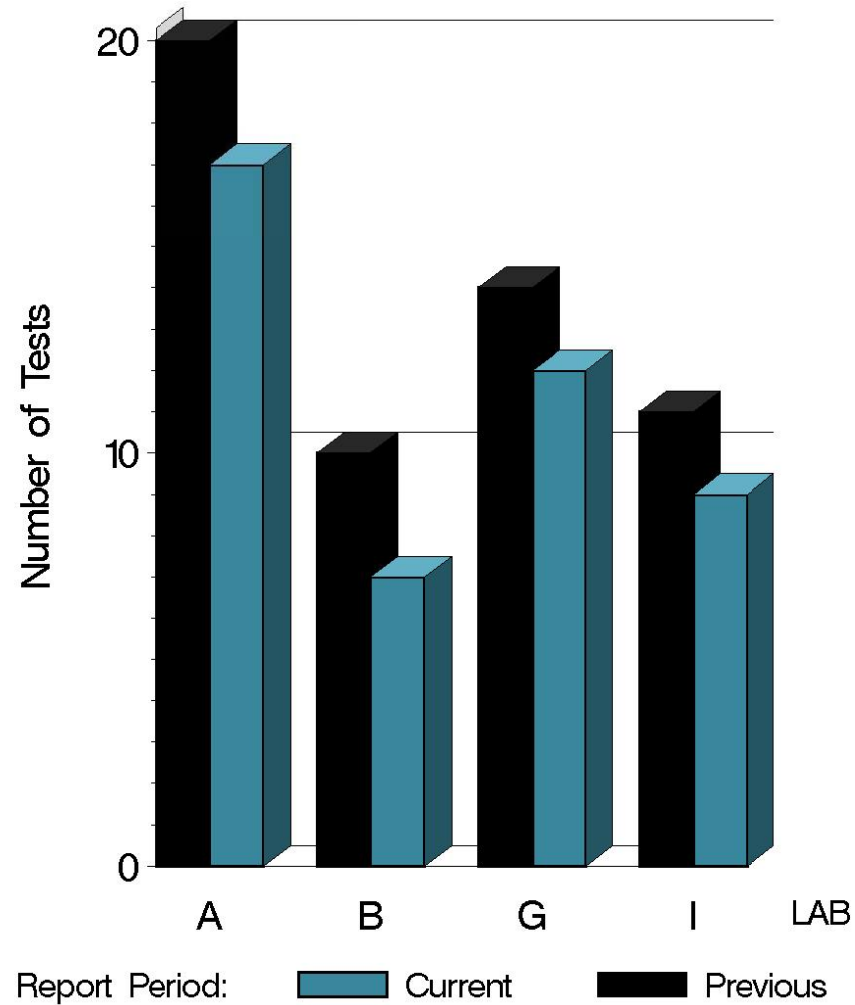
NUMBER OF FLUOROELASTOMER TESTS
REPORTED BY LAB AND REPORT PERIOD



11:12:20 03JUN2015

LDEOC (D 7216)

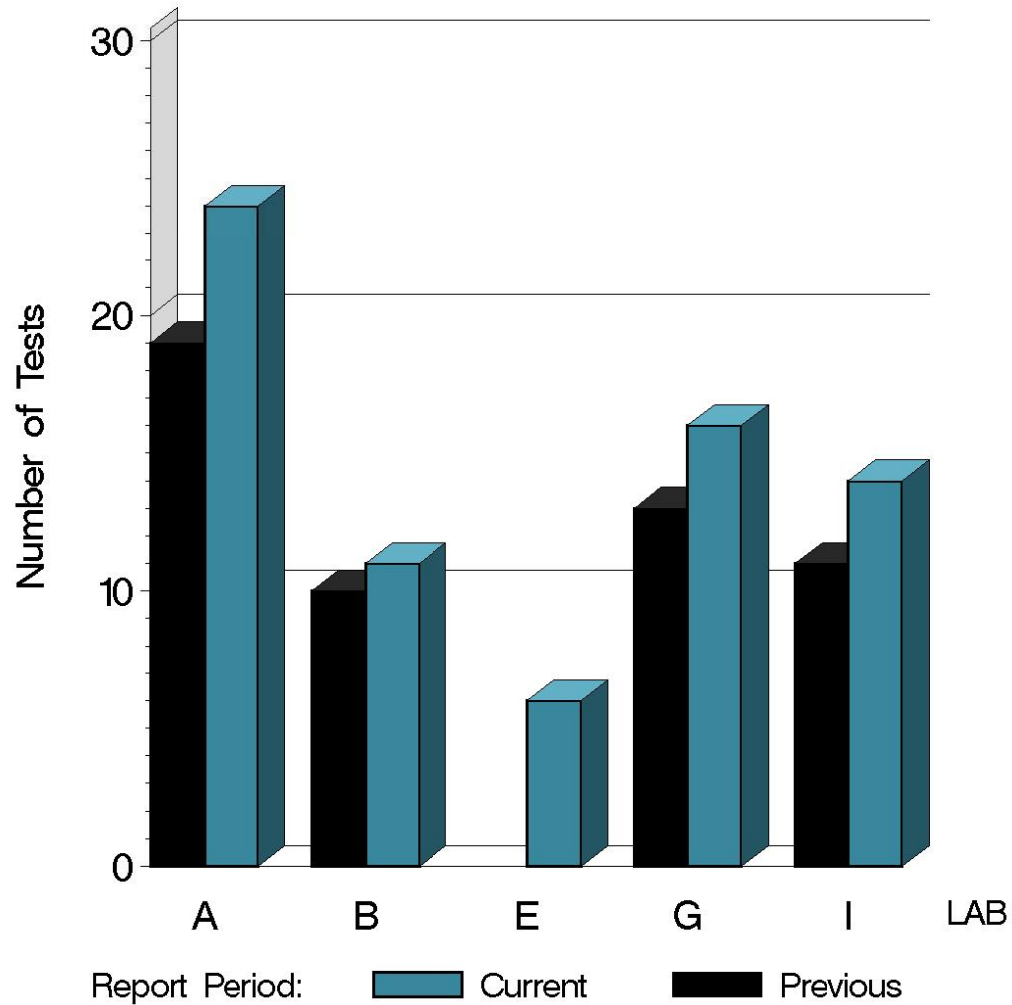
NUMBER OF NITRILE TESTS REPORTED BY LAB AND REPORT PERIOD



11:12:20 03JUN2015

LDEOC (D 7216)

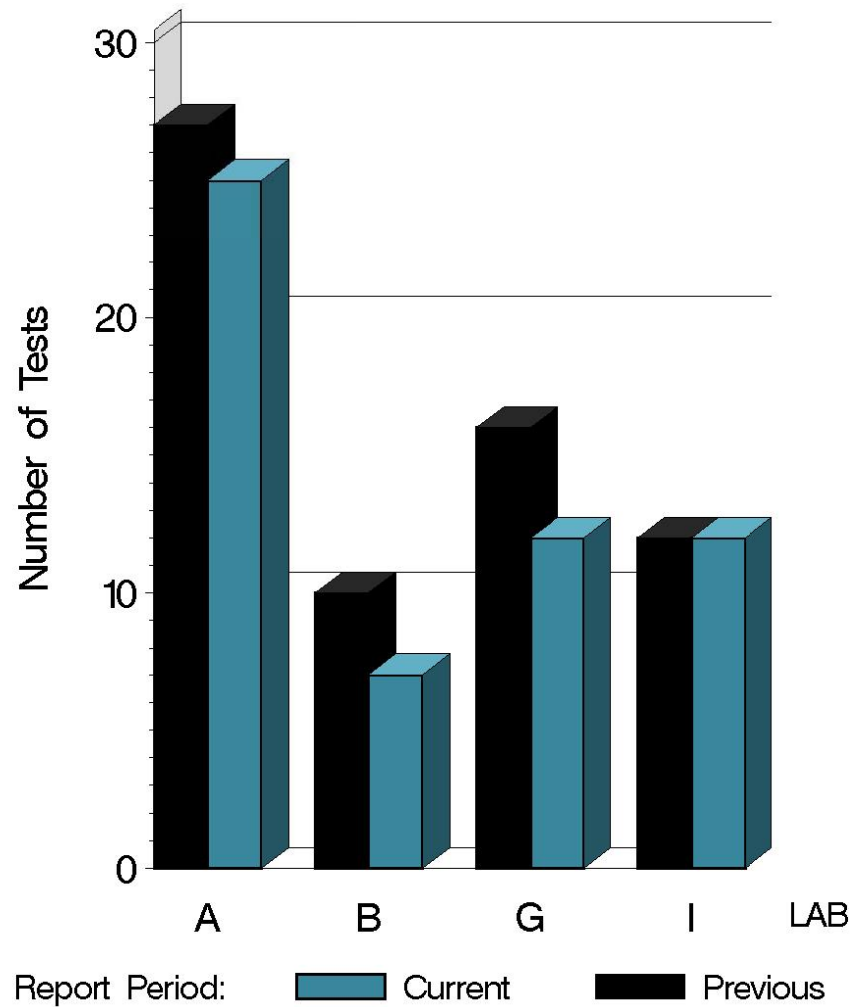
NUMBER OF POLYACRYLATE TESTS REPORTED BY LAB AND REPORT PERIOD



11:12:20 03JUN2015

LDEOC (D 7216)

NUMBER OF SILICONE TESTS
REPORTED BY LAB AND REPORT PERIOD



11:12:20 03JUN2015

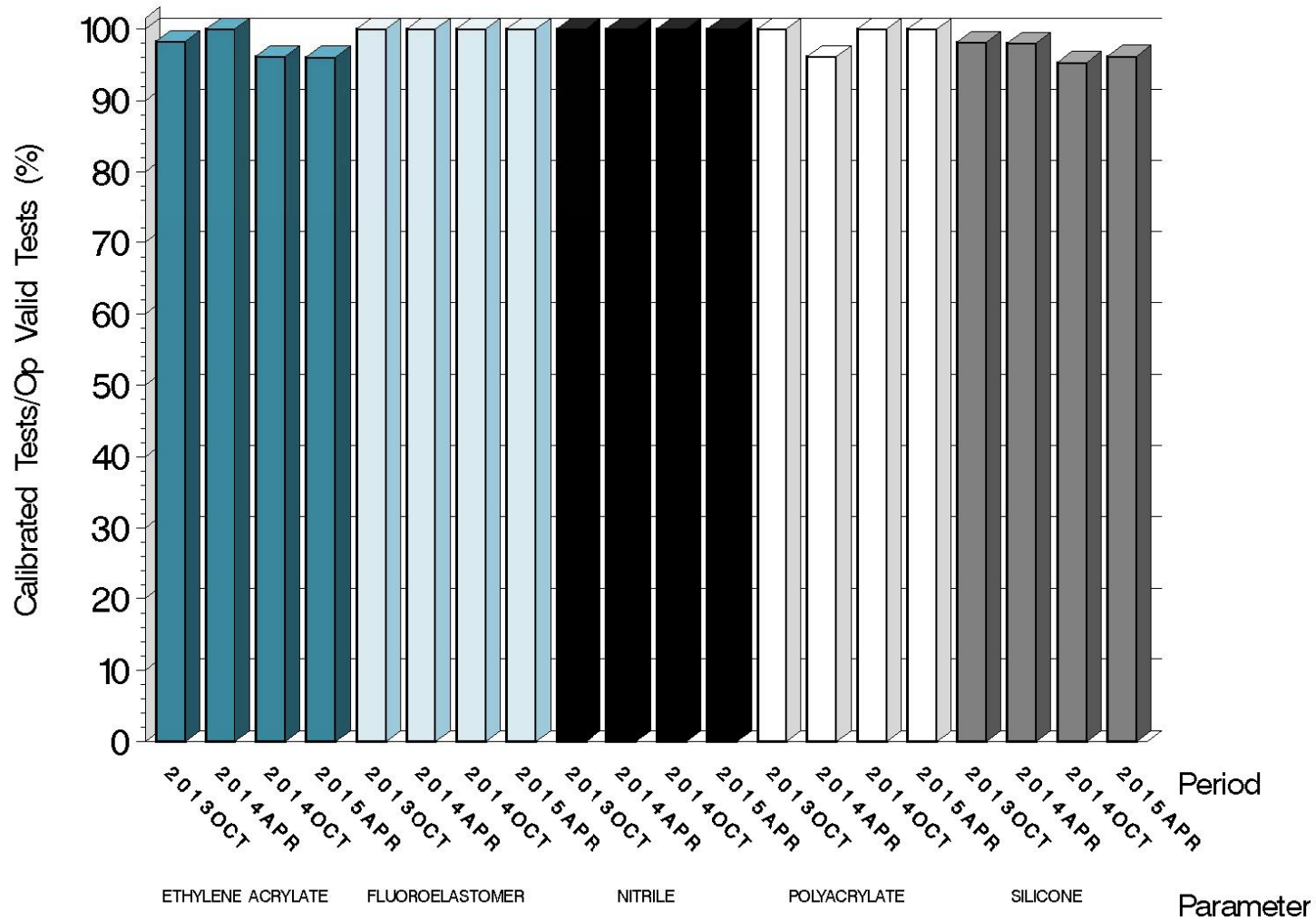
LDEOC (D 7216)

Test Distribution by Oil and Validity

		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	This Period	Last Period
Accepted for Calibration	AC	49	44	45	56	51	245	271
Rejected	OC	2	0	0	0	2	4	5
Acceptable Information Run	NI	10	0	0	12	0	22	0
Unacceptable Information Run	MI	2	0	0	0	0	2	0
Invalid Information Run (TMC)	RI	1	0	0	2	0	3	0
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	4	0	1	2	9	2
Total		66	48	45	71	56	286	278

LDEOC (D 7216)

OPERATIONALLY VALID TESTS MEETING ACCEPTANCE CRITERIA



11:12:20 03JUN2015

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	20	0	0	16	0	0	17	0	0	24	0	0	25	0	0	102	0
B	0	7	0	0	7	0	0	7	0	0	11	0	0	7	0	0	39	0
E	0	6	0	0	0	0	0	0	0	0	6	0	0	0	0	0	12	0
G	0	18	0	1	12	8	0	12	0	0	16	0	1	12	8	2	70	3
I	2	5	40	3	13	23	0	9	0	1	14	7	2	12	17	8	63	13
Total	2	66	3.0	4	48	8.3	0	45	0	1	71	1.4	3	56	5.4	10	286	3.5

LDEOC (D 7216)

CAUSES FOR LOST TESTS

Lab	Cause	Elastomer					Validity			Loss Rate		
		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	LC	RC	XC	Lost	Starts	%
G	Bath Failure	0	0	0	0	1	1	0	0	1	70	1.4
	Wrong Material Used	0	1	0	0	0	0	0	1	1		1.4
I	Sponsor Request	2	2	0	1	2	0	0	7	7	63	11.1
	Bath Failure	0	1	0	0	0	0	0	1	1		1.6
	Lost	2	4	0	1	3	1	0	9			
	Starts	66	48	45	71	56	286	286	286			
	%	3.0	8.3	0	1.4	5.4	0.3	0	3.1			

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	17	-0.173	-1.809	0.509
	B	7	0.401	-3.138	-0.746
	E	3	-1.238	-3.190	-2.328
	G	13	0.328	0.629	0.596
	I	11	0.357	-1.426	-1.081
	Industry	51	0.085	-1.369	-0.151
Fluoroelastomer	A	16	-0.217	1.267	-0.595
	B	7	-0.590	-0.748	-0.225
	E	0	-	-	-
	G	11	-0.855	-0.015	0.299
	I	10	-1.027	0.129	1.069
	Industry	44	-0.620	0.367	0.066
Nitrile	A	17	0.577	-0.707	-0.306
	B	7	1.643	-1.141	-0.130
	E	0	-	-	-
	G	12	0.239	1.034	-0.196
	I	9	0.246	-0.211	-0.666
	Industry	45	0.587	-0.211	-0.321
Polyacrylate	A	21	0.512	-1.663	-1.207
	B	9	1.194	-1.921	-1.504
	E	3	0.389	-0.983	-1.287
	G	12	-0.439	-0.009	-0.782
	I	11	0.880	-0.471	-1.180
	Industry	56	0.483	-1.079	-1.163
Silicone	A	25	-0.553	-0.667	1.792
	B	7	0.329	-0.496	0.653
	E	0	-	-	-
	G	11	0.827	1.701	1.086
	I	10	-0.170	-0.118	0.317
	Industry	53	-0.078	-0.049	1.217

LDEOC (D 7216)

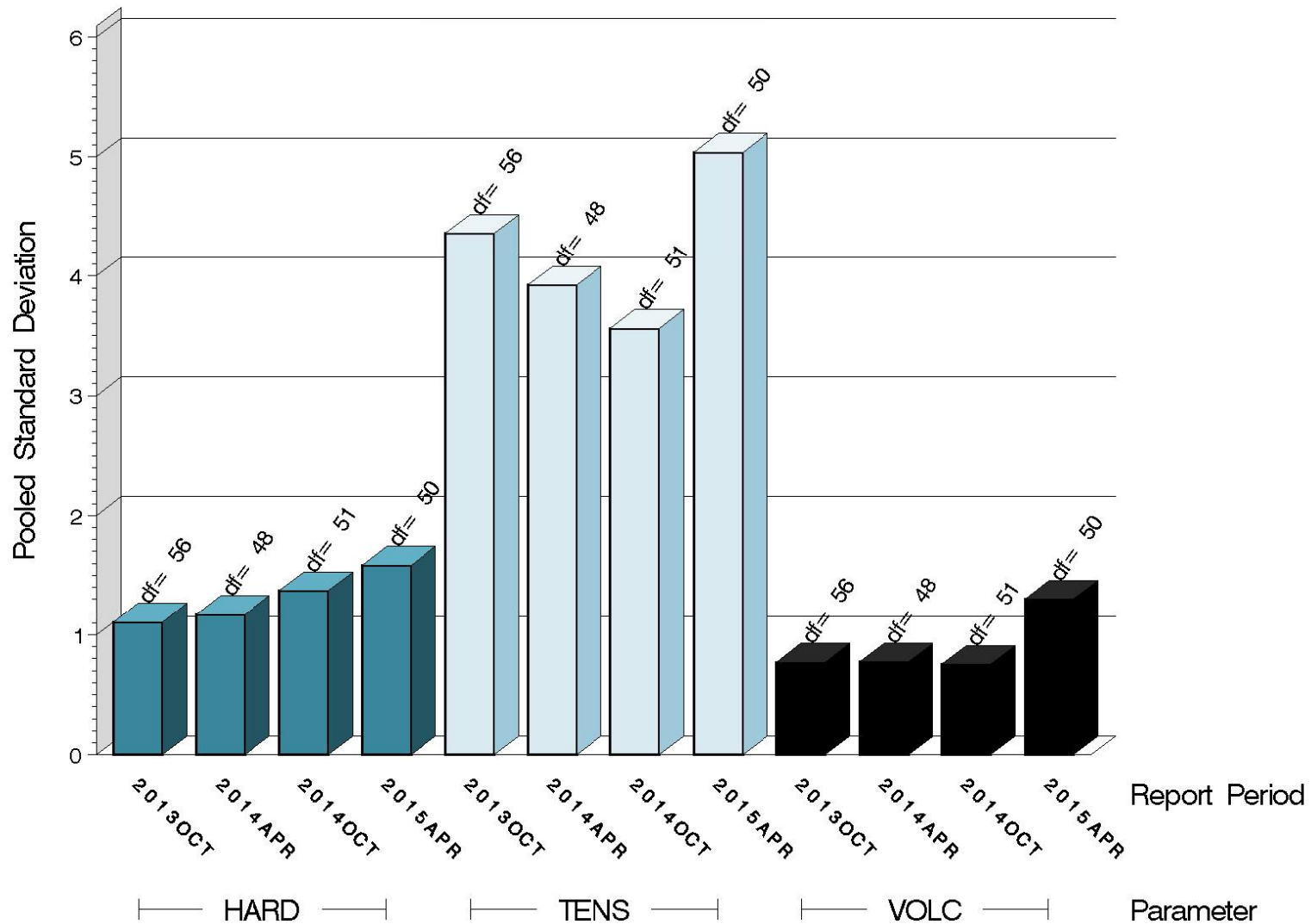
Individual test results can be viewed at the links shown in the following table:

<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

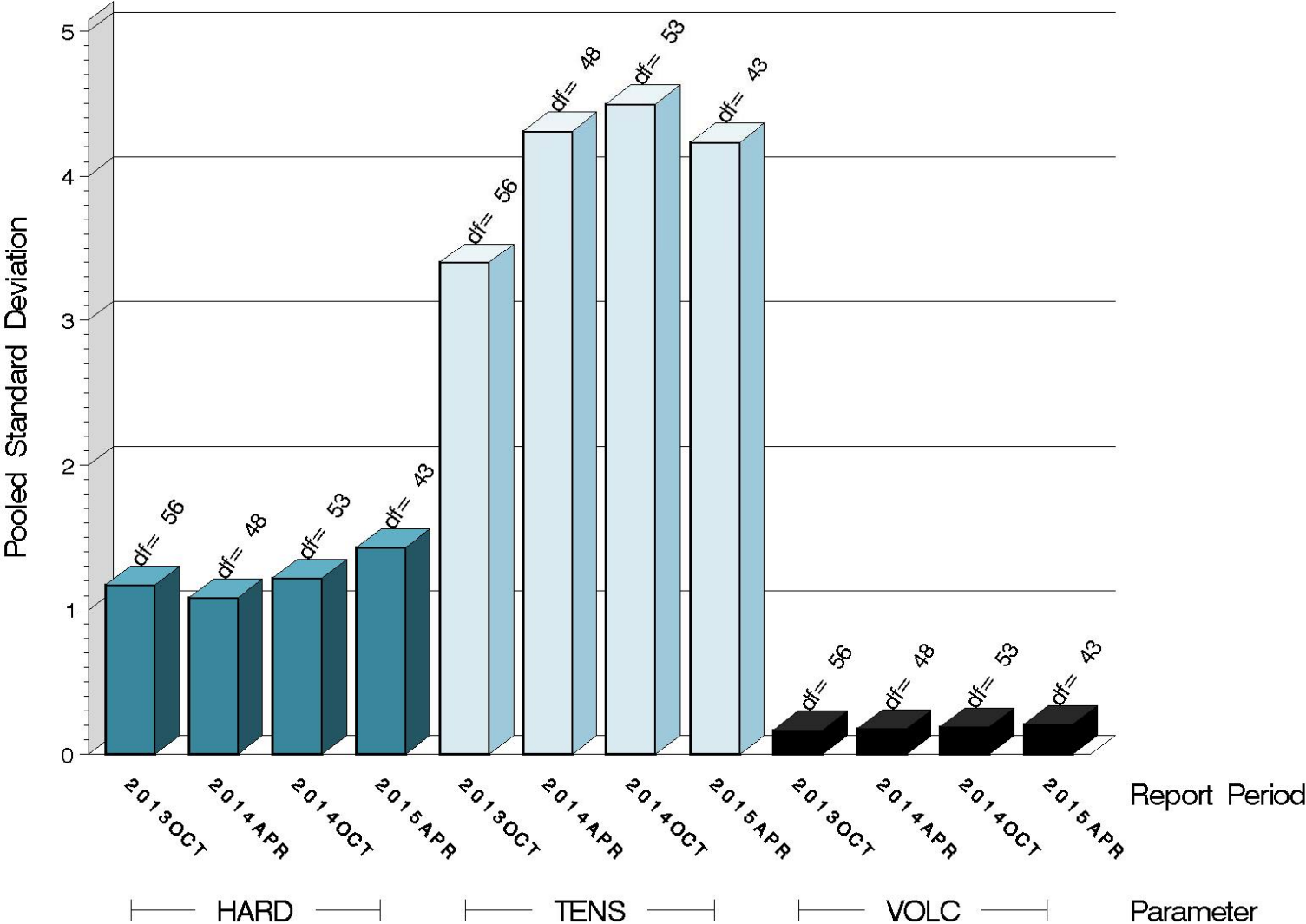


10:16:39 29MAY2015

LDEOC (D 7216)

FLUROELASTOMER TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

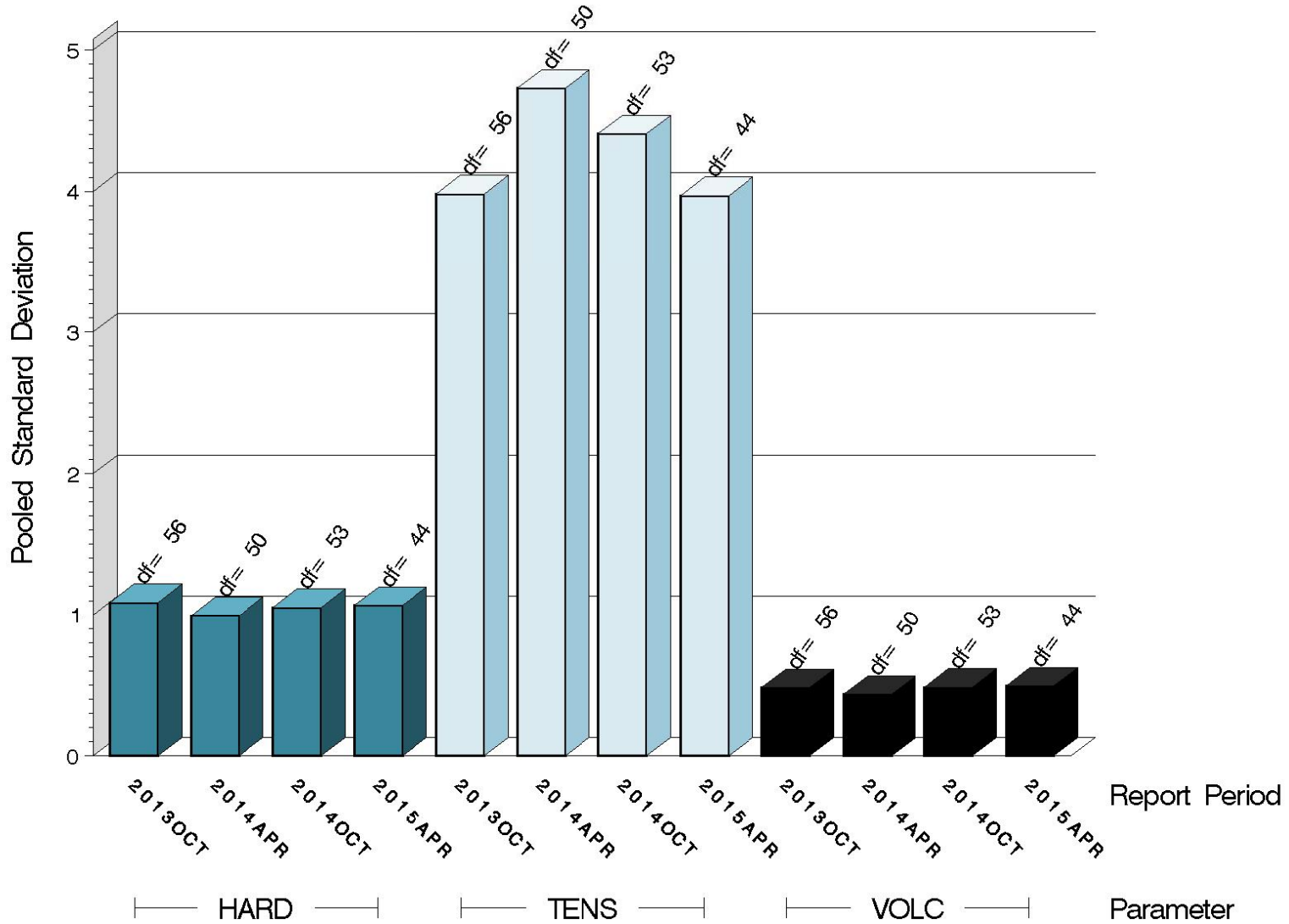


10:16:39 29MAY2015

LDEOC (D 7216)

NITRILE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

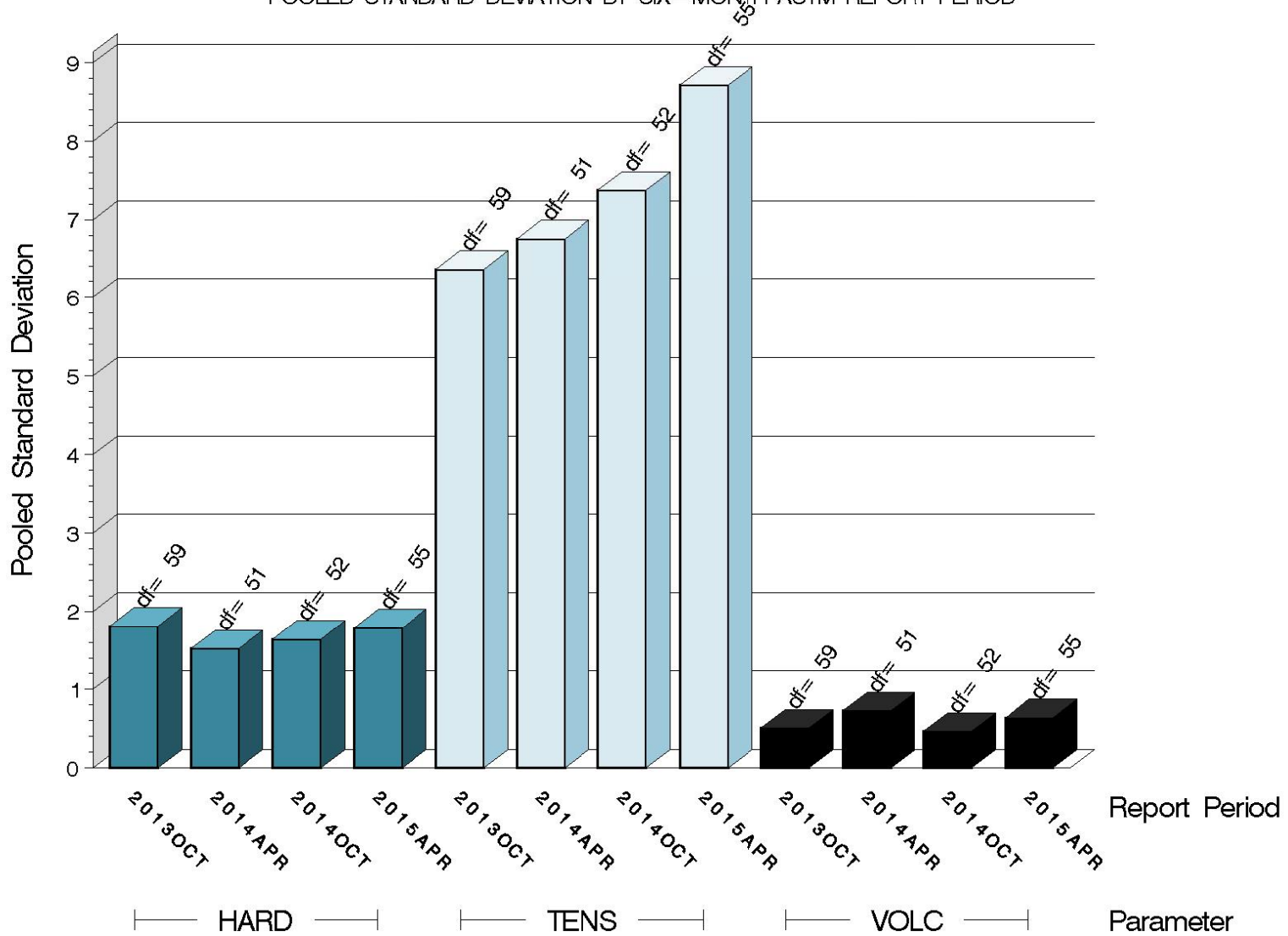


10:16:39 29MAY2015

LDEOC (D 7216)

POLYACRYLATE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

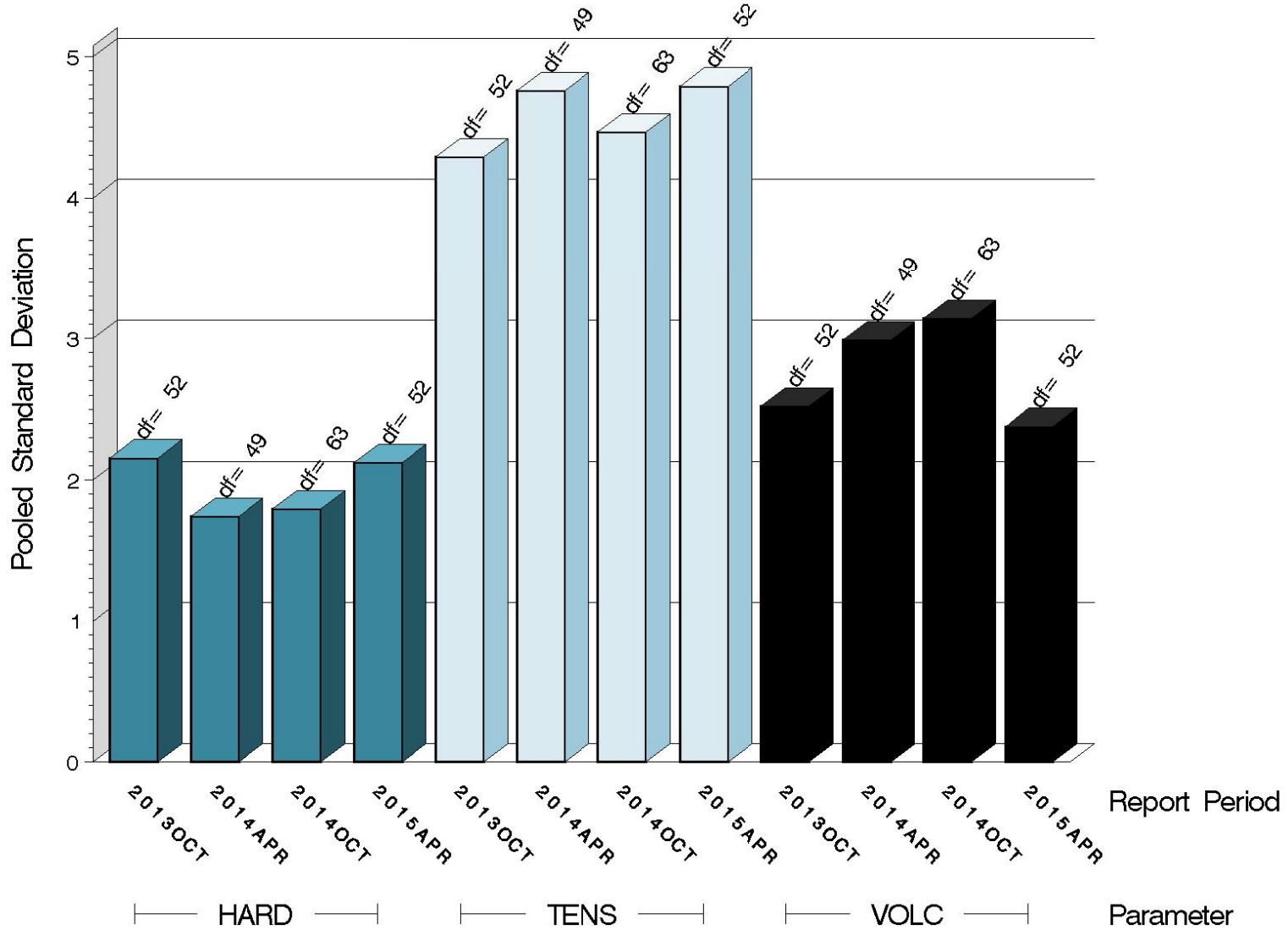


10:16:39 29MAY2015

LDEOC (D 7216)

SILICONE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



10:16:39 29MAY2015

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	Within limits	Within limits	Within limits
Nitrile	Severe	Within limits	Mild
Polyacrylate	Severe	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	Warning	Warning	Within limits
Fluoroelastomer	Within limits	Warning	Within limits
Nitrile	Within limits	Within limits	Within limits
Polyacrylate	Within limits	Within limits	Within limits
Silicone	Warning	Within limits	Within limits

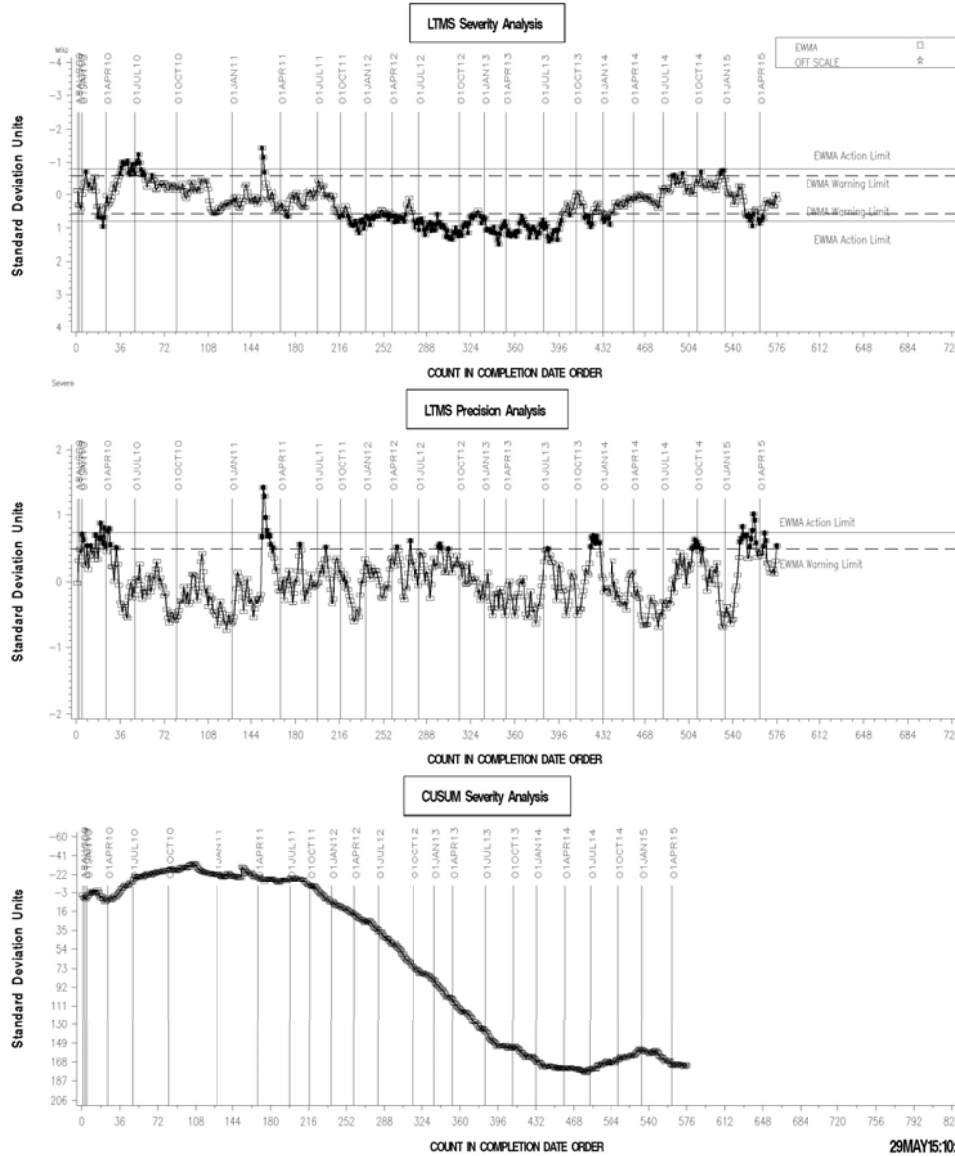
Industry control charts follow.

LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE VOLUME CHANGE AVERAGE

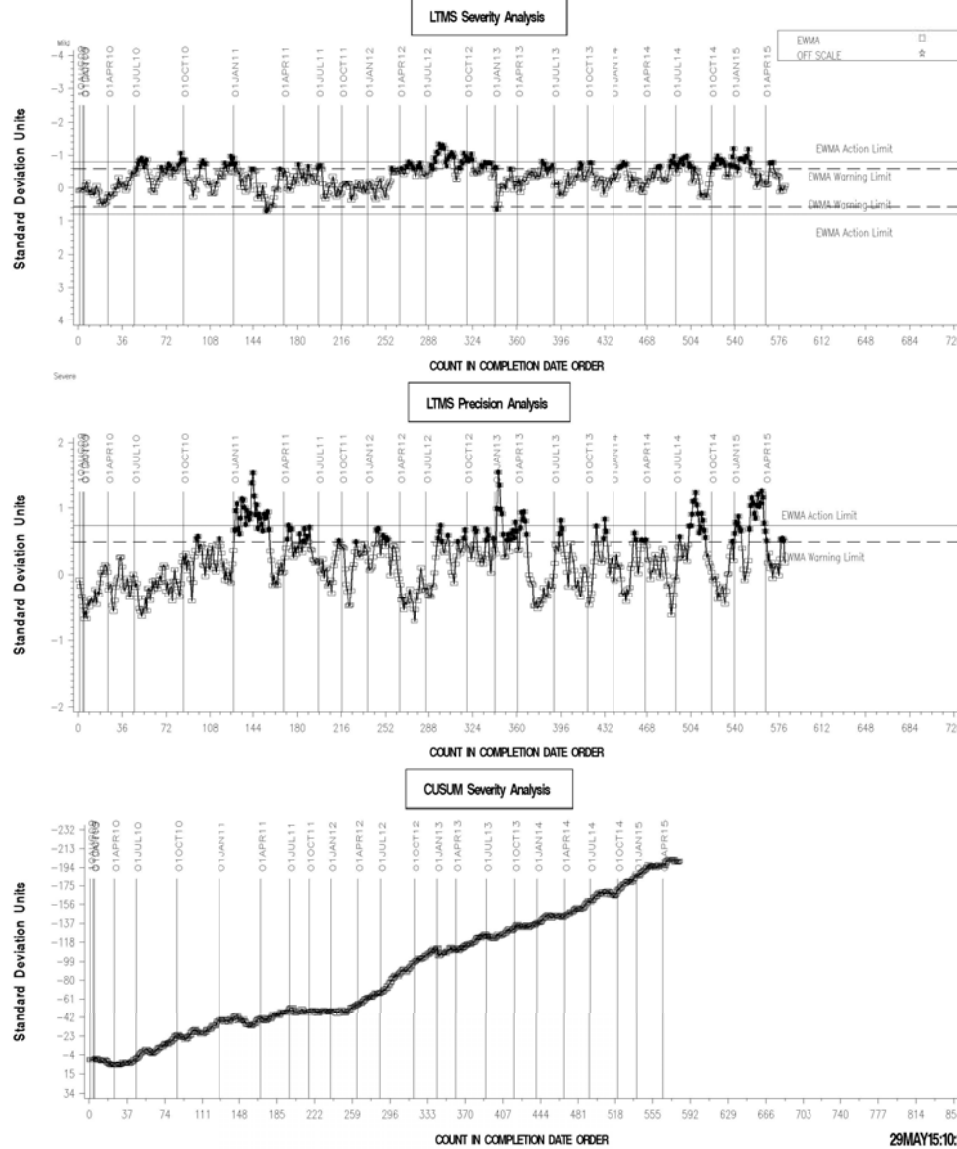


LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



REF FLUROELASTOMER VOLUME CHANGE AVERAGE



29MAY15:10:24

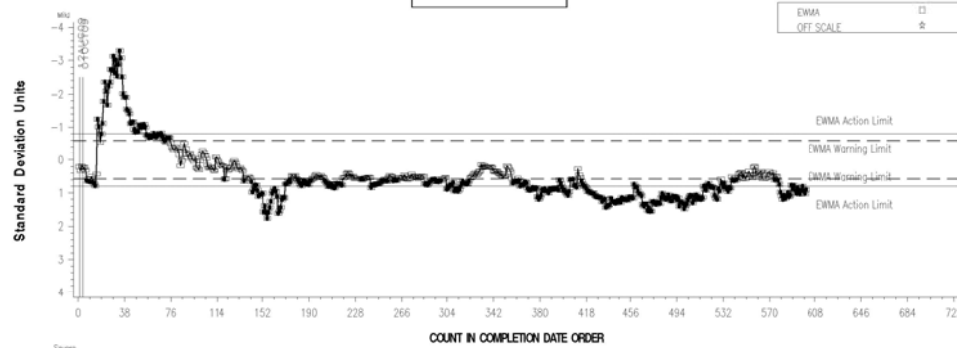
LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA

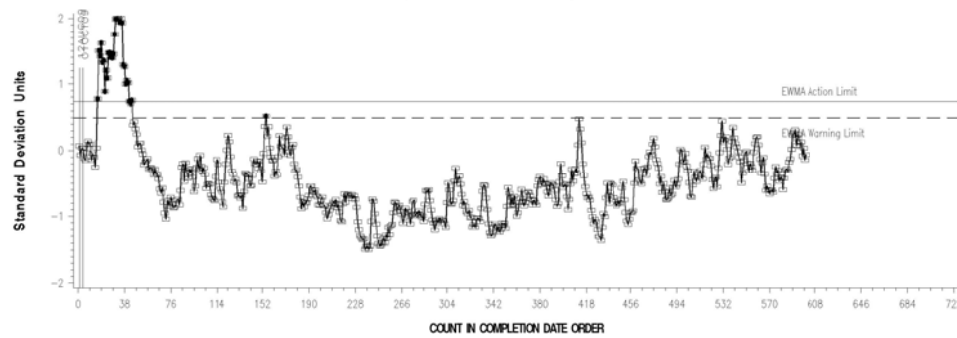


REFERENCE NITRILE VOLUME CHANGE AVERAGE

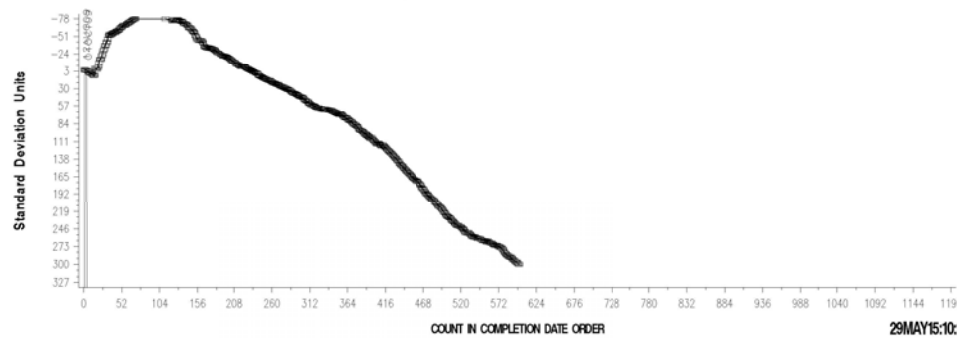
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

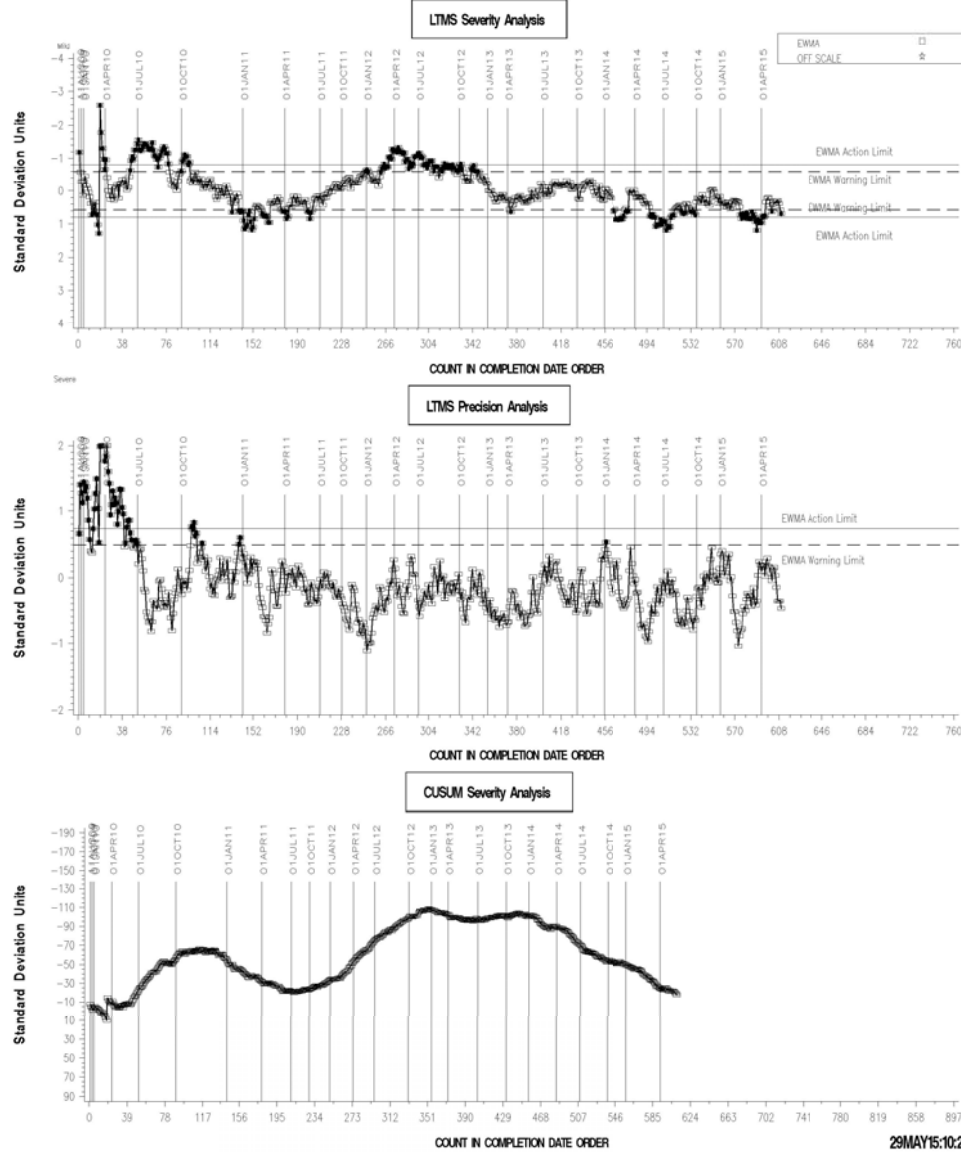


LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF POLYACRYLATE VOLUME CHANGE AVERAGE

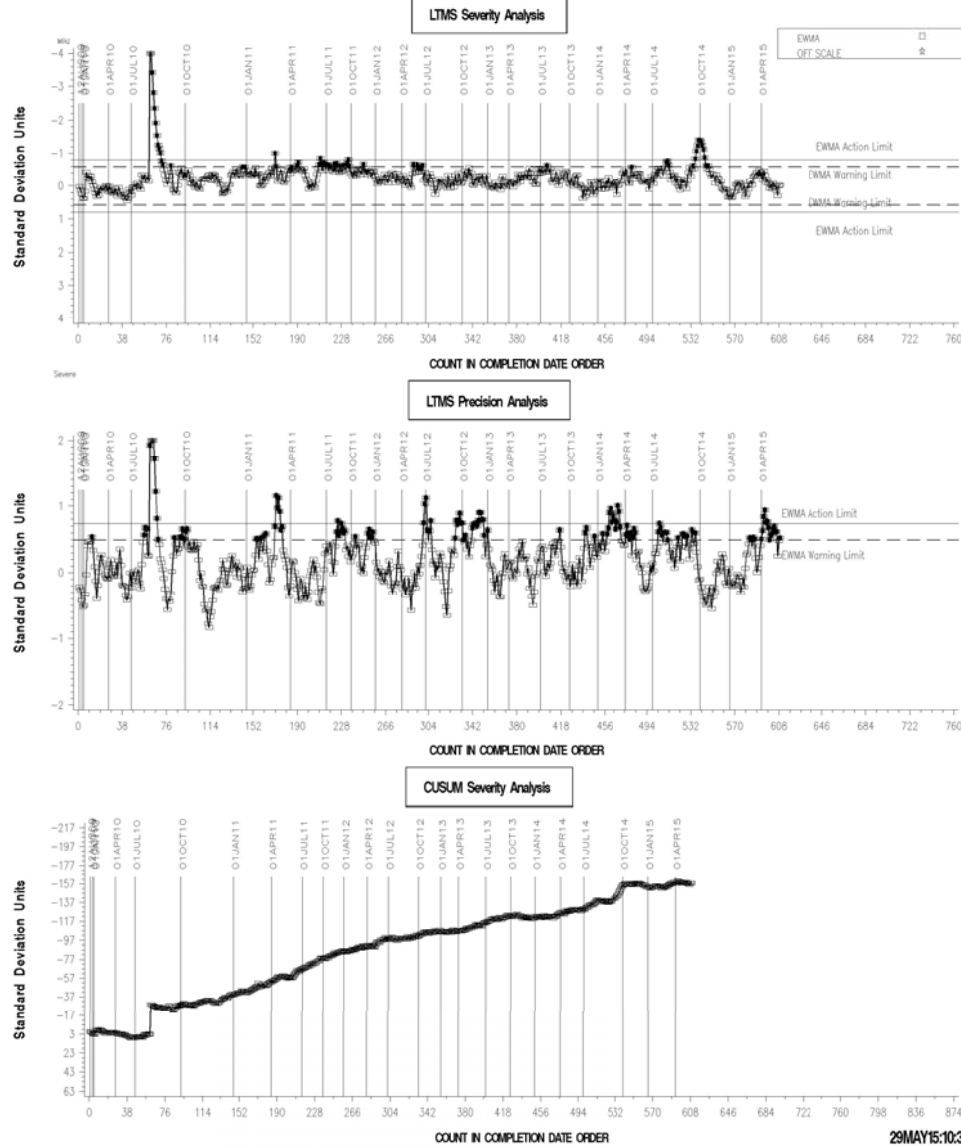


LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REFERENCE SILICON VOLUME CHANGE AVERAGE

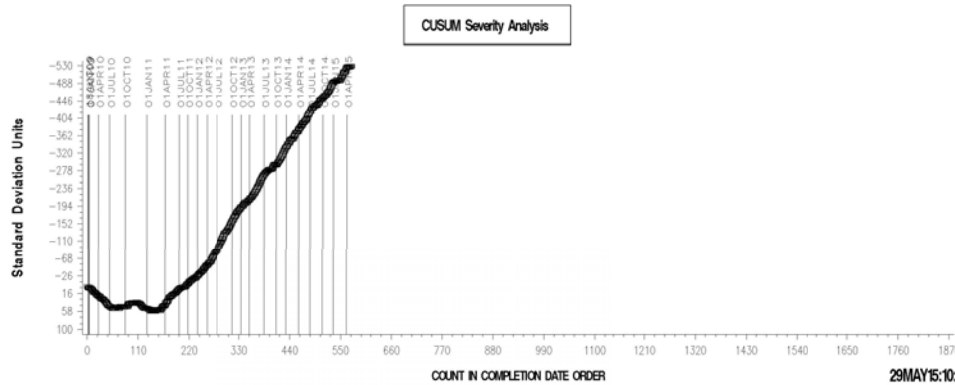
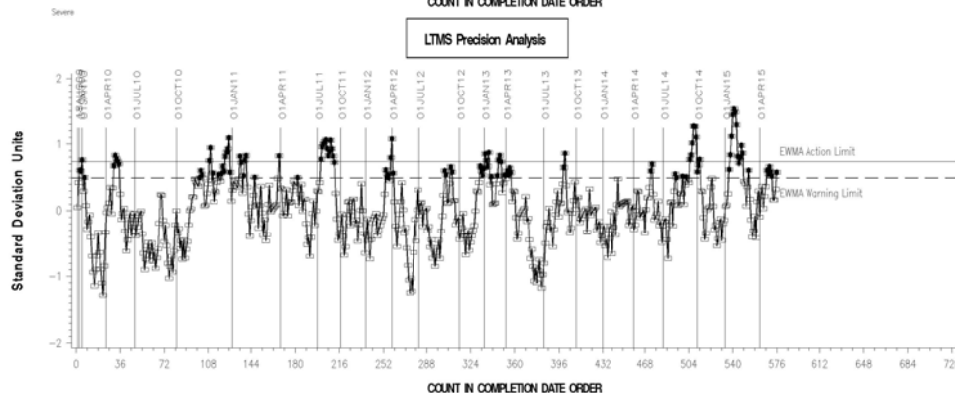
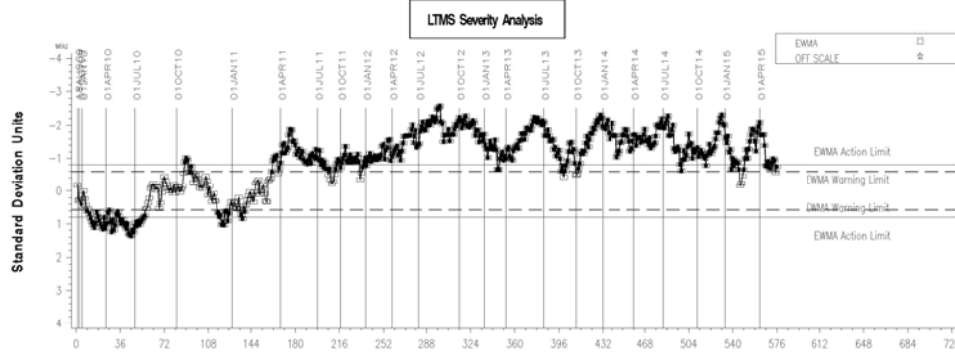


LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE POINTS HARDNESS CHANGE AVG



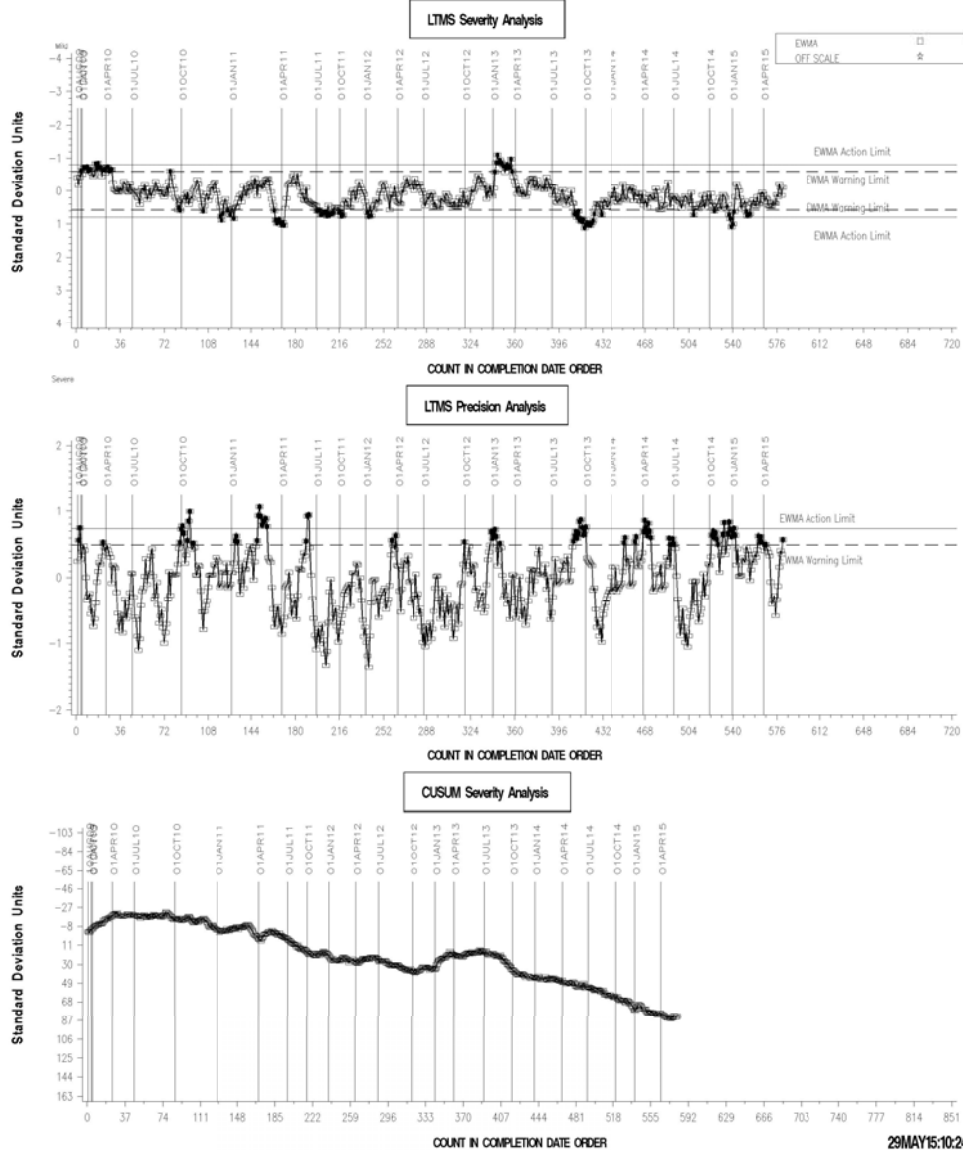
29MAY15:10:31

LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



REF FLUORO POINTS HARDNESS CHANGE AVERAGE



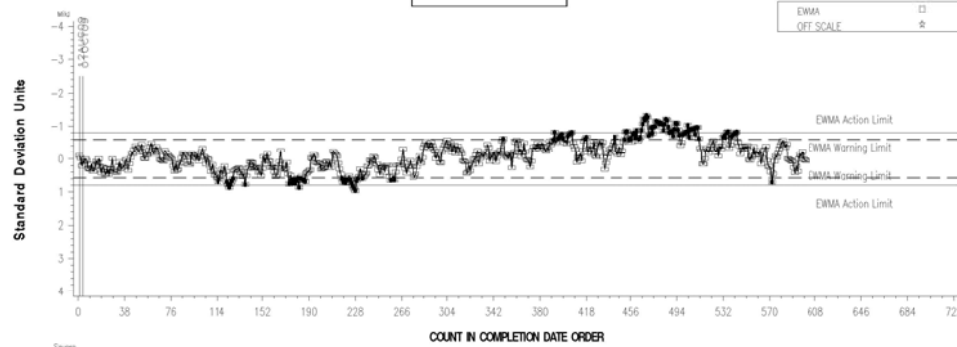
LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA

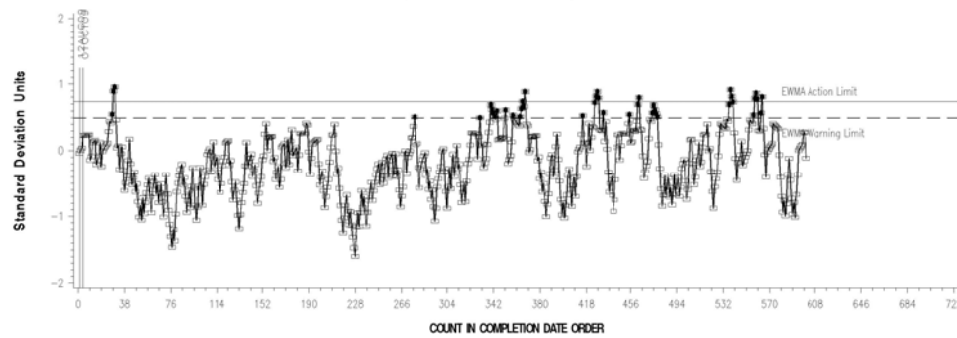


REF NITRILE POINTS HARDNESS CHANGE AVERAGE

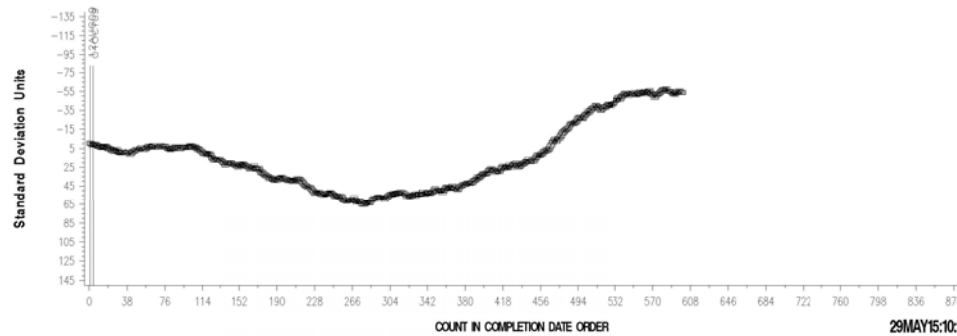
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

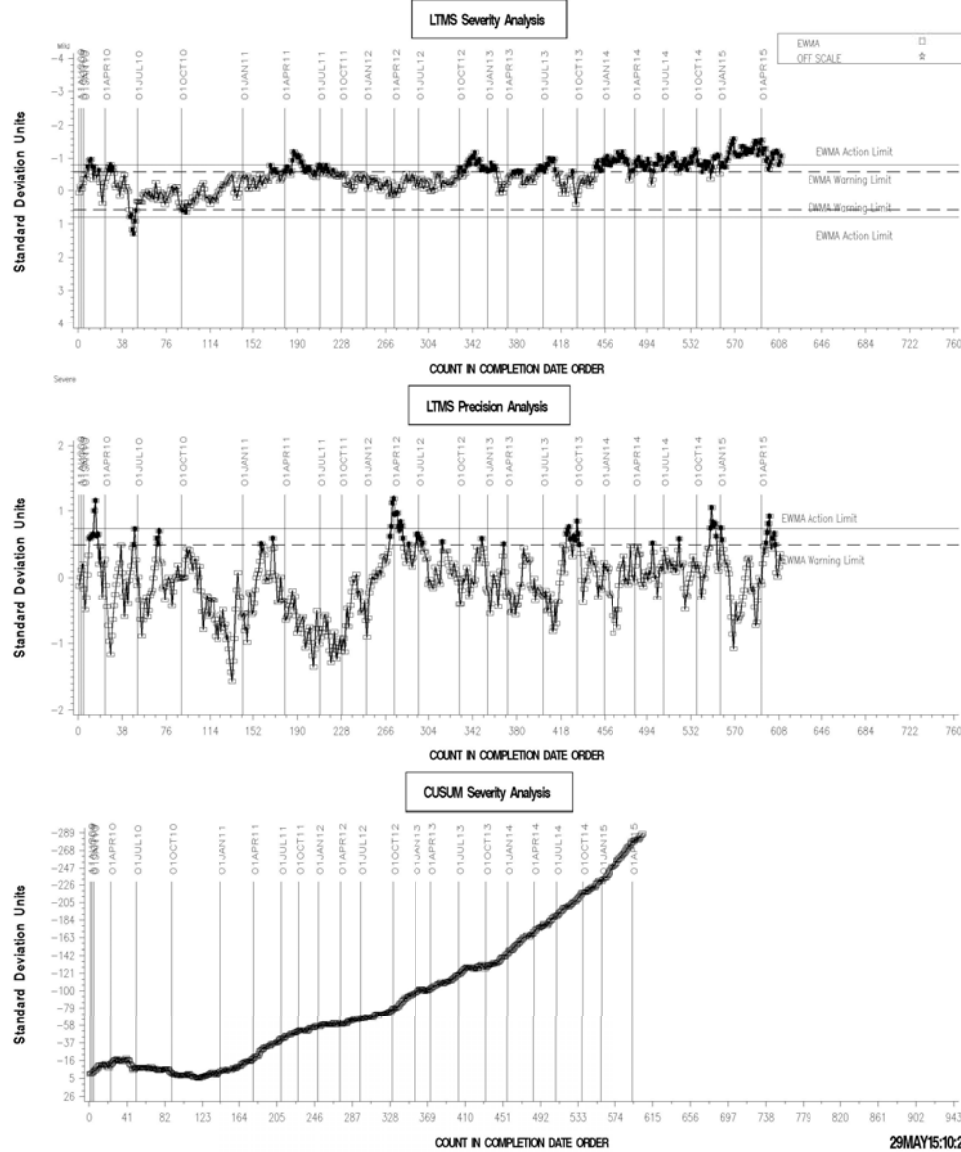


LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF POLYACRYLATE POINTS HARDNESS CHG AVG

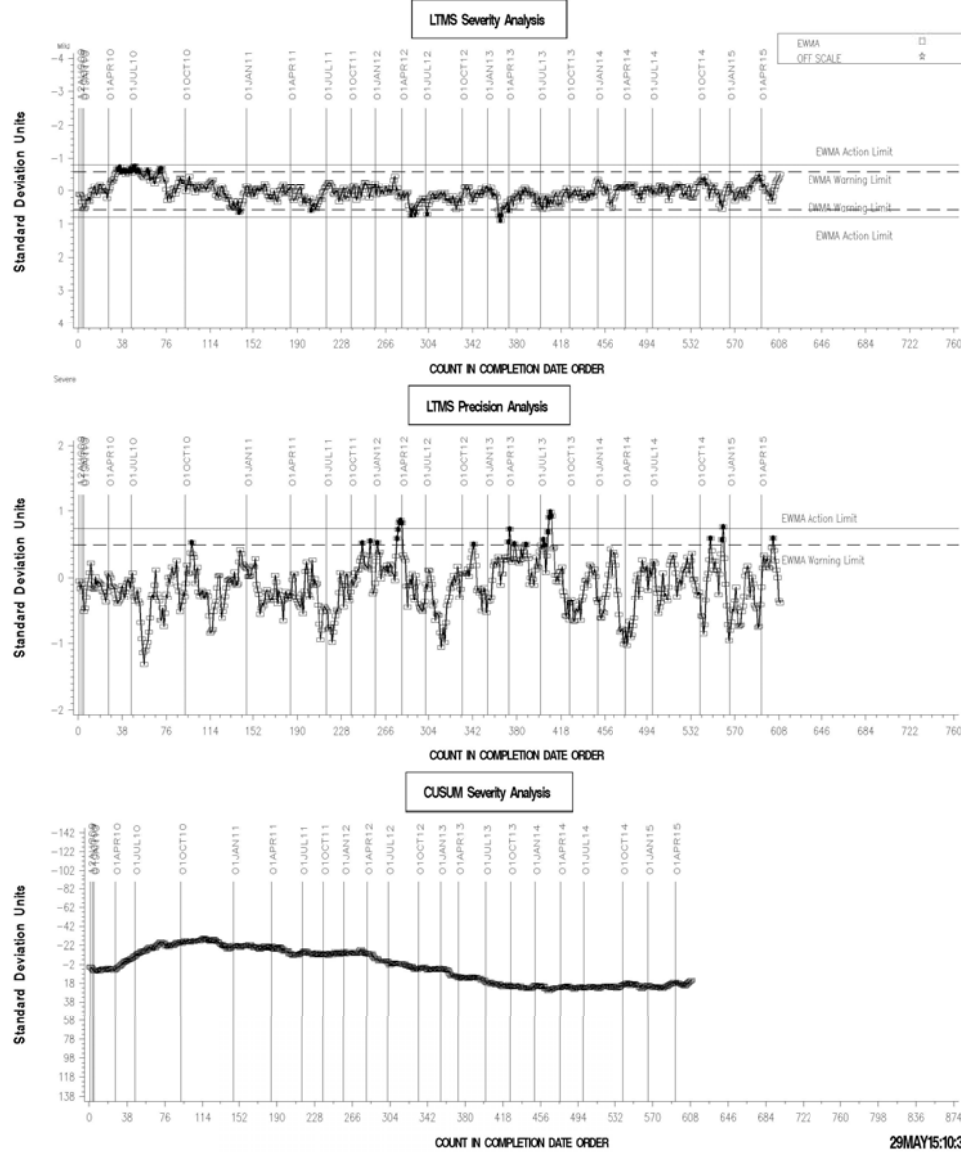


LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REF SILICON POINTS HARDNESS CHANGE AVERAGE

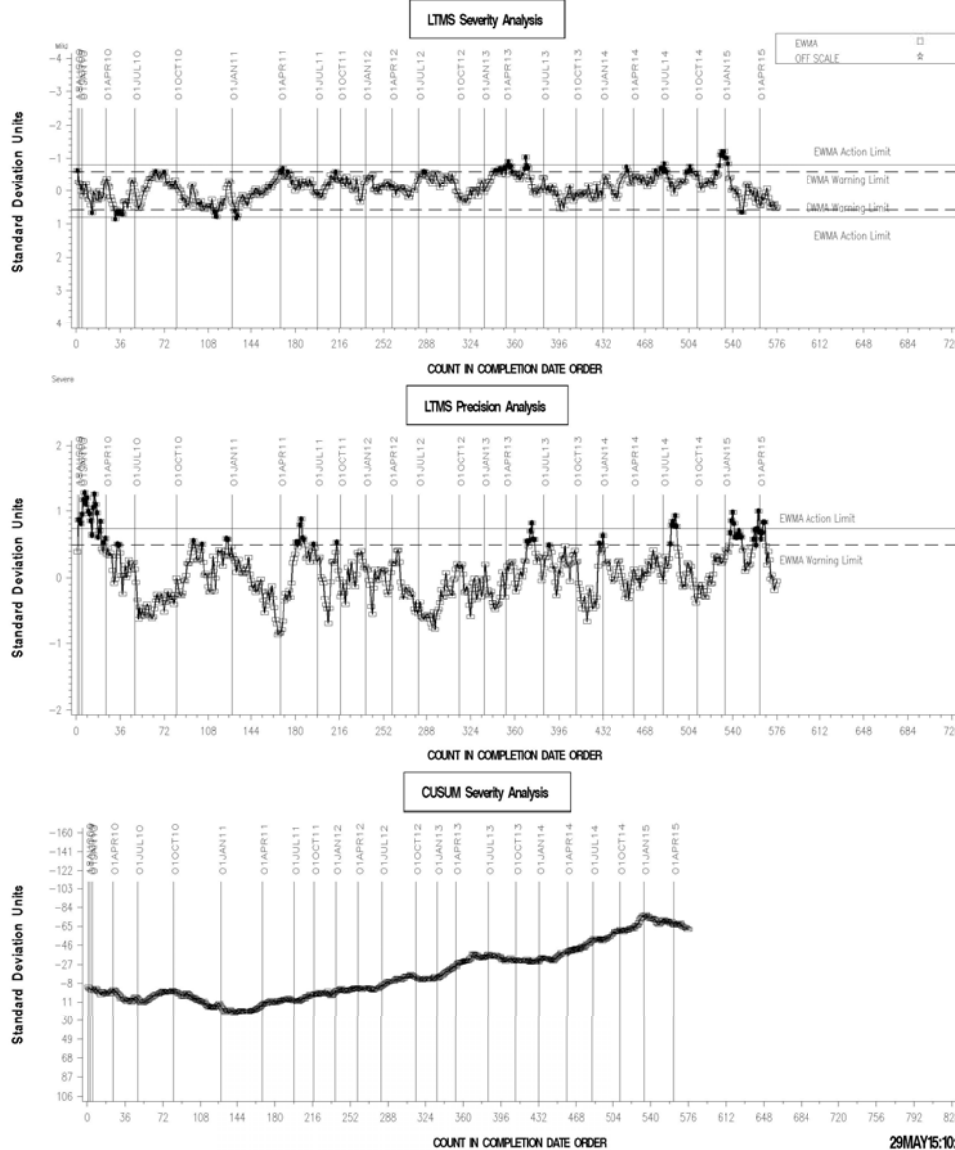


LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE TENSILE STRENGTH CHANGE AVG

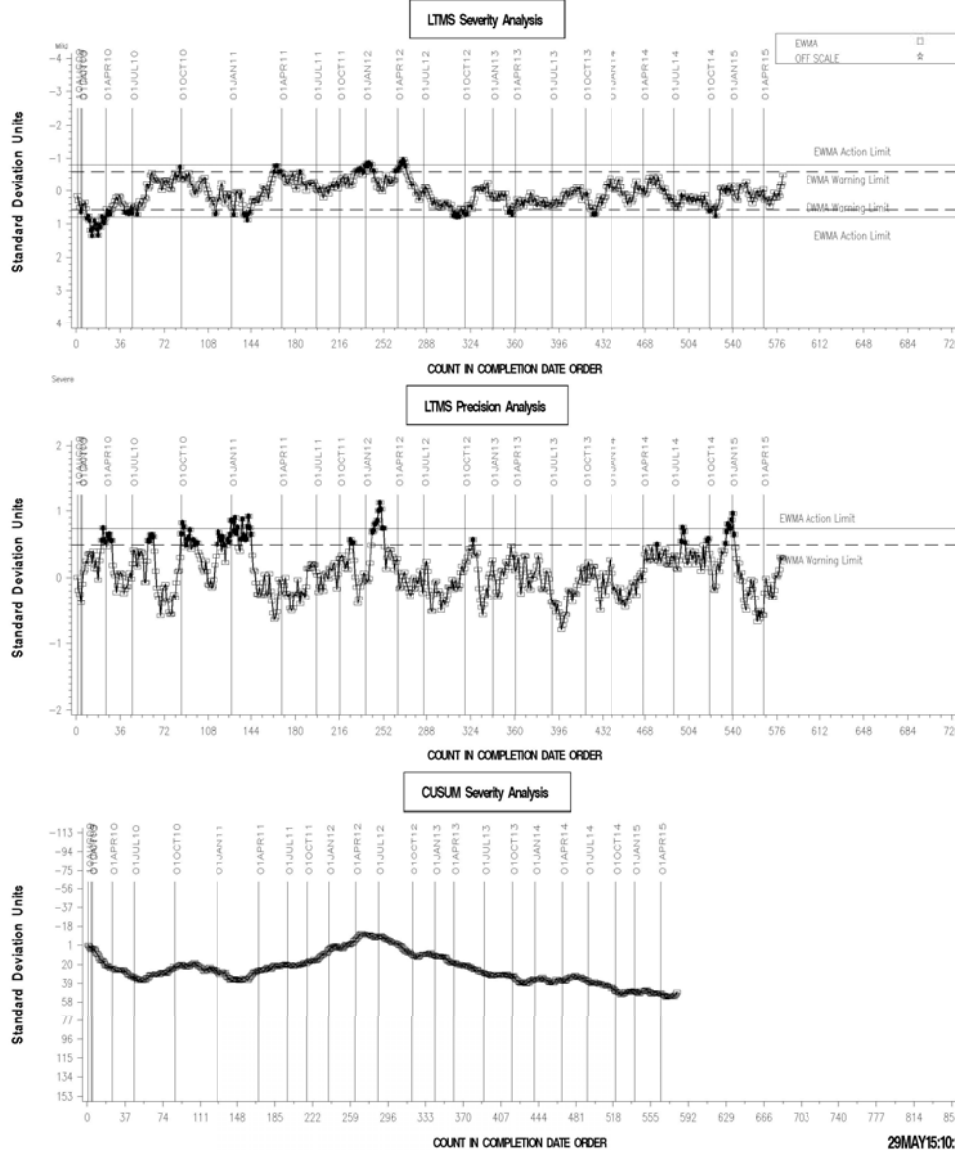


LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



REF FLURO TENSILE STRENGTH CHANGE AVERAGE



29MAY15:10:24

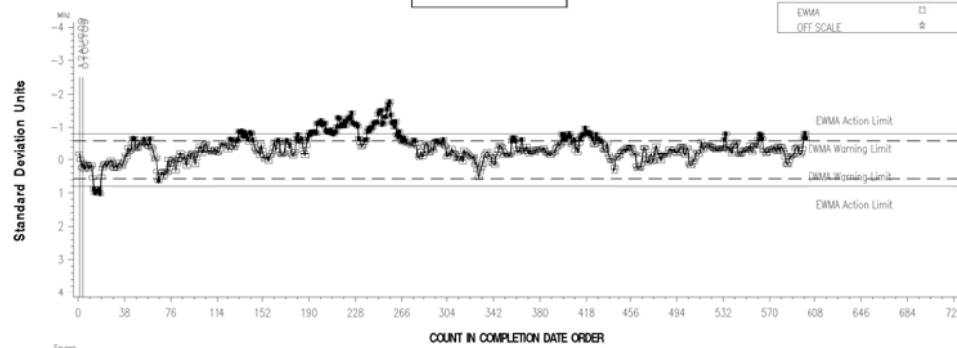
LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA

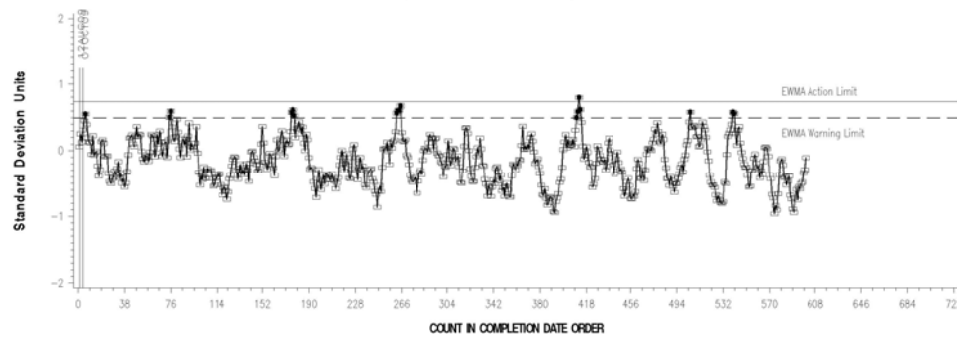


REF NITRILE TENSILE STRENGTH CHANGE AVERAGE

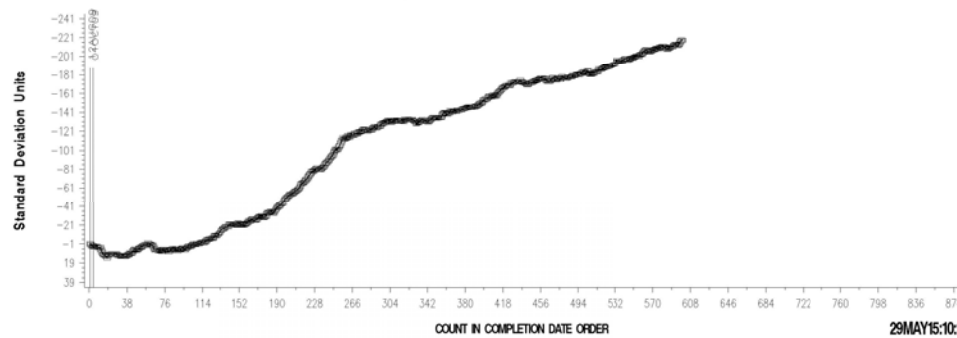
LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

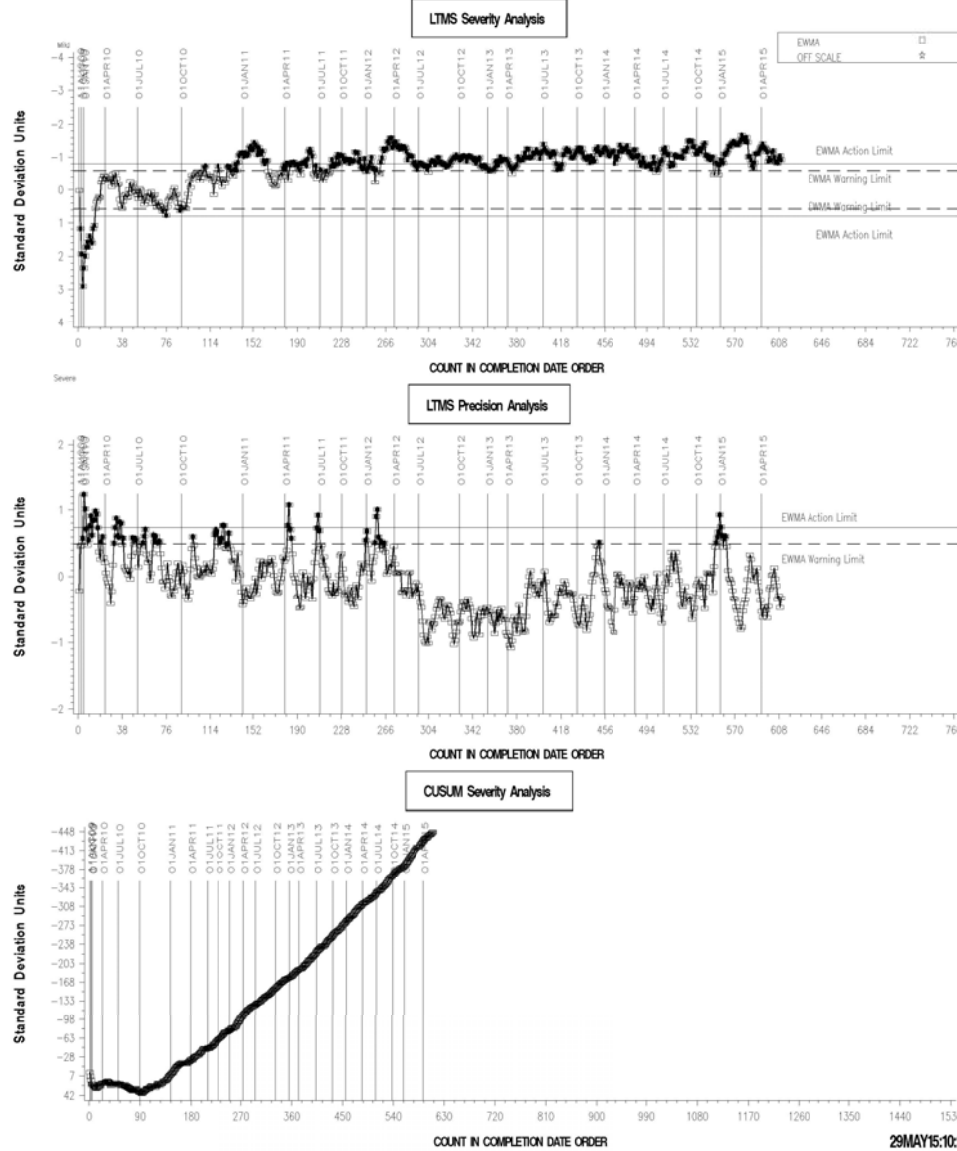


LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF POLYACRYLATE TENSILE STRENGTH CHG AVG

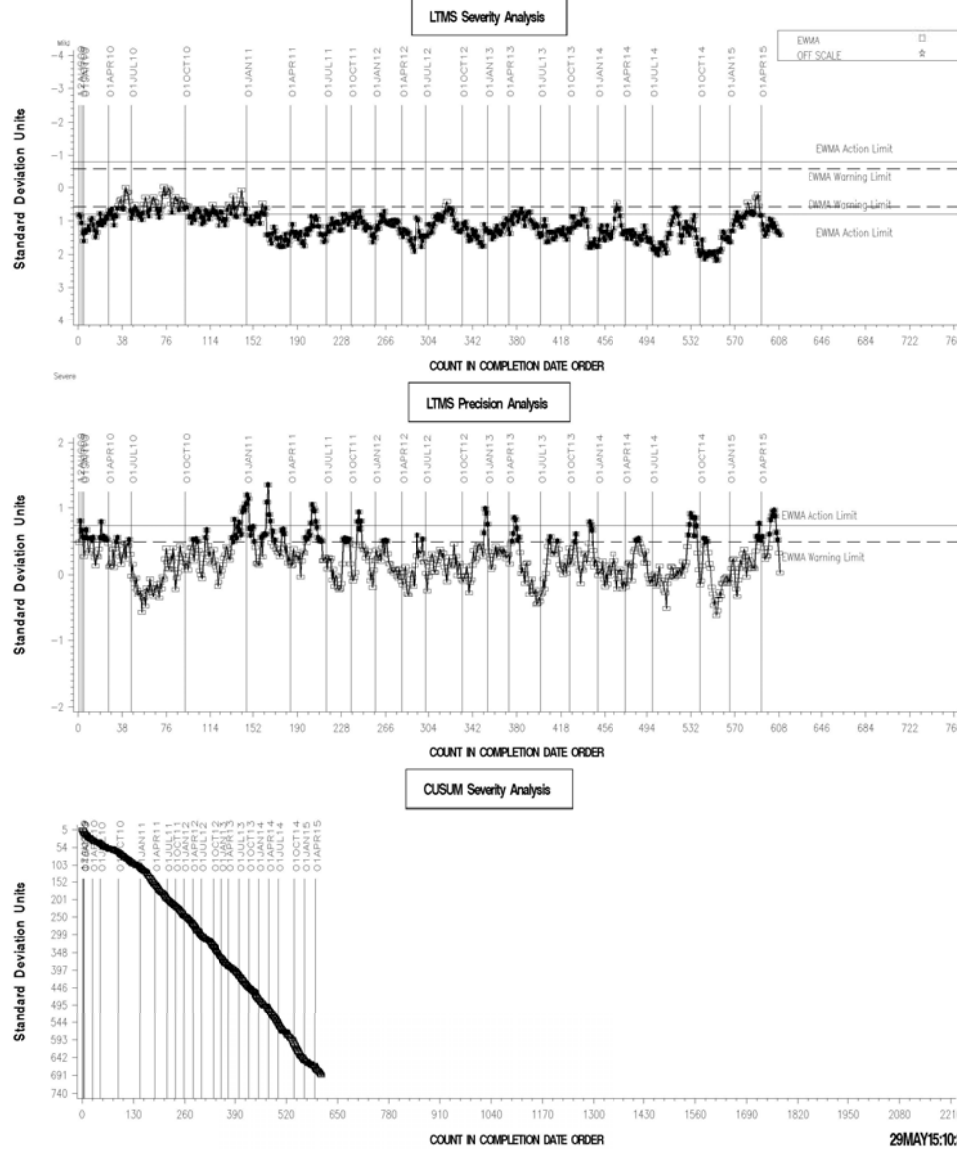


LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REF SILICON TENSILE STRENGTH CHANGE AVERAGE



LDEOC (D 7216)

INFORMATION LETTERS

No Information Letters were issued this period.

LDEOC (D 7216)

STATUS OF REFERENCE OIL SUPPLY

Oil	Samples @ Labs	@ TMC	
		Samples (750 mL)	Gallons
1006-1	254	2,245	445
Total	254	2,245	445