



Test Monitoring Center

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

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

MEMORANDUM: 17-012

DATE: May 10, 2017

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

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

SUBJECT: LDEOC Testing from October 1, 2016 through March 31, 2017

A total of 345 LDEOC tests were reported from 7 labs to the Test Monitoring Center during the period from October 1, 2016 through March 31, 2017.

Please find attached a summary of testing activity this period.

MTK/mtk/mem17-012.mtk.doc

cc: Frank Farber

Jeff Clark

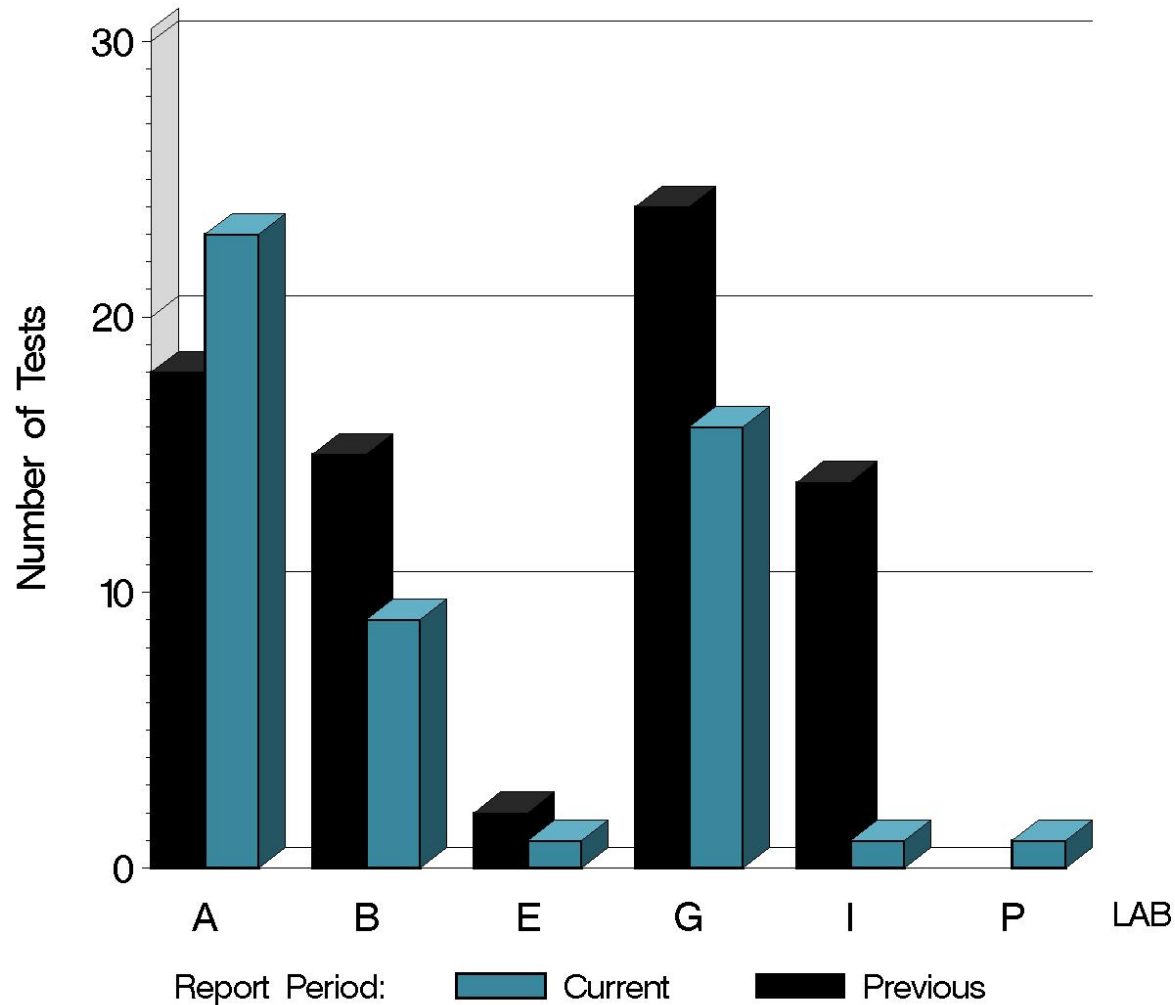
EOEC Surveillance Panel

<ftp://ftp.astmtmc.cmu.edu/docs/bench/ldeoc/semiannualreports/ldeoc-04-2017.pdf>

Distribution: email

LDEOC (D 7216)

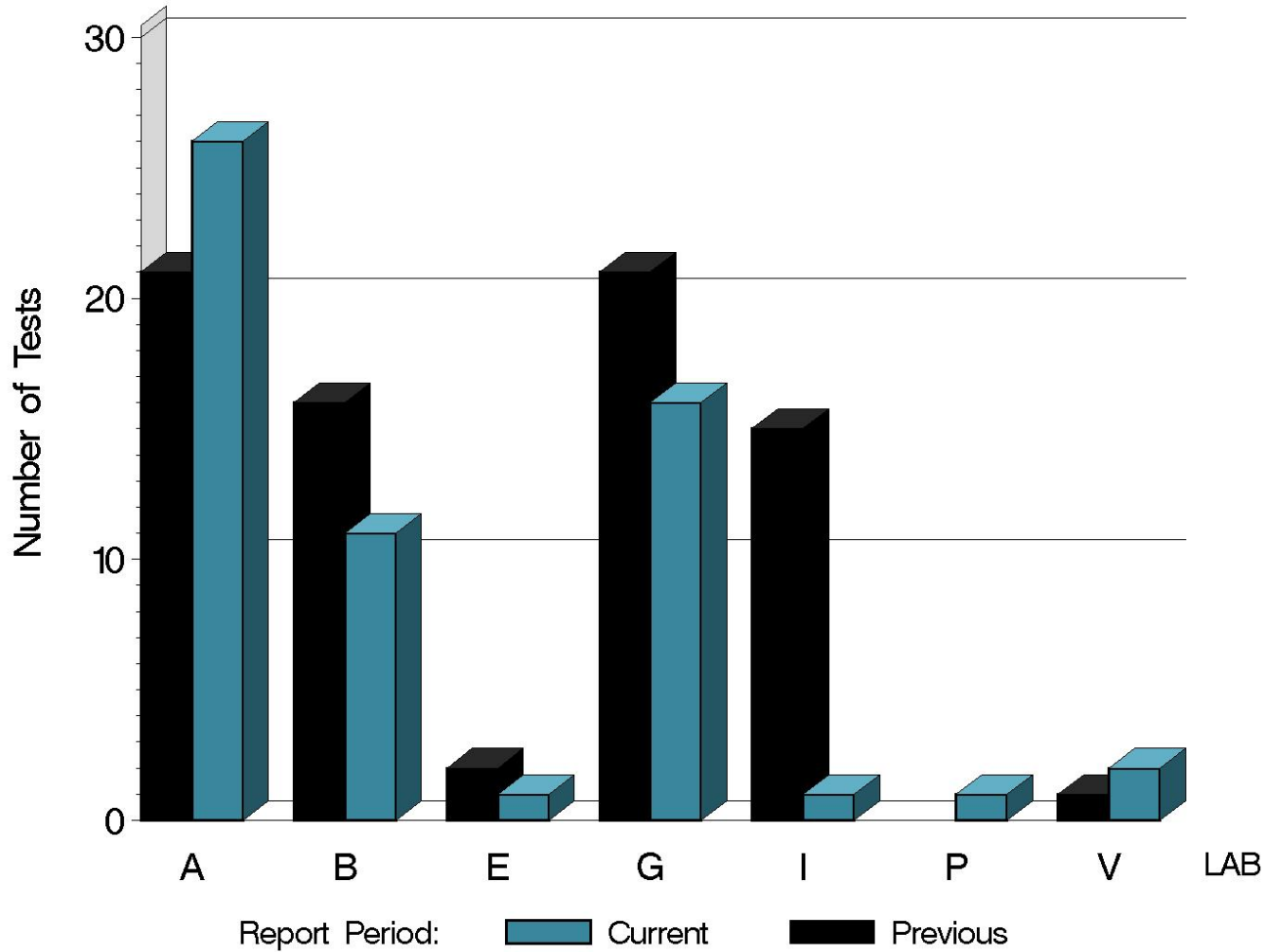
NUMBER OF ETHYLENE ACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



15:28:51 09MAY2017

LDEOC (D 7216)

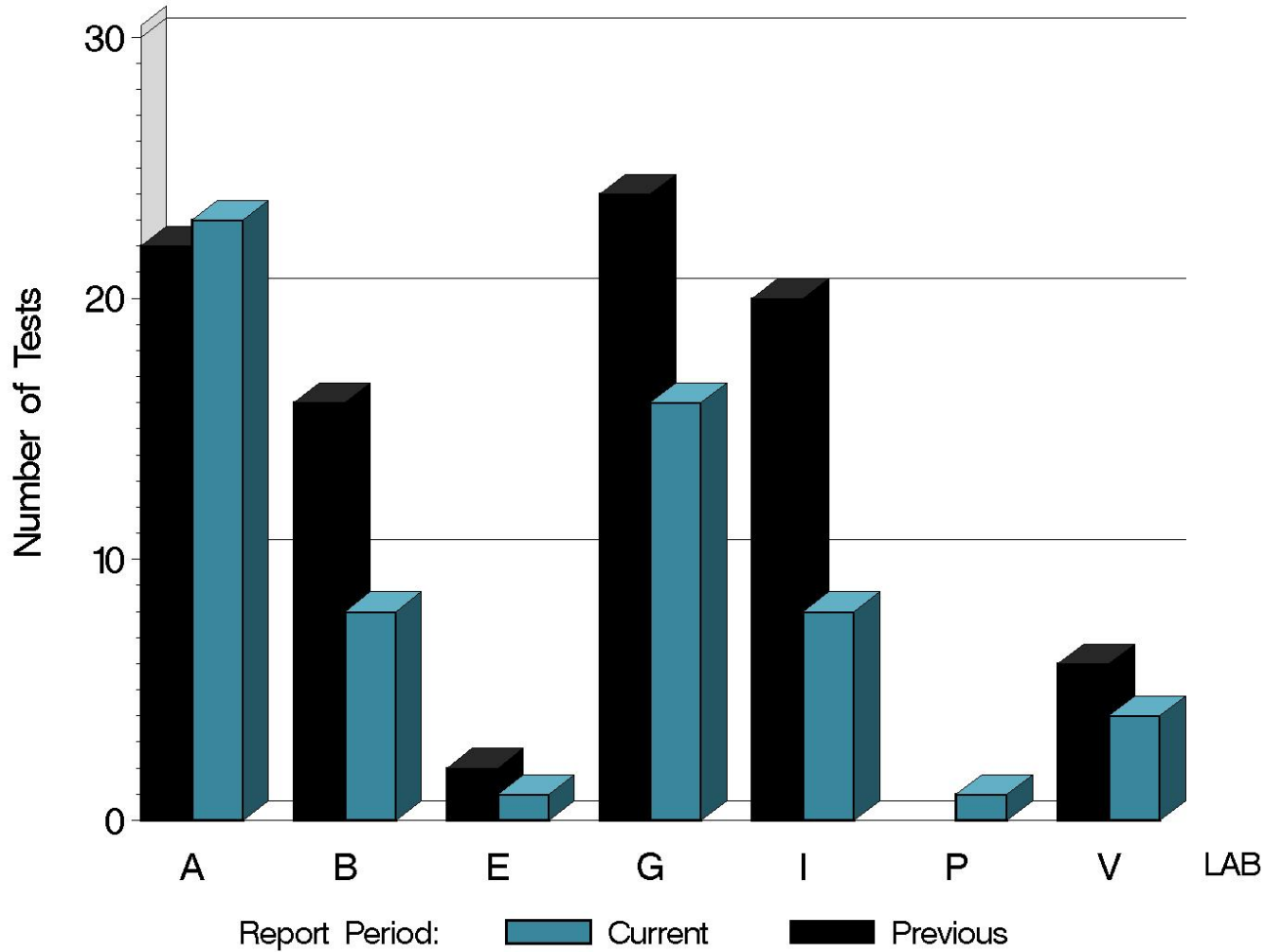
NUMBER OF FLUOROELASTOMER TESTS
REPORTED BY LAB AND REPORT PERIOD



15:28:51 09MAY2017

LDEOC (D 7216)

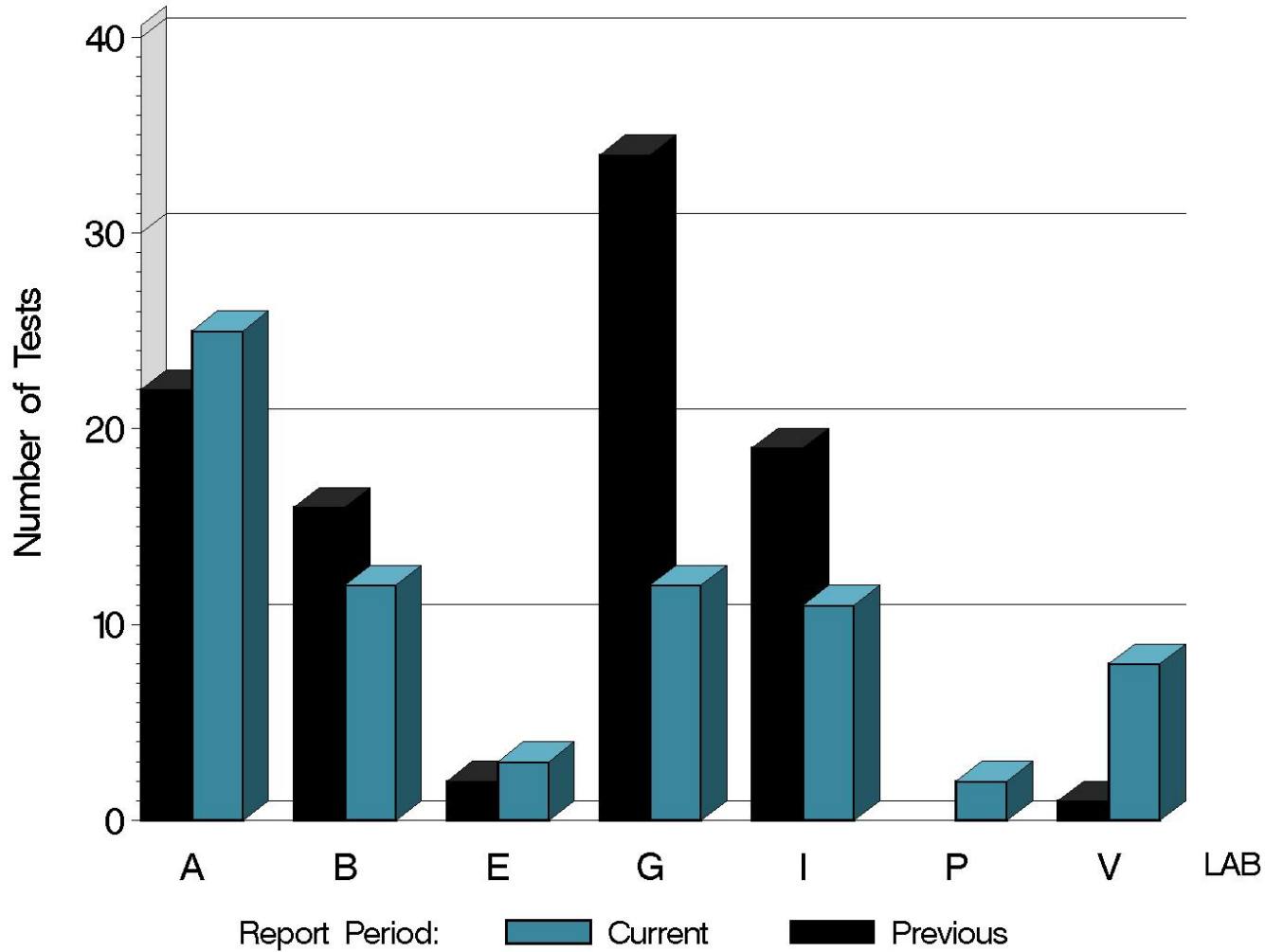
NUMBER OF NITRILE TESTS REPORTED BY LAB AND REPORT PERIOD



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LDEOC (D 7216)

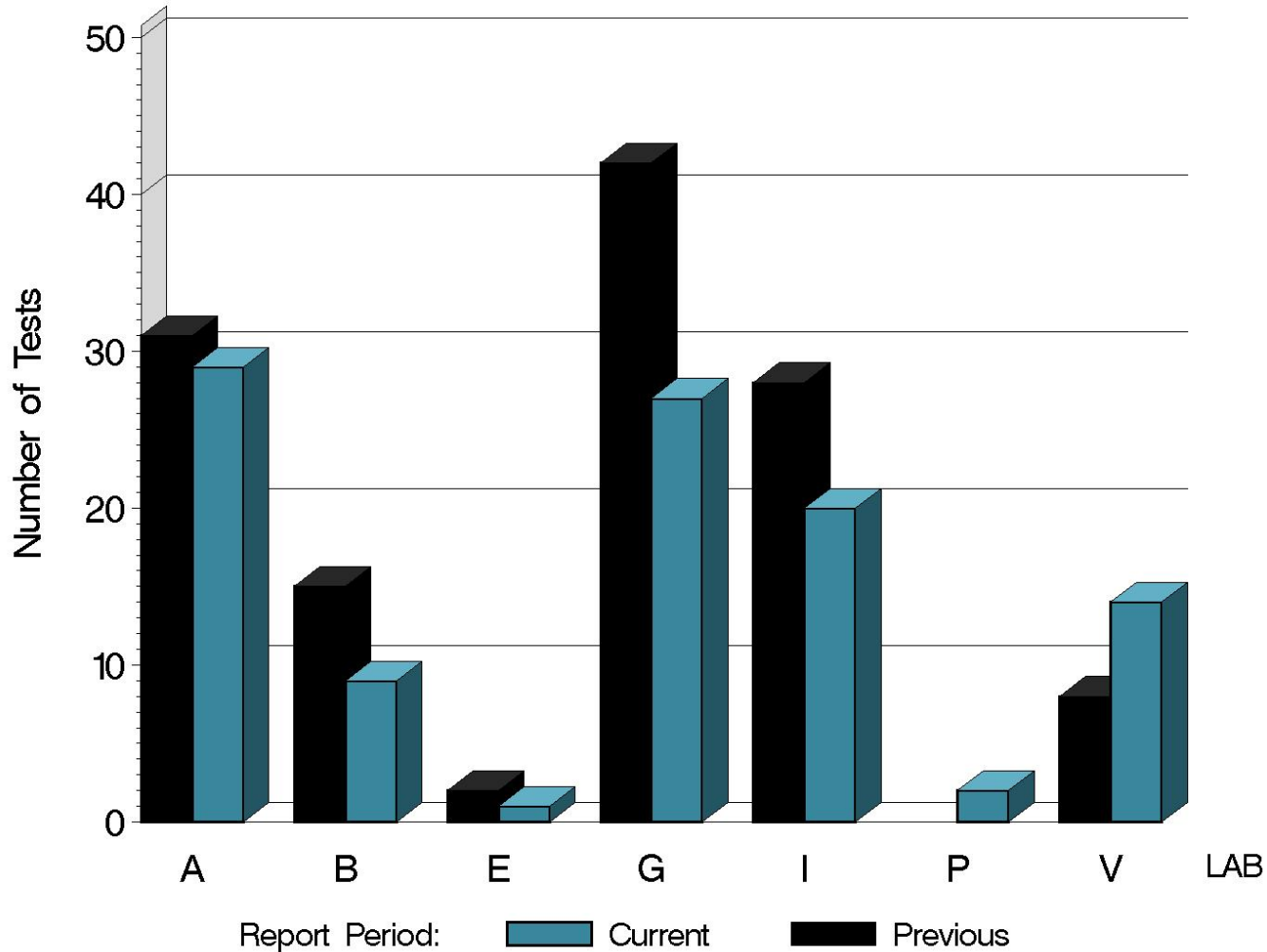
NUMBER OF POLYACRYLATE TESTS
REPORTED BY LAB AND REPORT PERIOD



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LDEOC (D 7216)

NUMBER OF SILICONE TESTS
REPORTED BY LAB AND REPORT PERIOD



15:28:51 09MAY2017

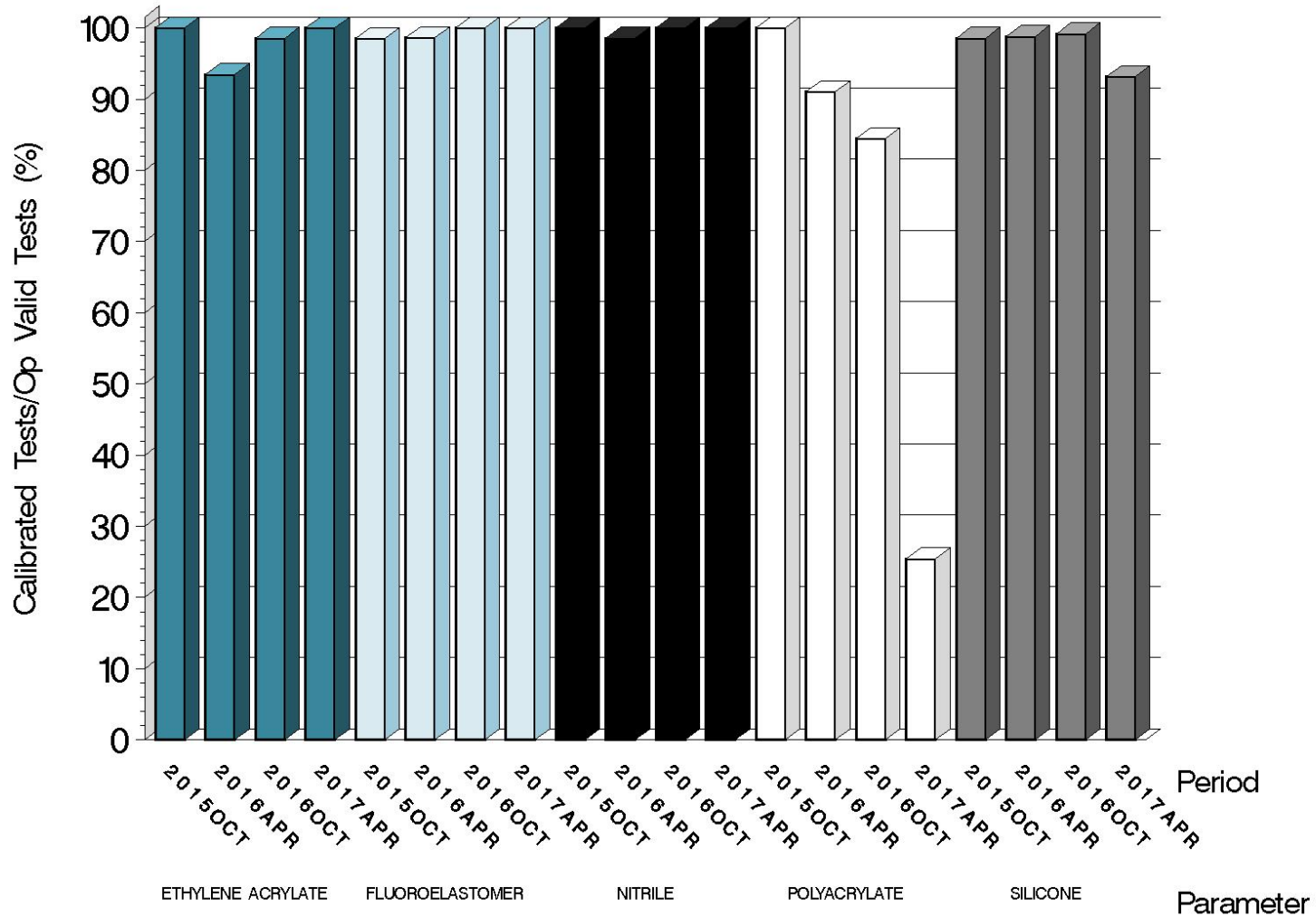
LDEOC (D 7216)

Test Distribution by Oil and Validity

		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	This Period	Last Period
Accepted for Calibration	AC	51	54	61	14	95	275	426
Rejected	OC	0	0	0	41	7	48	16
Acceptable Information Run	NI	0	4	0	12	0	16	8
Unacceptable Information Run	MI	0	0	0	5	0	5	2
Invalid Information Run (TMC)	LI	0	0	0	1	0	1	0
Invalid Information Run (TMC)	RI	0	0	0	0	0	0	0
Operationally Invalid (lab)	LC	0	0	0	0	0	0	0
Acceptable Shakedown Run	AS	0	0	0	0	0	0	4
Aborted Calibration	XC	0	0	0	0	0	0	1
Total		51	58	61	73	102	345	457

LDEOC (D 7216)

OPERATIONALLY VALID TESTS MEETING ACCEPTANCE CRITERIA



15:28:51 09MAY2017

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	23	0	0	26	0	0	23	0	0	25	0	0	29	0	0	126	0
B	0	9	0	0	11	0	0	8	0	0	12	0	0	9	0	0	49	0
E	0	1	0	0	1	0	0	1	0	0	3	0	0	1	0	0	7	0
G	0	16	0	0	16	0	0	16	0	0	12	0	0	27	0	0	87	0
I	0	1	0	0	1	0	0	8	0	0	11	0	0	20	0	0	41	0
P	0	1	0	0	1	0	0	1	0	0	2	0	0	2	0	0	7	0
V	0	0	0	0	2	0	0	4	0	0	8	0	0	14	0	0	28	0
Total	0	51	0	0	58	0	0	61	0	0	73	0	0	102	0	0	345	0

LDEOC (D 7216)

CAUSES FOR LOST TESTS

Lab	Cause	Elastomer					Validity			Loss Rate		
		Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	LC	RC	XC	Lost	Starts	%
-	No Lost Tests this Period	0	0	0	0	0	0	0	0	0	345	0
	Lost	0	0	0	0	0	0	0	0	0		
	Starts	51	58	61	73	102	345	345	345			
	%	0	0	0	0	0	0	0	0			

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	23	-1.641	-0.038	0.941
	B	9	-0.706	0.562	0.385
	E	1	-1.818	-1.758	1.385
	G	16	-1.058	1.538	0.859
	I	1	-0.429	0.440	-1.189
	P	1	-1.065	-2.857	-1.111
	V	0	-	-	-
	Industry	51	-1.262	0.483	0.744
Fluoroelastomer	A	22	-0.615	1.110	-0.380
	B	11	-0.618	-0.015	0.421
	E	1	1.267	-1.455	-0.647
	G	16	-0.808	-0.032	0.933
	I	1	-2.933	1.515	1.378
	P	1	0.667	0.525	-1.157
	V	2	-1.000	1.515	-2.378
	Industry	54	-0.672	0.506	0.111
Nitrile	A	23	1.384	-0.027	-0.625
	B	8	1.900	-0.402	-0.345
	E	1	1.867	-2.126	-0.873
	G	16	1.150	0.747	-1.058
	I	8	1.308	0.603	-0.392
	P	1	1.550	-0.977	0.283
	V	4	1.179	-0.690	-1.190
	Industry	61	1.378	0.116	-0.697

LDEOC (D 7216)

Average Δ 's by Lab					
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI
Polyacrylate	A	20	3.683	-0.766	-0.820
	B	10	3.308	-0.896	-0.900
	E	1	4.545	-1.416	-0.988
	G	10	4.367	0.208	-0.395
	I	6	4.987	0.316	-1.160
	P	2	3.492	-2.065	-0.597
	V	6	2.987	-1.199	-0.496
	Industry	55	3.814	-0.601	-0.754
Silicone	A	29	-0.034	-0.689	2.179
	B	9	0.258	-0.815	1.863
	E	1	0.449	0.765	3.417
	G	27	1.130	-0.597	1.544
	I	20	-1.133	0.348	0.115
	P	2	0.180	-0.706	1.335
	V	14	0.407	-1.056	1.350
	Industry	102	0.154	-0.509	1.460

Test Monitoring Center

<http://astmtmc.cmu.edu>



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LDEOC (D 7216)

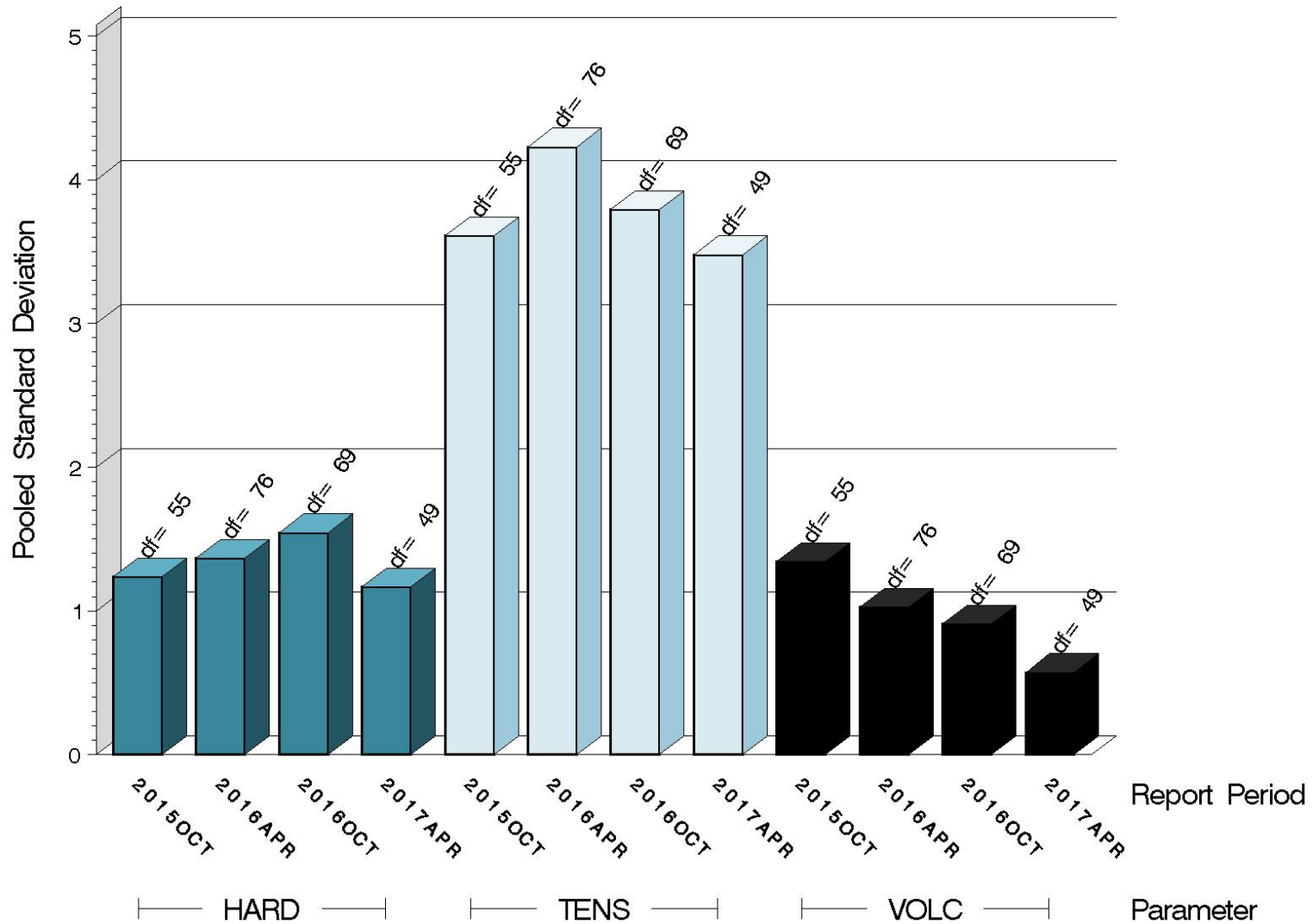
Individual test results can be viewed at the links shown in the following table:

<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

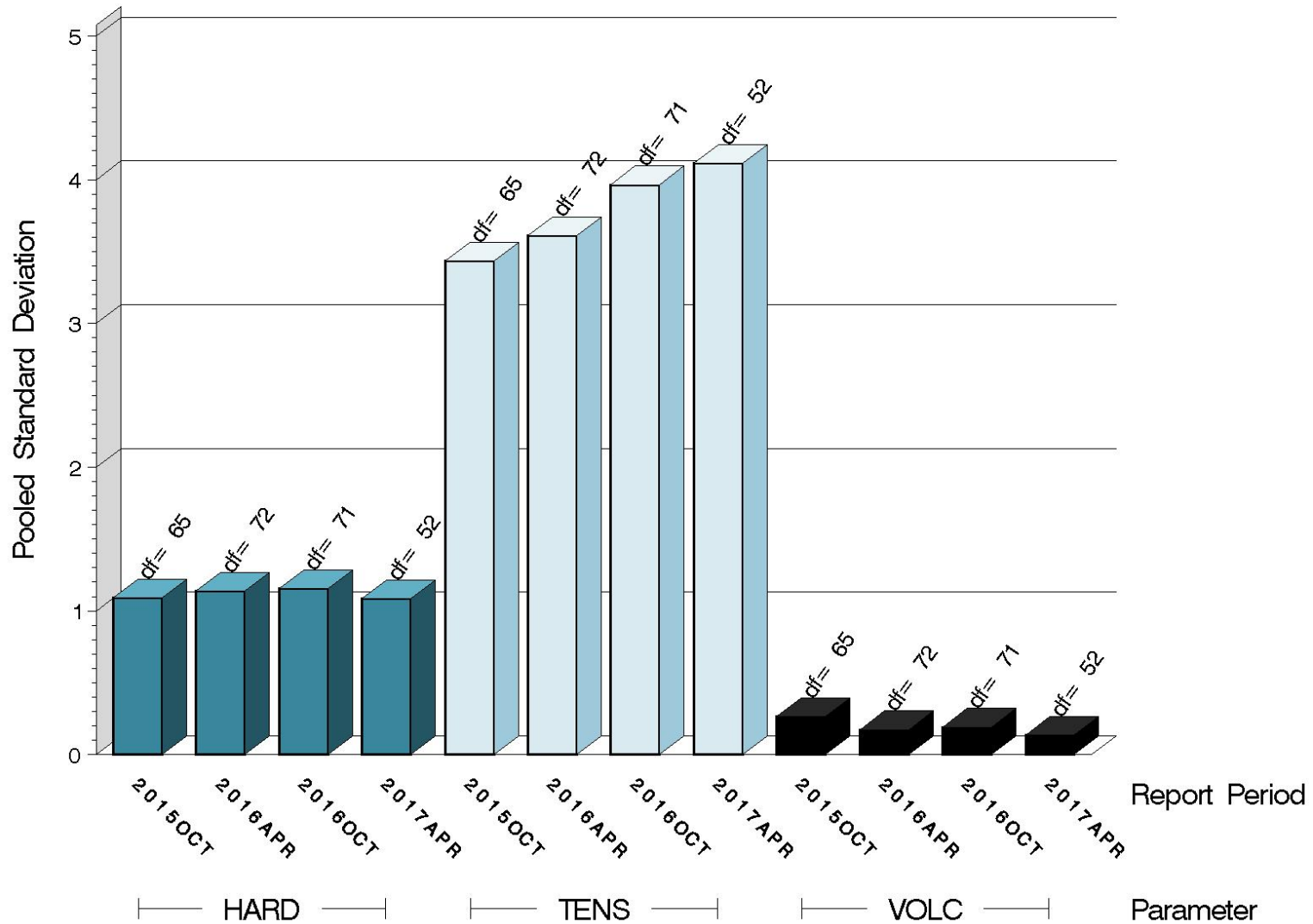
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



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LDEOC (D 7216)

FLUOROELASTOMER TEST PRECISION POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

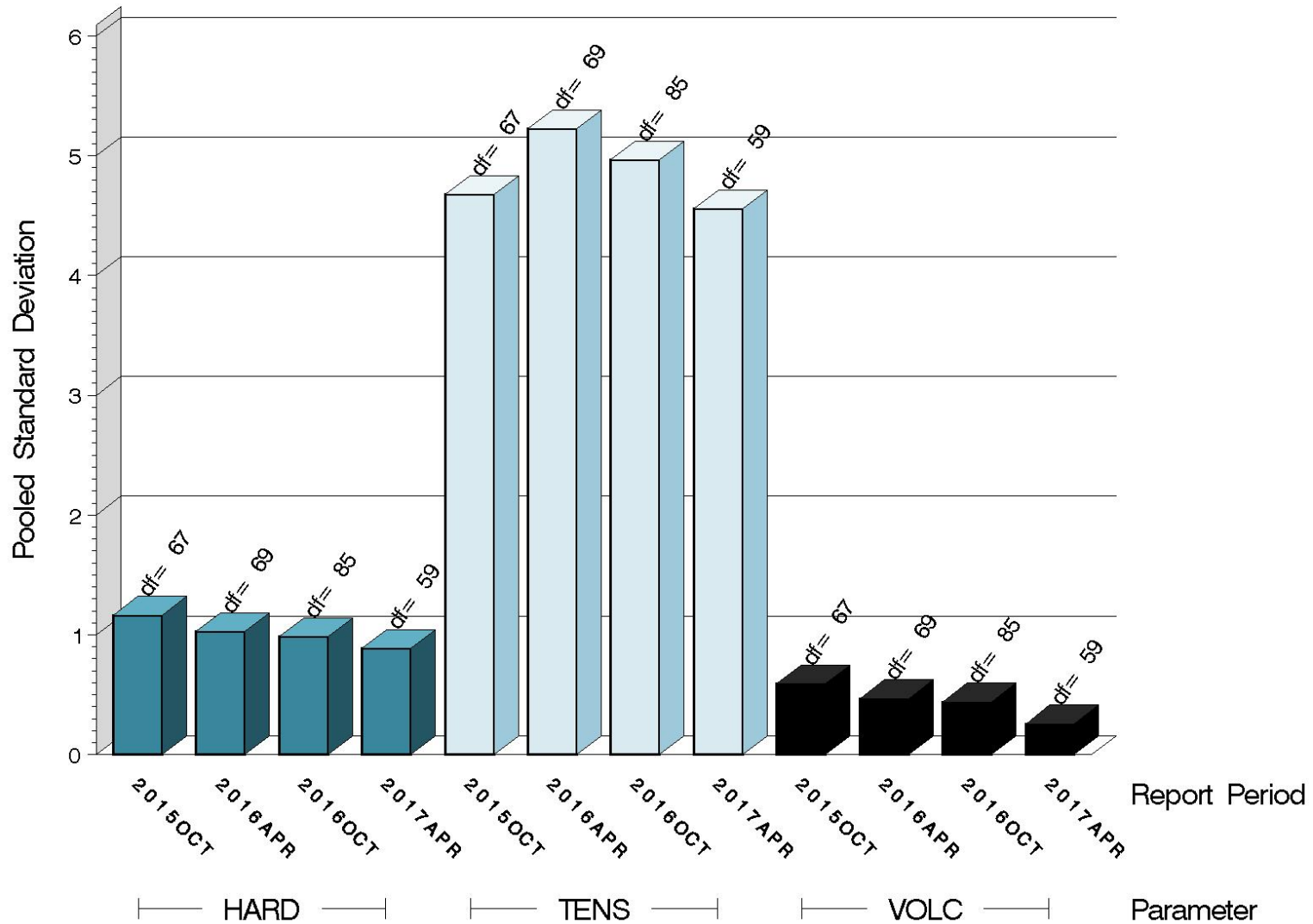


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LDEOC (D 7216)

NITRILE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

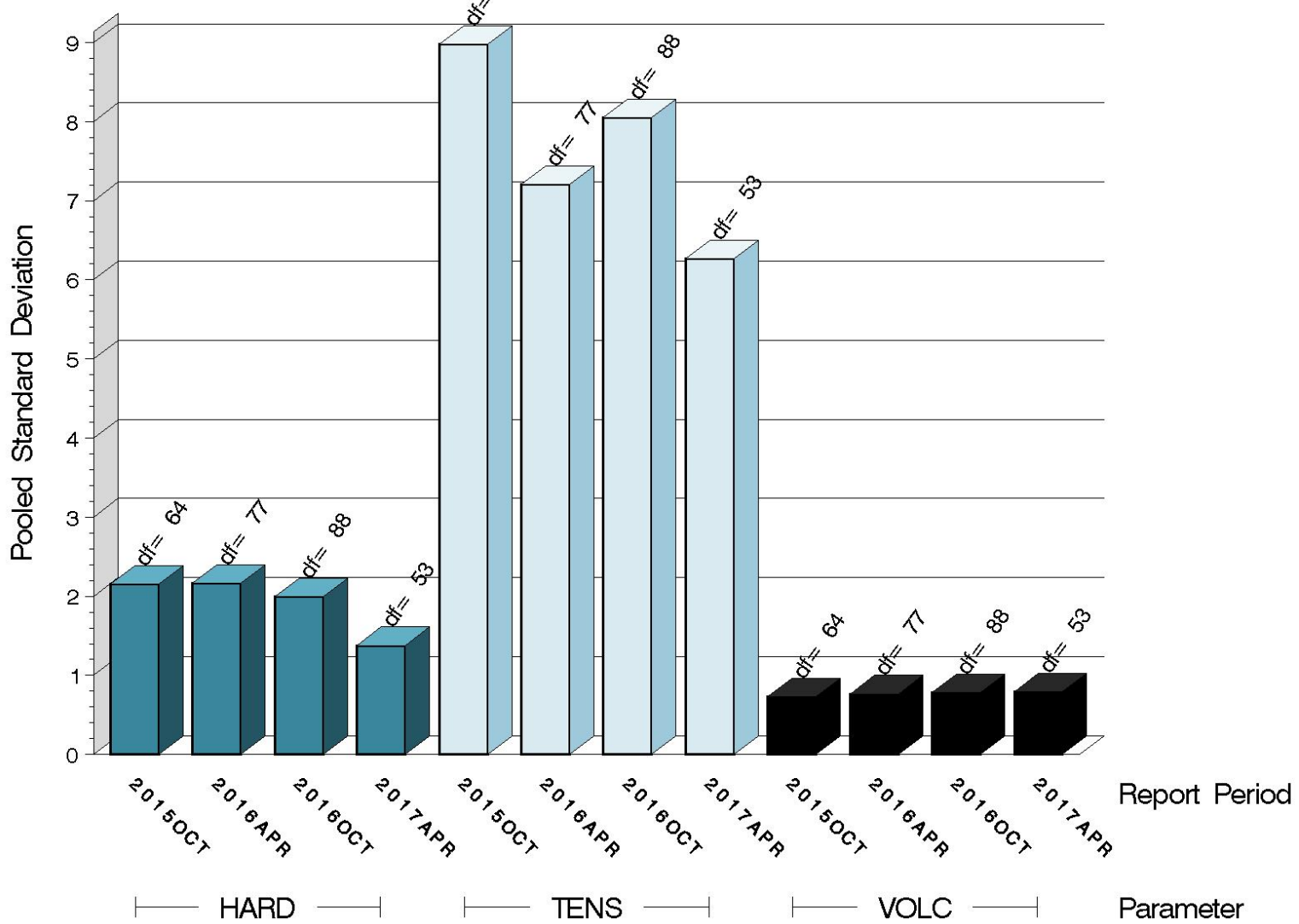


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LDEOC (D 7216)

POLYACRYLATE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD

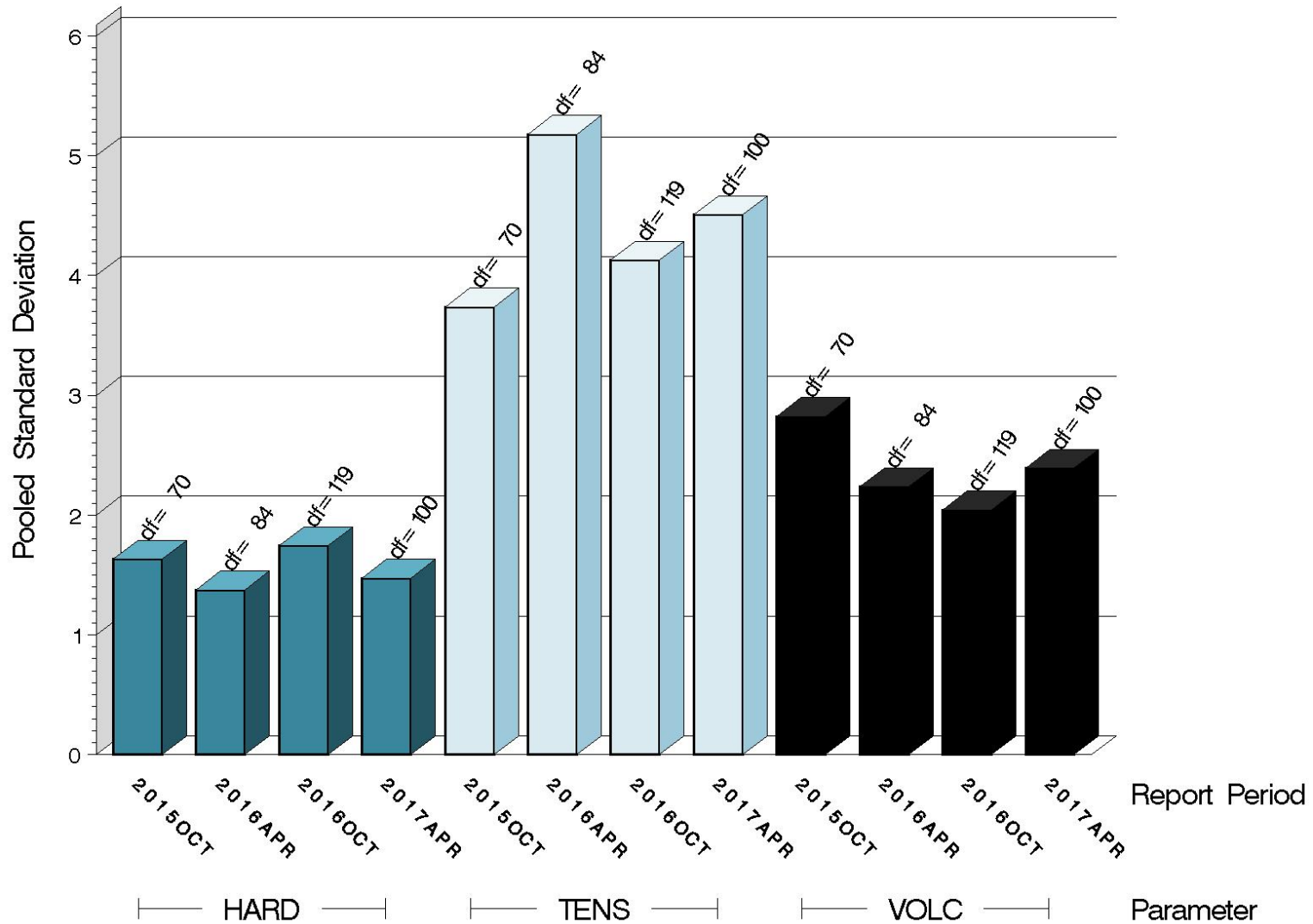


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LDEOC (D 7216)

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

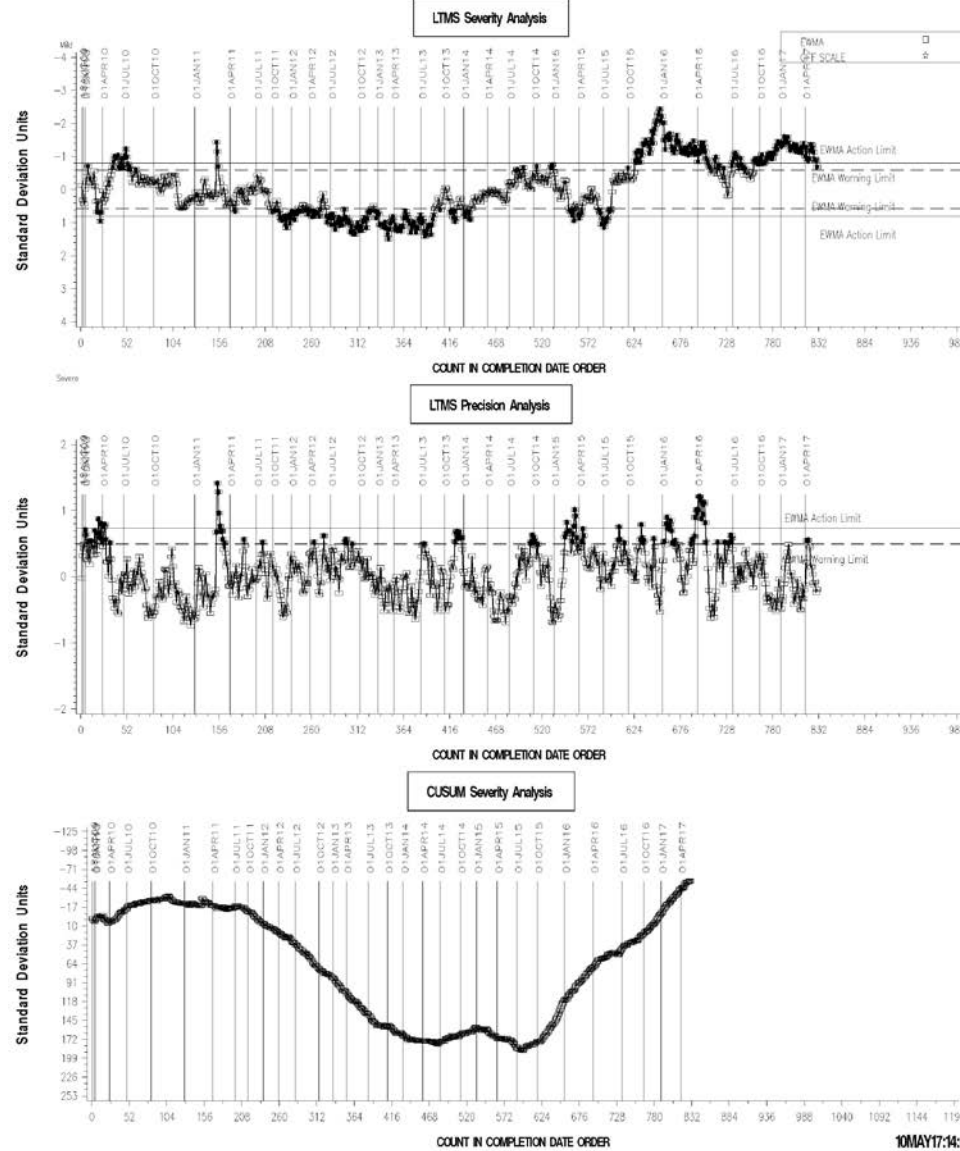
Industry control charts follow.

LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE VOLUME CHANGE AVERAGE

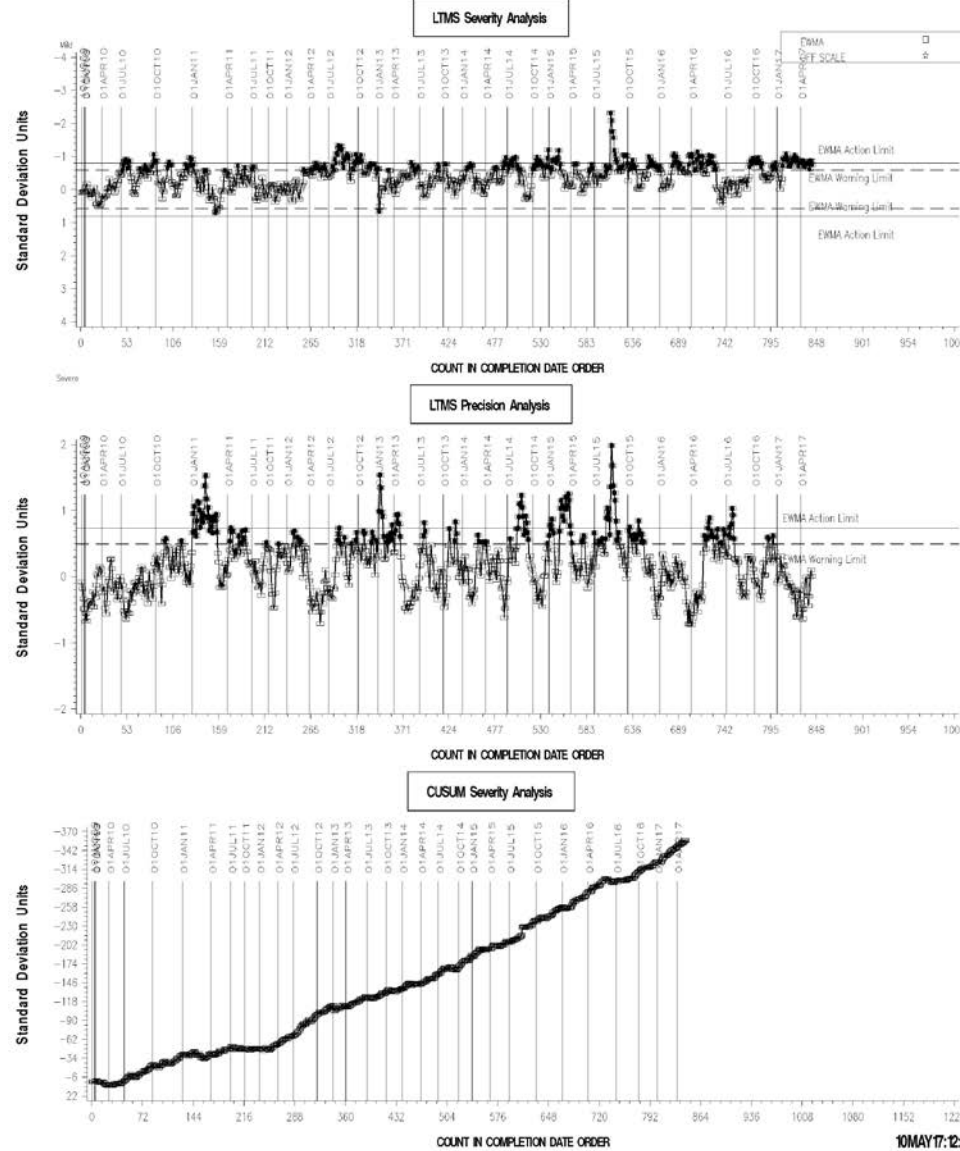


LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



REF FLUOROELASTOMER VOLUME CHANGE AVERAGE

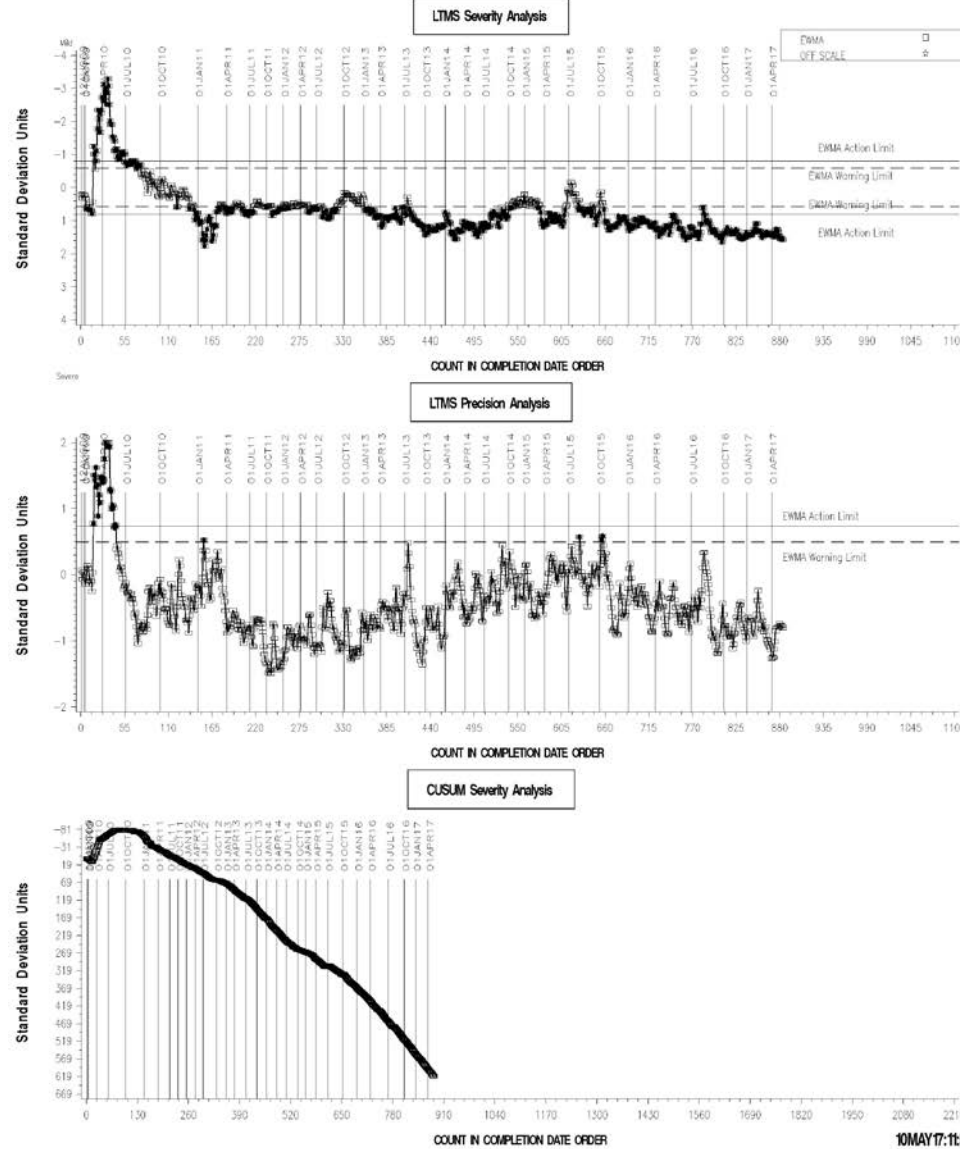


LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



REFERENCE NITRILE VOLUME CHANGE AVERAGE



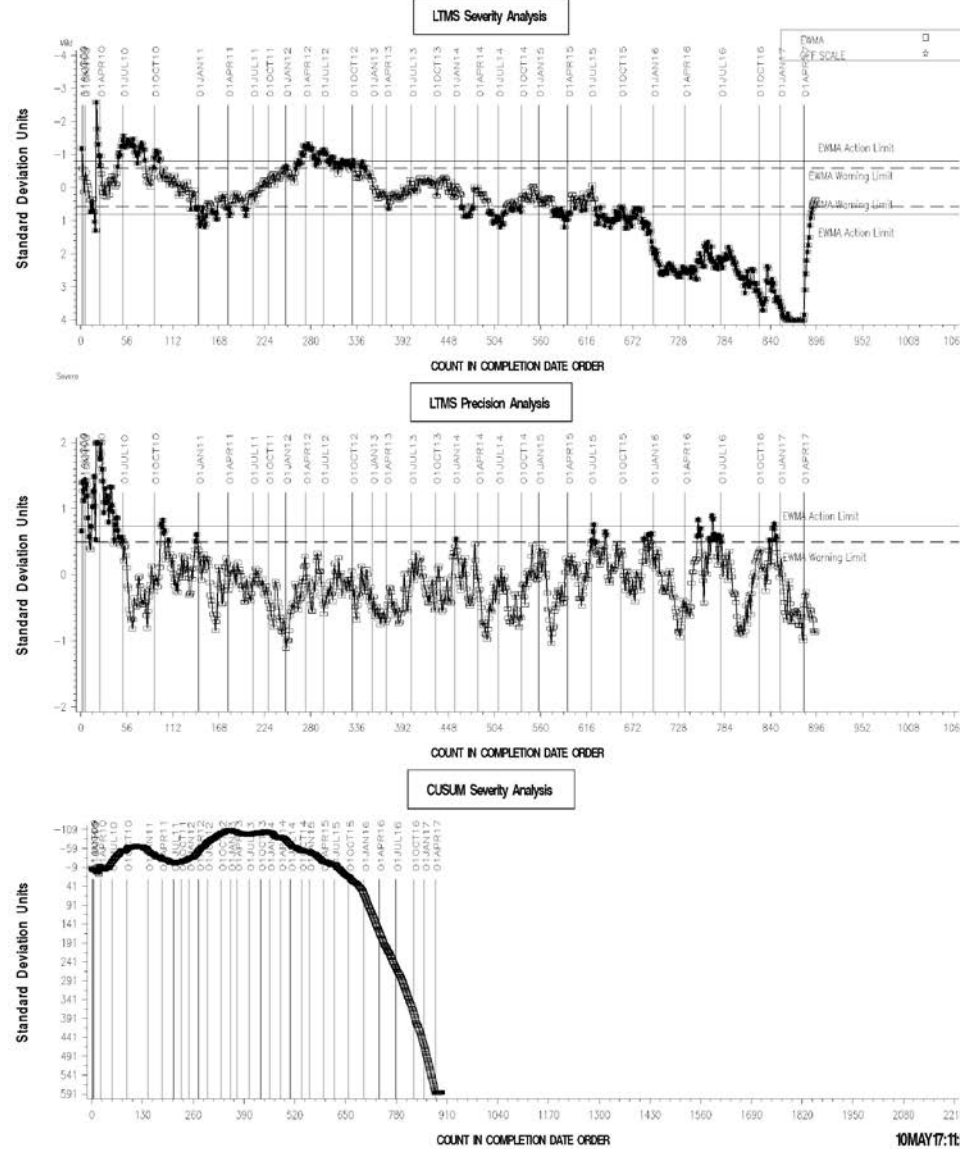
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LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



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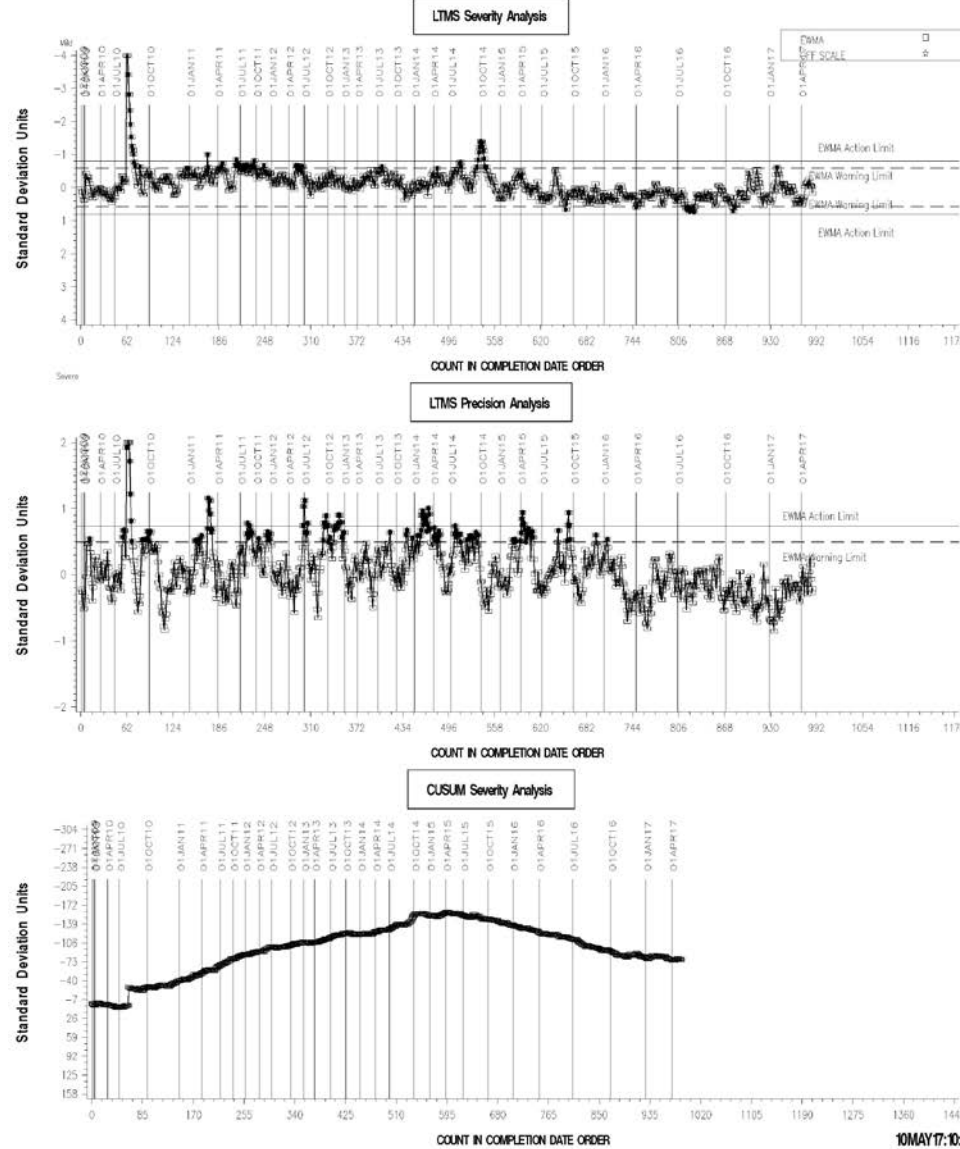


LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REFERENCE SILICON VOLUME CHANGE AVERAGE

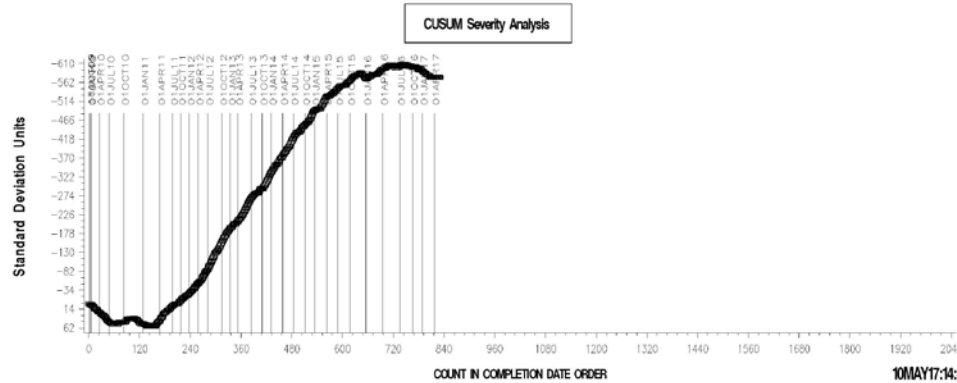
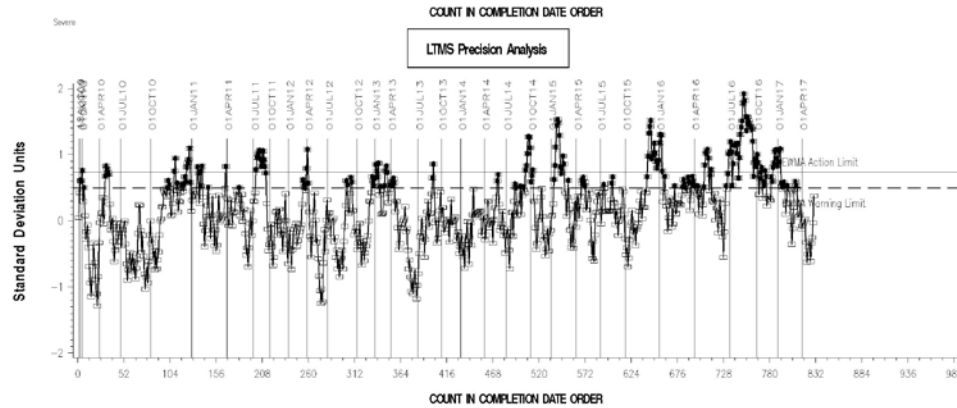
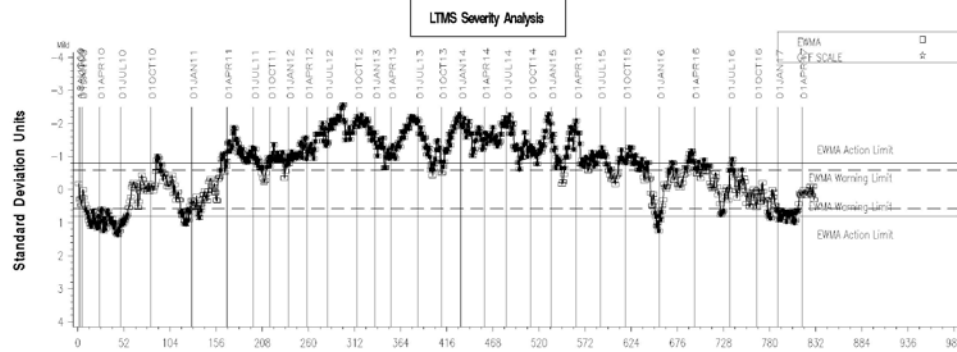


LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE POINTS HARDNESS CHANGE AVG

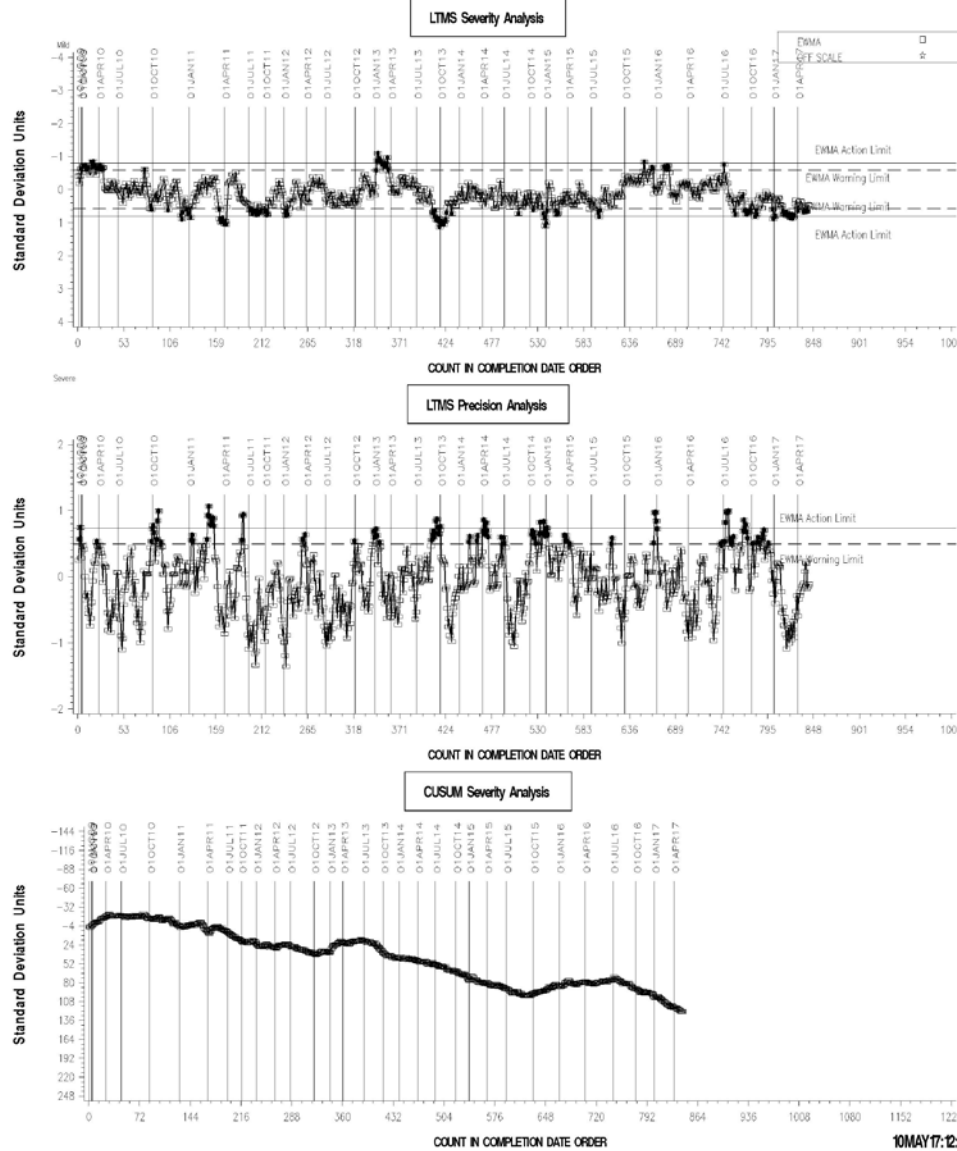


LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



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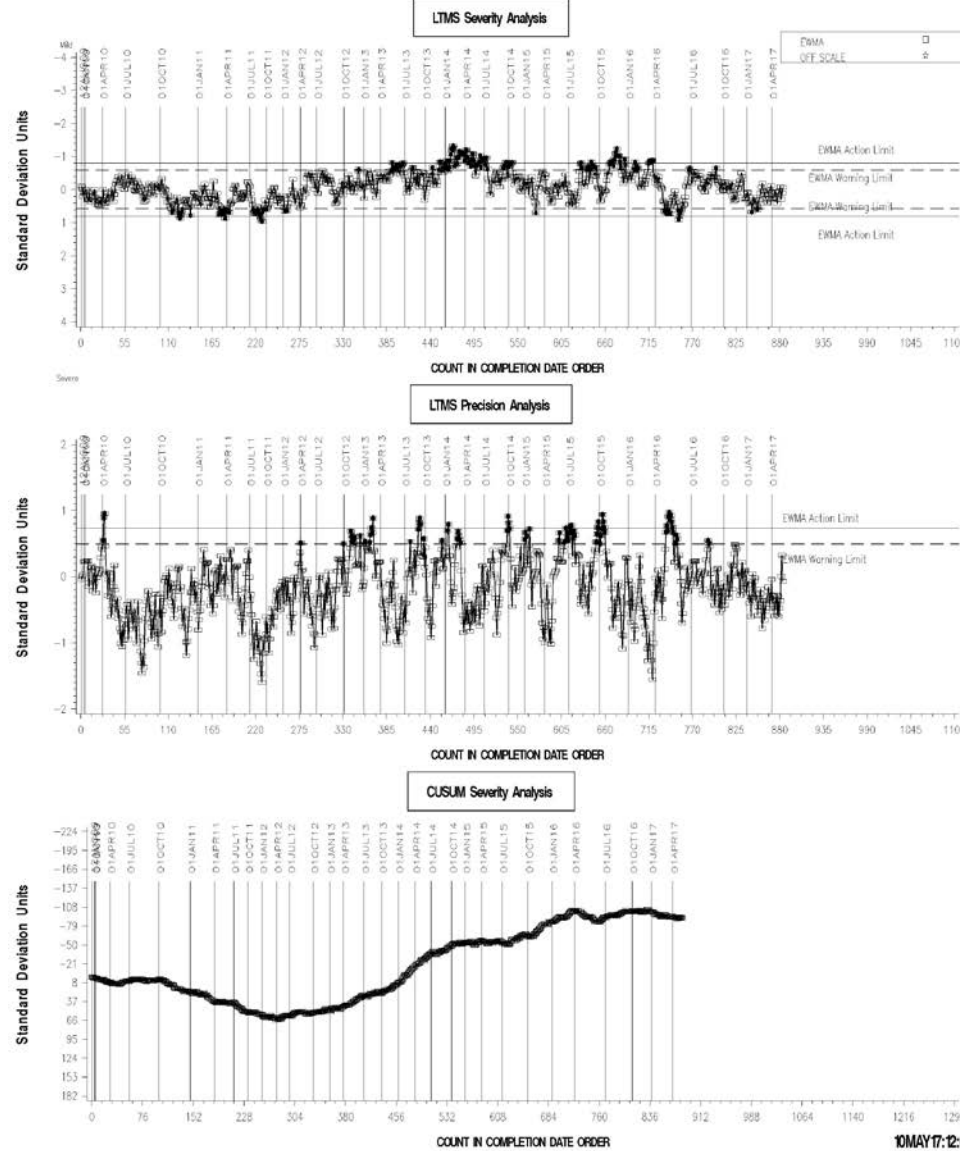


LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



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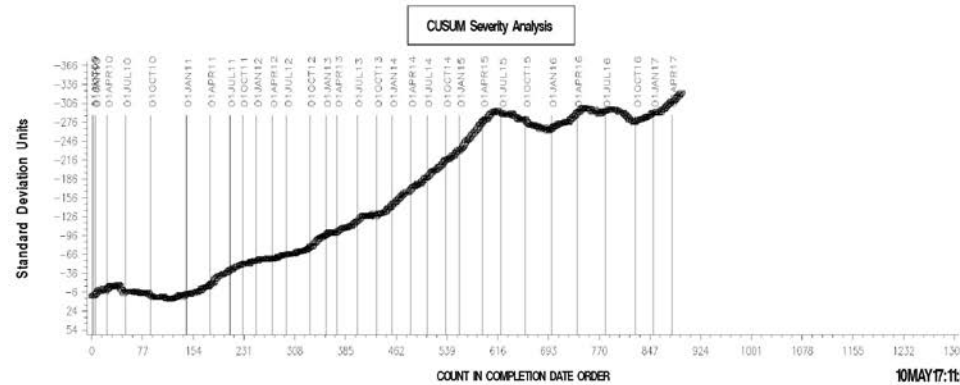
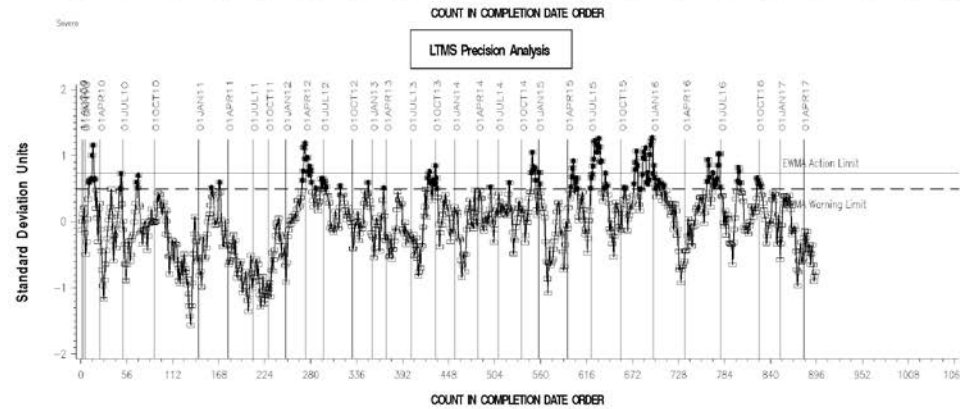
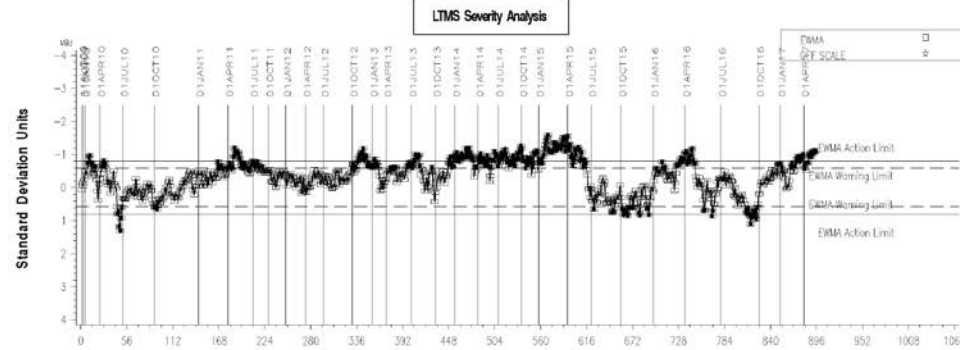


LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



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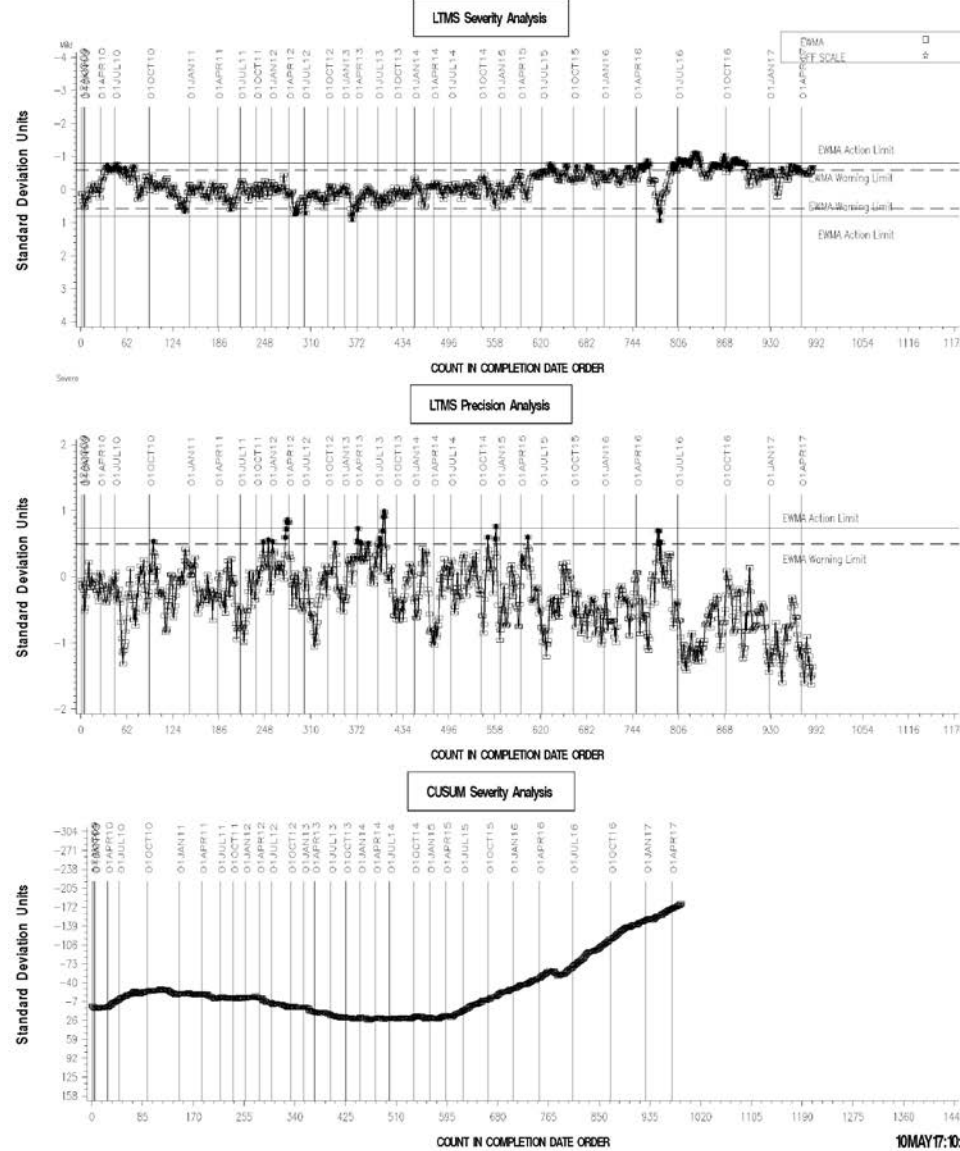


LDEOC (D 7216)

LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REF SILICON POINTS HARDNESS CHANGE AVERAGE

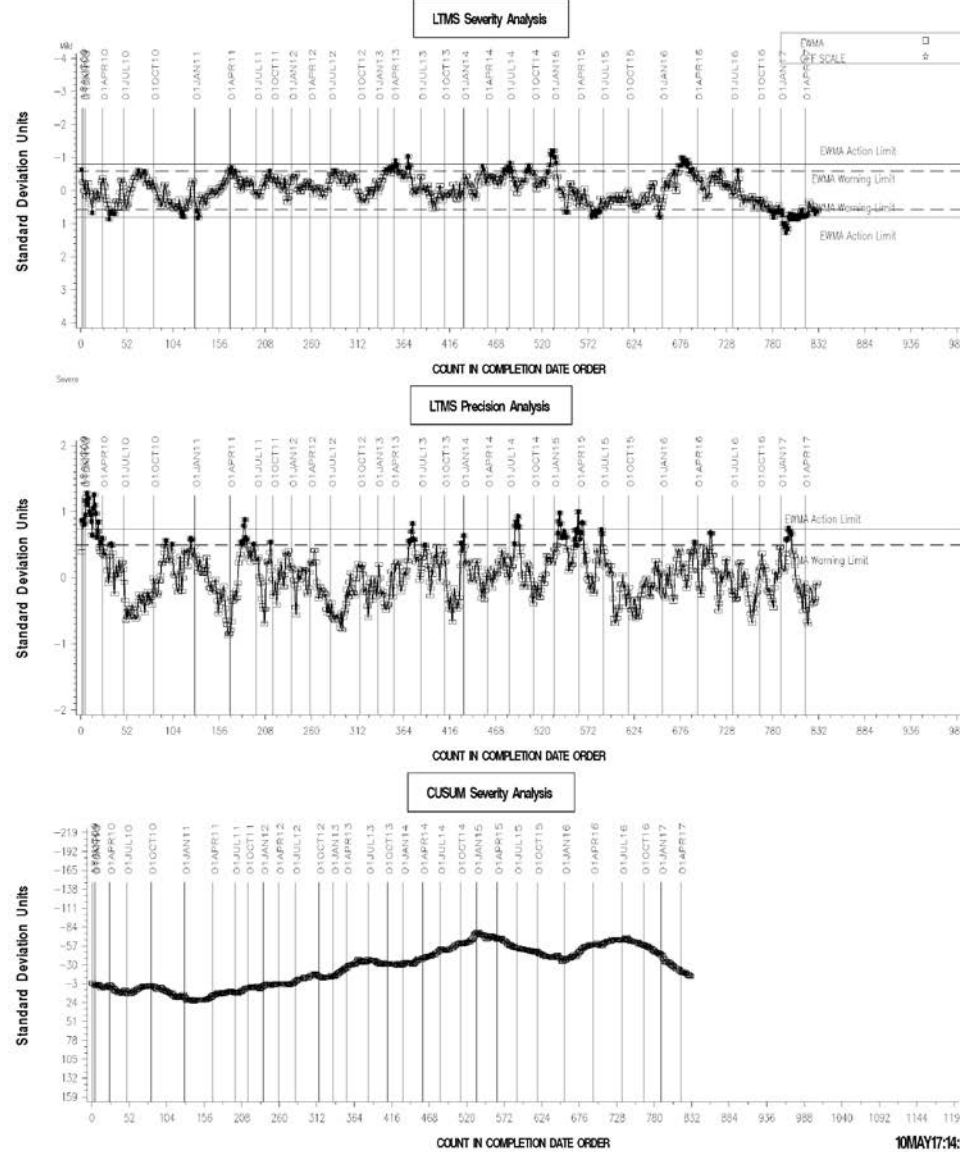


LDEOC (D 7216)

LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF ETH ACRYLATE TENSILE STRENGTH CHANGE AVG



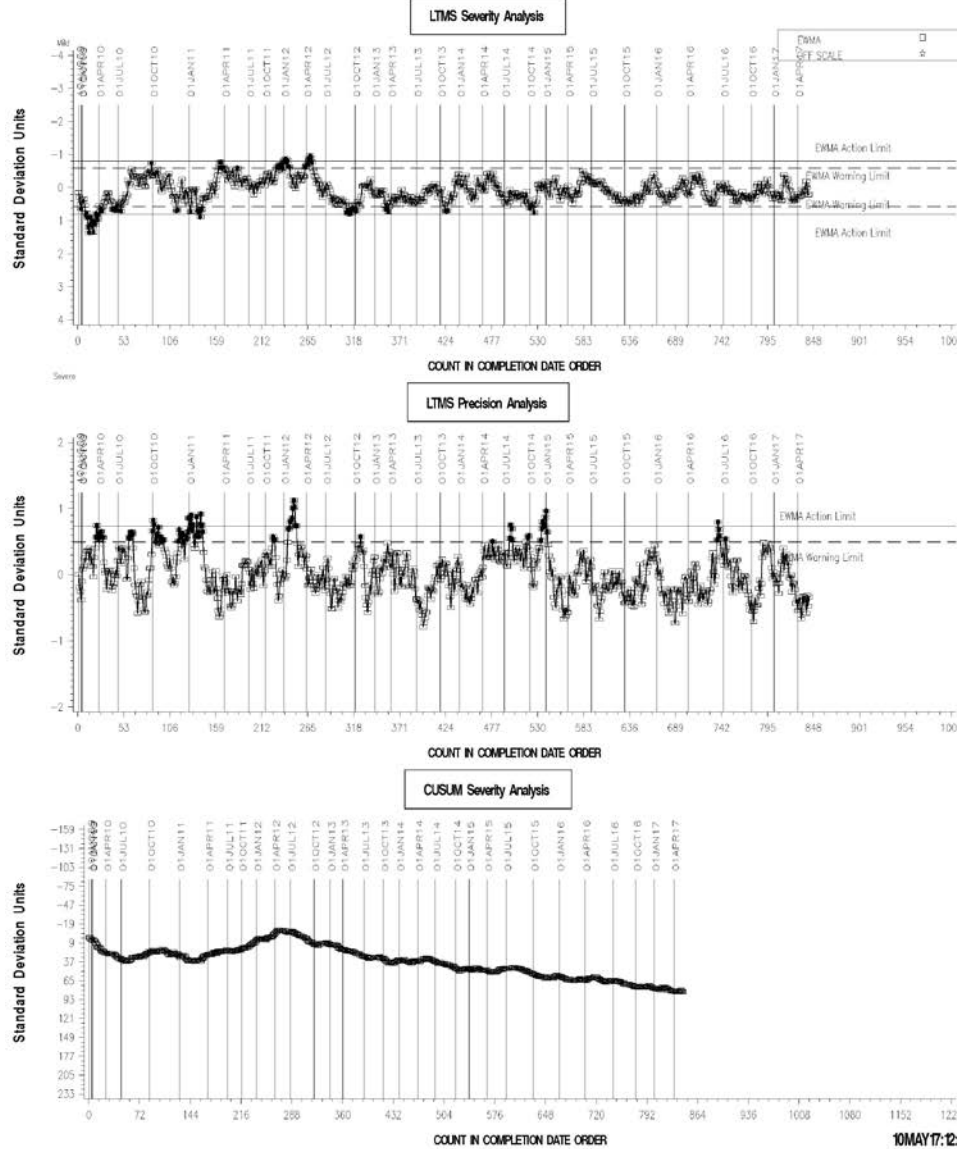
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LDEOC (D 7216)

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



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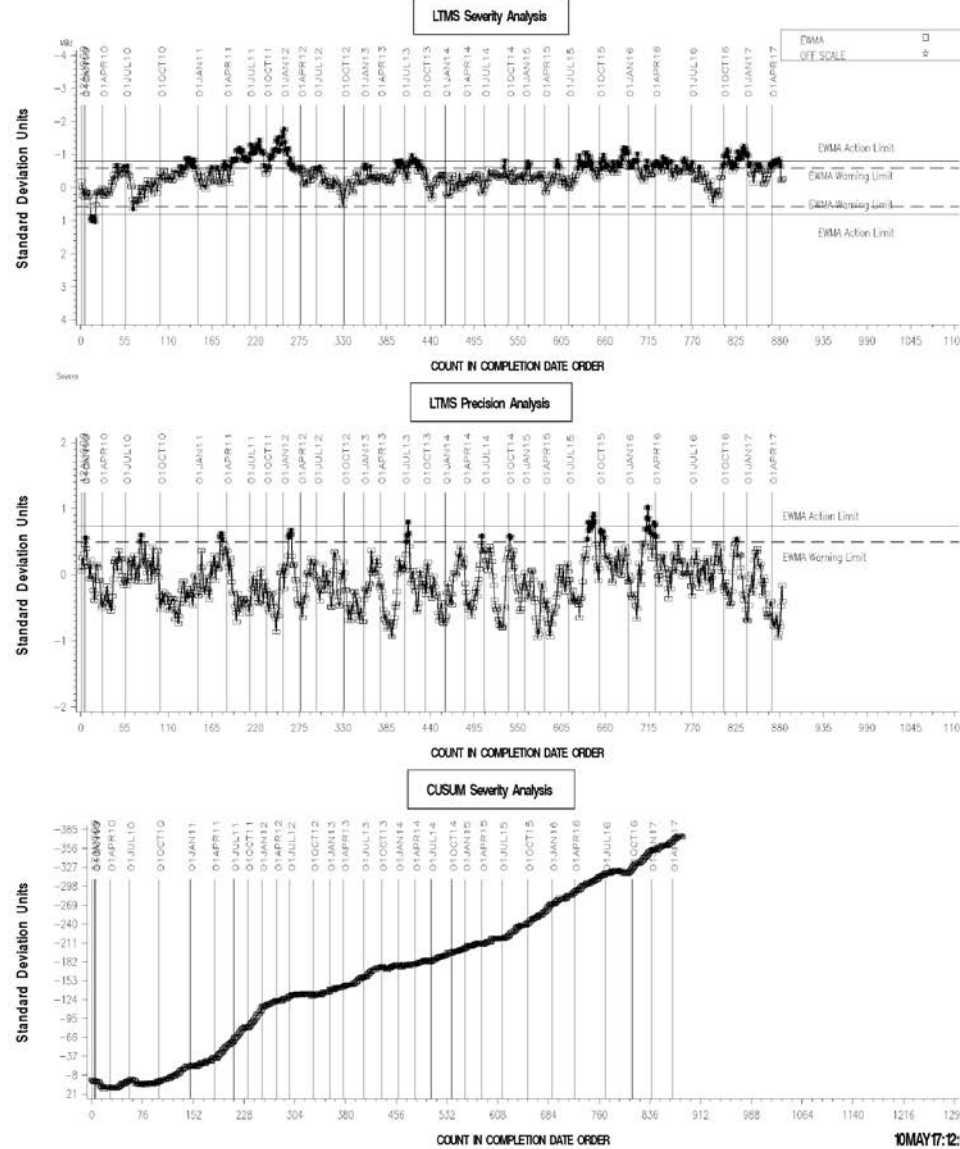
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LDEOC (D 7216)

LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



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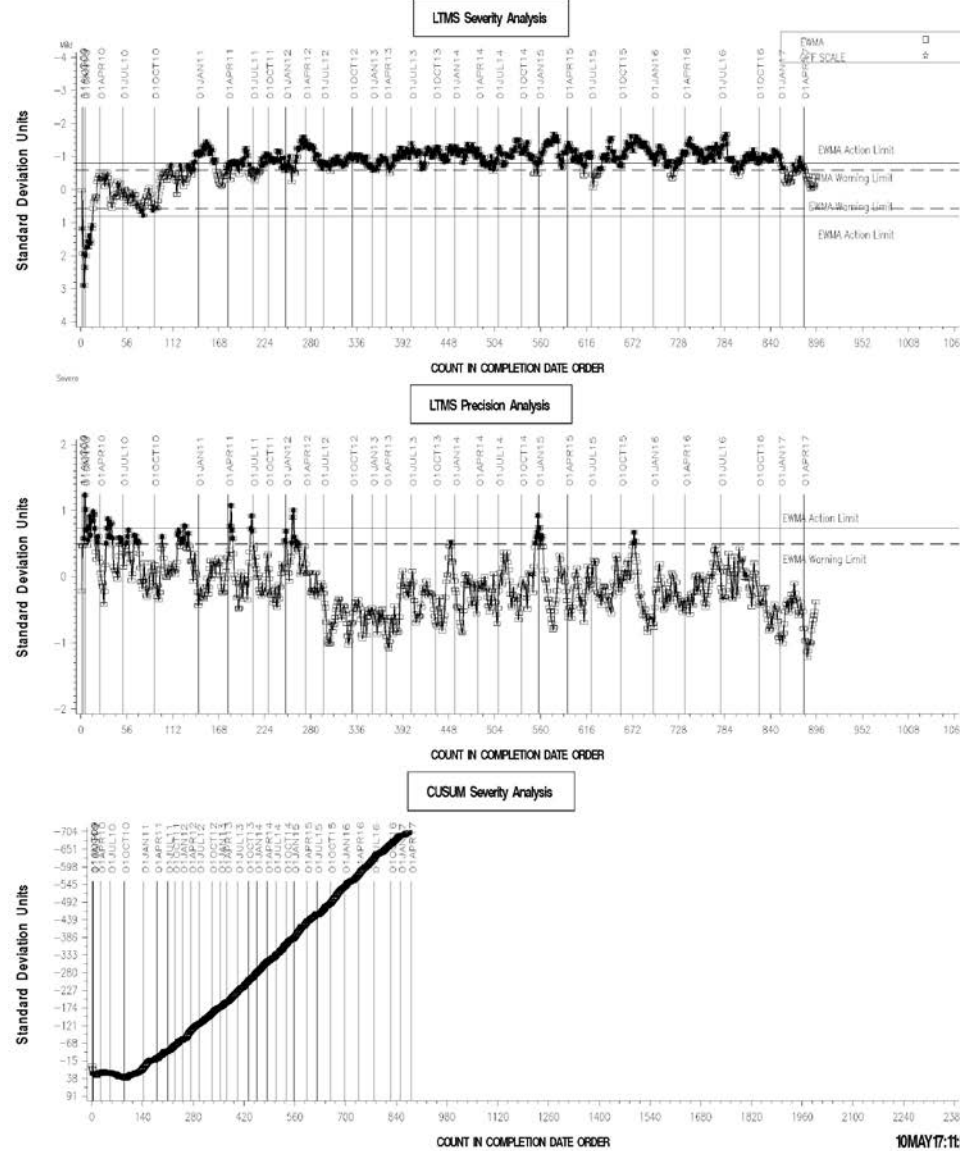


LDEOC (D 7216)

LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



REF POLYACRYLATE TENSILE STRENGTH CHG AVG

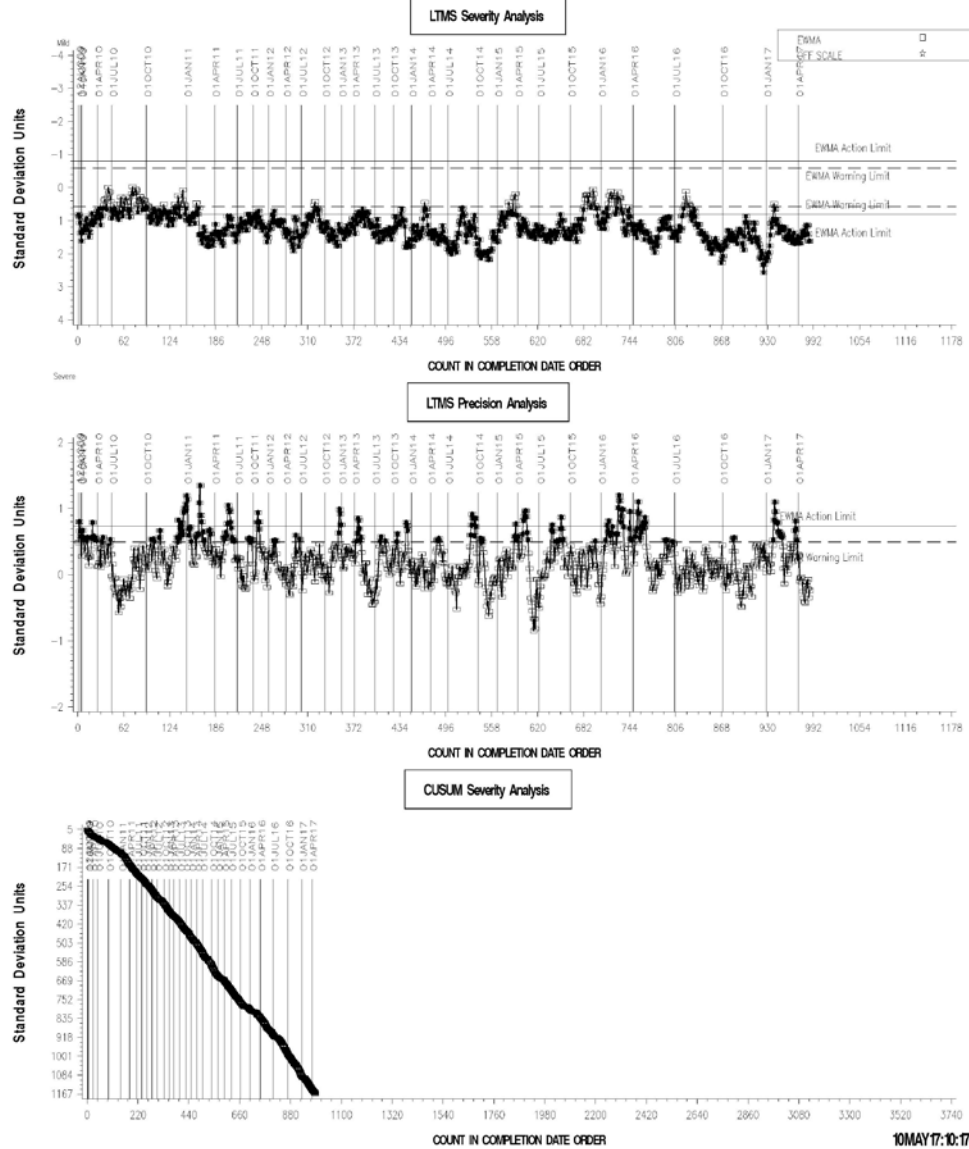


LDEOC (D 7216)

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	24	0	0
1006-2	261	9,709	1924
Total	285	9,709	1924

The TMC inventory of oil 1006-1 is depleted.

Reference Oil 1006-2 has been approved for LDEOC testing, using the existing test targets for reference oil 1006-1.