



Test Monitoring Center

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

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

MEMORANDUM: 11-027

DATE: June 10, 2011

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

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

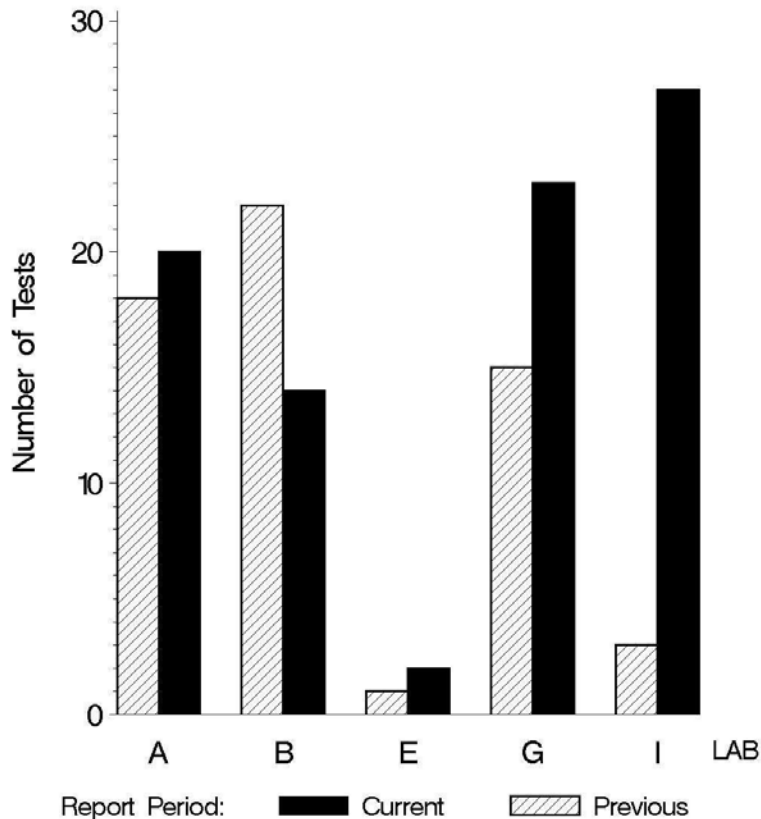
SUBJECT: LDEOC Testing from October 1, 2010 through March 31, 2011

A total of 450 LDEOC tests were reported to the Test Monitoring Center during the period from October 1, 2010 through March 31, 2011. Following is a summary of testing activity this period.

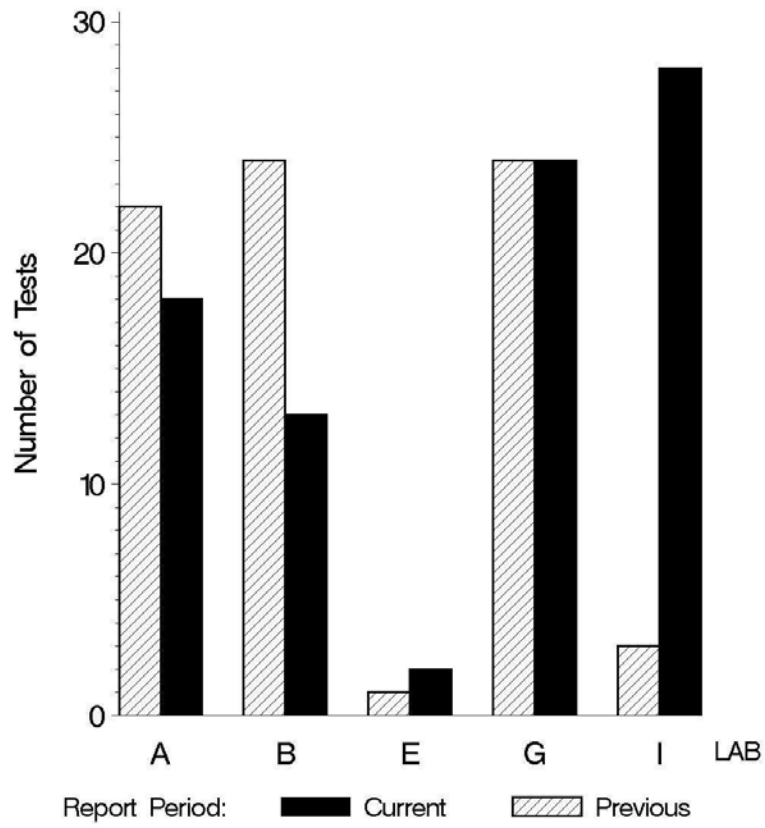
Reporting Data	
Number of Labs	5

Tests reported this period were distributed as shown below:

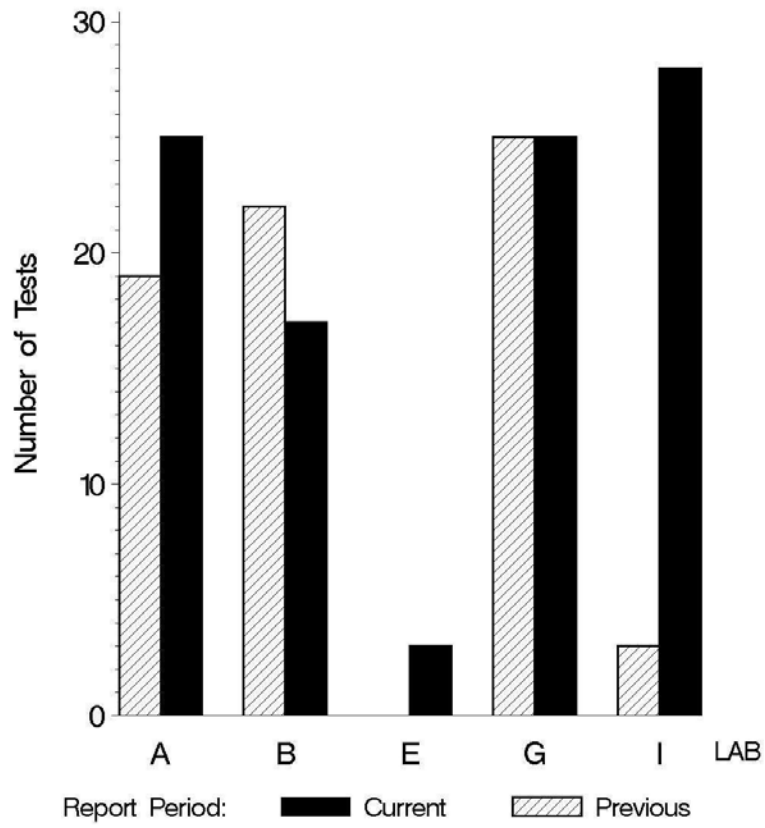
NUMBER OF FLUOROELASTOMER TESTS REPORTED BY LAB AND REPORT PERIOD



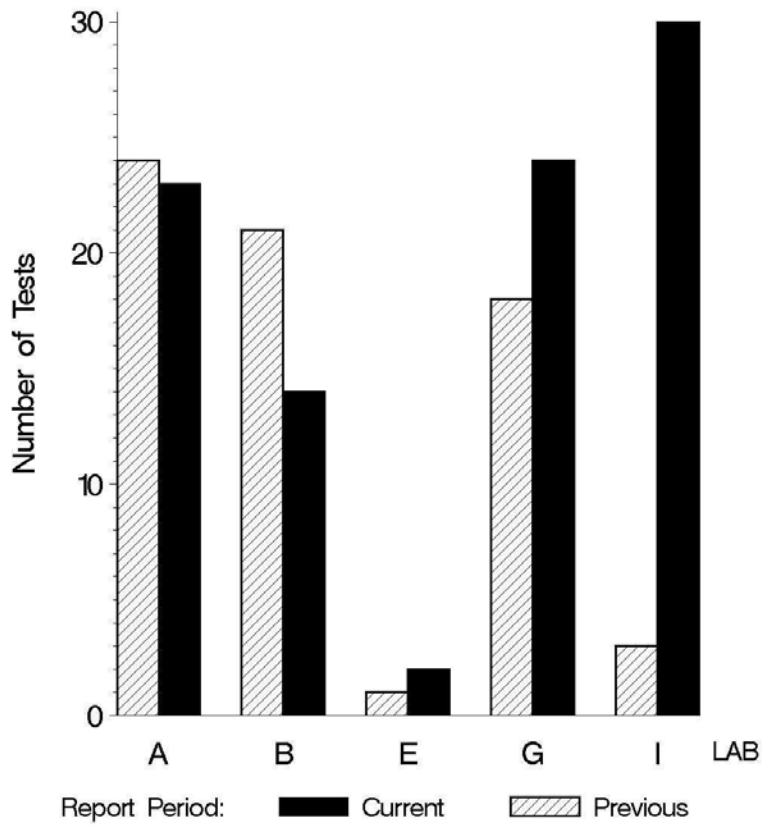
NUMBER OF NITRILE TESTS REPORTED BY LAB AND REPORT PERIOD



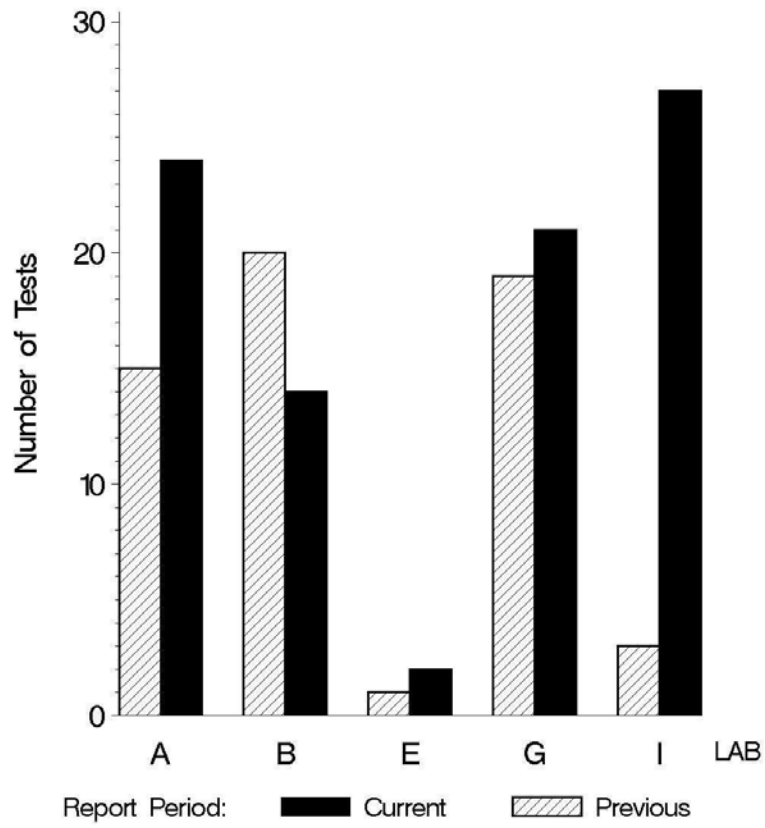
NUMBER OF POLYACRYLATE TESTS REPORTED BY LAB AND REPORT PERIOD



NUMBER OF SILICONE TESTS REPORTED BY LAB AND REPORT PERIOD



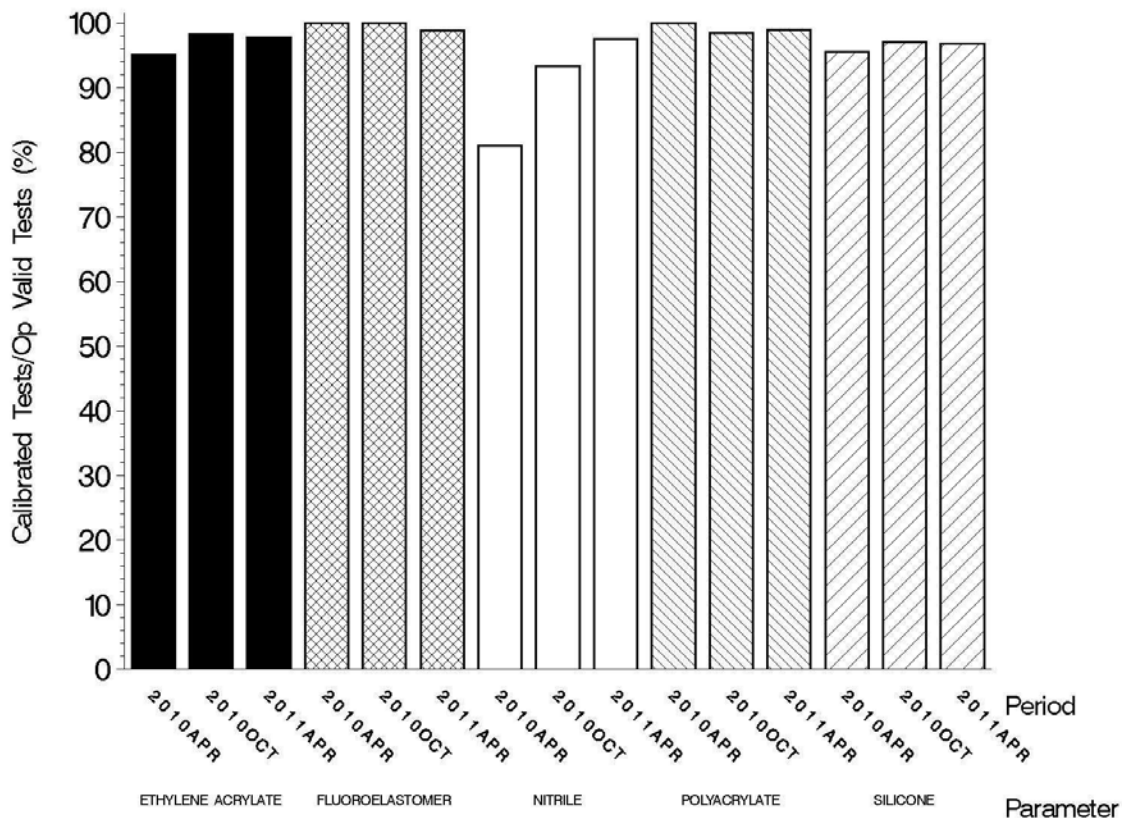
NUMBER OF ETHYLENE ACRYLATE TESTS REPORTED BY LAB AND REPORT PERIOD



Test Distribution by Oil and Validity

			Ethylene Acrylate	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Totals	
								This Period	Last Period
Accepted for Calibration	AC	84	82	79	88	89	422	308	
Rejected	OC	2	1	2	1	3	9	9	
Acceptable Donated Test	AG	1	1	2	3	1	8	0	
Unacceptable Donated Test	MI	0	0	0	2	0	2	0	
Operationally Invalid (lab)	LC	1	1	1	3	0	6	0	
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0	0	1	
Aborted Calibration	XC	0	1	1	1	0	3	5	
Total			88	86	85	98	93	450	323

**OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA**



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

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	24	0	0	20	0	0	18	0	0	25	0	0	23	0	0	110	0
B	0	14	0	0	14	0	0	13	0	0	17	0	0	14	0	0	72	0
E	0	2	0	0	2	0	0	2	0	0	3	0	0	2	0	0	11	0
G	1	21	4.8	1	23	4.3	1	24	4.2	3	25	12	0	24	0	6	117	5.1
I	0	27	0	1	27	3.7	1	28	3.6	1	28	3.6	0	30	0	3	140	2.1
Total	1	88	1.1	2	86	2.3	2	85	2.4	4	98	4.1	0	93	0	9	450	2.0

Lost tests are those that were aborted or operationally invalid.

Causes for Lost Tests

		Elastomer					Validity			Loss Rate		
Lab	Cause	Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Ethylene Acrylate	LC	RC	XC	Lost	Starts	%
G	Initial Weights Not Recorded	•				•	•			2	117	4.3
	Wrong Elastomer Used		•				•			3		
I	Power Failure	•	•	•					•	3	140	2.9
	Ran Over Test Time		•				•			1		
	Lost	2	5	1	0	1	6	0	3			
	Starts	88	86	85	98	93	450	450	450			
	%	2.3	5.8	1.2	0	1.1	1.3	0	0.7			

Average Δ 's by Lab					
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI
Ethylene Acrylate	A	24	-0.294	-0.123	0.067
	B	14	0.512	-0.548	0.677
	E	2	-6.390	-0.626	-0.501
	G	20	0.655	0.857	0.080
	I	26	0.239	-0.331	0.138
	Industry	86	0.077	-0.039	0.178
Fluoroelastomer	A	20	-0.177	1.218	-1.280
	B	14	-1.067	0.737	-0.487
	E	2	0.100	-0.960	-1.286
	G	22	0.085	-1.185	1.054
	I	25	-0.043	0.446	0.660
	Industry	83	-0.210	0.215	0.057
Nitrile	A	17	0.759	-0.098	-0.760
	B	13	0.555	0.791	-0.672
	E	2	-0.592	0.747	-1.713
	G	23	0.646	0.522	-0.257
	I	26	0.731	0.305	-0.138
	Industry	81	0.652	0.371	-0.427
Polyacrylate	A	25	0.665	-0.792	-0.711
	B	15	-0.310	-0.340	-0.366
	E	3	-1.728	-0.730	-0.590
	G	20	-0.604	0.825	-0.796
	I	26	1.142	-0.225	-0.628
	Industry	89	0.274	-0.185	-0.644
Silicone	A	23	-0.891	-0.386	1.506
	B	14	0.801	-0.776	0.559
	E	2	-2.522	0.765	0.914
	G	24	0.468	1.030	1.147
	I	29	-0.721	-0.064	0.669
	Industry	92	-0.261	0.051	0.992

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

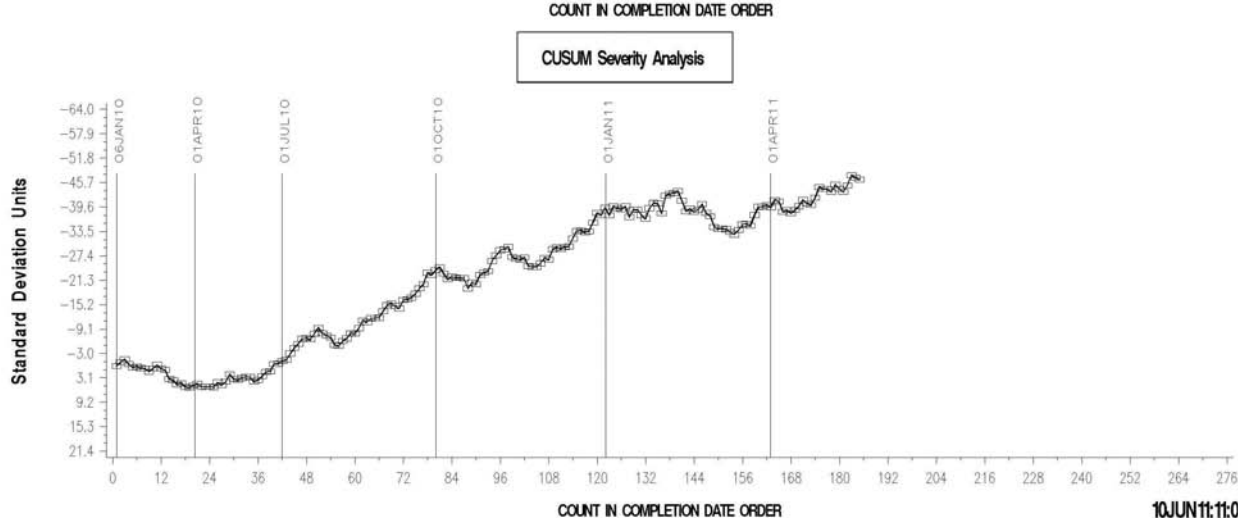
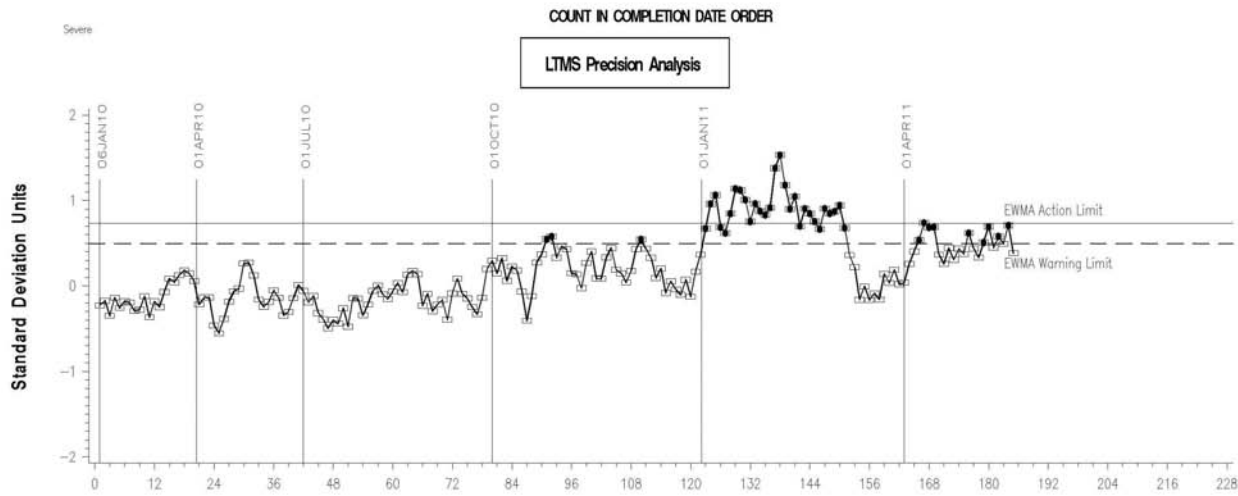
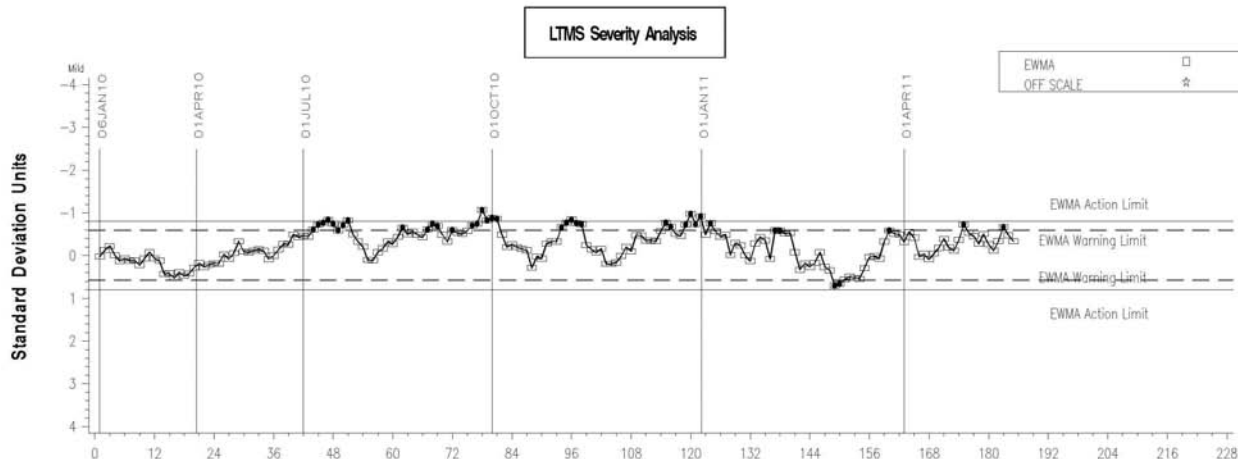
<i>Links to Individual Test Result Data</i>	
Elastomer Type	Web Link to Data
Fluoroelastomer	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeocf/data/
Nitrile	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeocn/data/
Polyacrylate	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeoep/data/
Silicone	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeocs/data/
Ethylene Acrylate	ftp://ftp.astmtmc.cmu.edu/refdata/bench/ldeoea/data/

LTMS CONTROL CHARTS

LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



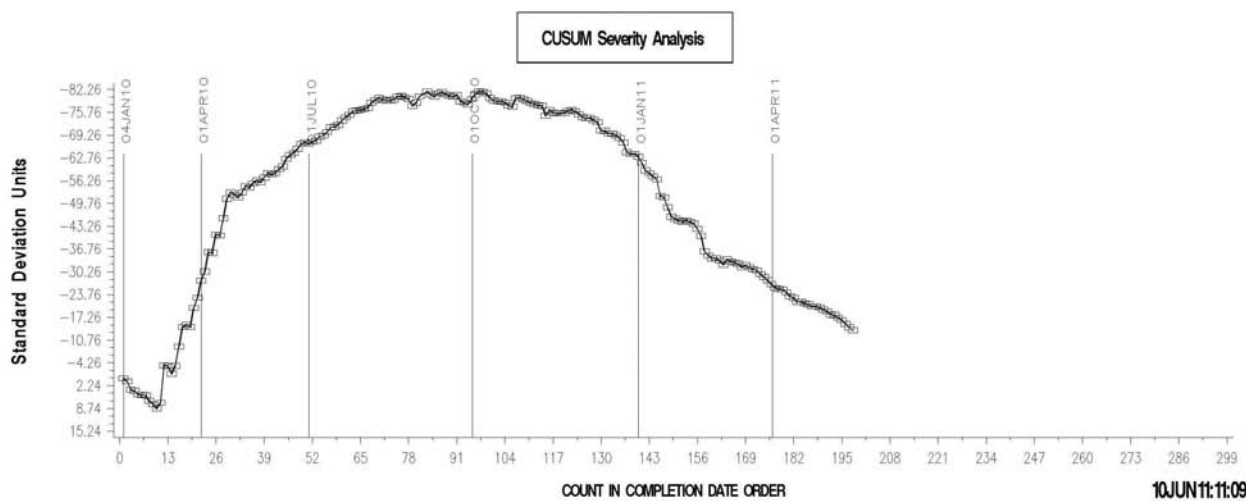
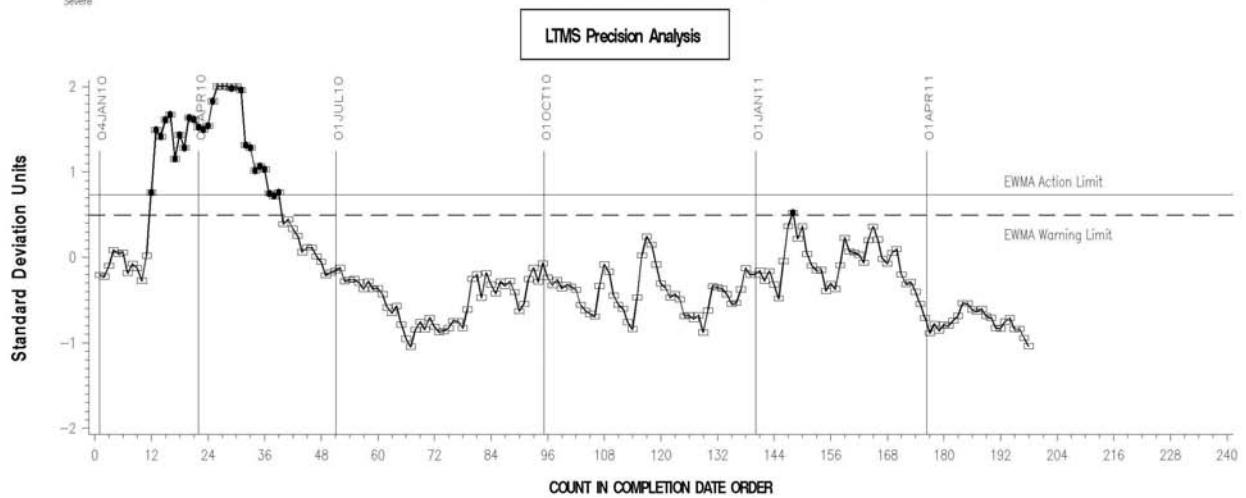
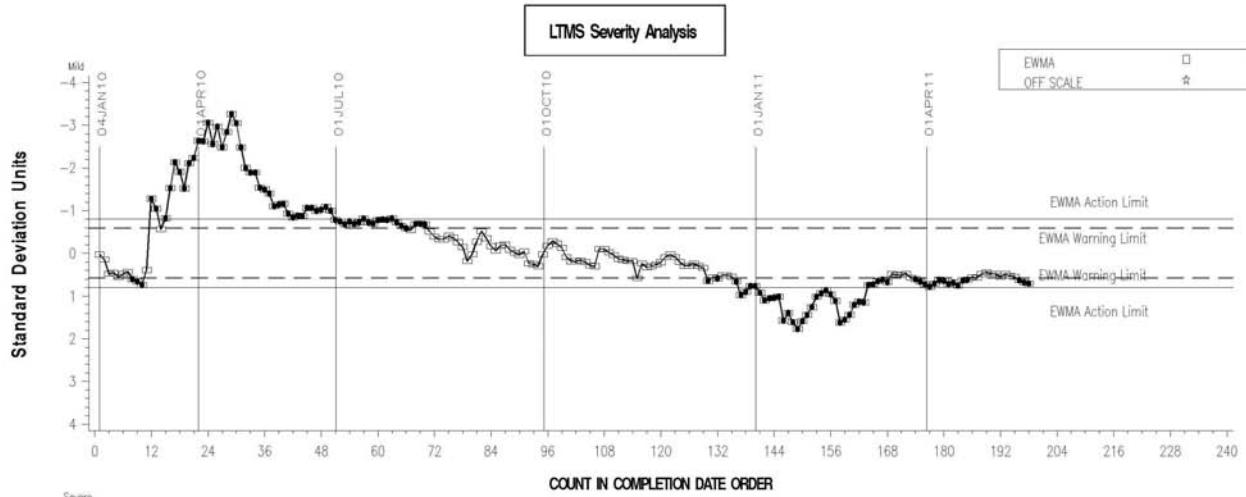
REF FLUOROELASTOMER VOLUME CHANGE AVERAGE



LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



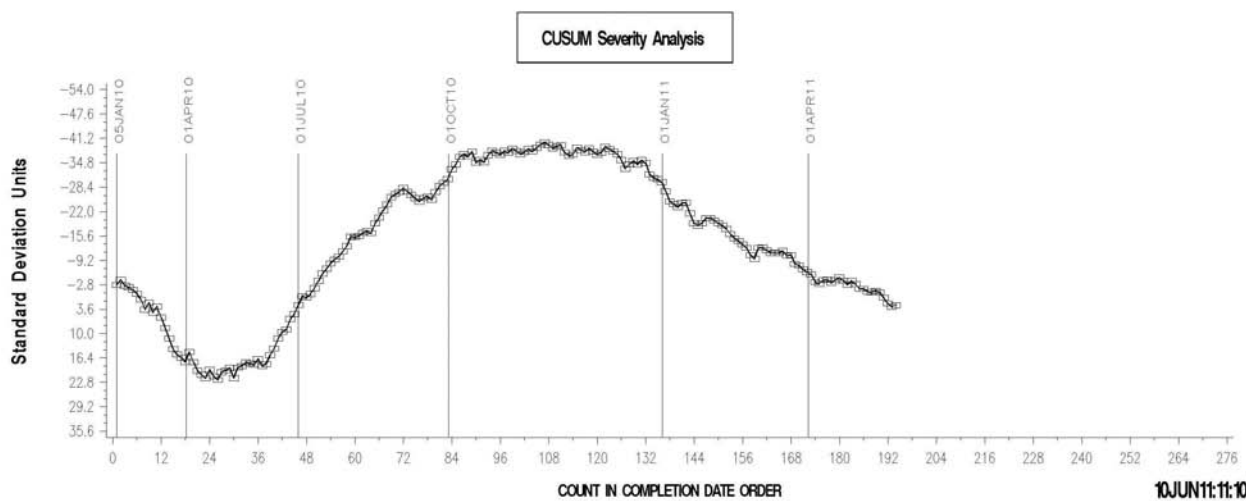
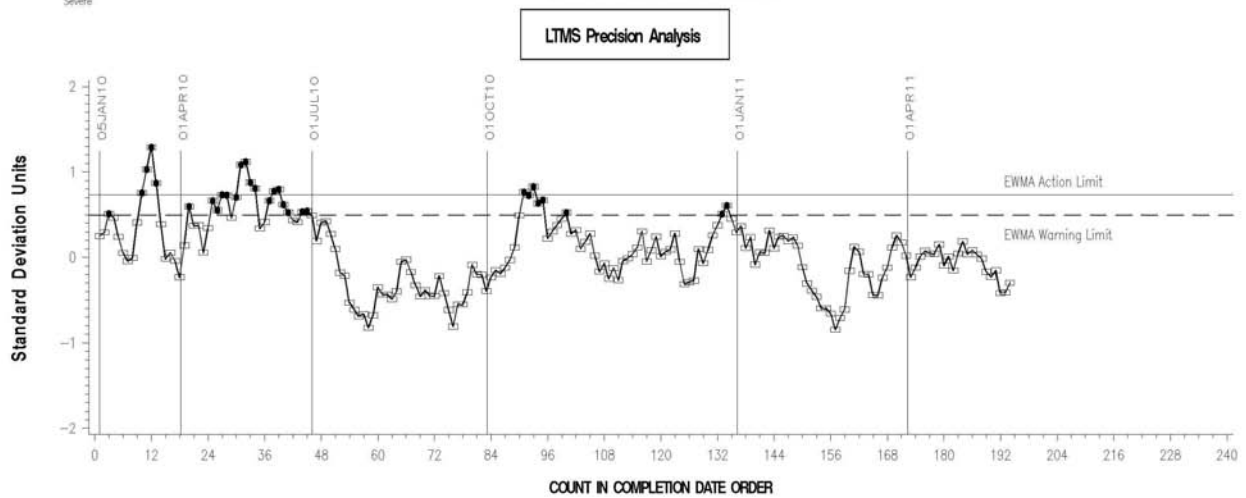
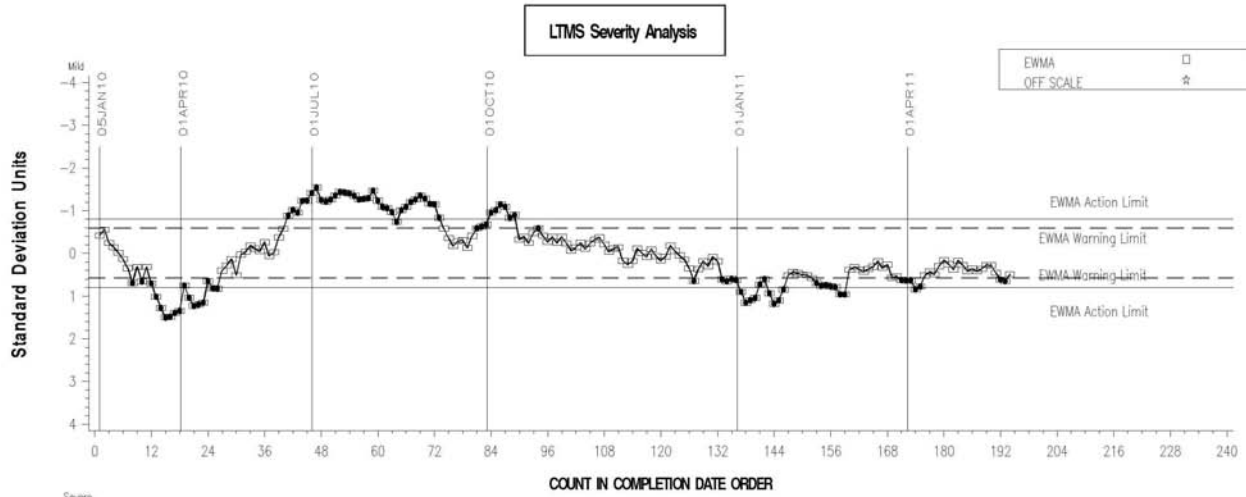
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LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



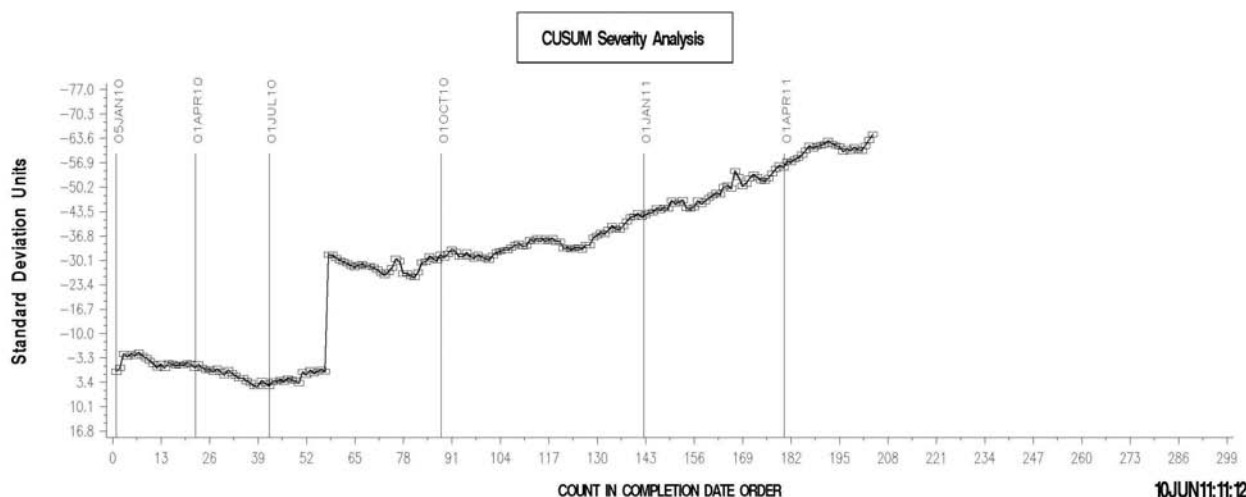
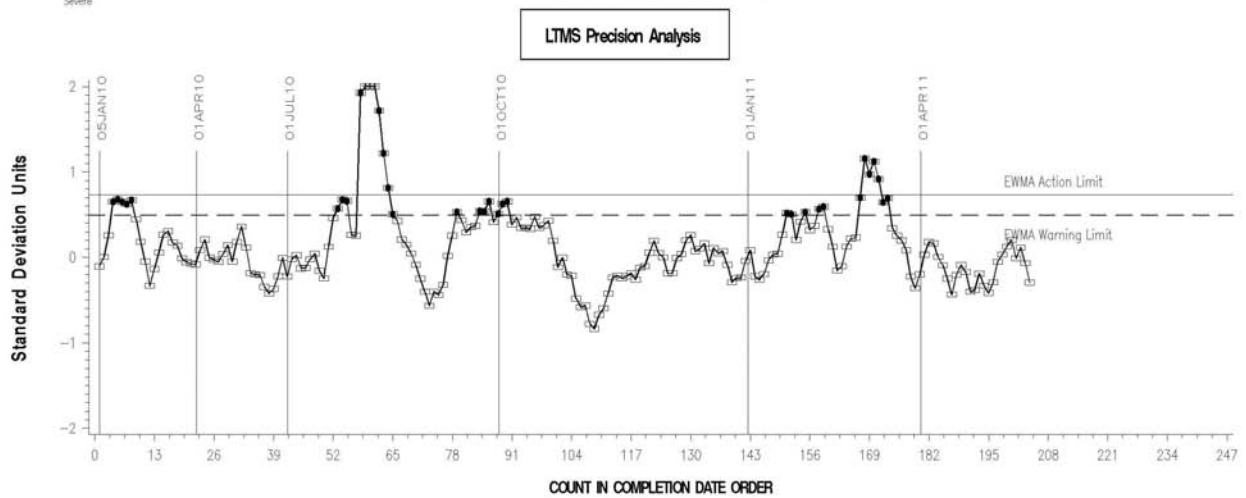
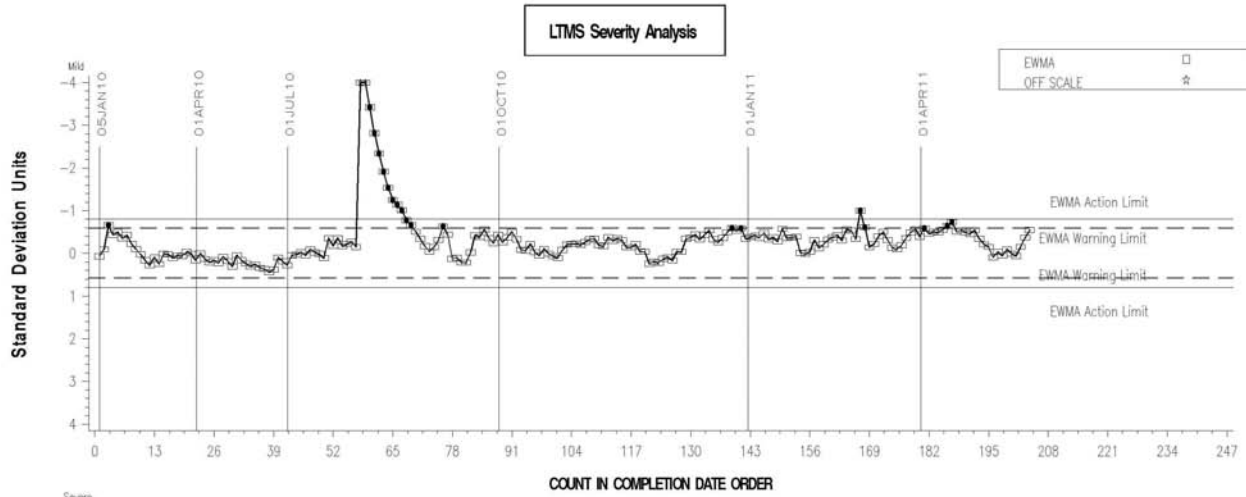
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LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



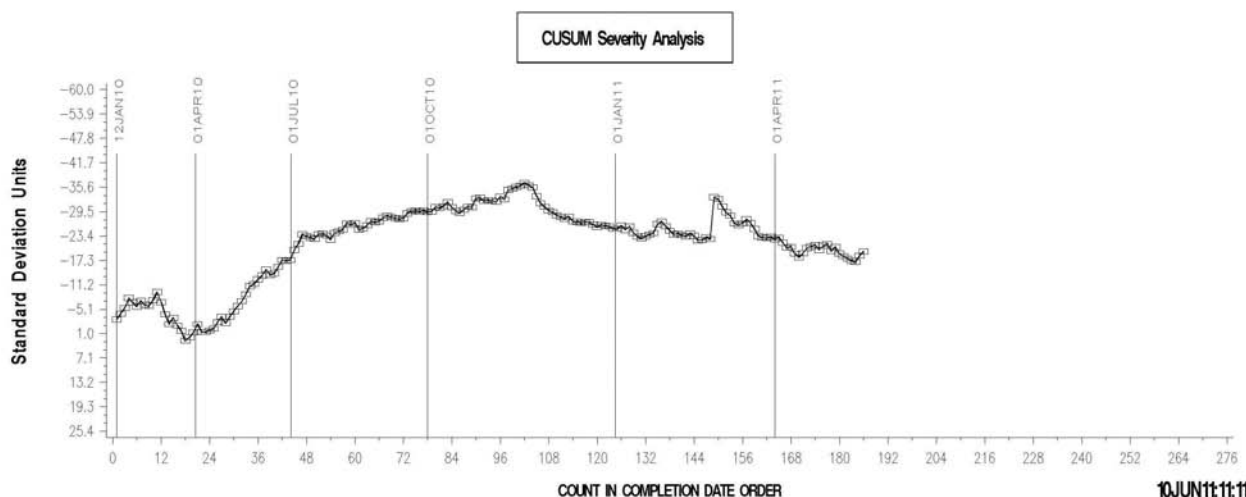
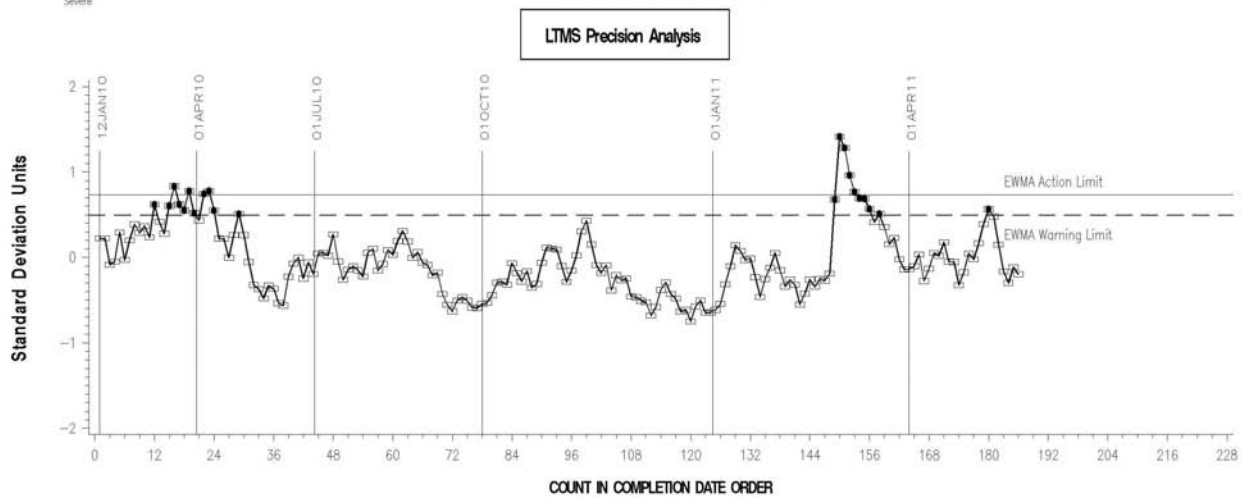
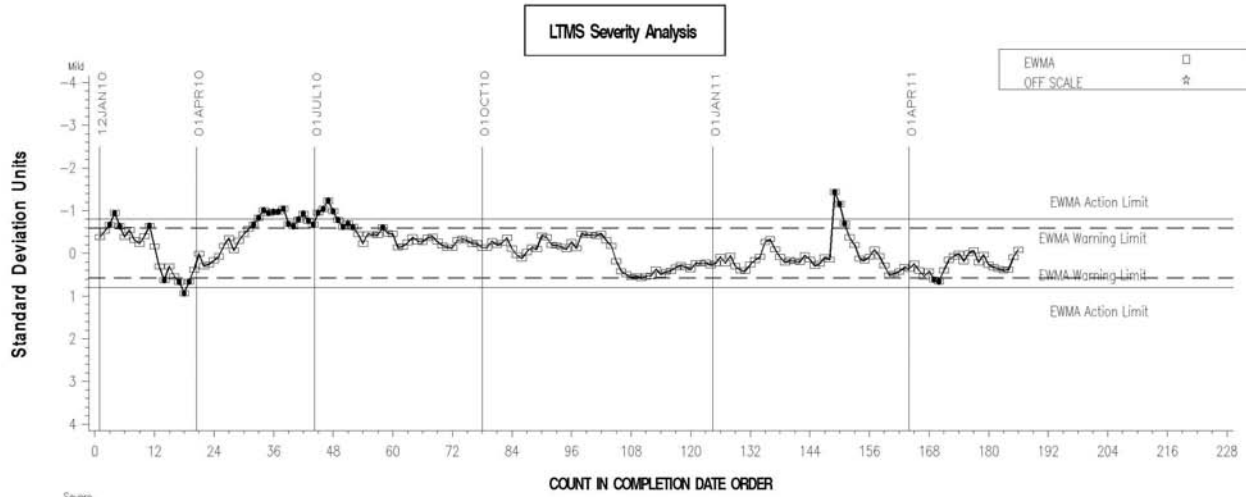
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LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



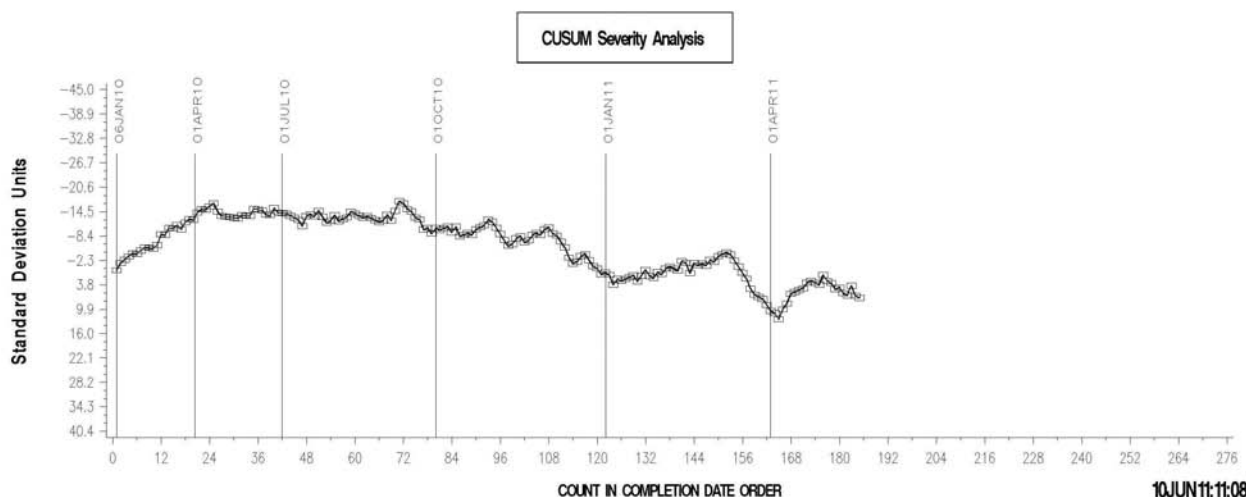
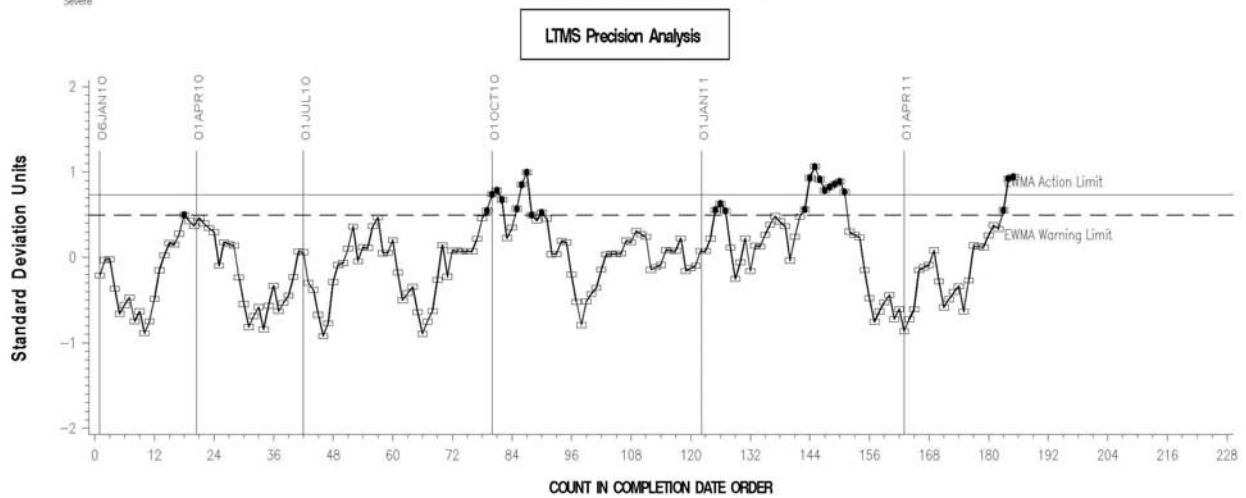
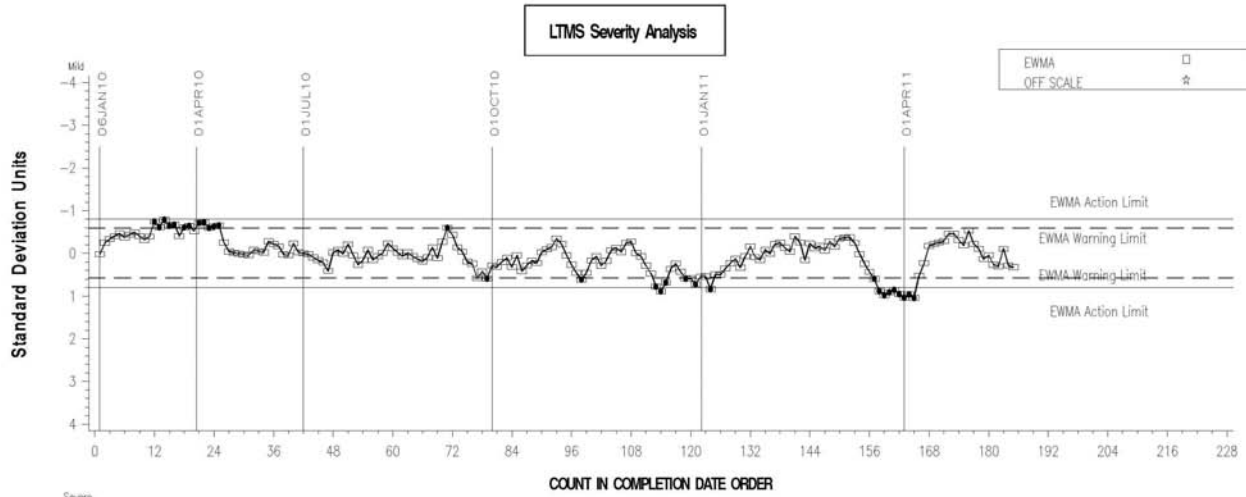
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LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



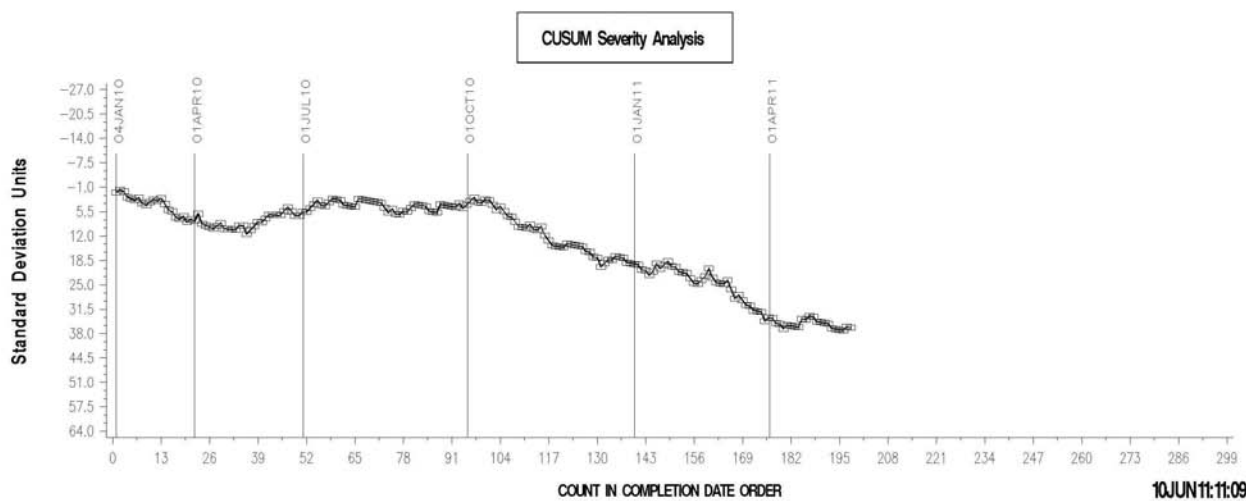
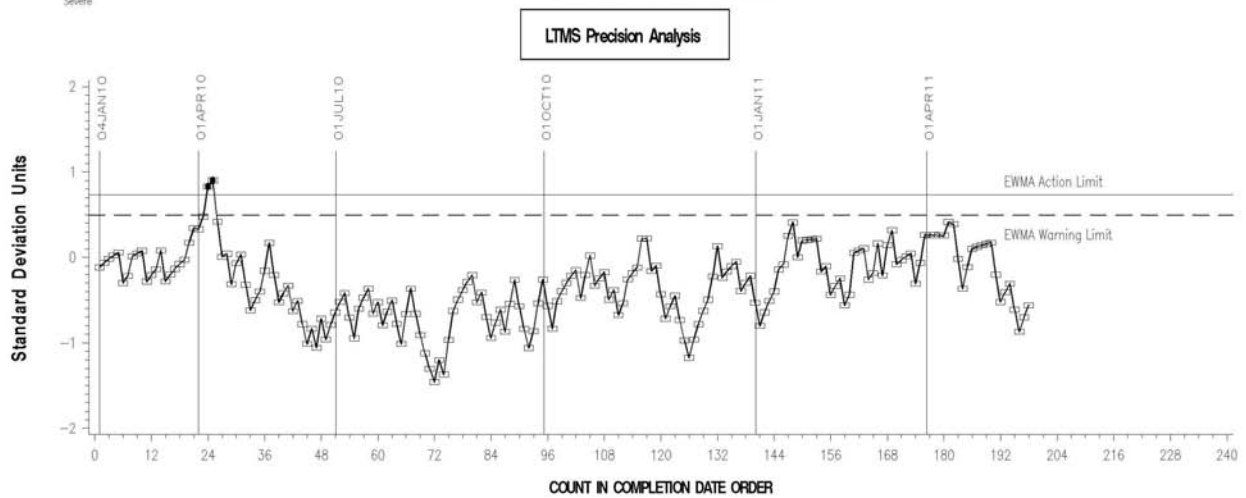
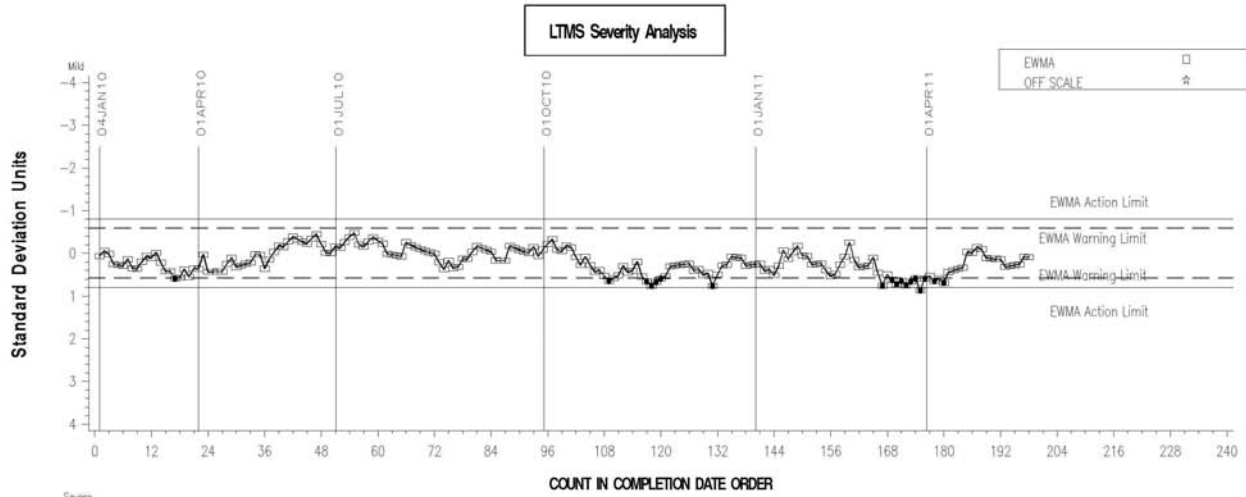
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LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



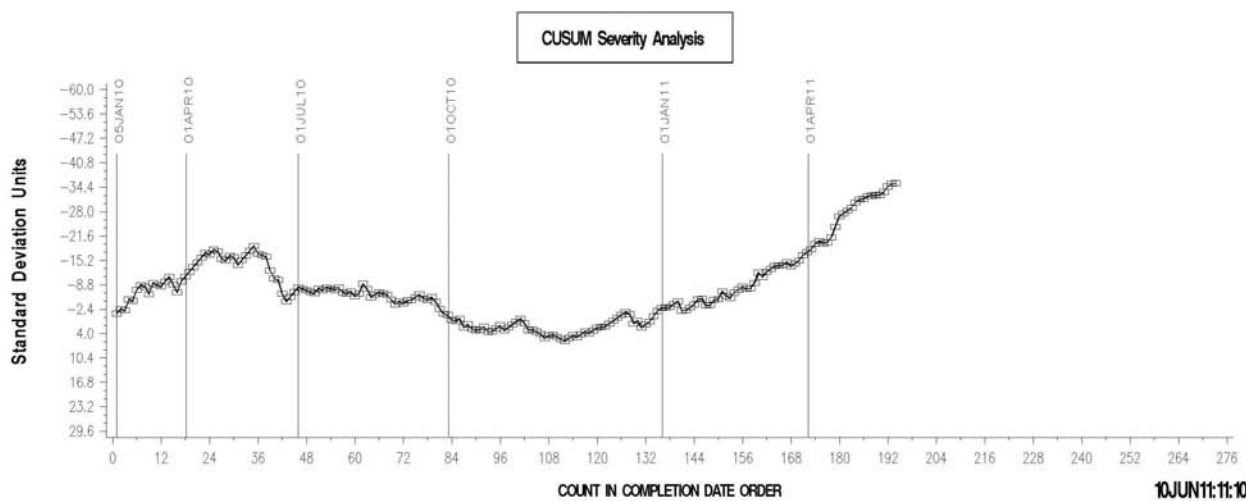
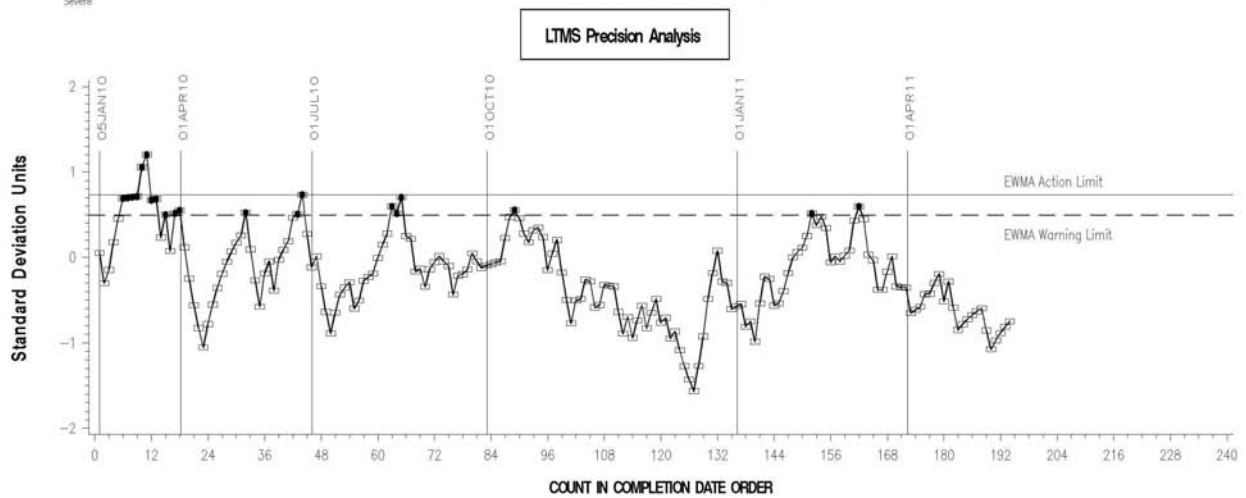
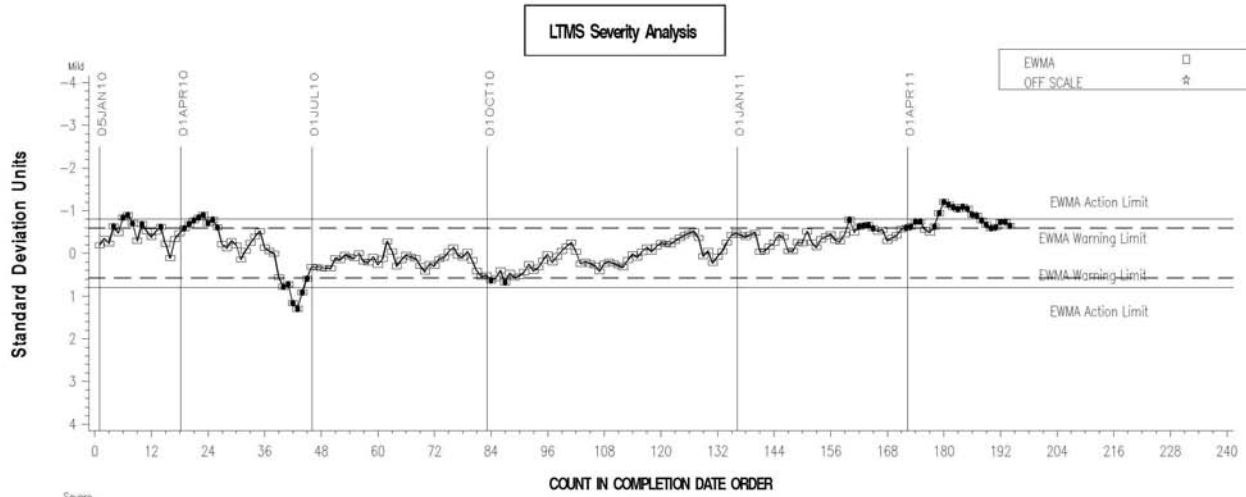
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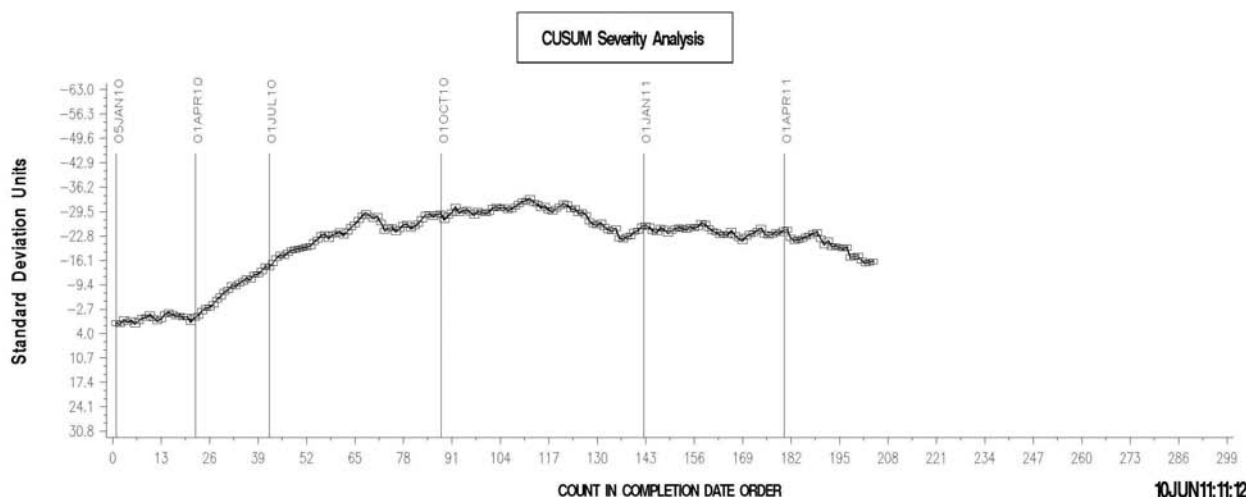
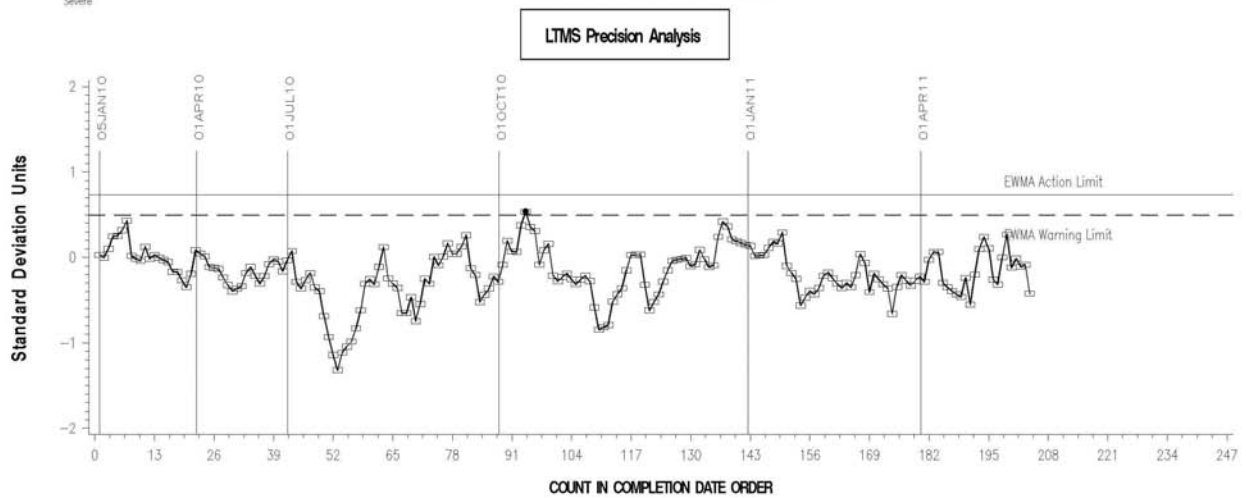
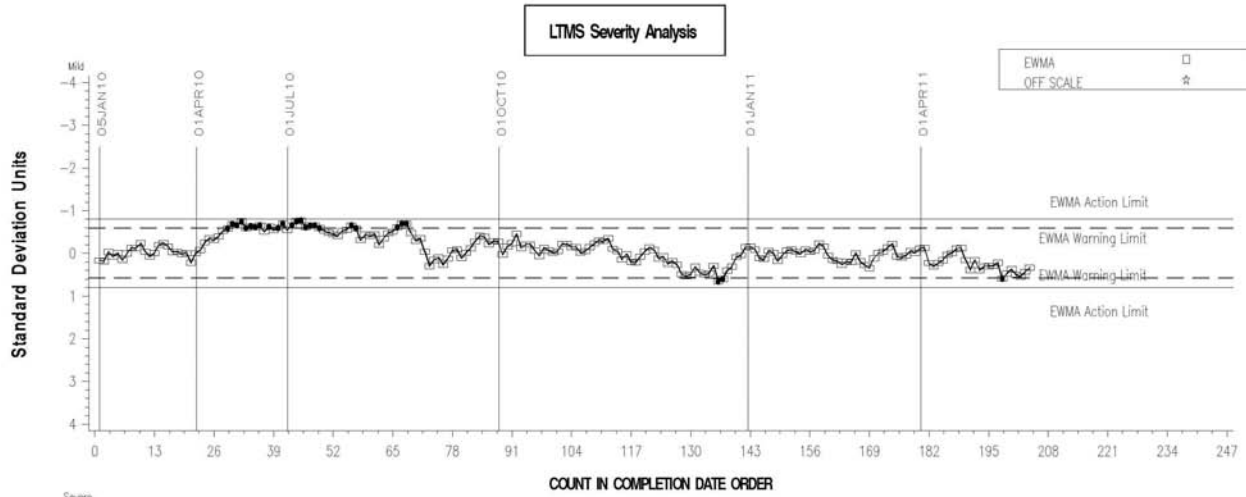
REF POLYACRYLATE POINTS HARDNESS CHG AVG



LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



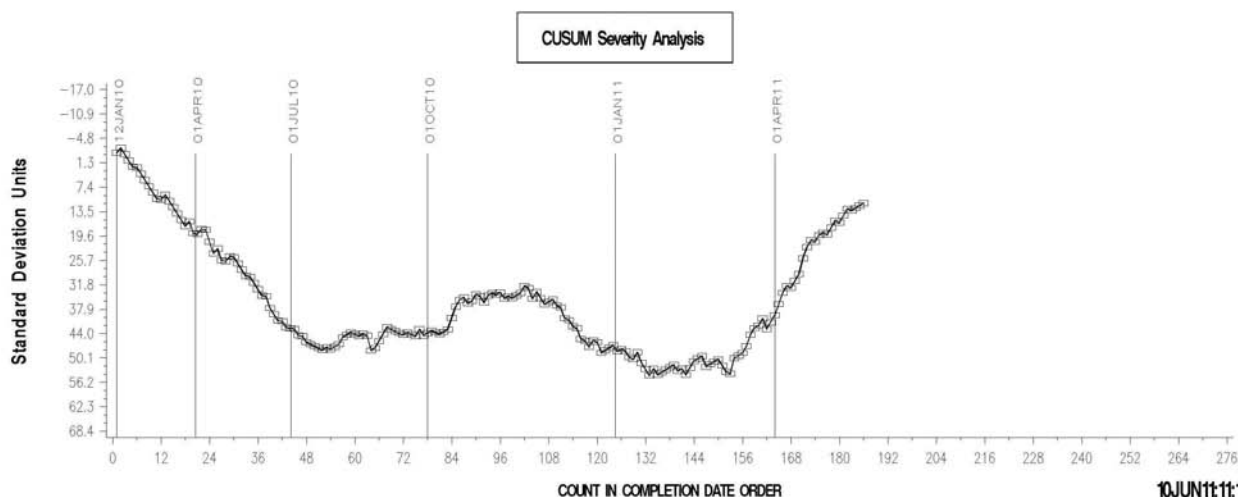
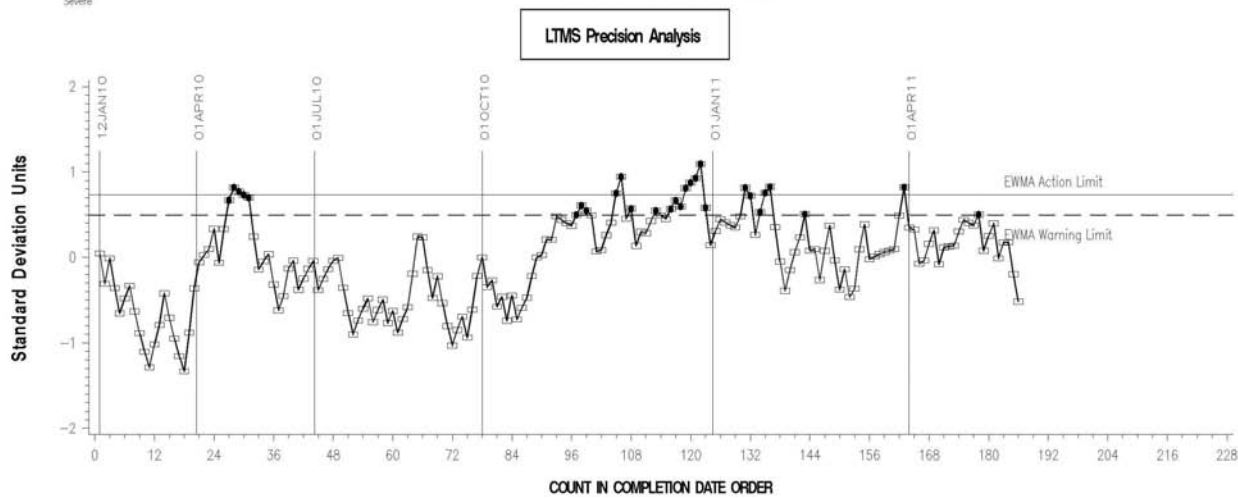
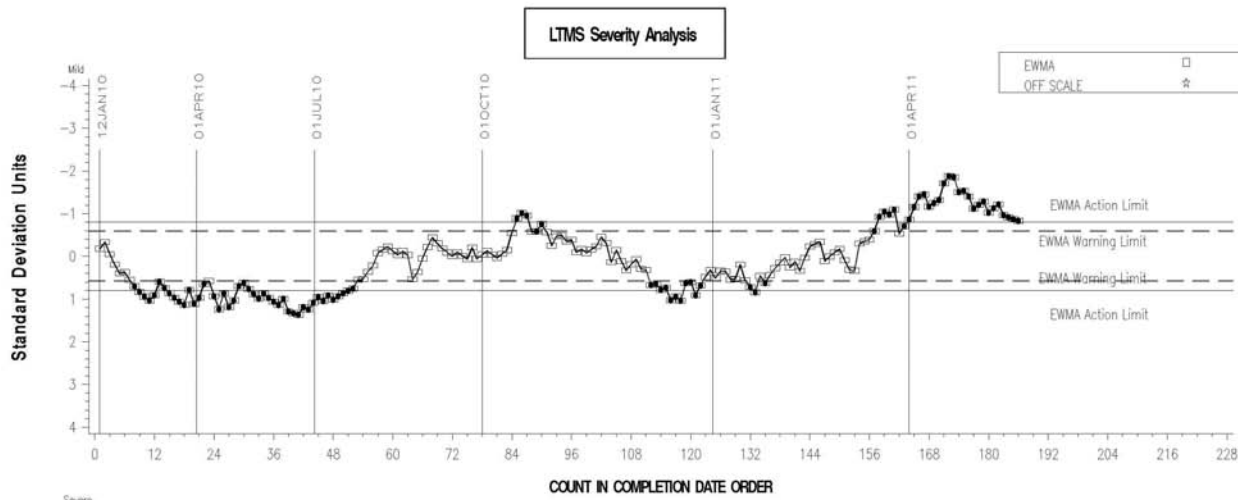
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LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA



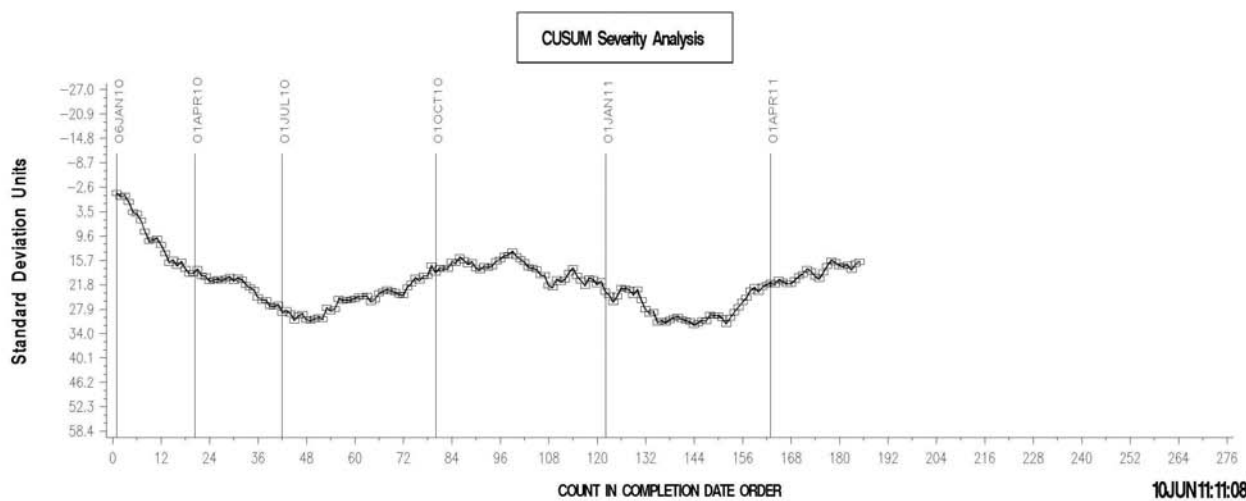
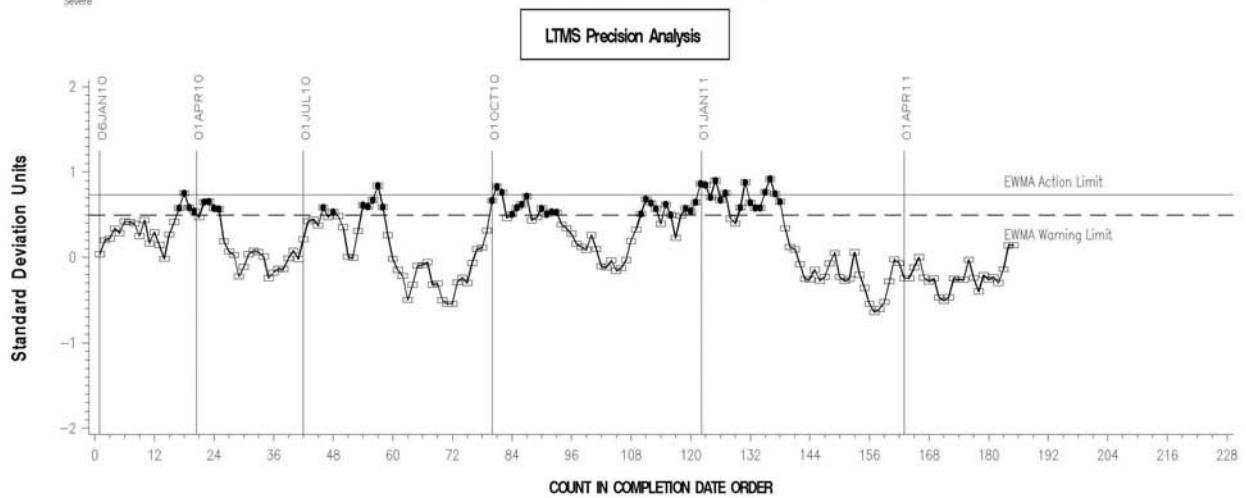
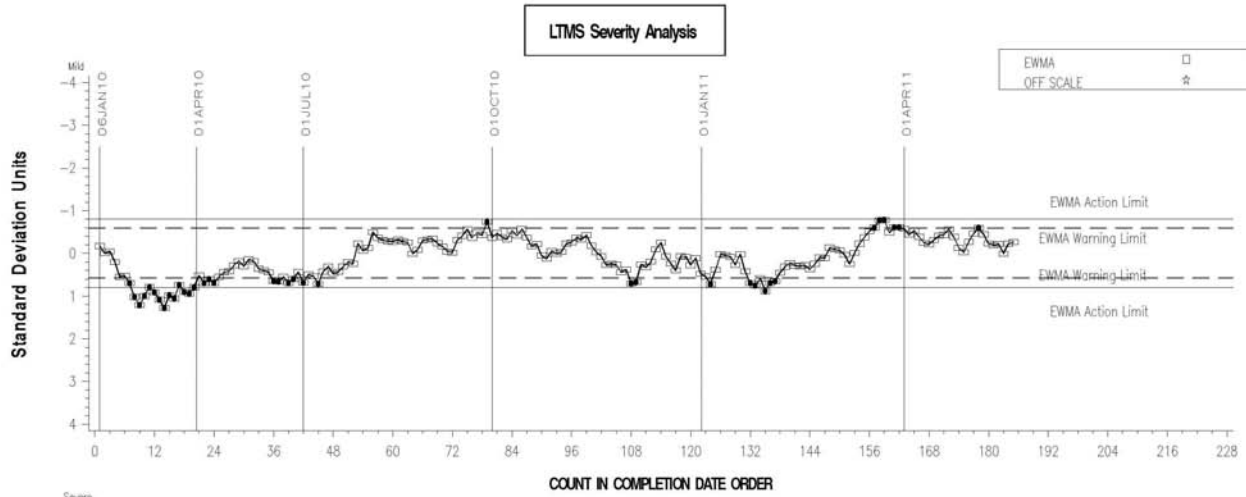
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LDEOC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



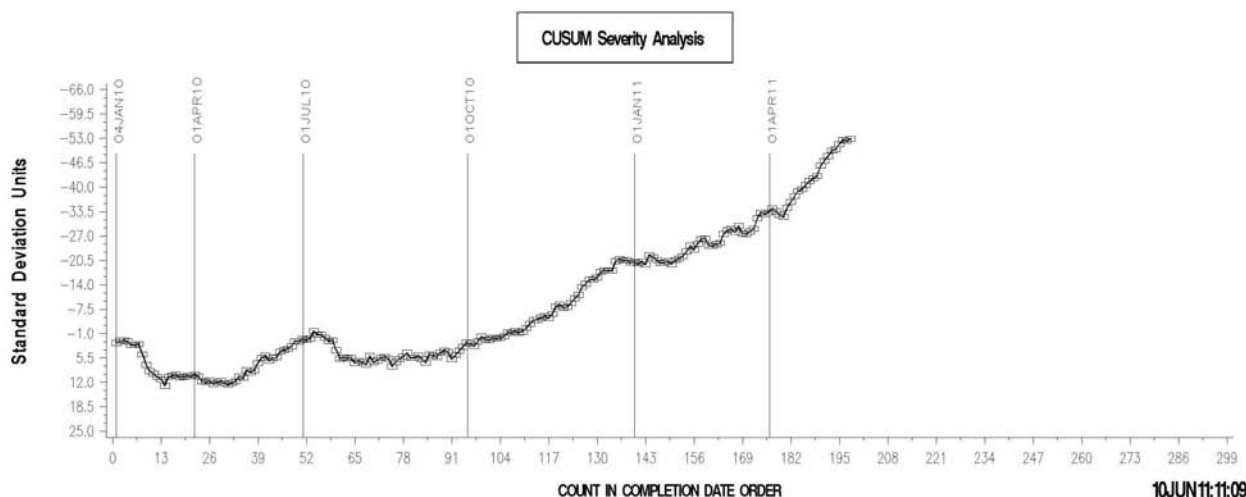
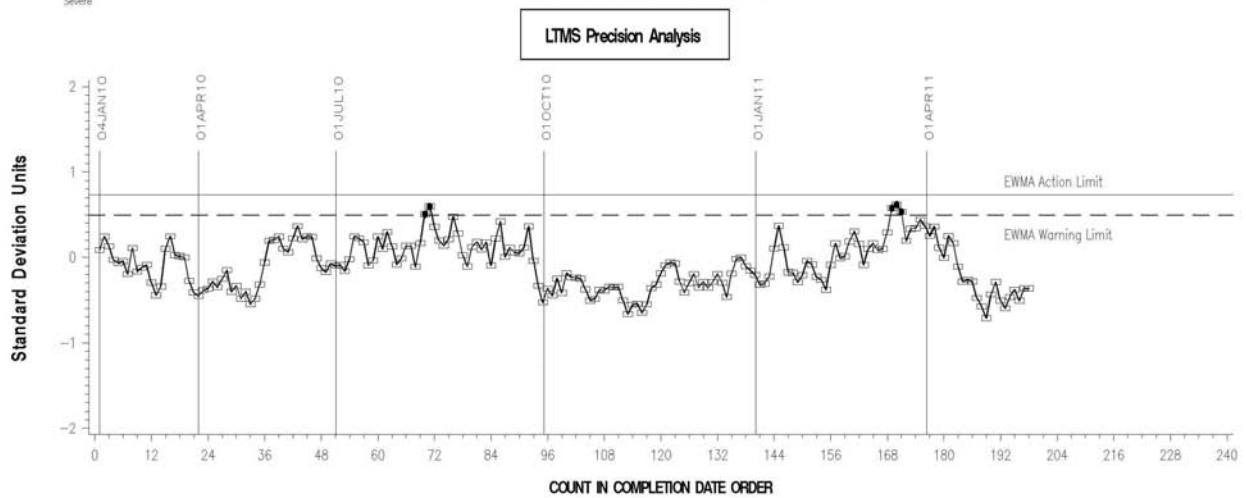
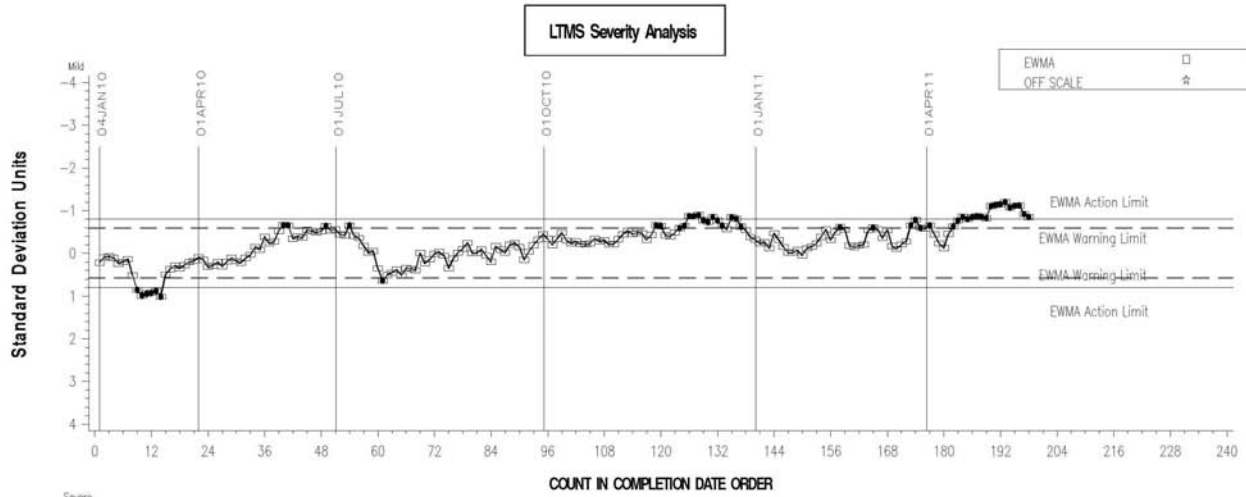
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LDEOC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



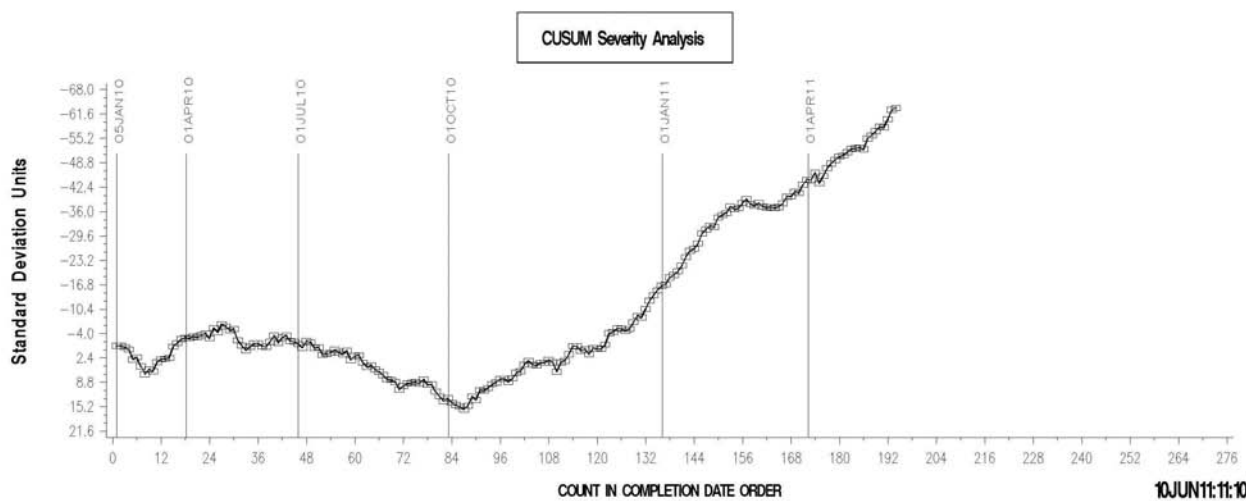
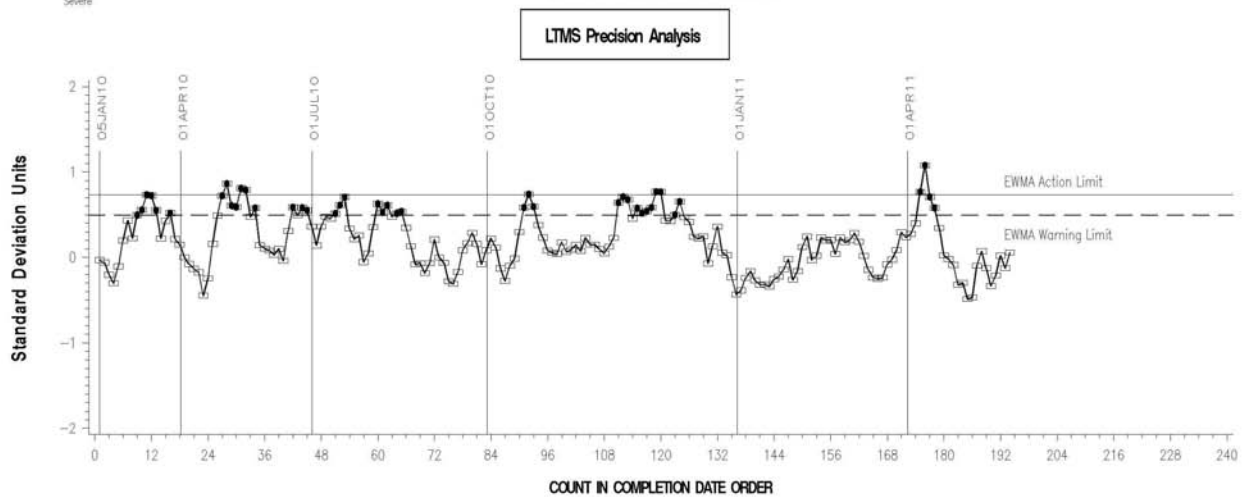
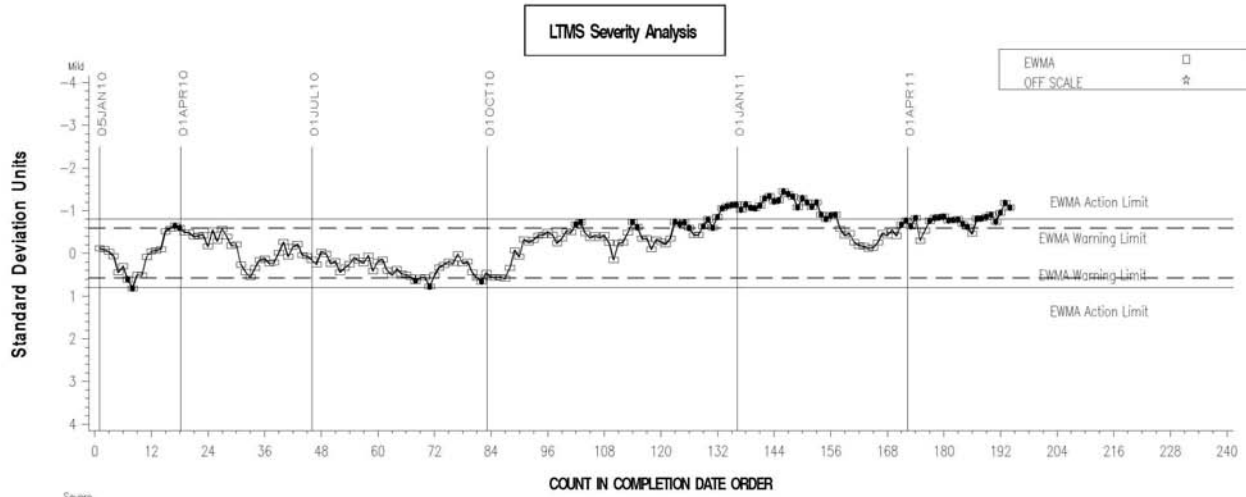
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LDEOC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



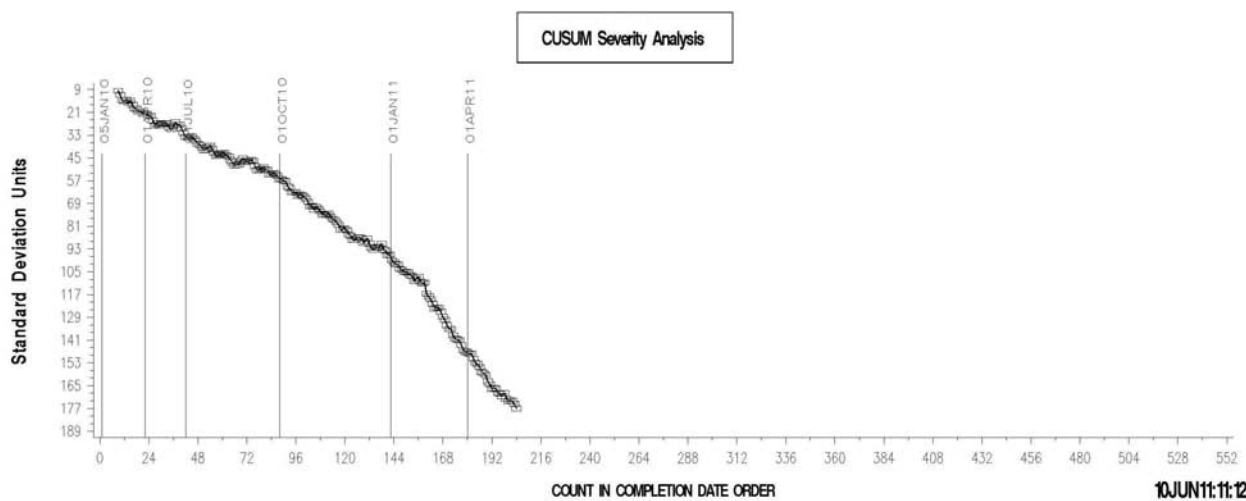
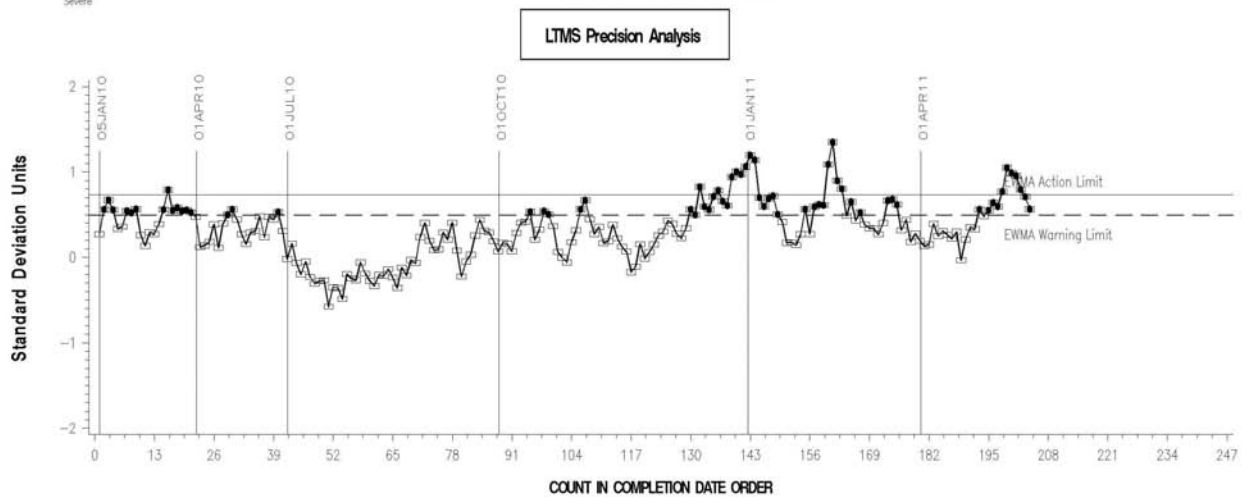
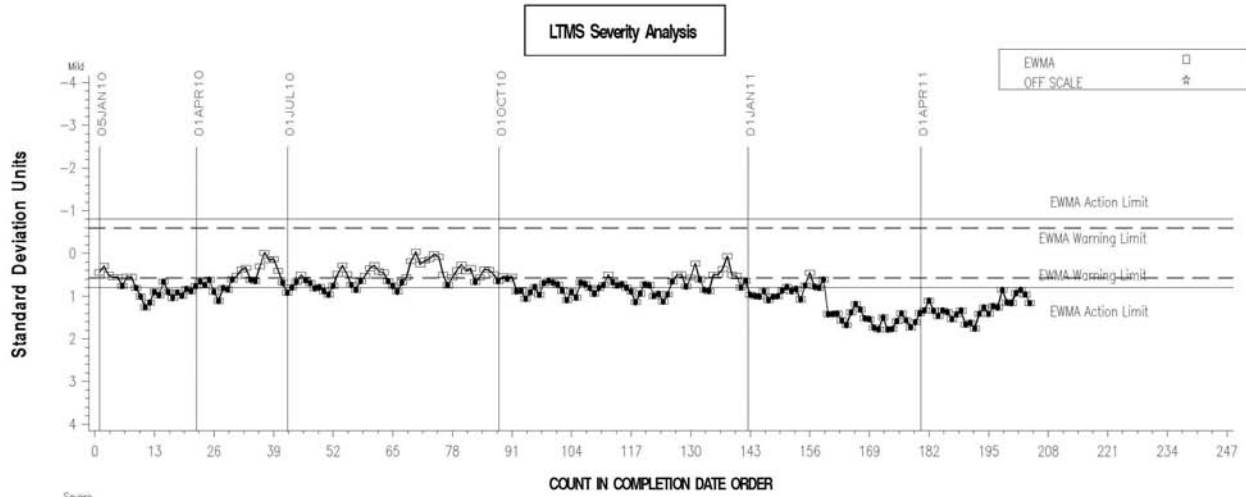
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LDEOC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



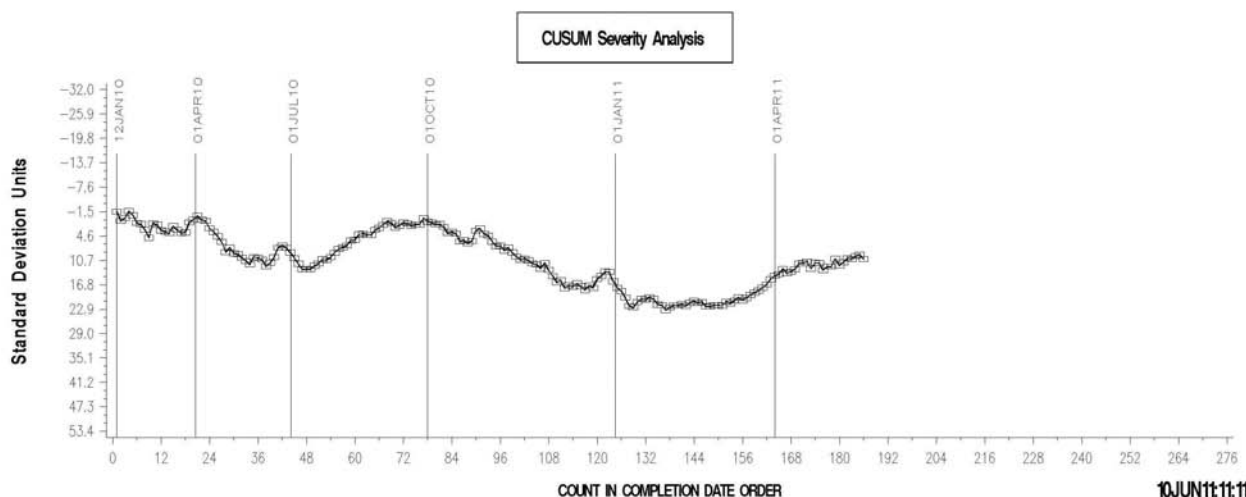
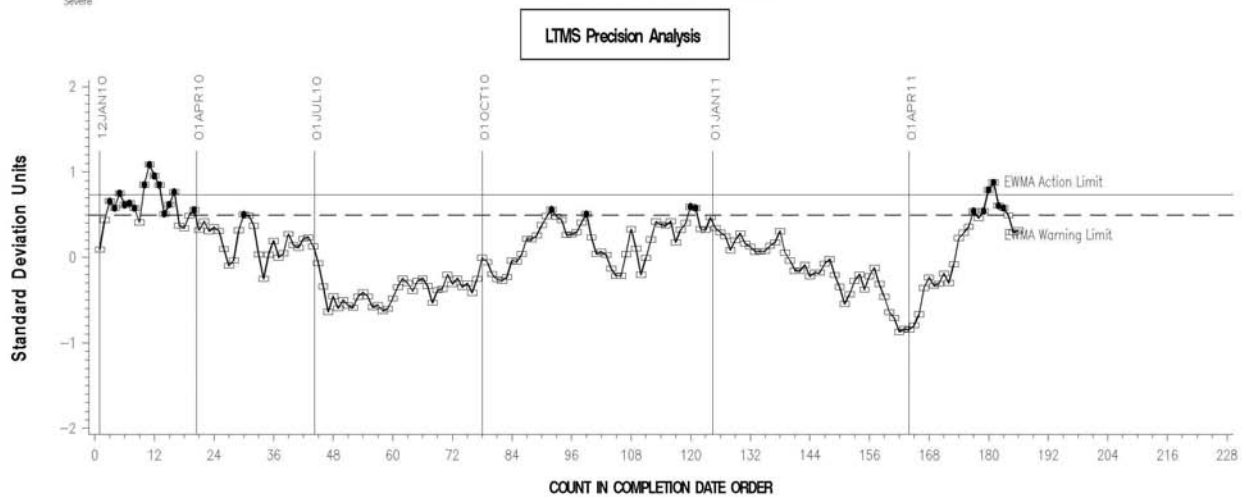
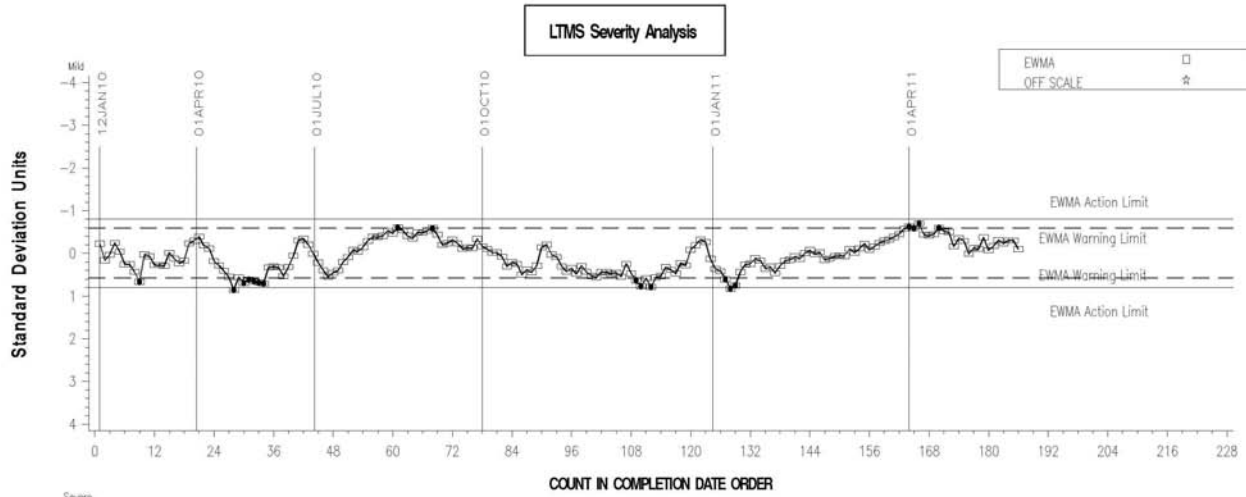
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LDEOC – ETHYLENE ACRYLATE INDUSTRY OPERATIONALLY VALID DATA

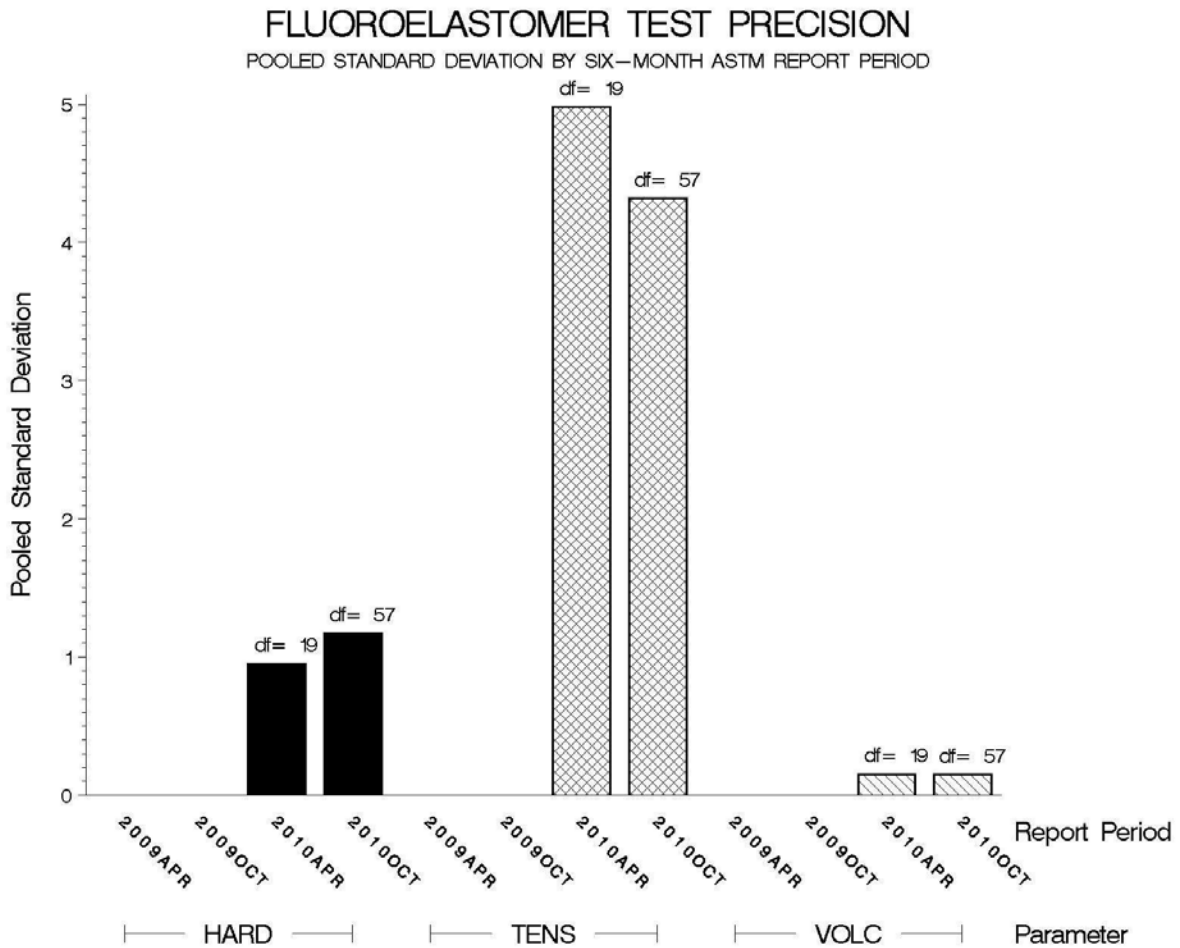


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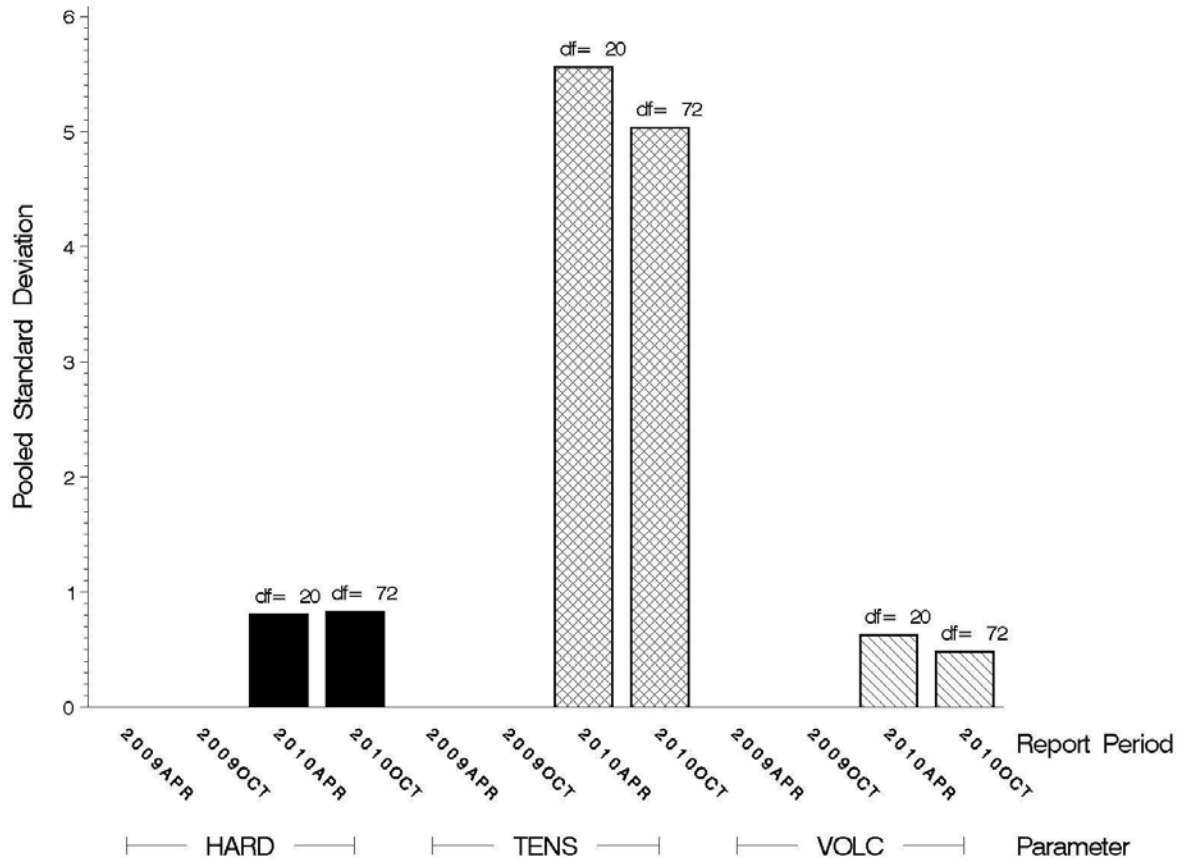
POOLED S:

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



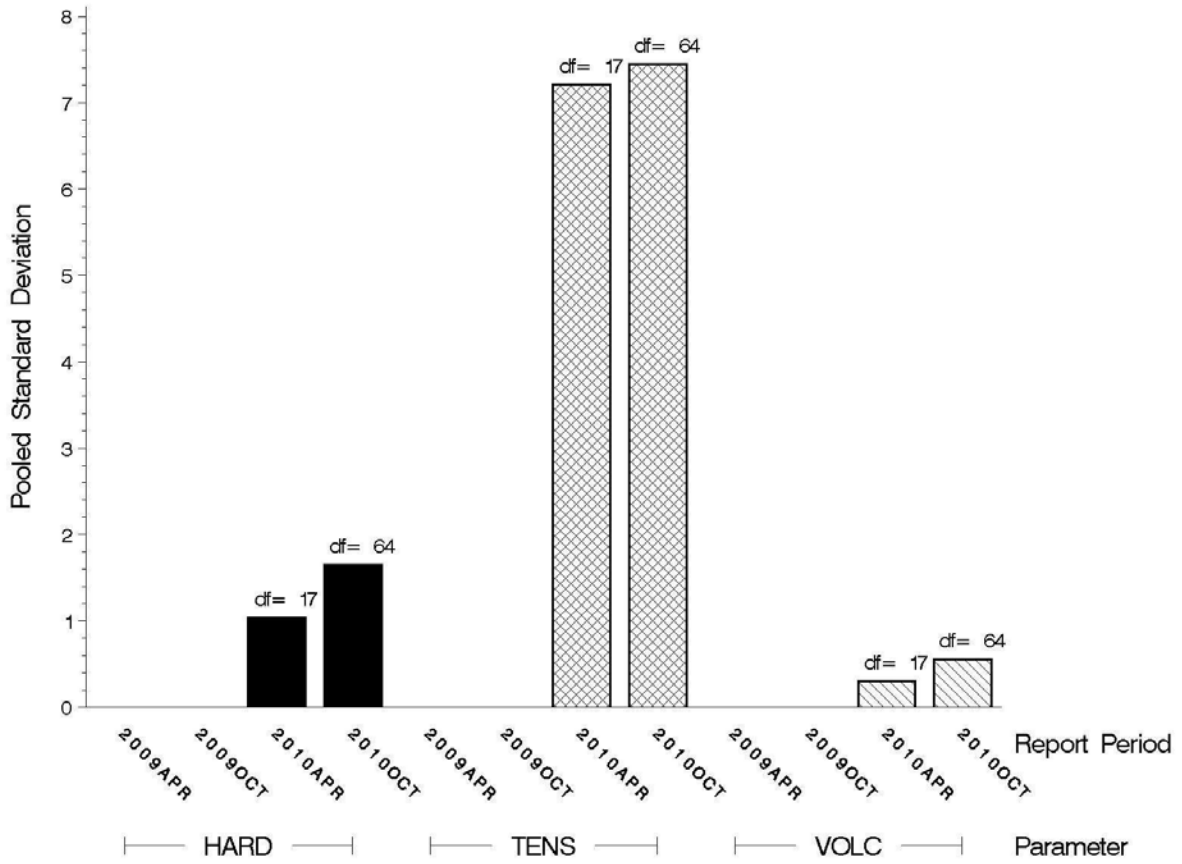
NITRILE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



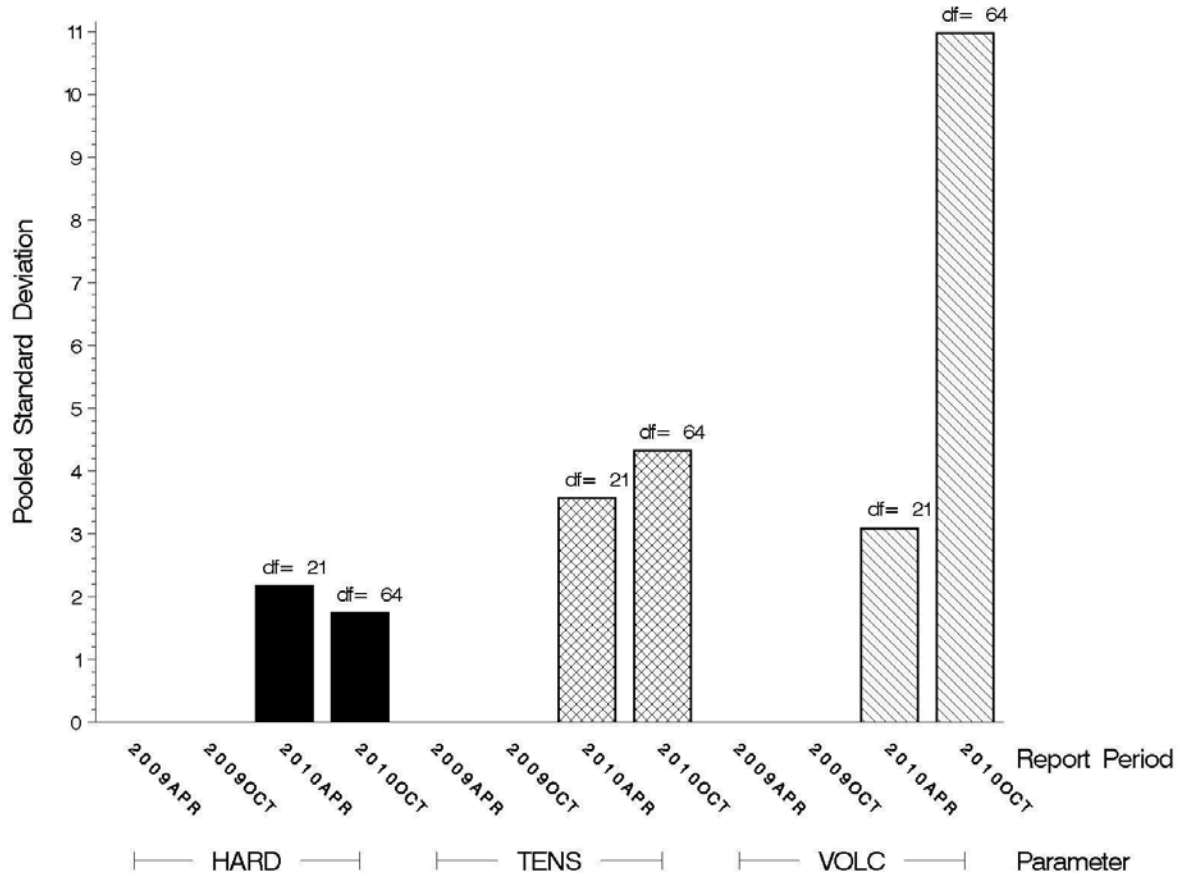
POLYACRYLATE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



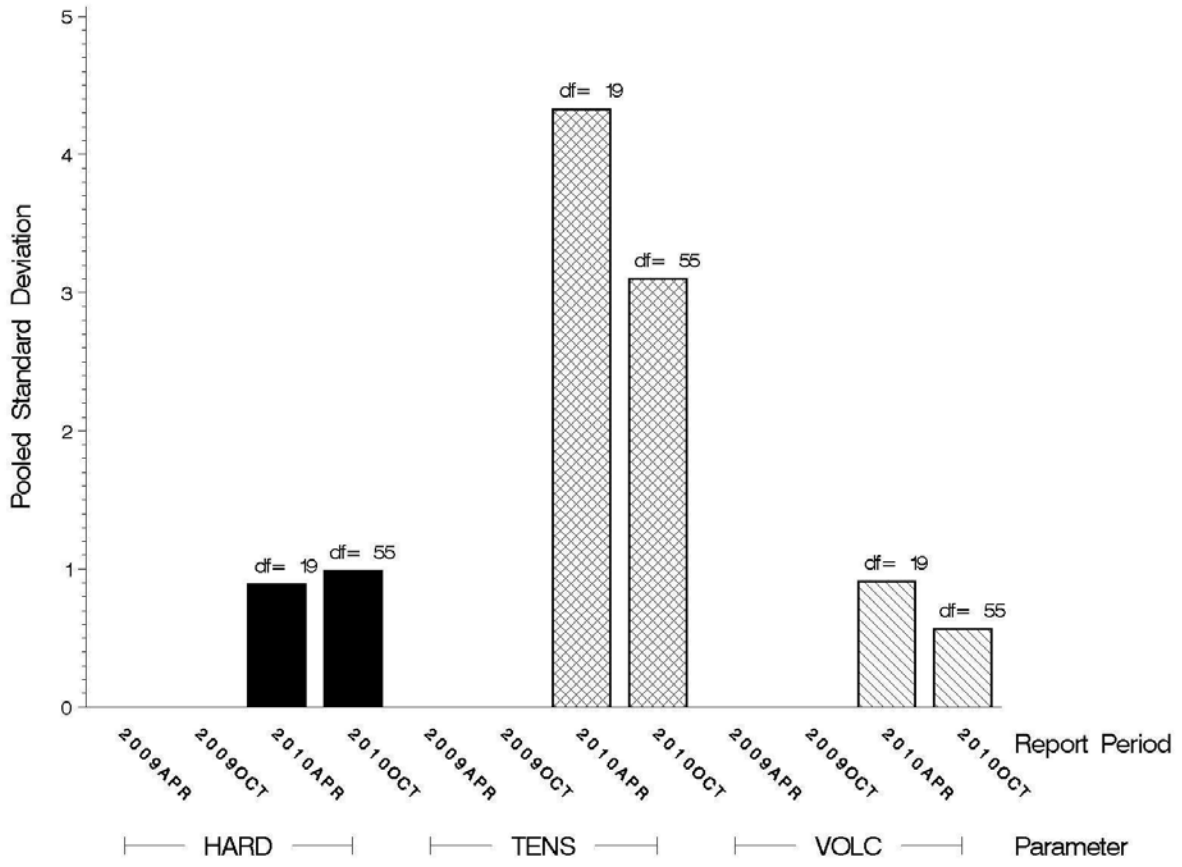
SILICONE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



ETHYLENE ACRYLATE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



STATUS OF REFERENCE OIL SUPPLY:

At the end of this report period, the testing oil supply stood as outlined in the following table:

Oil	Cans @ Labs	@ TMC	
		Cans	Gallons
1006-1	196	9058	1795
Total	196	9058	1795

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.

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	Severe	Within limits	Mild
Polyacrylate	Within limits	Mild	Mild
Silicone	Within limits	Within limits	Severe
Ethylene Acrylate	Within limits	Mild	Within limits

**Summary of Precision
as Measured by LTMS Control Charting**

Elastomer	VOLC	HARD	TENS
Fluoroelastomer	Within limits	Alarm	Within limits
Nitrile	Within limits	Within limits	Within limits
Polyacrylate	Within limits	Within limits	Within limits
Silicone	Within limits	Within limits	Warning
Ethylene Acrylate	Within limits	Within limits	Within limits

MTK/mtk/astm0411.doc/mem11-027.mtk.doc

c: F. M. Farber
J. A. Clark
EOEC Surveillance Panel
<ftp://ftp.astmtmc.cmu.edu/docs/bench/ldeoc/semiannualreports/ldeoc-04-2011.pdf>

Distribution: email