



# Test Monitoring Center

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

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

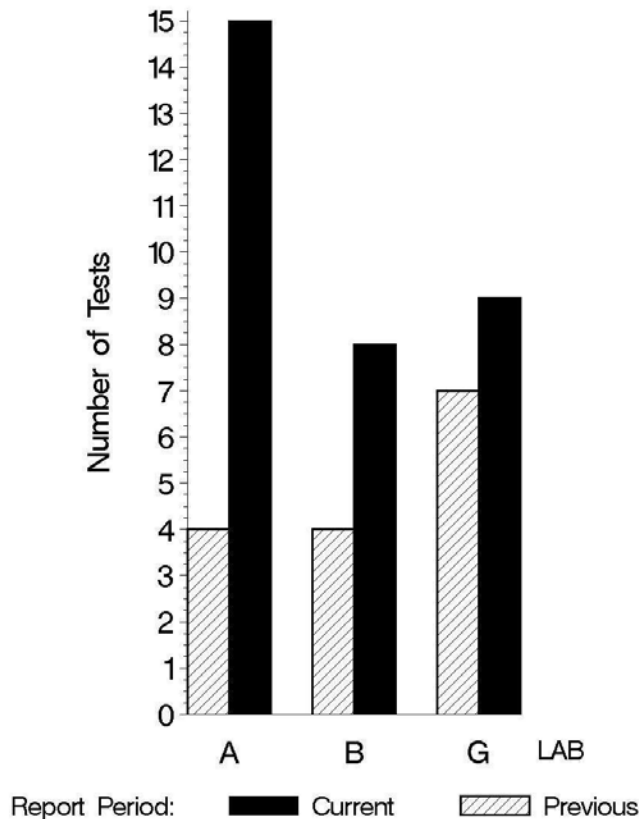
MEMORANDUM: 11-021  
DATE: June 6, 2011  
TO: Becky Grinfield,  
Chairman, Engine Oil Elastomer Compatibility Surveillance Panel  
FROM: Michael T. Kasimirsky *Michael T. Kasimirsky*  
SUBJECT: EOEC Testing from October 1, 2010 through March 31, 2011

A total of 159 EOEC 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.

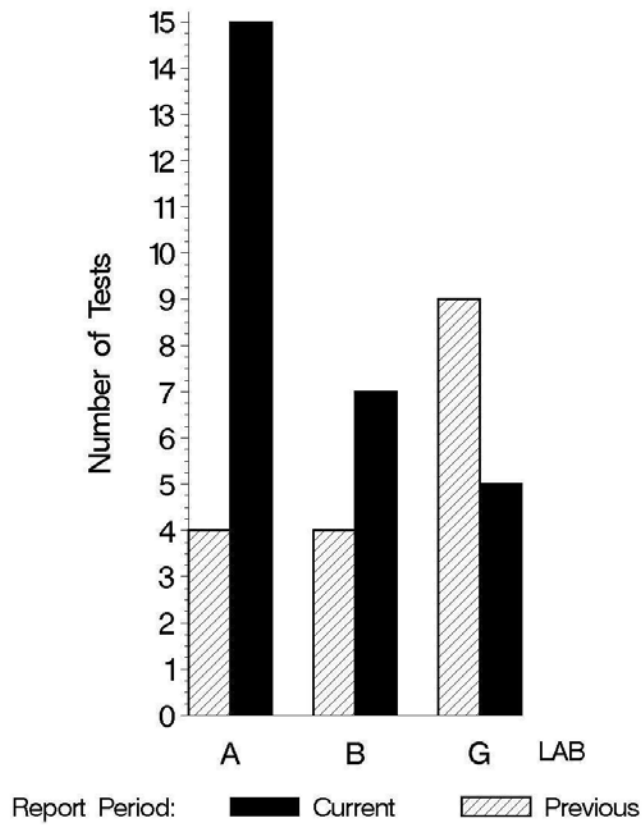
	Reporting Data
Number of Labs	3

Tests reported this period were distributed as shown below:

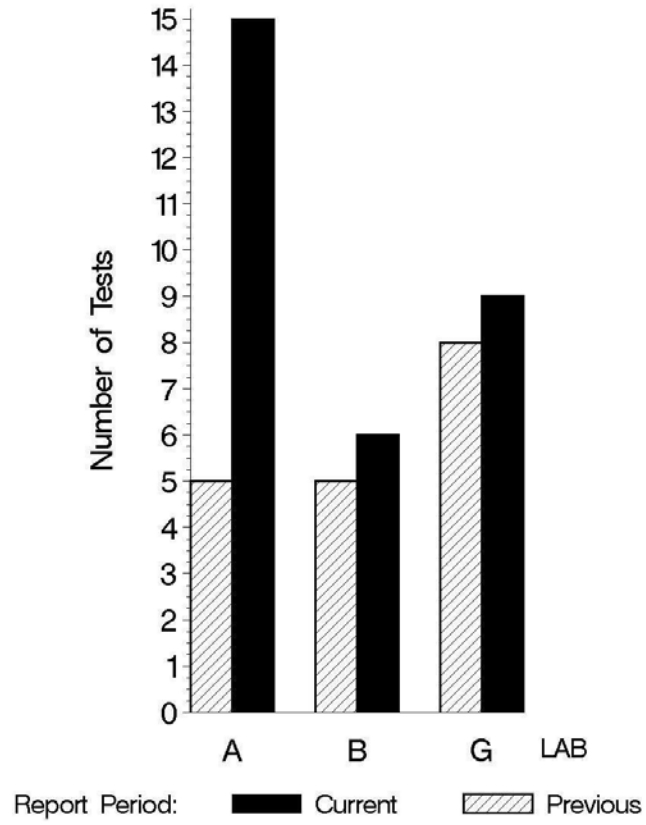
## NUMBER OF FLUOROELASTOMER TESTS REPORTED BY LAB AND REPORT PERIOD



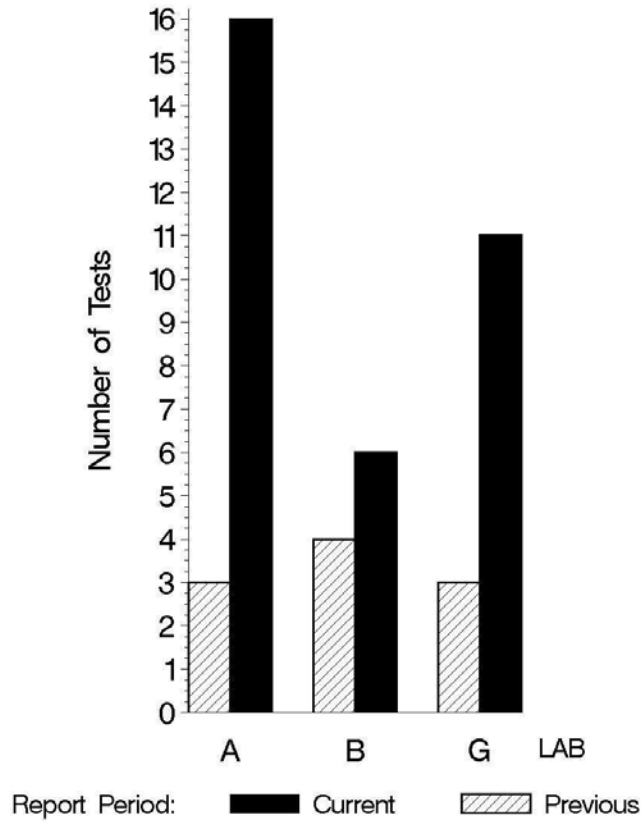
### NUMBER OF NITRILE TESTS REPORTED BY LAB AND REPORT PERIOD



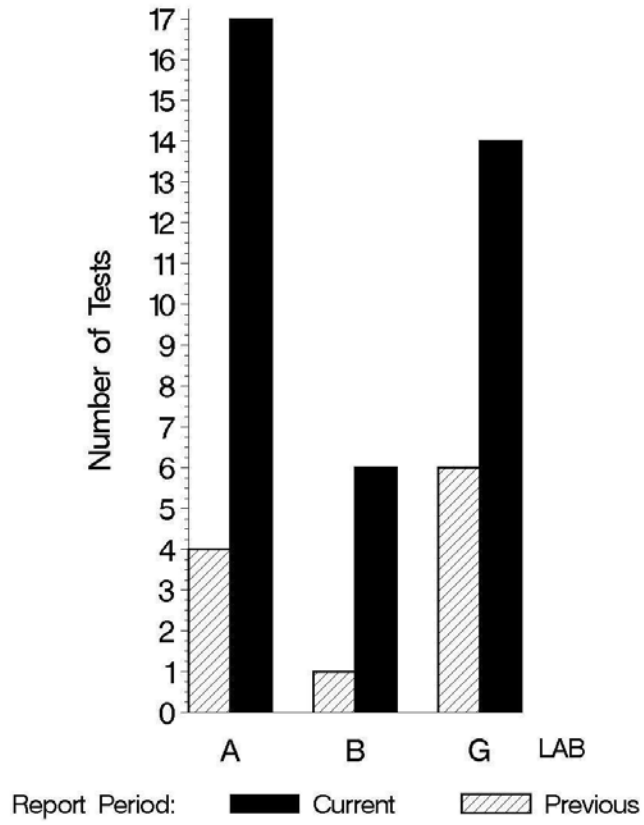
### NUMBER OF POLYACRYLATE TESTS REPORTED BY LAB AND REPORT PERIOD



### NUMBER OF SILICONE TESTS REPORTED BY LAB AND REPORT PERIOD



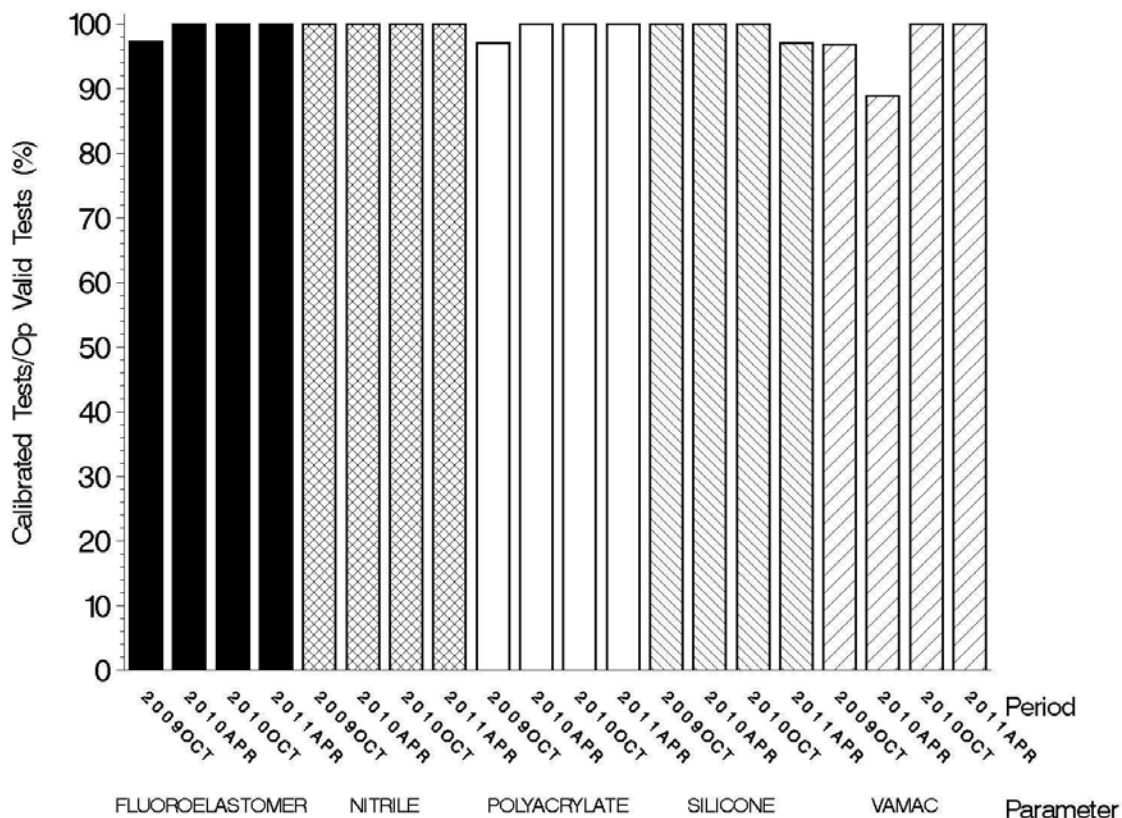
### NUMBER OF VAMAC TESTS REPORTED BY LAB AND REPORT PERIOD



**Test Distribution by Oil and Validity**

							Totals	
		Fluoroelastomer	Nitrile	Polyacrylate	Silicone	Vamac	This Period	Last Period
Accepted for Calibration	AC	32	27	30	32	37	158	67
Rejected	OC	0	0	0	1	0	1	0
Information Run (not for calibration)	NI	0	0	0	0	0	0	0
Operationally Invalid (lab)	LC	0	0	0	0	0	0	2
Operationally Invalid (lab/TMC)	RC	0	0	0	0	0	0	0
Aborted Calibration	XC	0	0	0	0	0	0	0
<b>Total</b>		<b>32</b>	<b>27</b>	<b>30</b>	<b>33</b>	<b>37</b>	<b>159</b>	<b>69</b>

**OPERATIONALLY VALID TESTS  
MEETING ACCEPTANCE CRITERIA**



The above chart shows the percentage of accepted operationally valid tests. This period one test failed to meet the acceptance criteria.

Lost Tests per Start by Lab and Elastomer Type

Lab	Fluoroelastomer			Nitrile			Polyacrylate			Silicone			Vamac			Total		
	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%	Lost	Starts	%
A	0	15	0	0	15	0	0	15	0	0	16	0	0	17	0	0	78	0
B	0	8	0	0	7	0	0	6	0	0	6	0	0	6	0	0	33	0
G	0	9	0	0	5	0	0	9	0	0	11	0	0	14	0	0	48	0
Total	0	32	0	0	27	0	0	30	0	0	33	0	0	37	0	0	159	0

Lost tests are those that were aborted or operationally invalid.

Causes for Lost Tests

Lab		Cause		Elastomer					Validity			Loss Rate		
				Fluoroelastomer	Nitrile	Polyacrylate	Silicone	VAMAC	LC	RC	XC	Lost	Starts	%
-	-	No Lost Tests										0	159	0%
		Lost	0	0	0	0	0	0	0	0				
		Starts	32	27	30	33	37	159	159	159				
		%	0%	0%	0%	0%	0%	0%	0%	0%				



Average $\Delta$ /s by Lab						
Elastomer	Lab	n	VOLCYI	HARDYI	TENSYI	ELONYI
Fluoroelastomer	A	15	0.446	0.167	-0.451	-0.578
	B	8	-0.287	0.091	-0.165	-0.304
	G	9	0.728	-0.944	0.204	-0.407
	Industry	32	0.342	-0.165	-0.195	-0.461
Nitrile	A	15	1.712	0.149	-1.068	0.023
	B	7	1.918	0.348	-0.448	0.662
	G	5	1.757	-0.266	-1.256	-0.348
	Industry	27	1.774	0.124	-0.942	0.120
Polyacrylate	A	15	1.553	-0.346	0.315	0.597
	B	6	1.599	-0.735	0.343	0.366
	G	9	1.635	0.469	0.929	0.900
	Industry	30	1.586	-0.180	0.505	0.642
Silicone	A	16	-0.543	-0.057	-0.686	0.522
	B	6	1.257	-0.326	-1.870	0.659
	G	11	1.366	0.873	-1.701	-0.634
	Industry	33	0.421	0.204	-1.240	0.162
VAMAC	A	17	1.206	-1.391	1.678	0.124
	B	6	1.673	-2.011	1.741	0.057
	G	14	1.618	-0.281	1.695	-0.257
	Industry	37	1.438	-1.072	1.695	-0.031

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

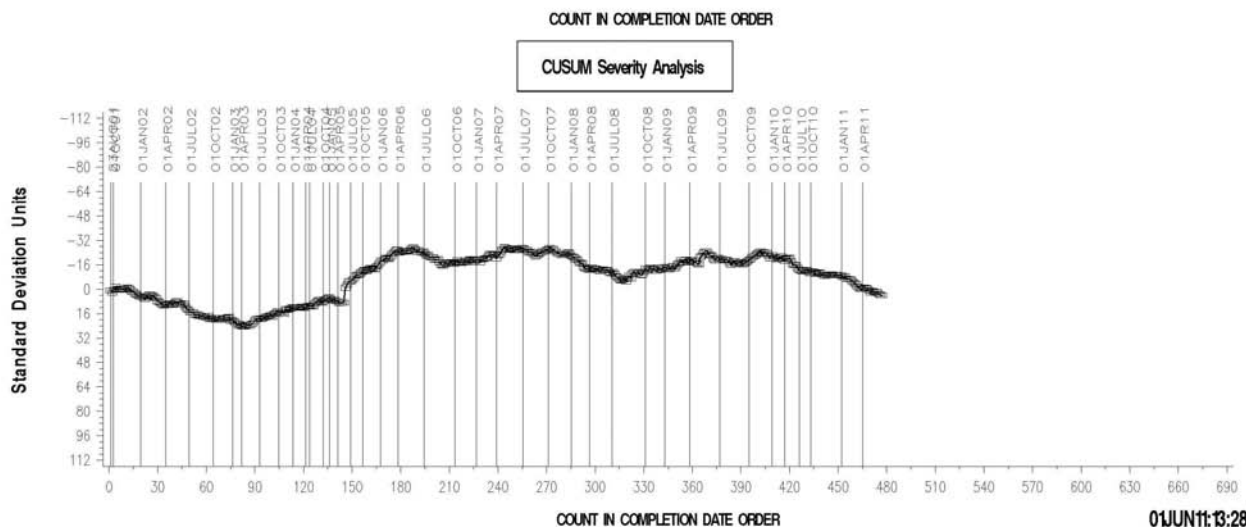
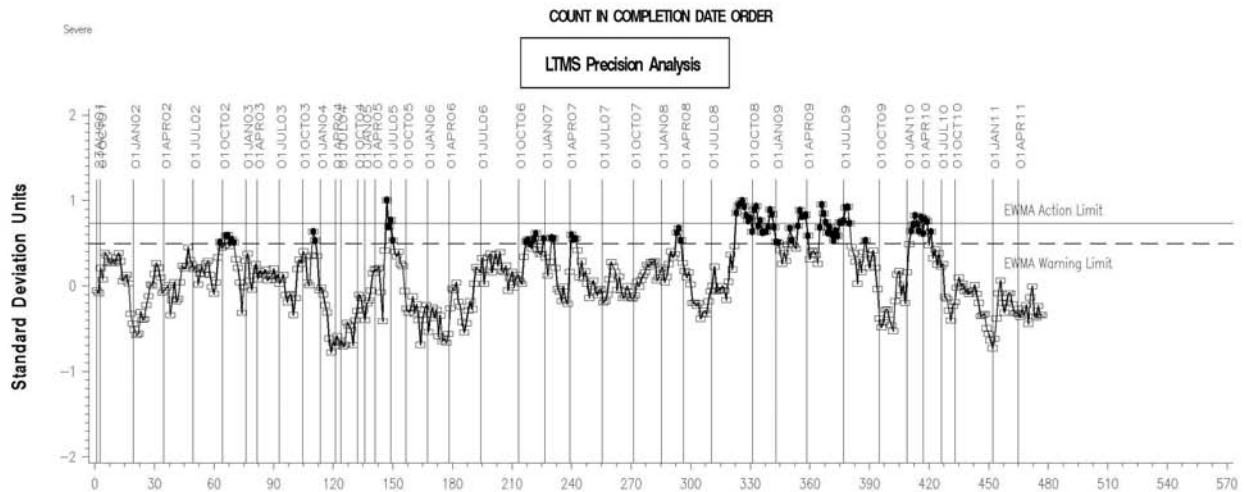
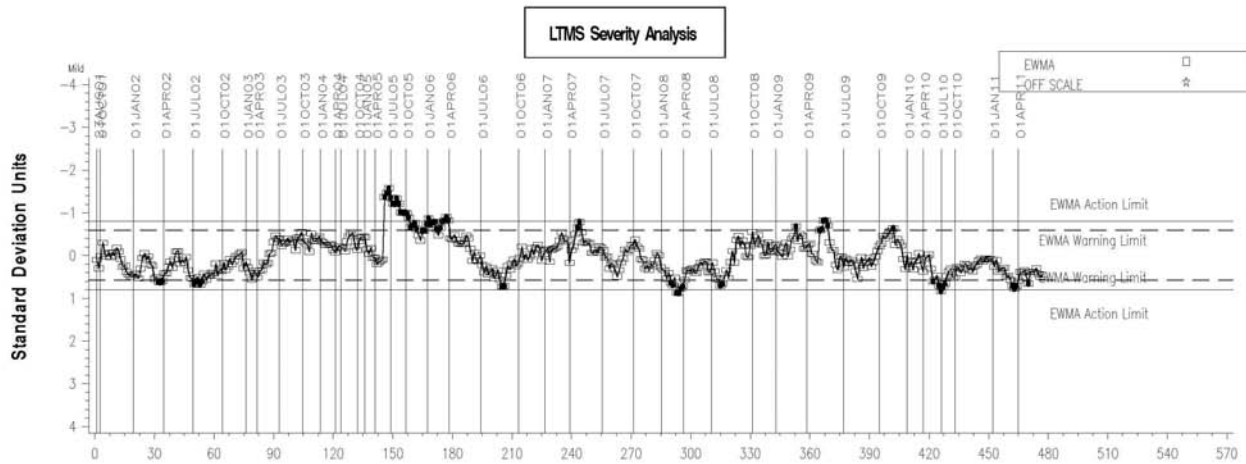
<i>Links to Individual Test Result Data</i>	
<b>Elastomer Type</b>	<b>Web Link to Data</b>
Fluoroelastomer	<a href="ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocf/data/">ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocf/data/</a>
Nitrile	<a href="ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocn/data/">ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocn/data/</a>
Polyacrylate	<a href="ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocp/data/">ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocp/data/</a>
Silicone	<a href="ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecs/data/">ftp://ftp.astmtmc.cmu.edu/refdata/bench/eoecs/data/</a>
VAMAC	<a href="ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocv/data/">ftp://ftp.astmtmc.cmu.edu/refdata/bench/eocv/data/</a>

LTMS CONTROL CHARTS

**EOEC – FLUOROELASTOMER INDUSTRY OPERATIONALLY VALID DATA**



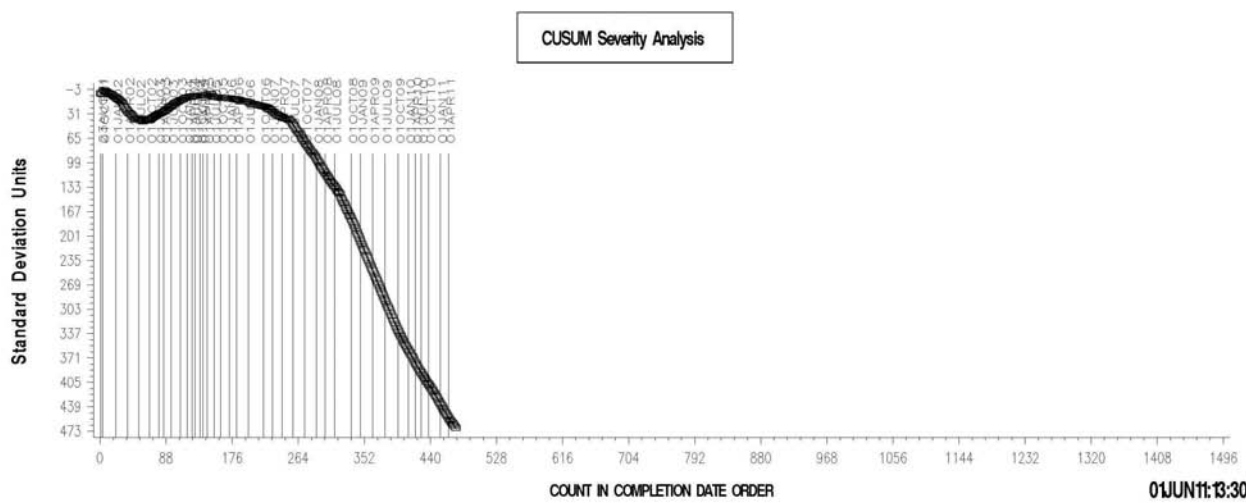
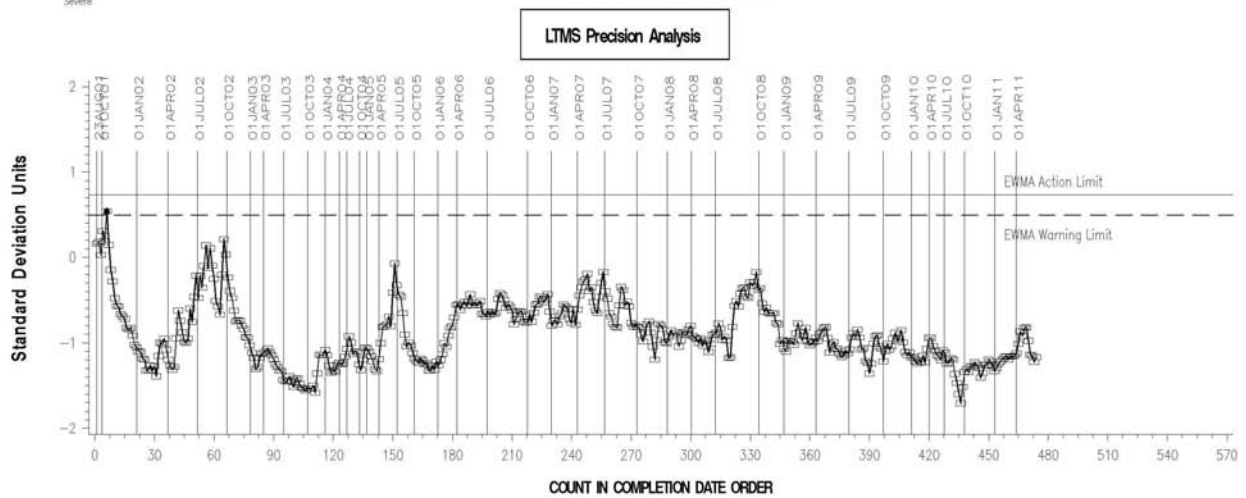
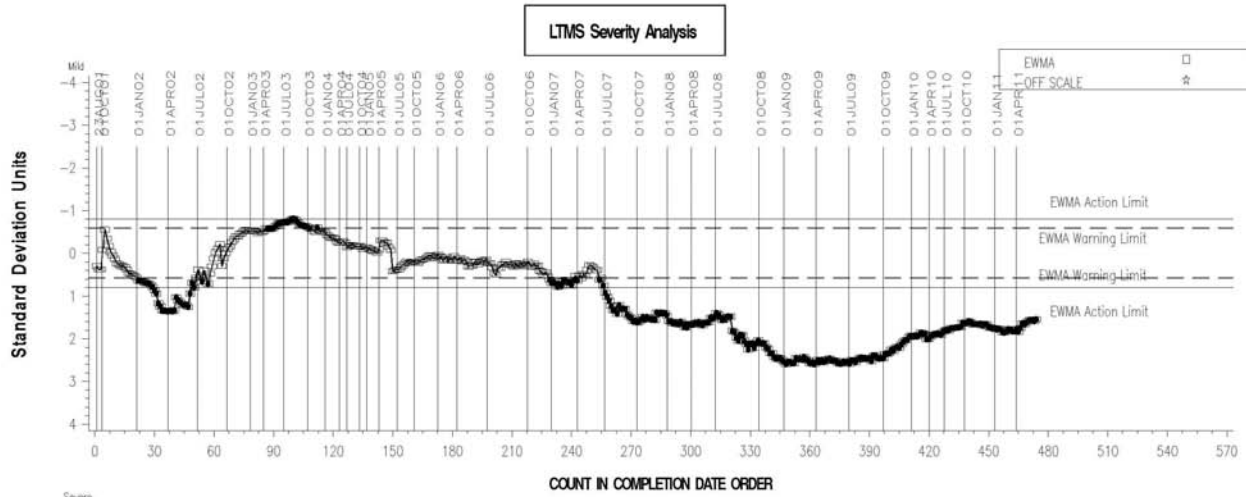
**FLUOROELASTOMER VOLUME CHANGE AVG.**



EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



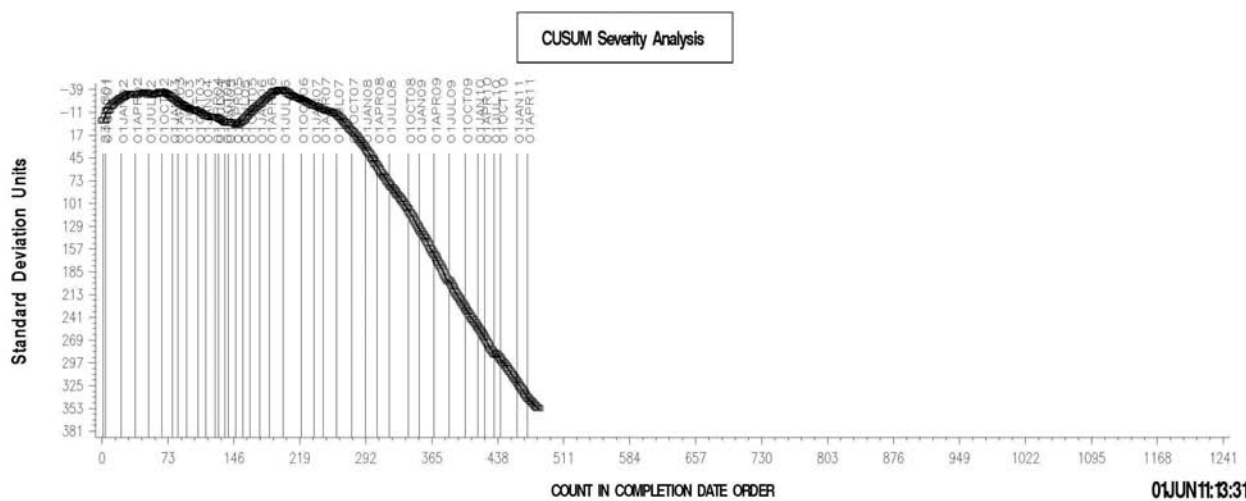
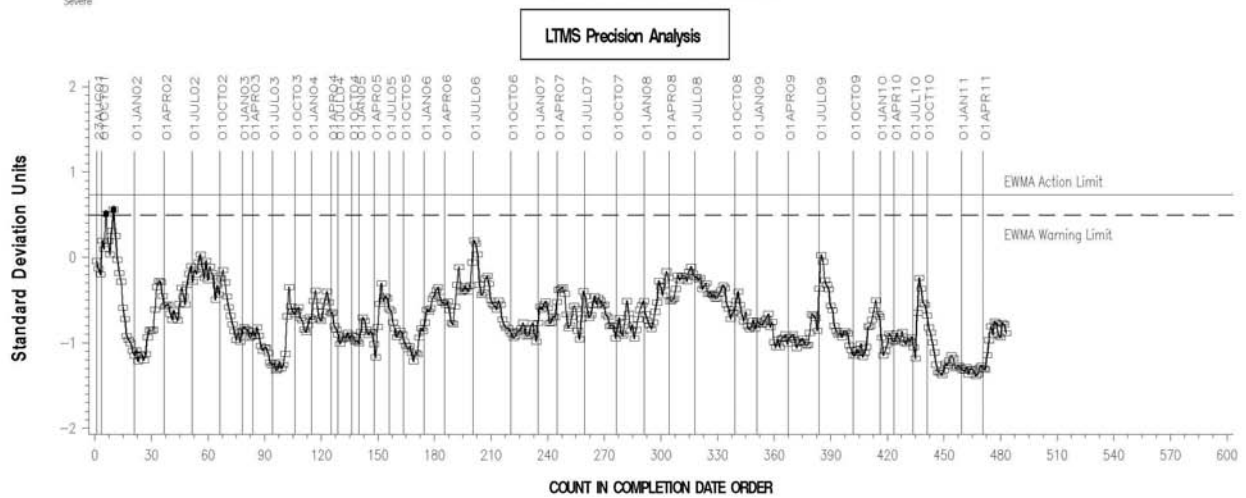
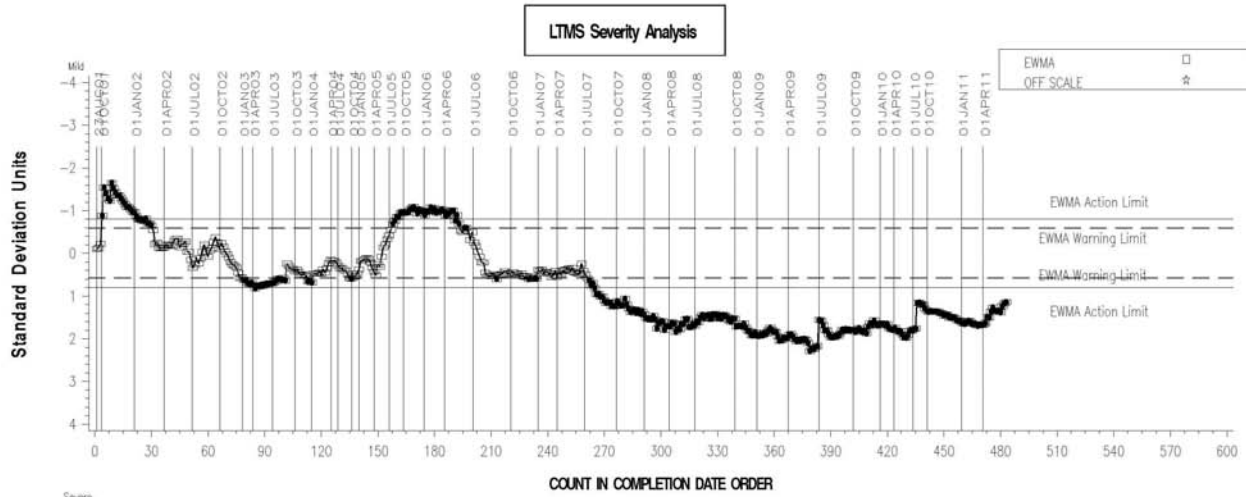
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EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



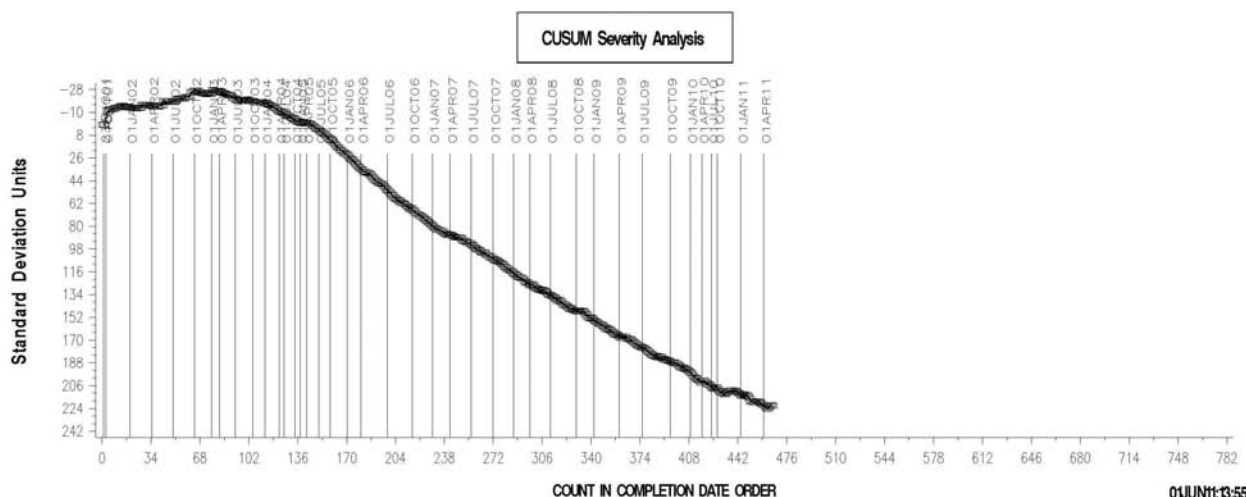
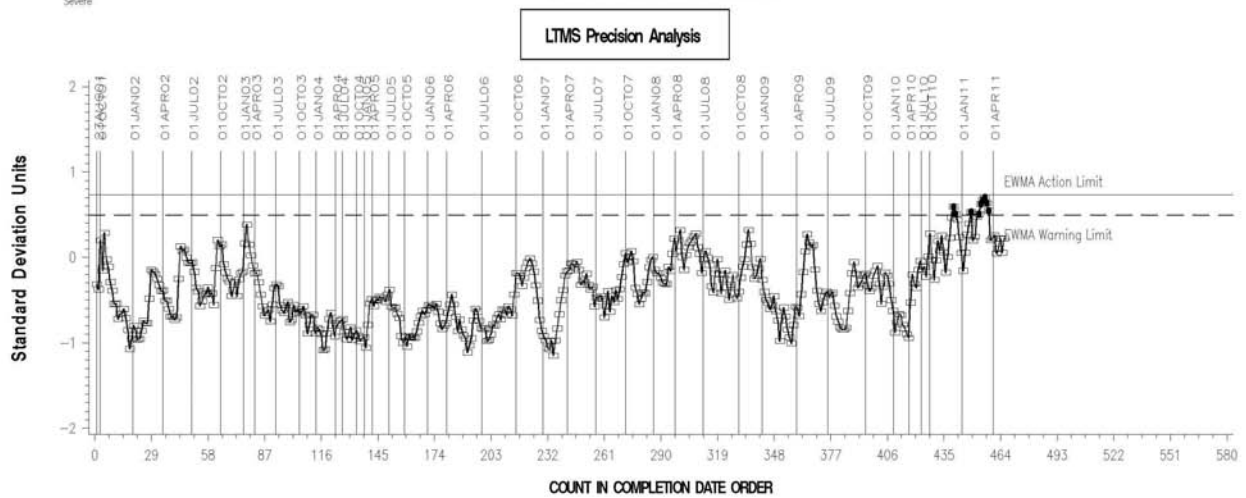
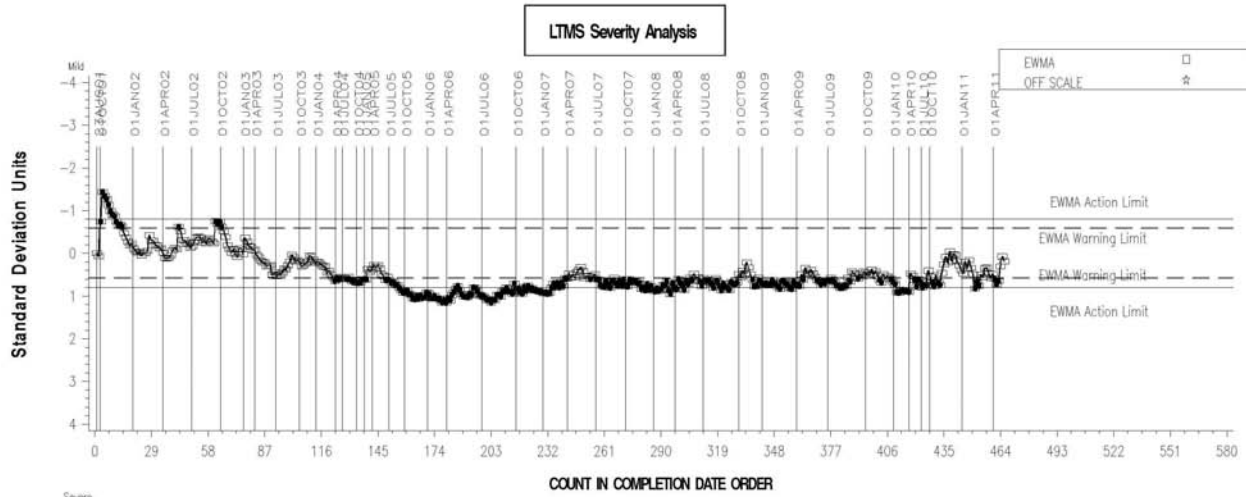
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EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



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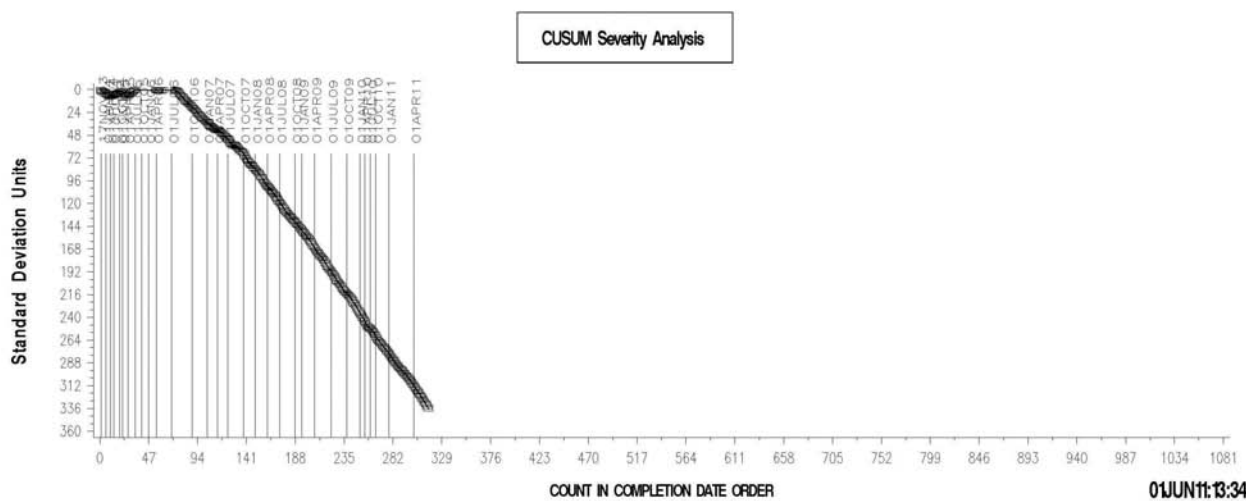
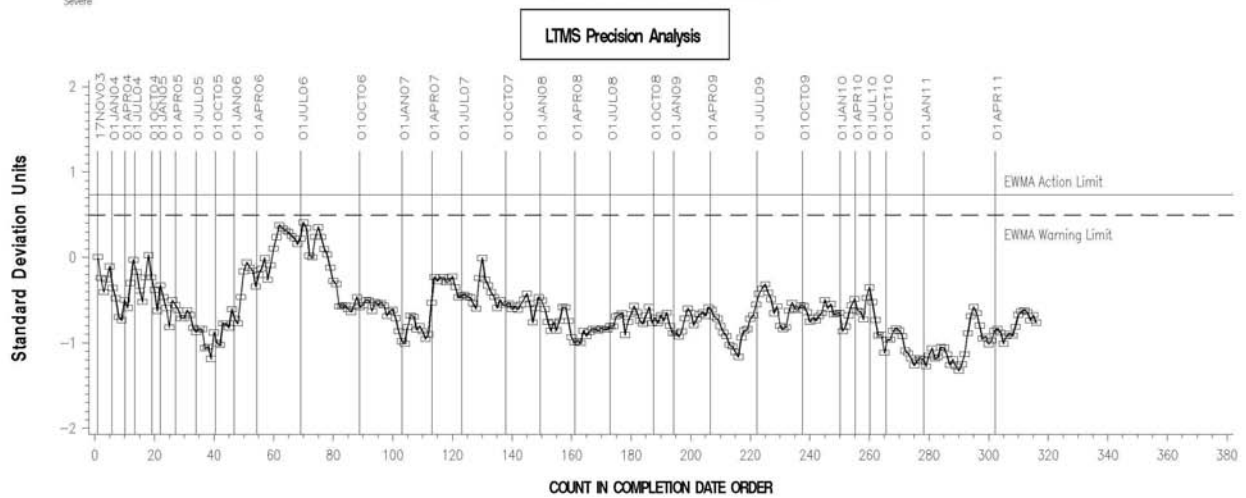
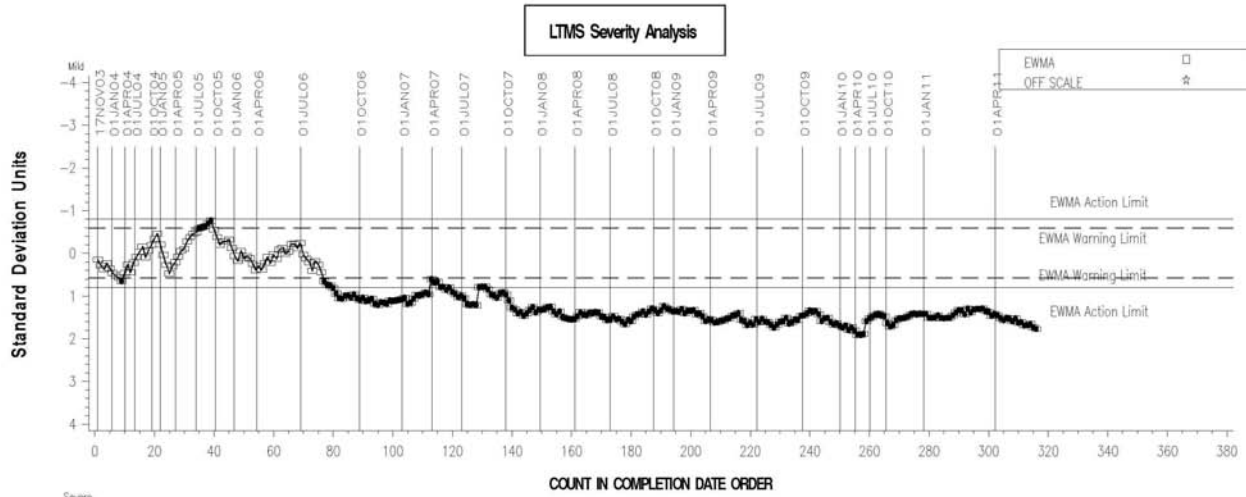




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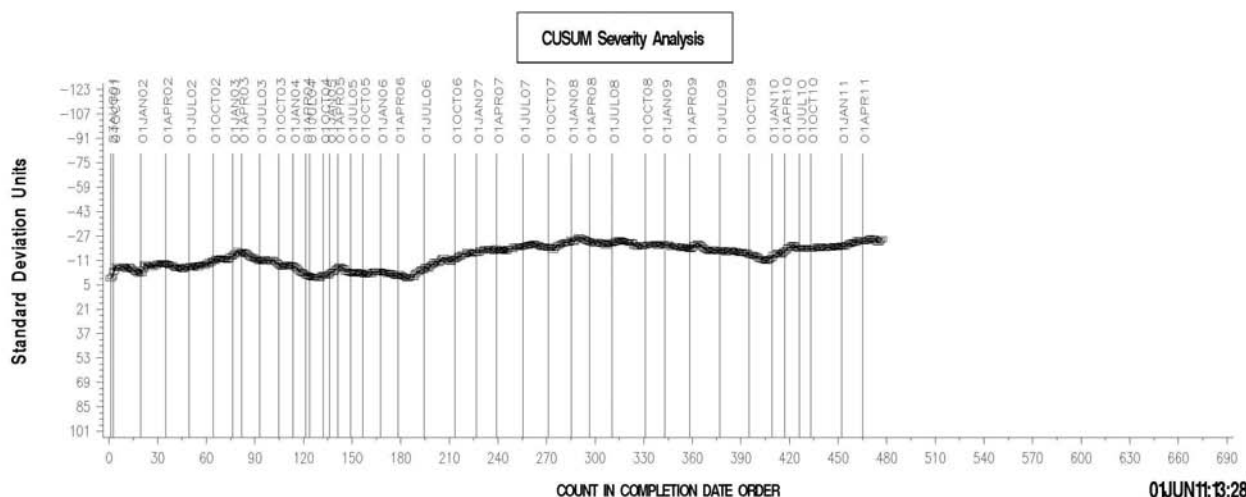
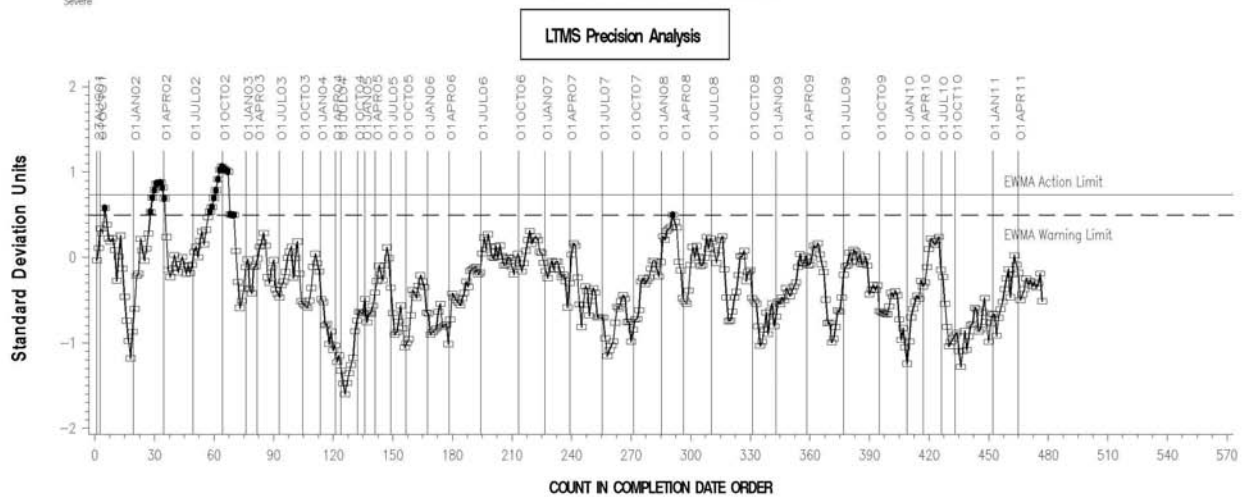
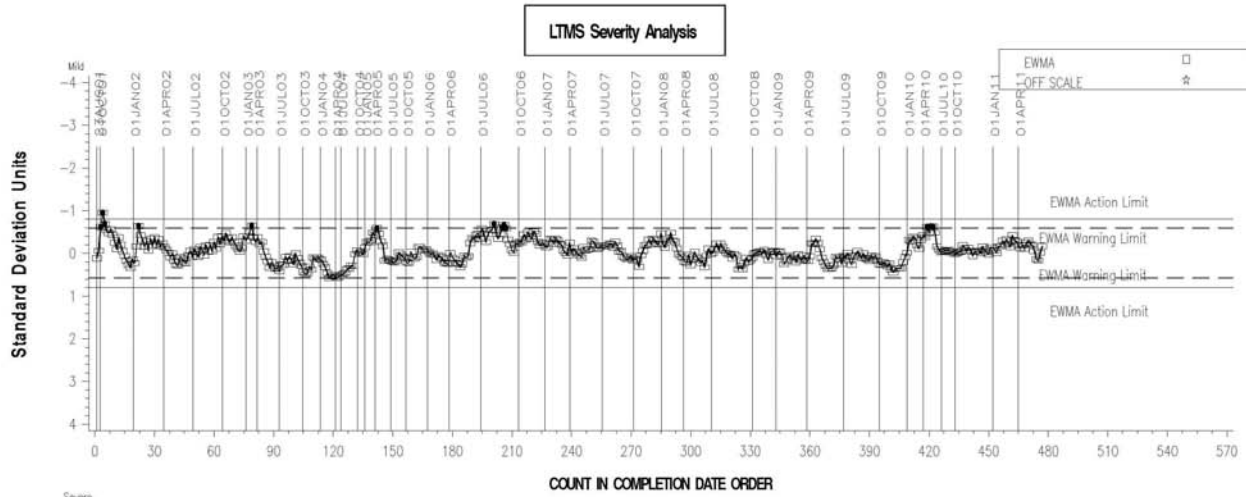
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EOEC – FLUROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



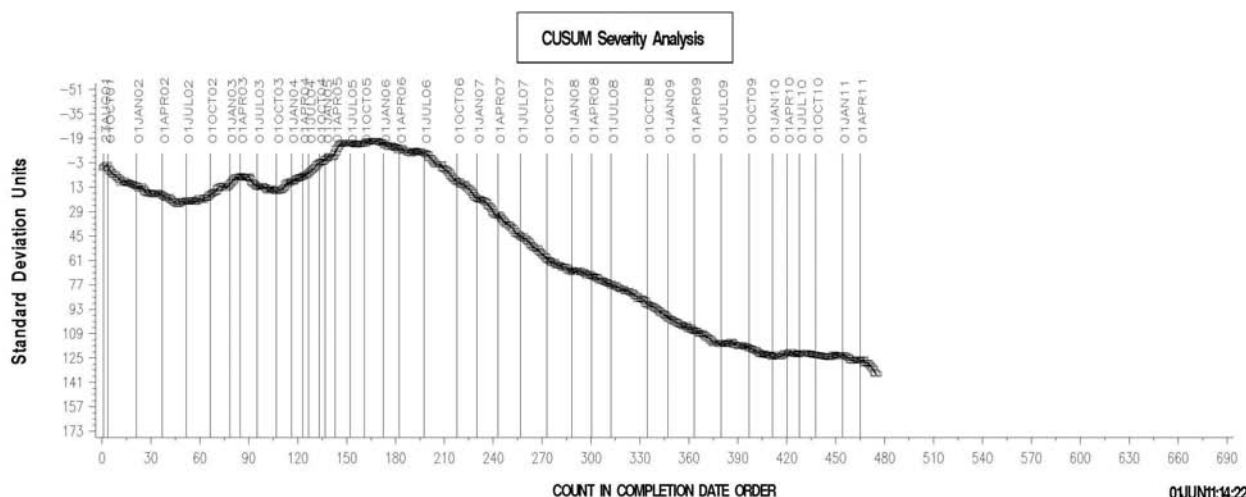
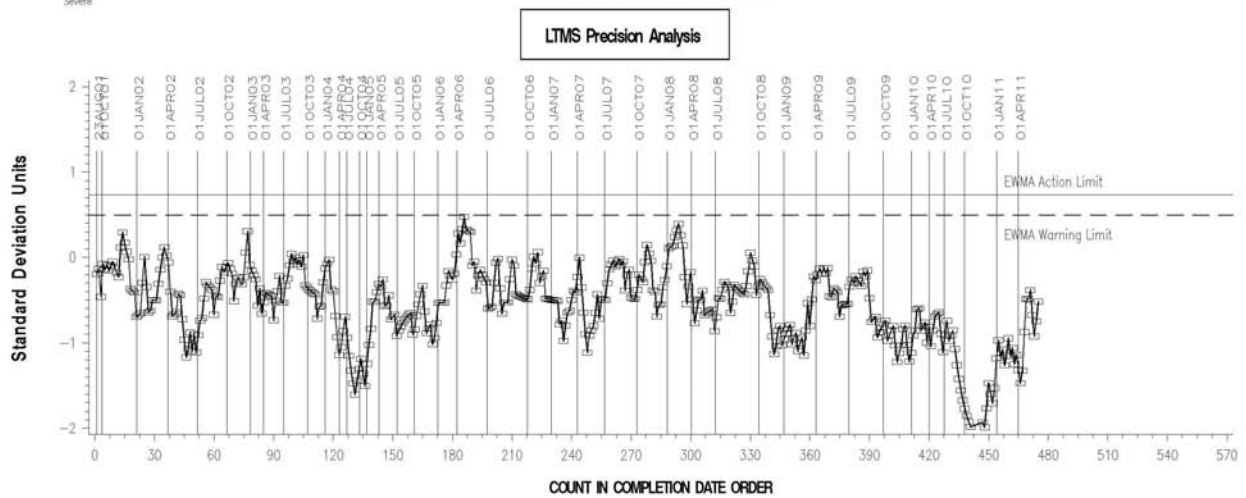
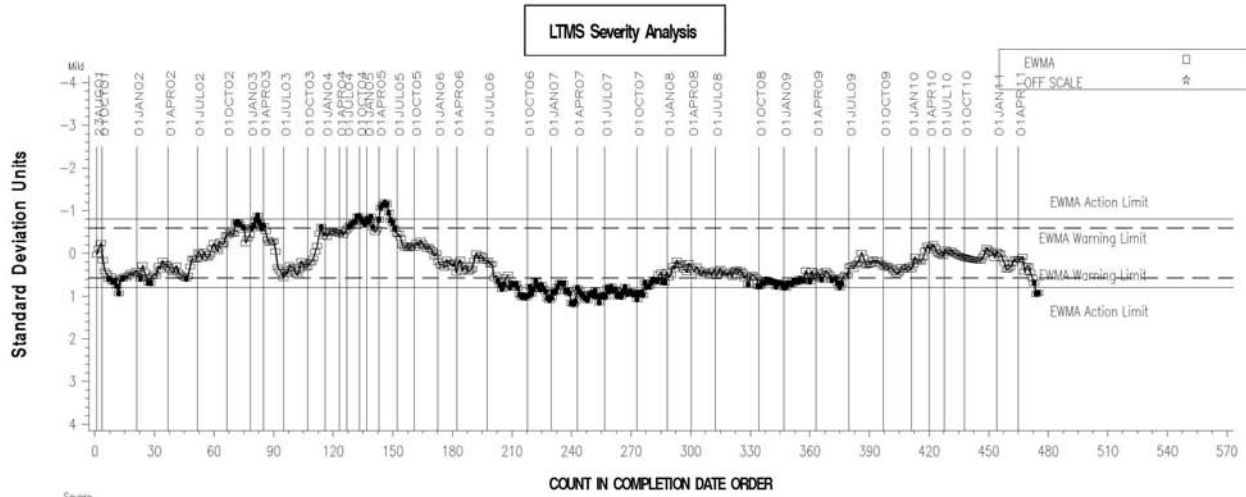
FLUROELASTOMER POINTS HARDNESS CHANGE



EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



REFERENCE NITRILE POINTS HARDNESS CHANGE AVERAGE

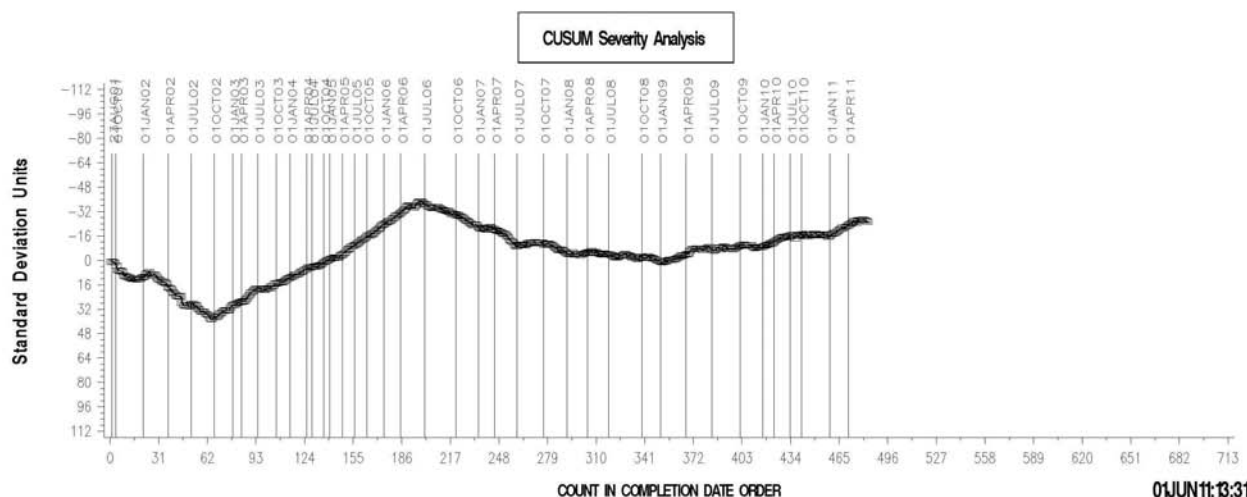
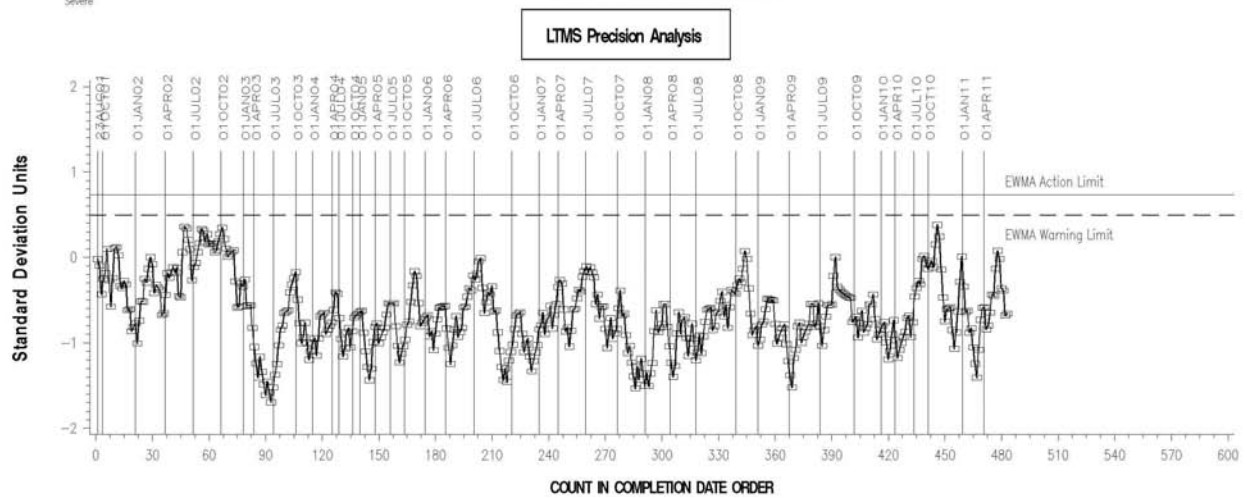
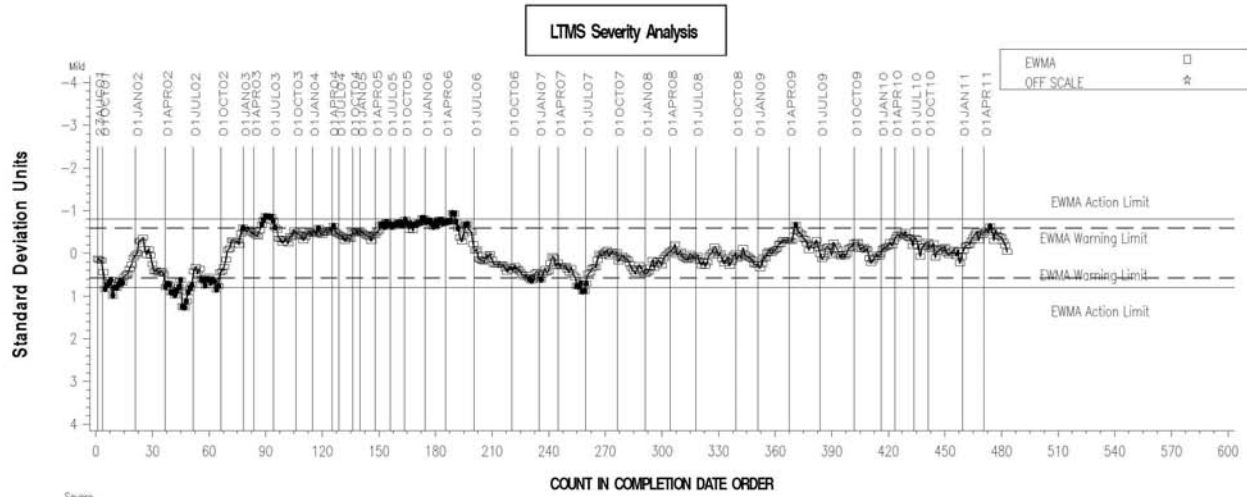




EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



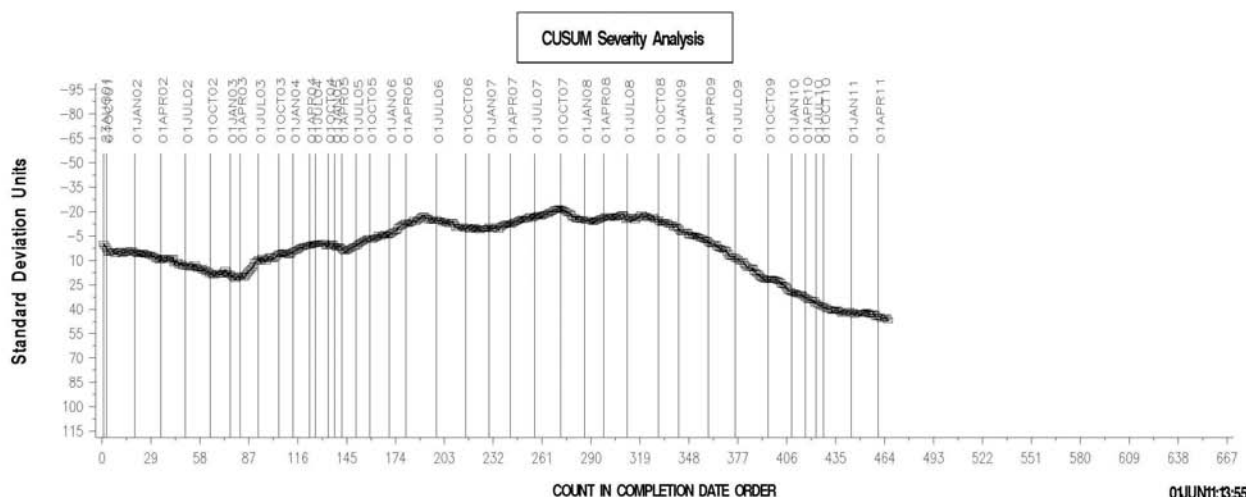
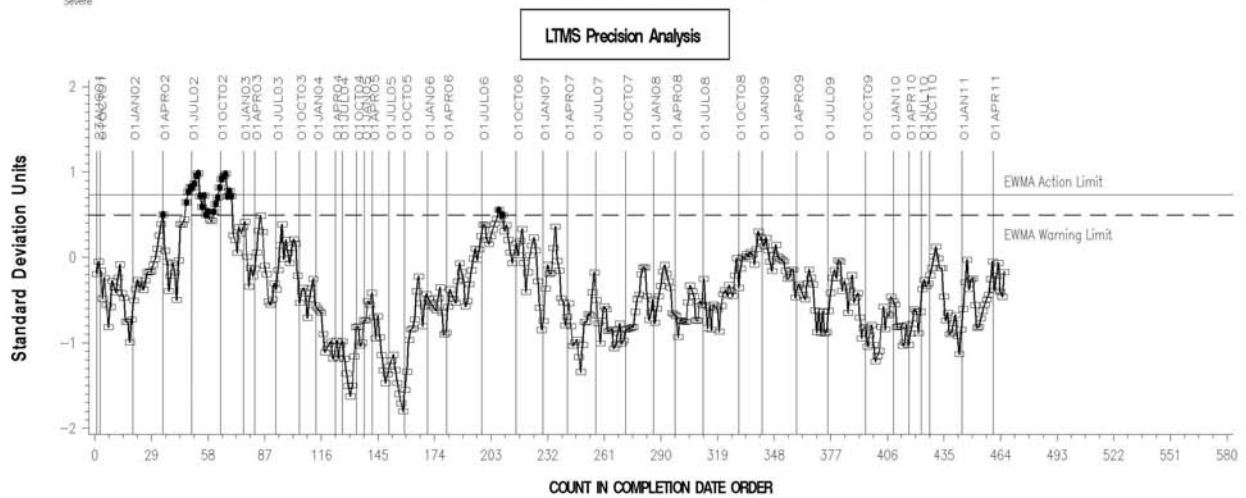
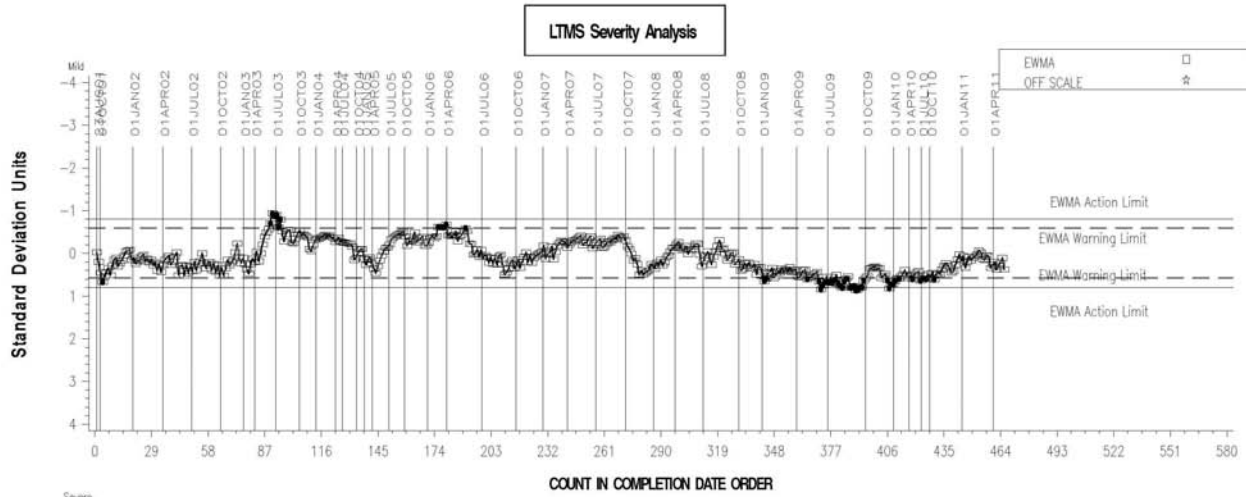
REFERENCE POLYACRYLATE POINTS HARDNESS CHANGE AVER



EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



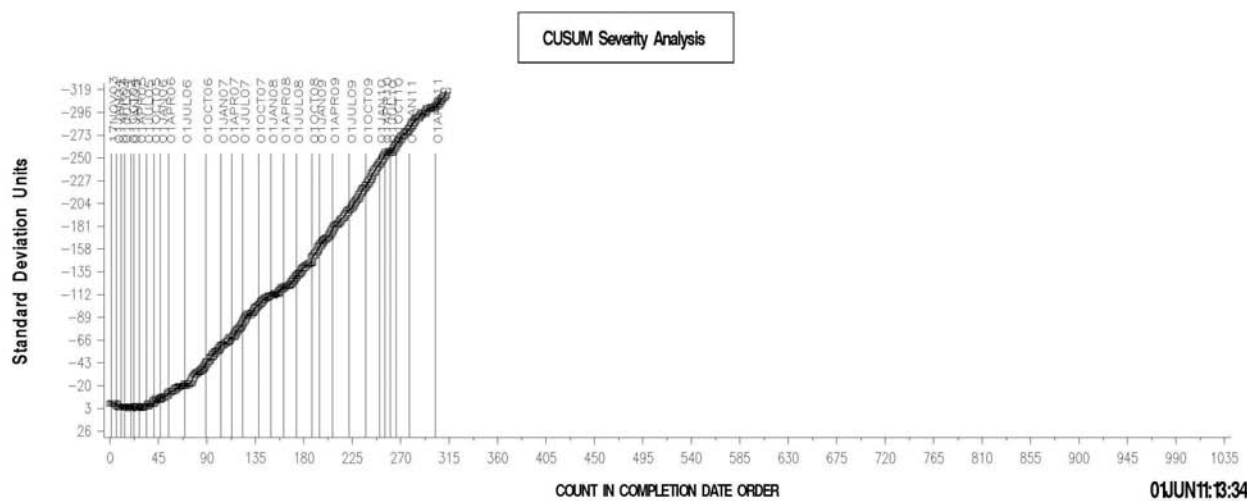
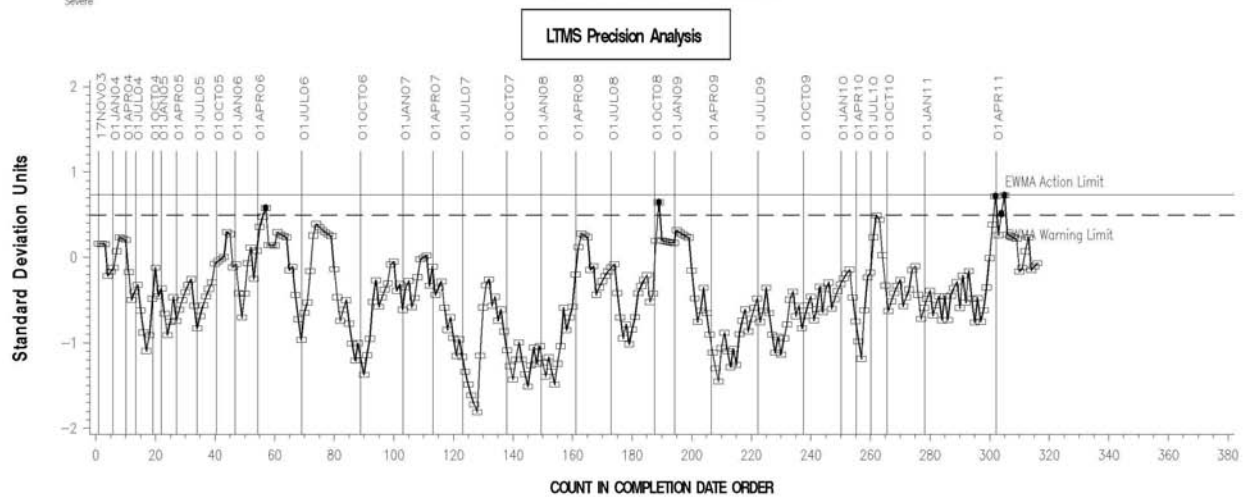
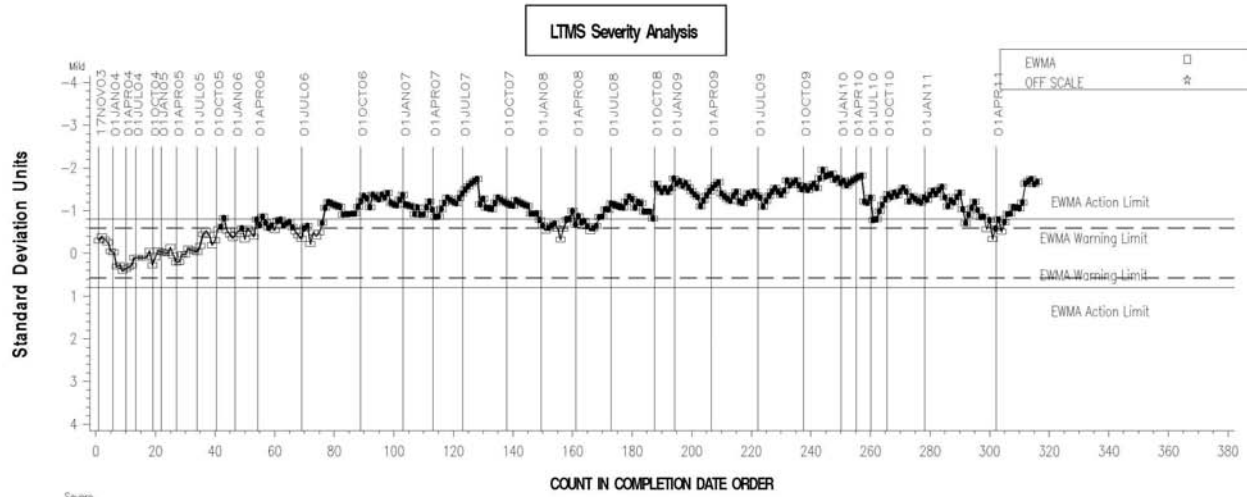
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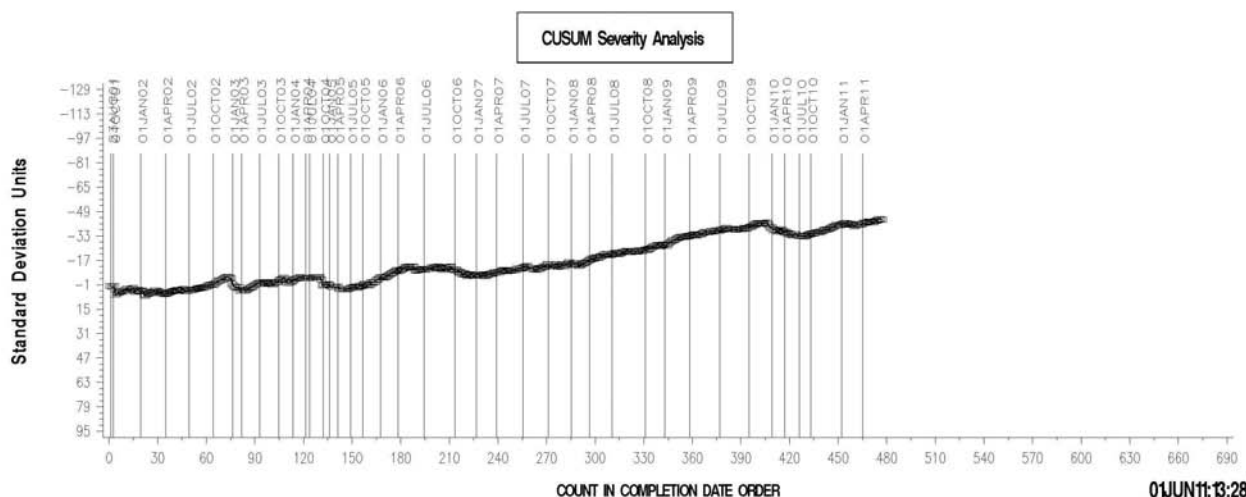
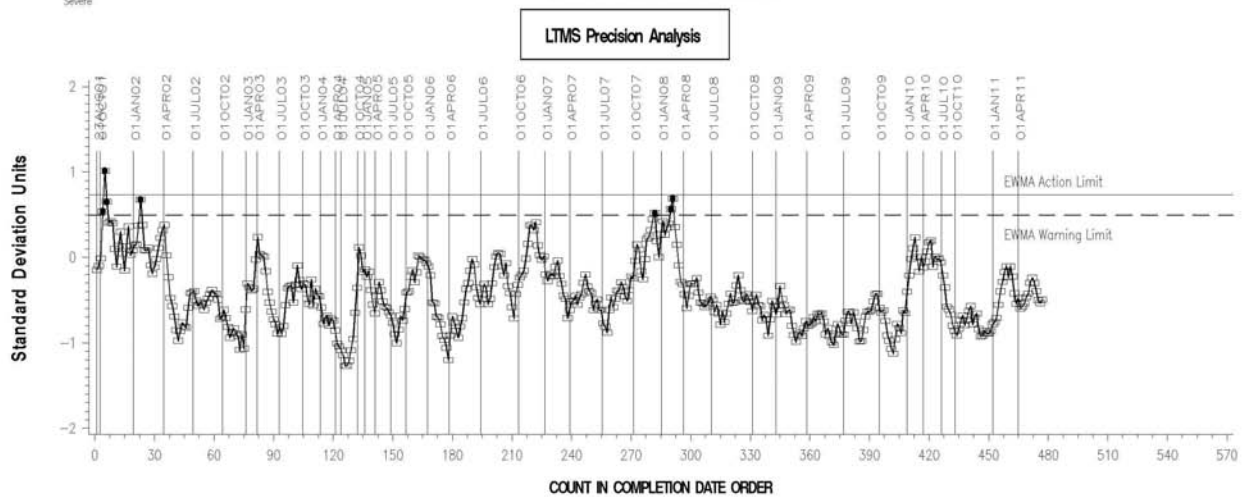
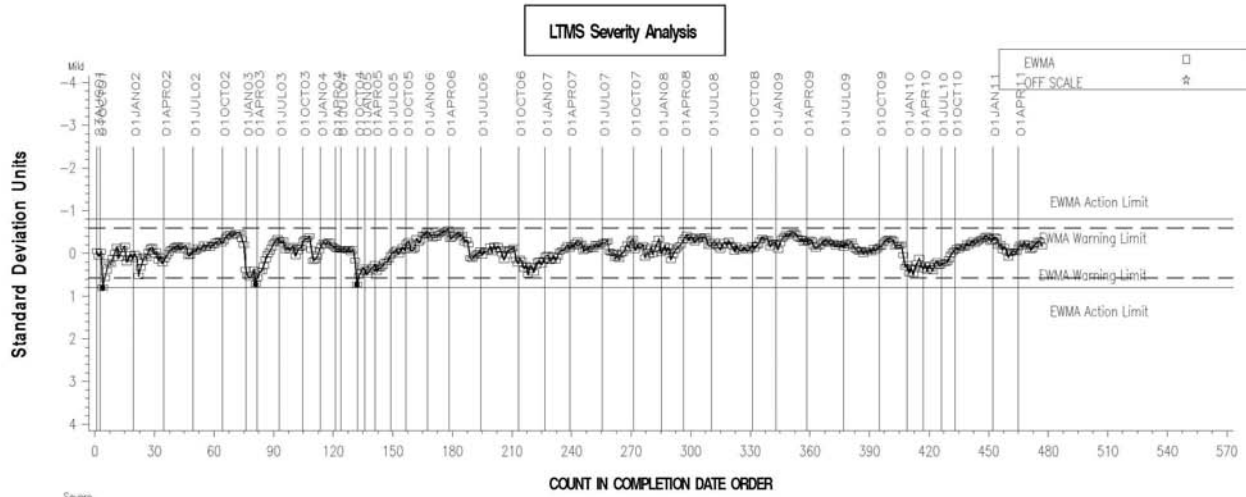
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EOEC – FLUROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



FLUROELASTOMER TENSILE STRENGTH CHANGE

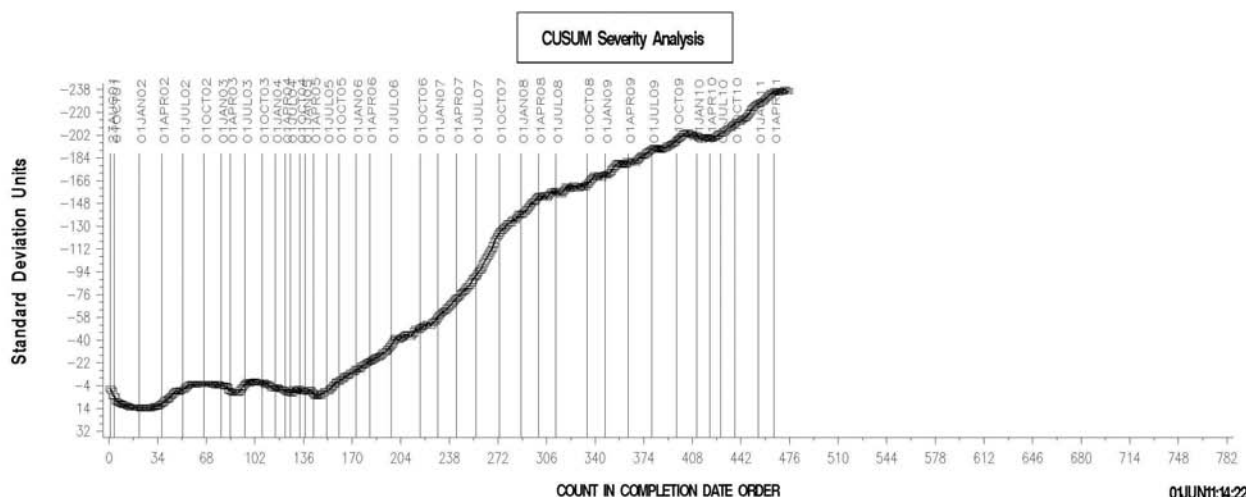
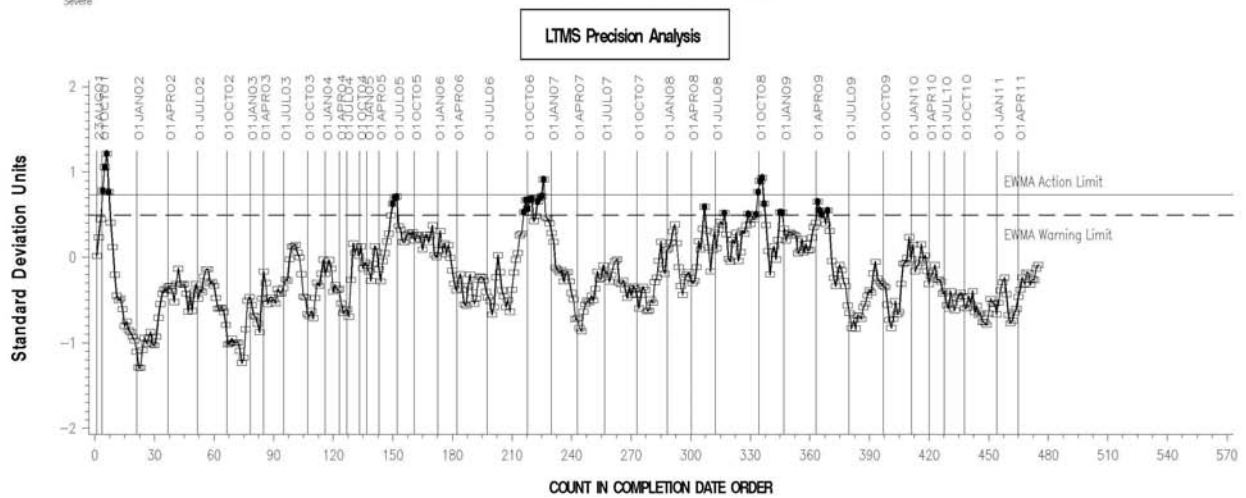
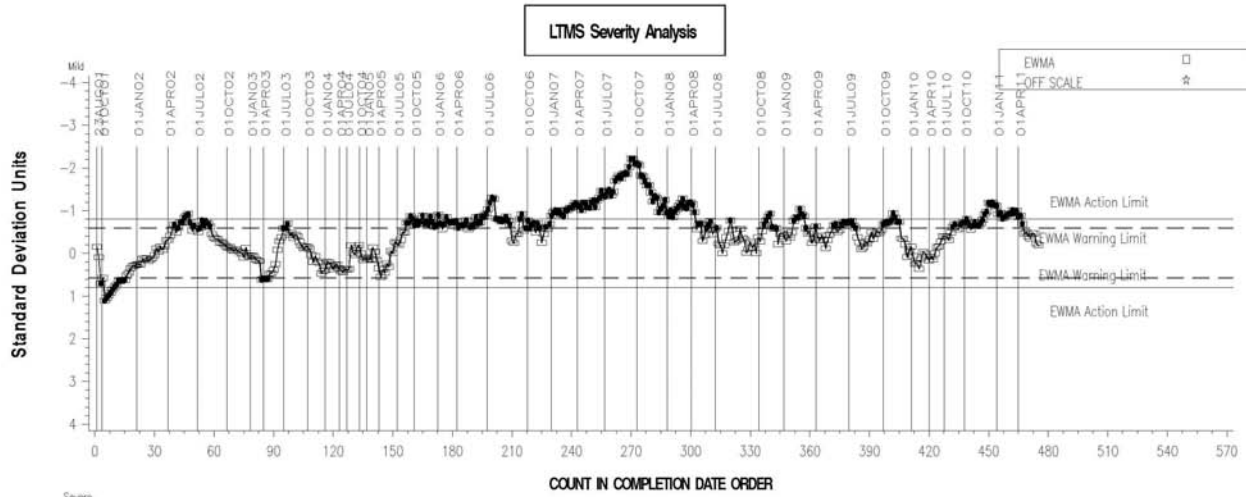




EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



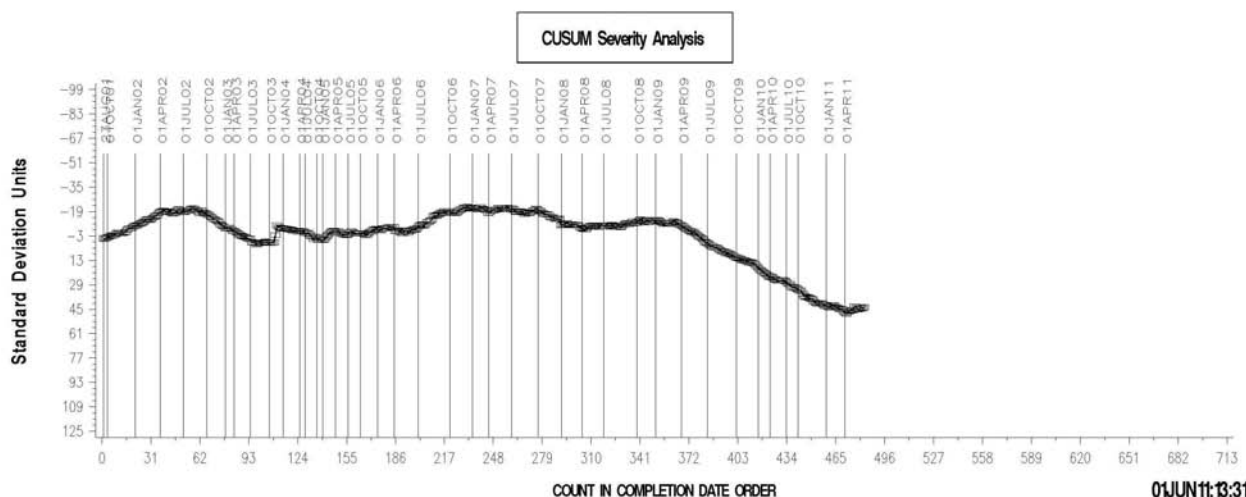
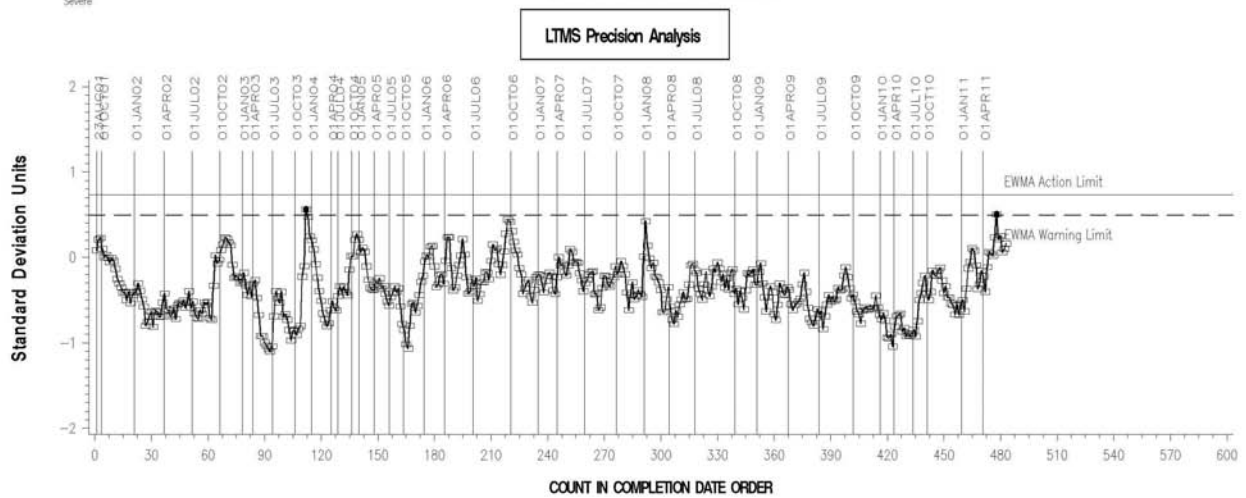
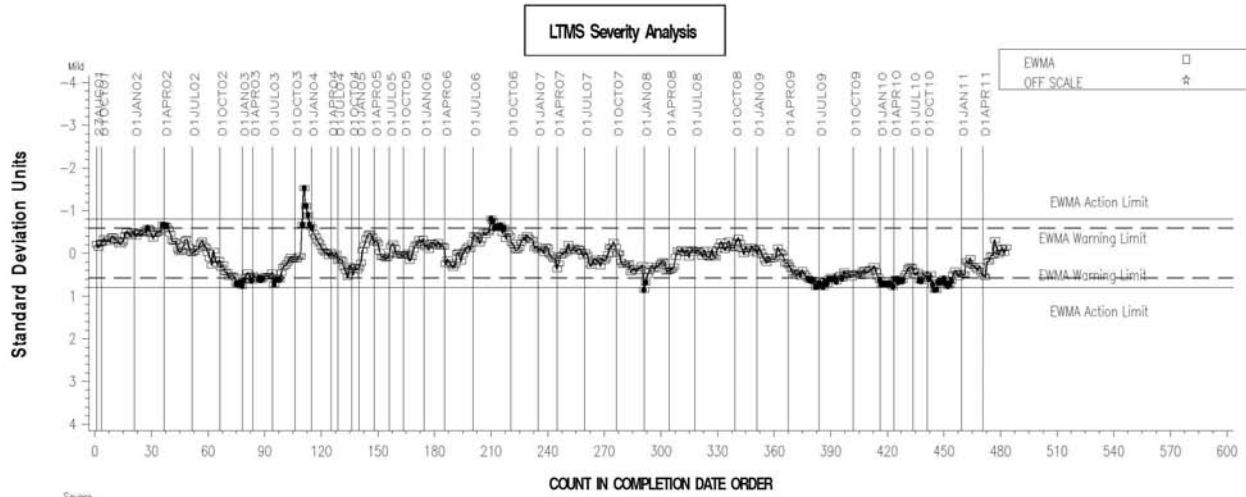
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EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



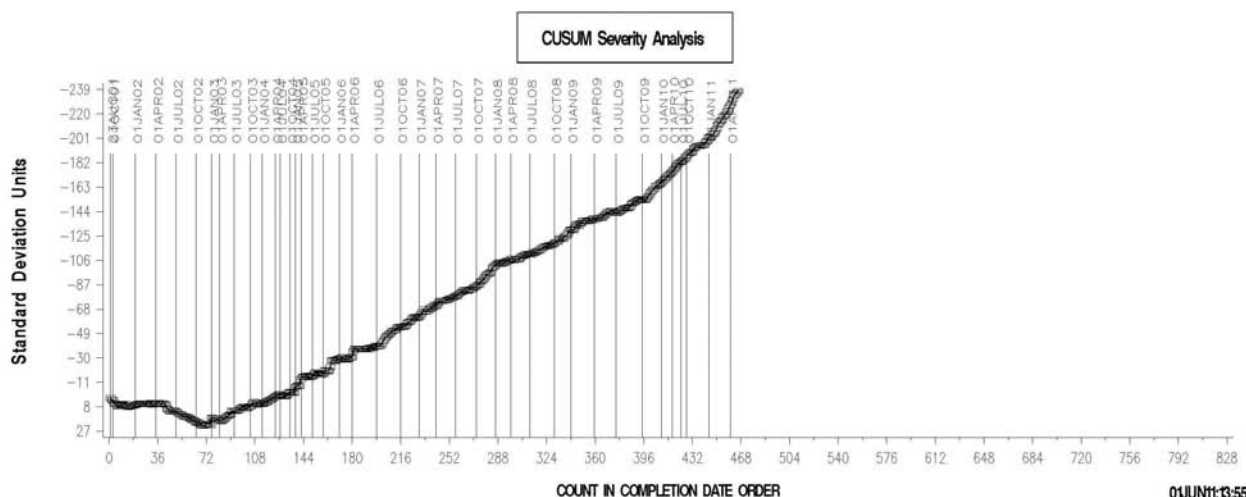
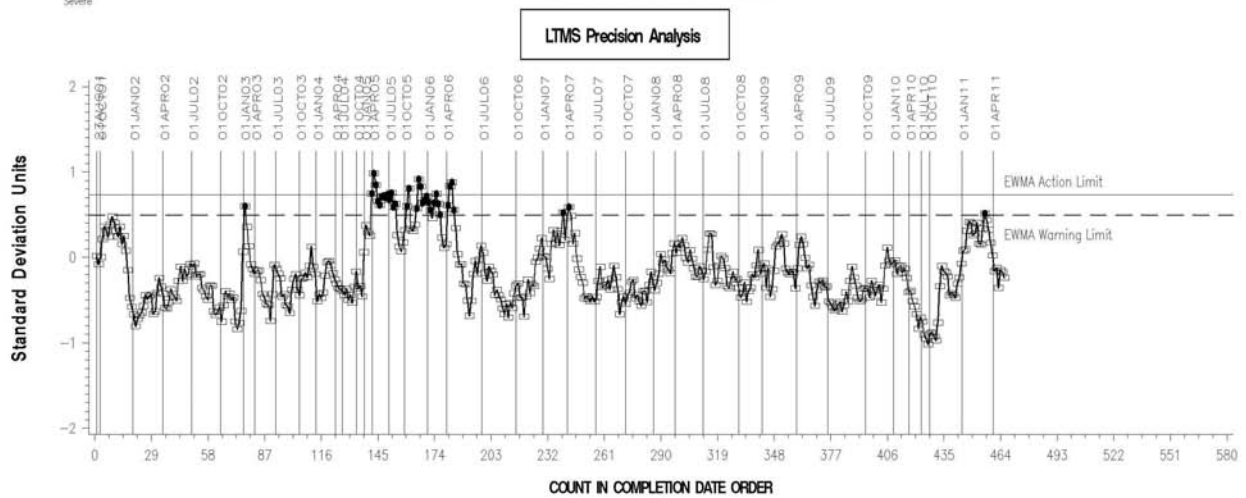
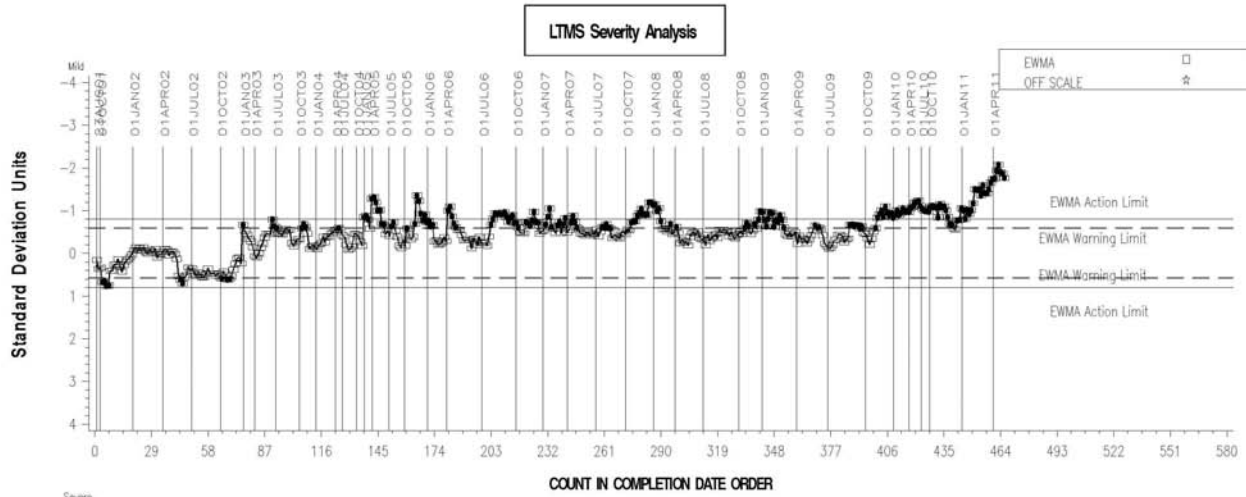
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EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



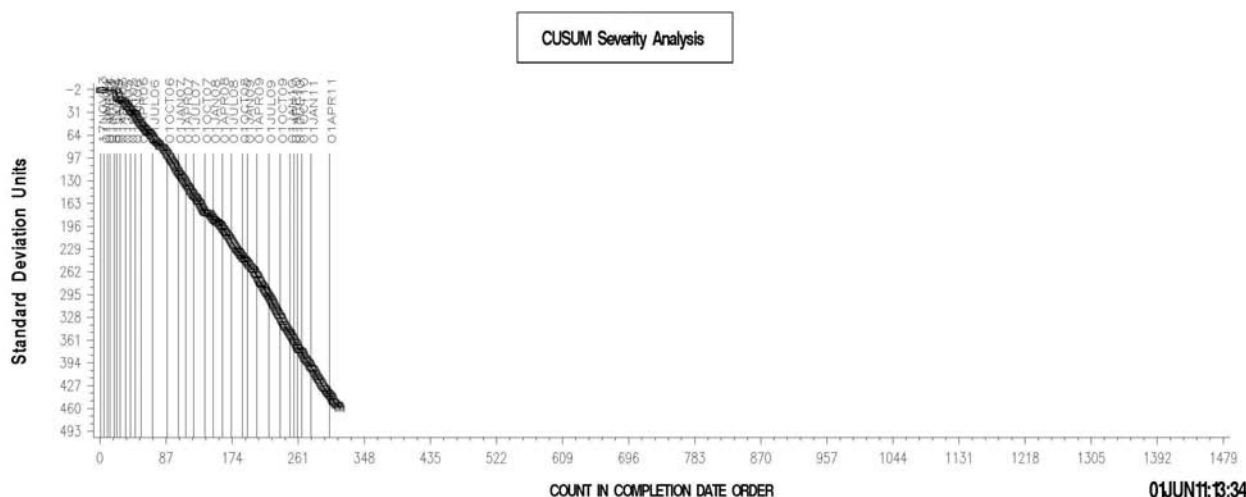
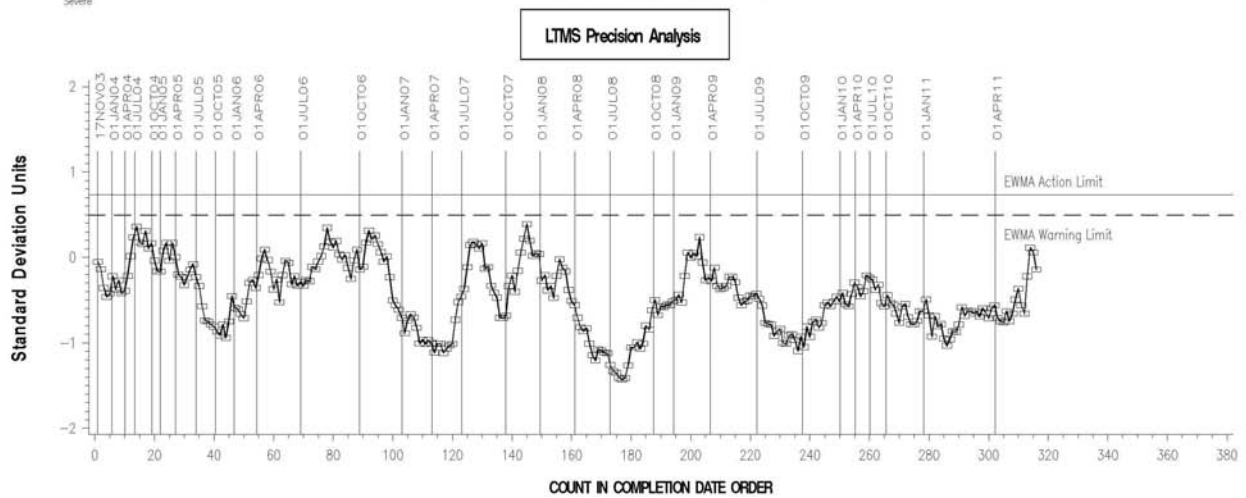
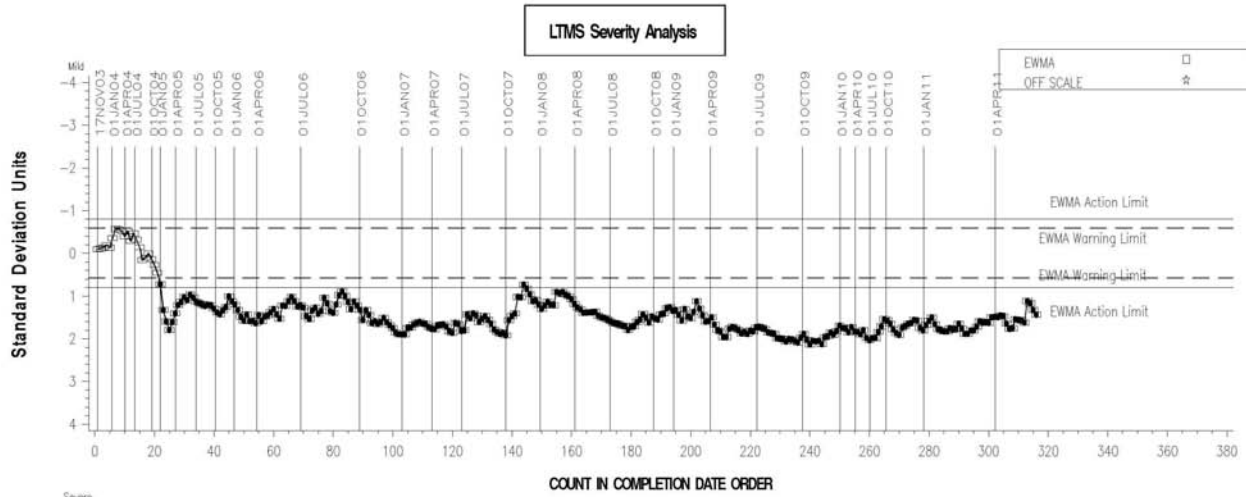
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EOEC – VAMAC INDUSTRY OPERATIONALLY VALID DATA



REFERENCE VAMAC G TENSILE STRENGTH CHANGE AVERAGE

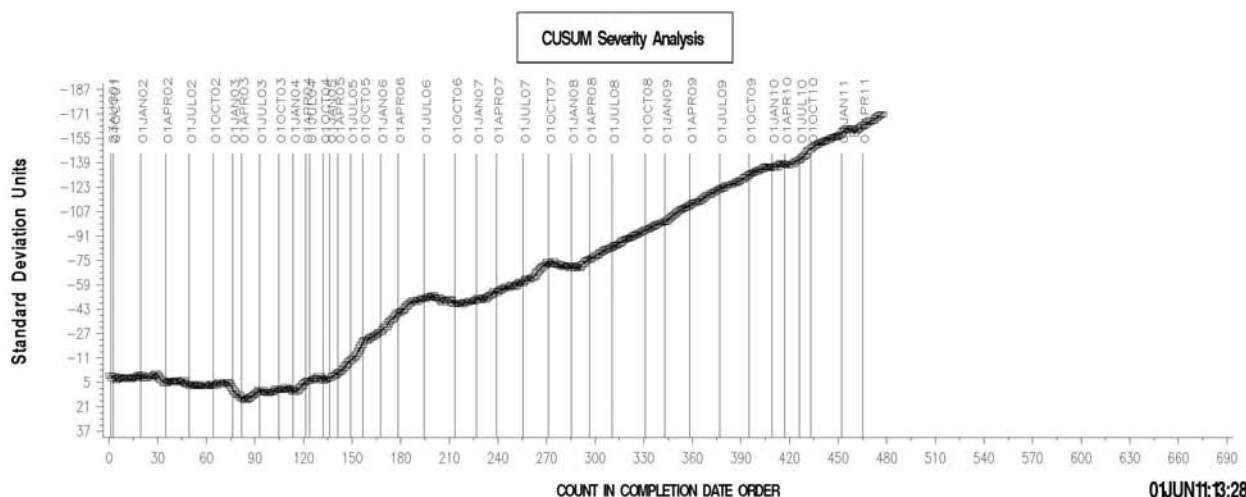
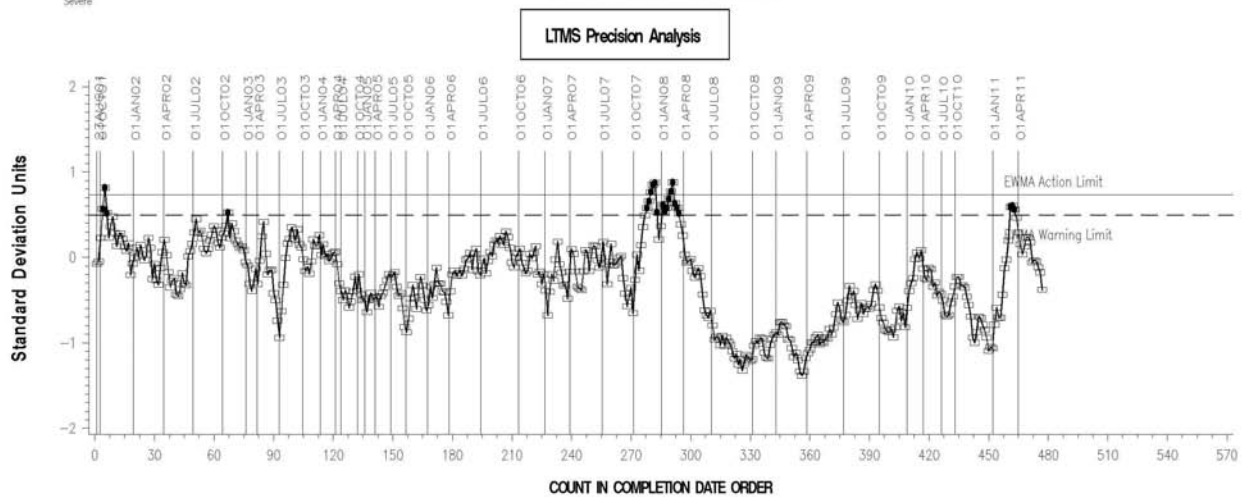
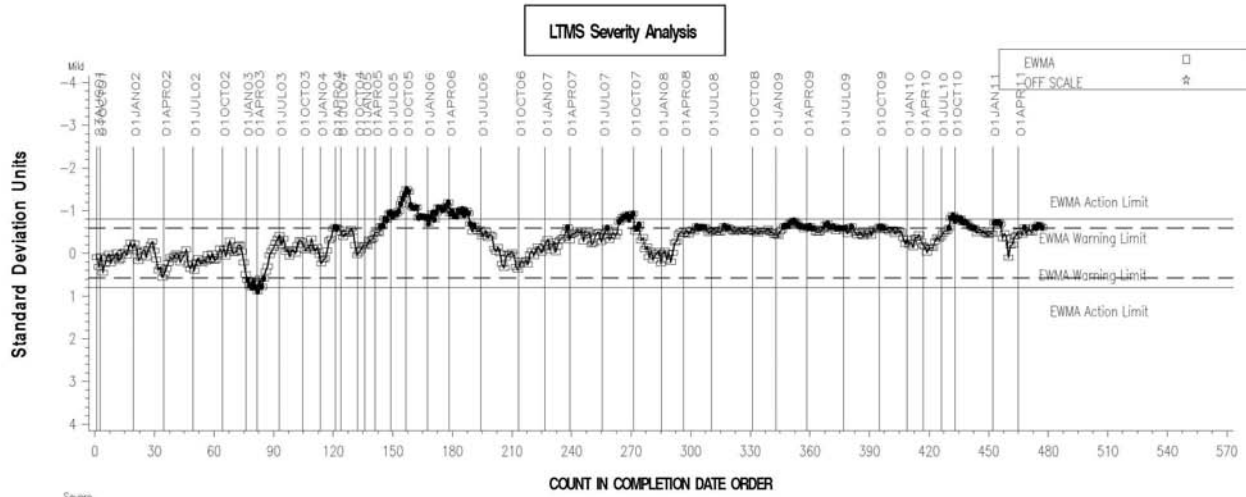




EOEC – FLUROELASTOMER INDUSTRY OPERATIONALLY VALID DATA



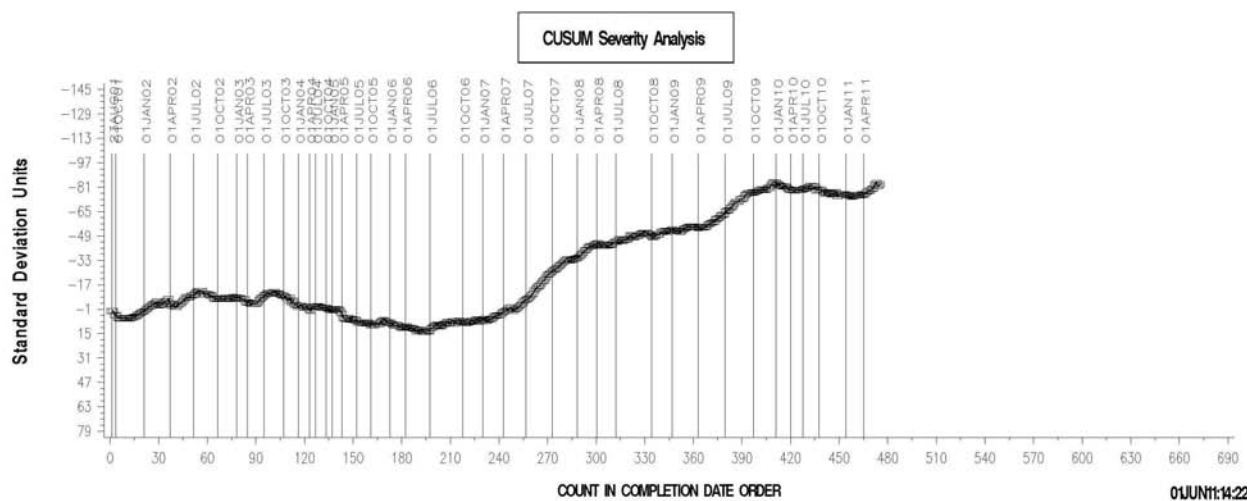
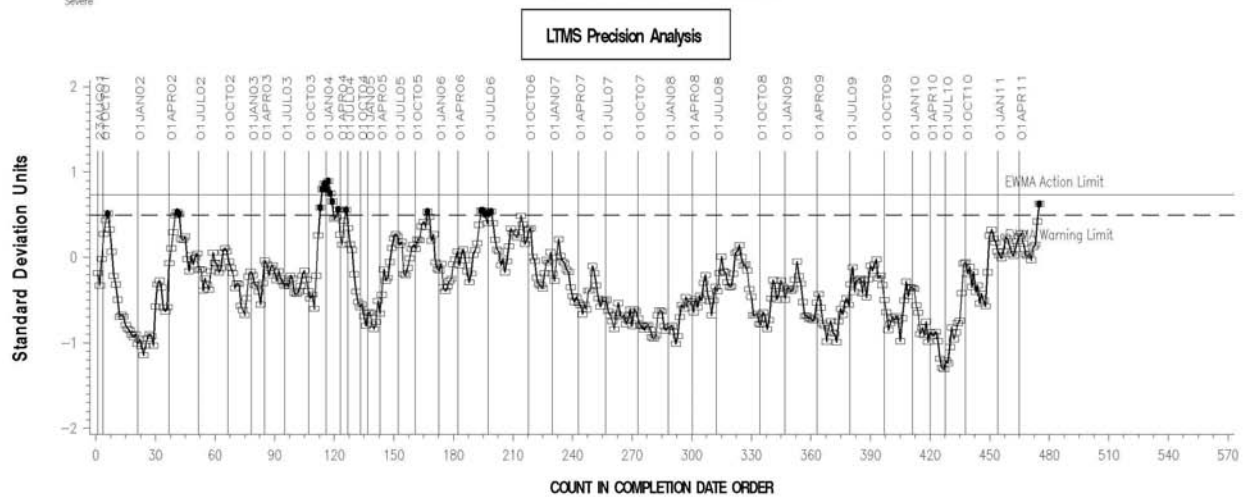
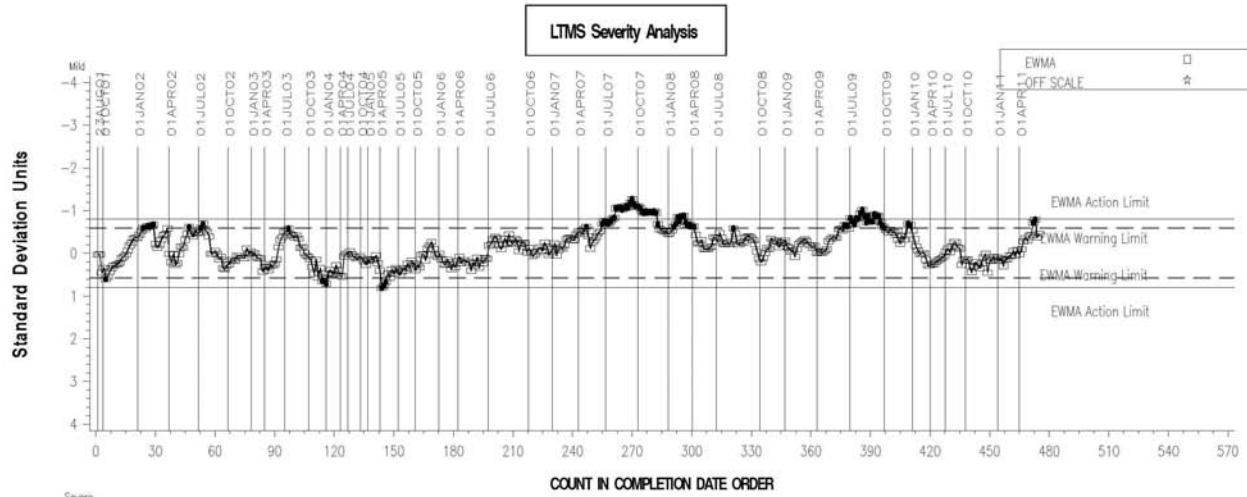
FLUROELASTOMER ELONGATION CHANGE AVG.



EOEC – NITRILE INDUSTRY OPERATIONALLY VALID DATA



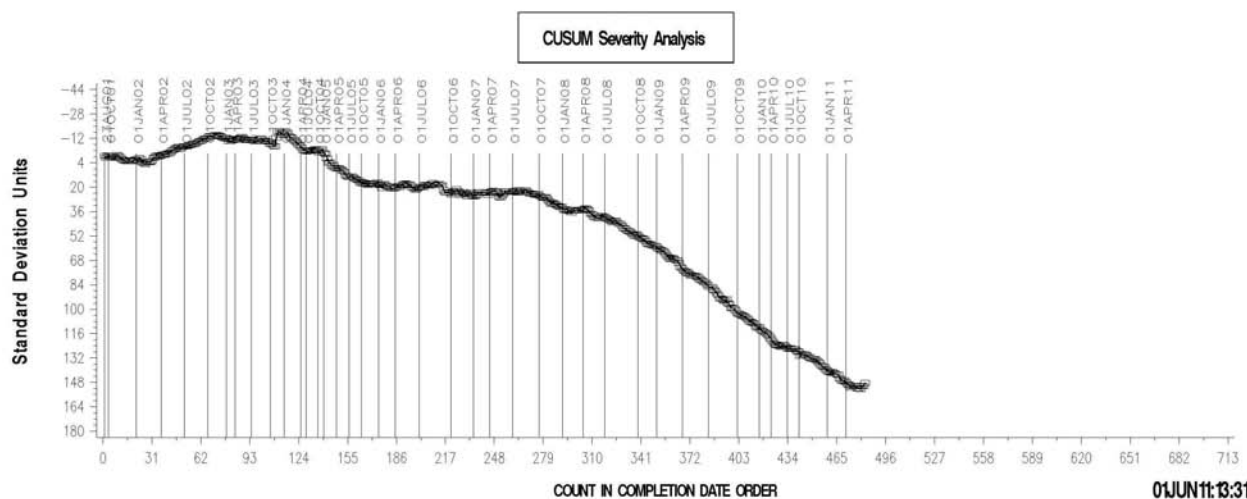
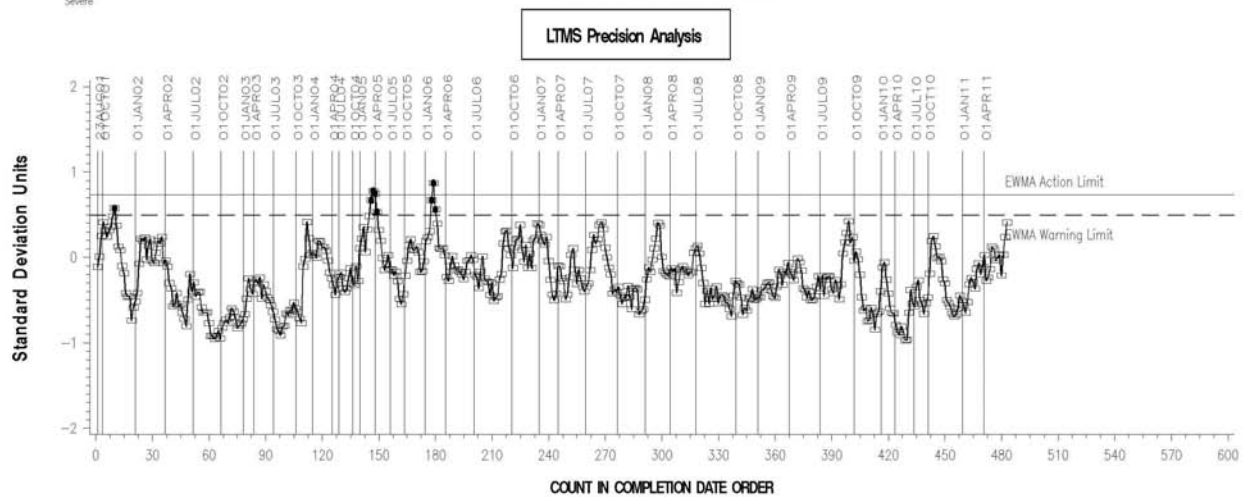
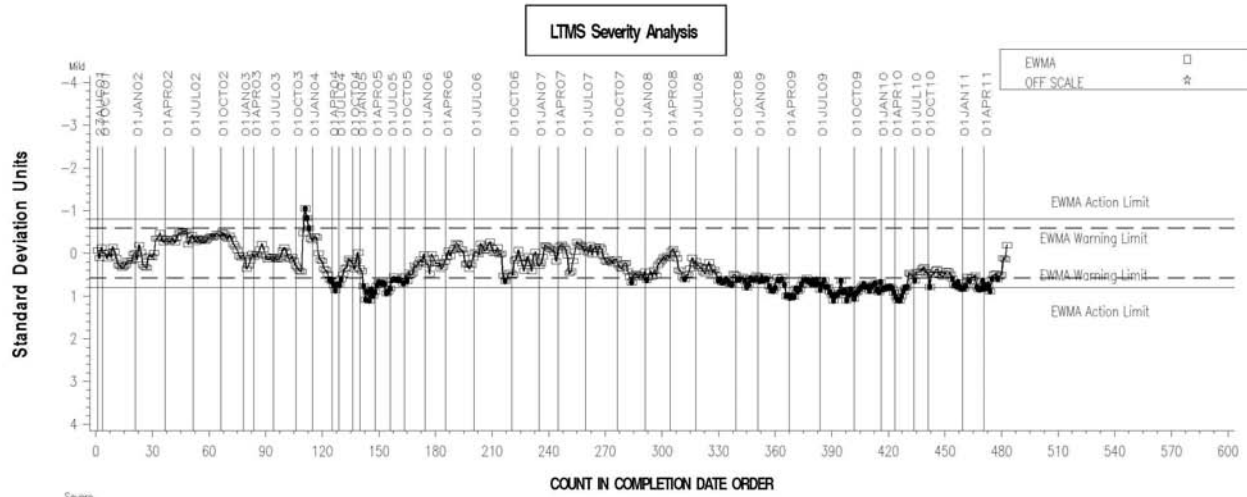
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EOEC – POLYACRYLATE INDUSTRY OPERATIONALLY VALID DATA



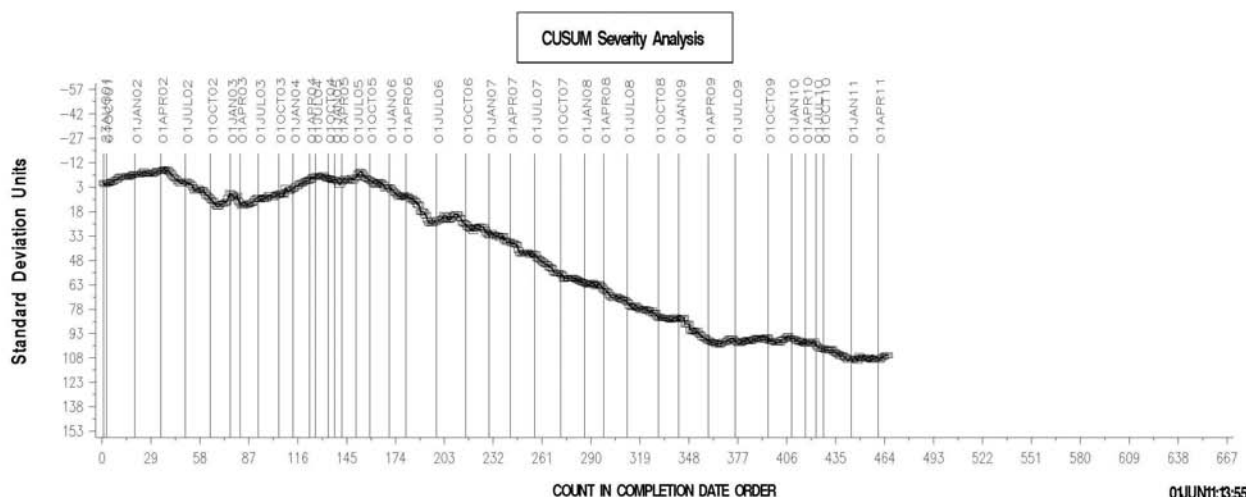
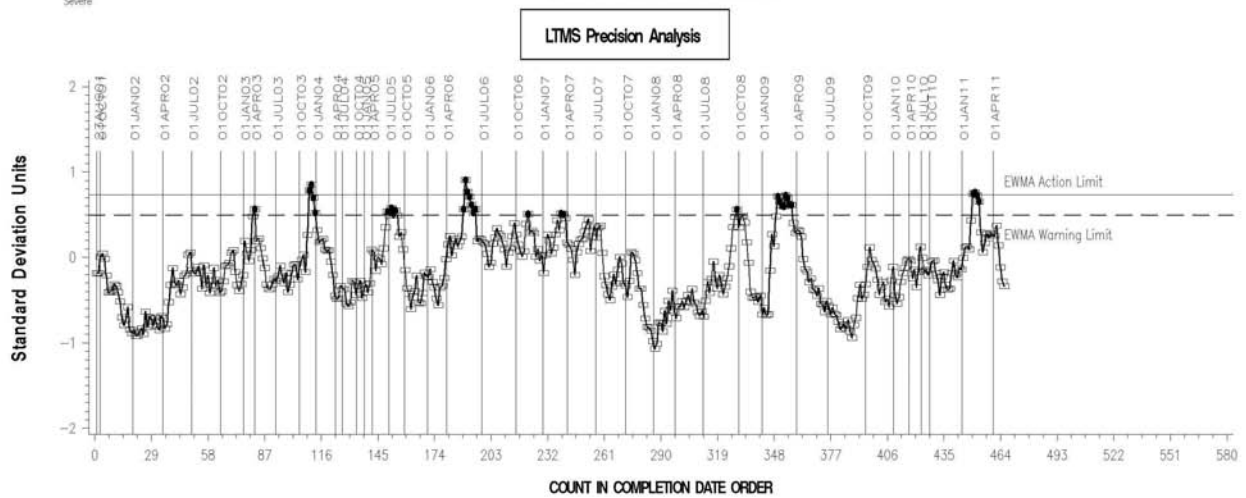
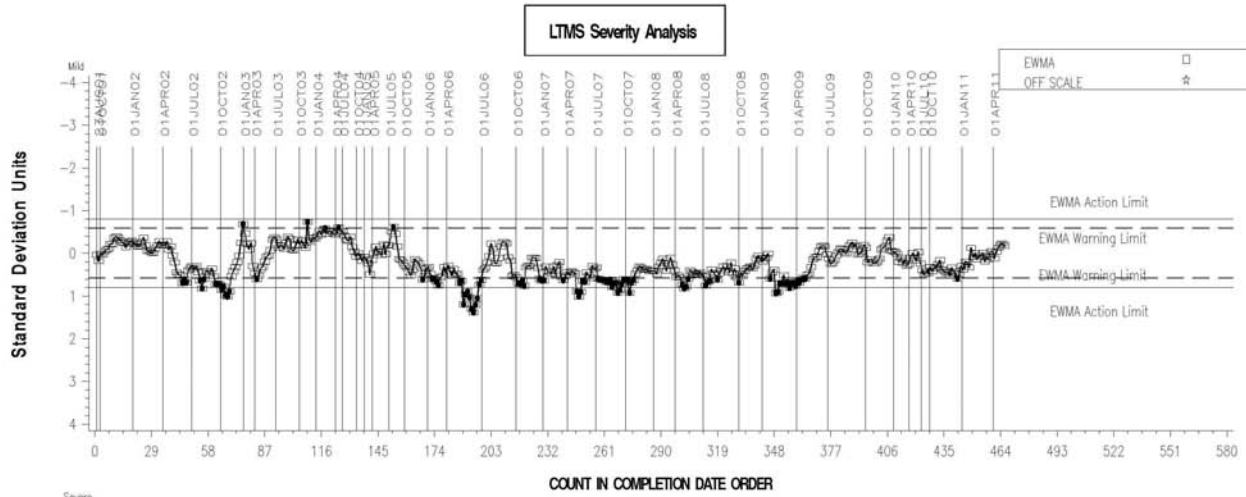
REFERENCE POLYACRYLATE ELONGATION CHANGE AVERAGE



EOEC – SILICONE INDUSTRY OPERATIONALLY VALID DATA



REFERENCE SILICON ELONGATION CHANGE AVERAGE

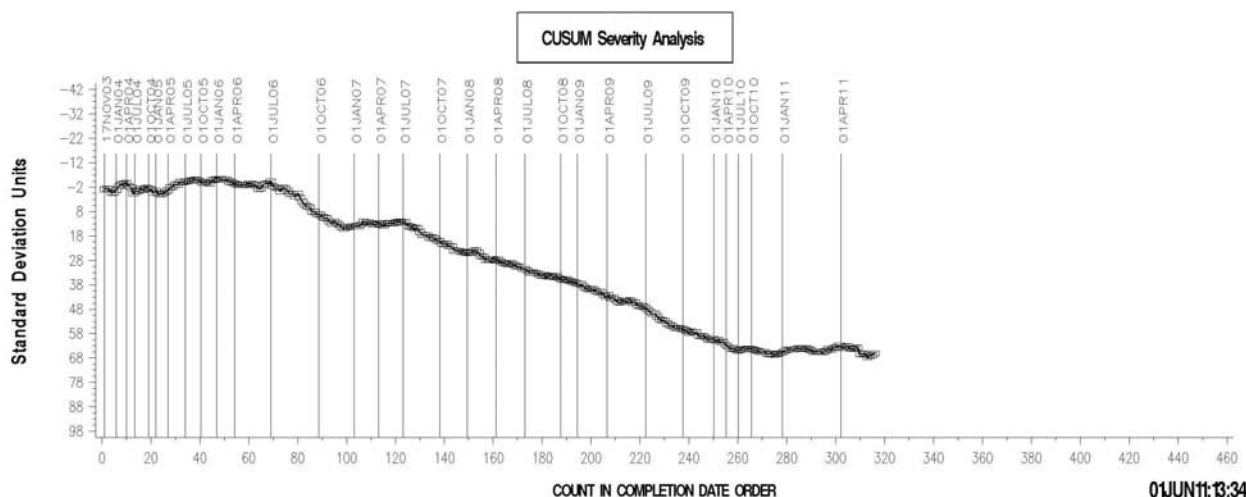
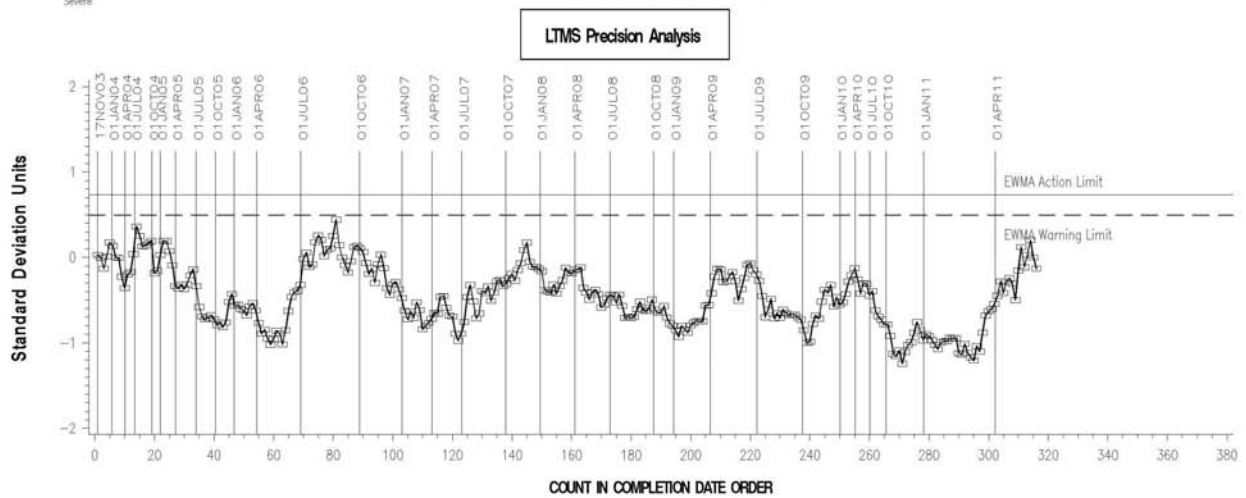
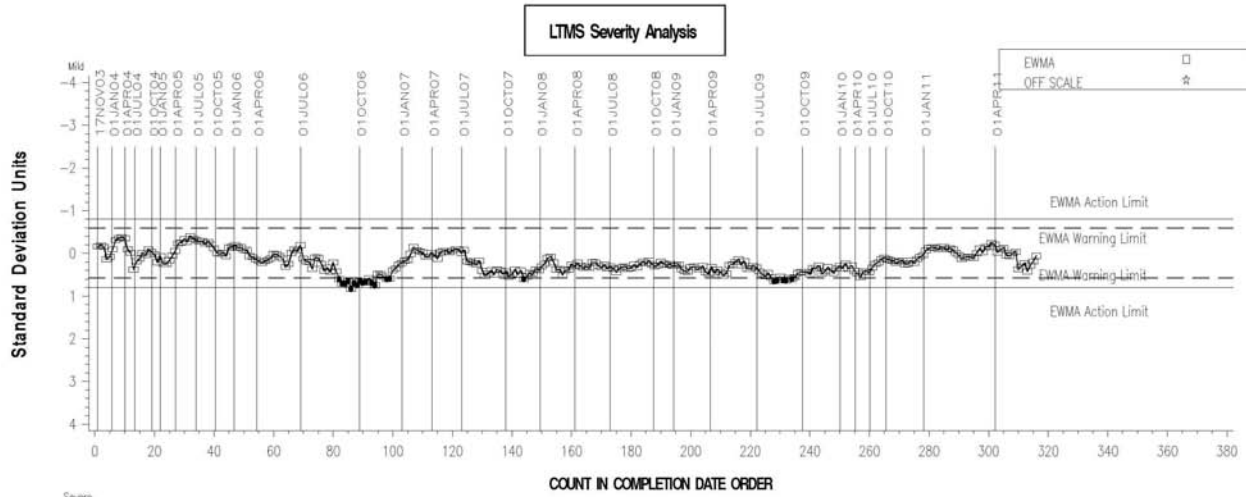




EOEC – VAMAC INDUSTRY OPERATIONALLY VALID DATA

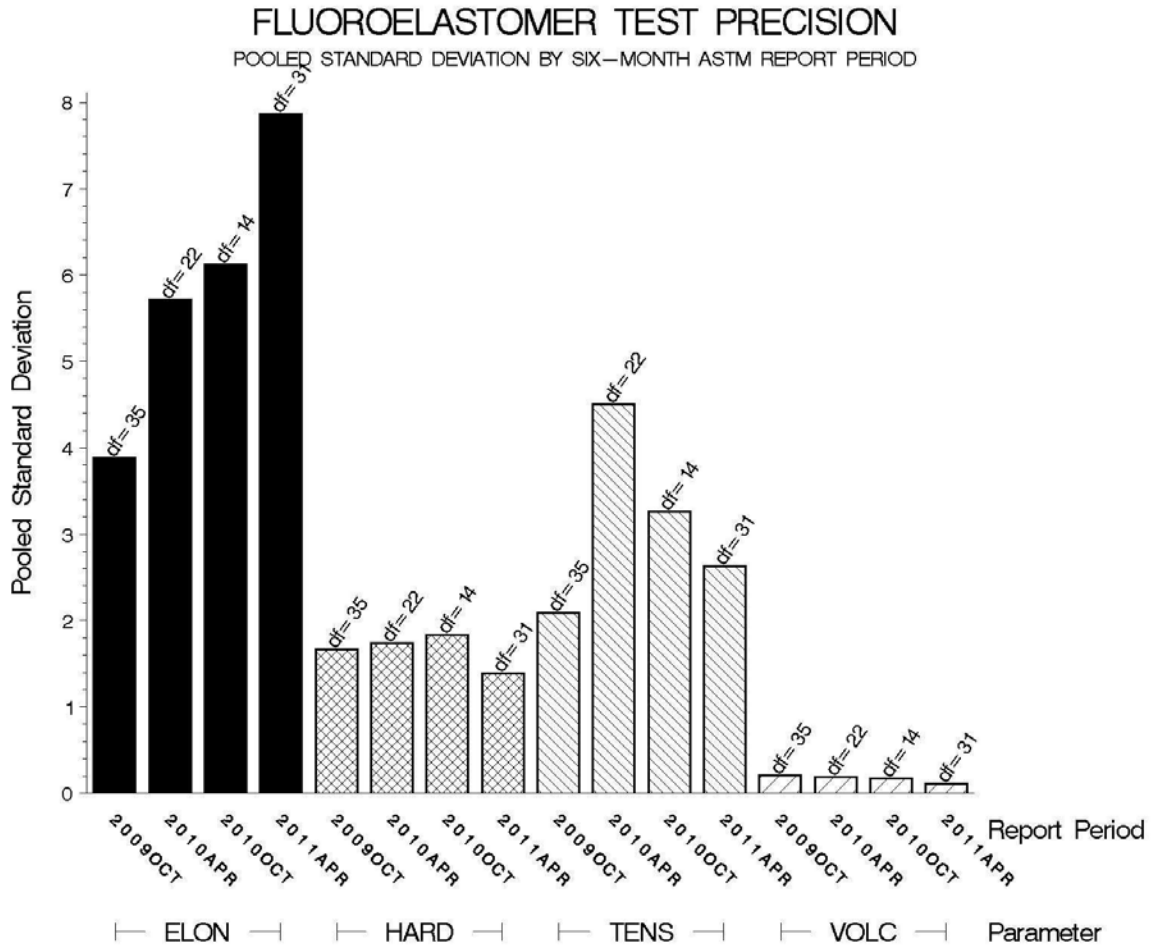


REFERENCE VAMAC G ELONGATION CHANGE AVERAGE



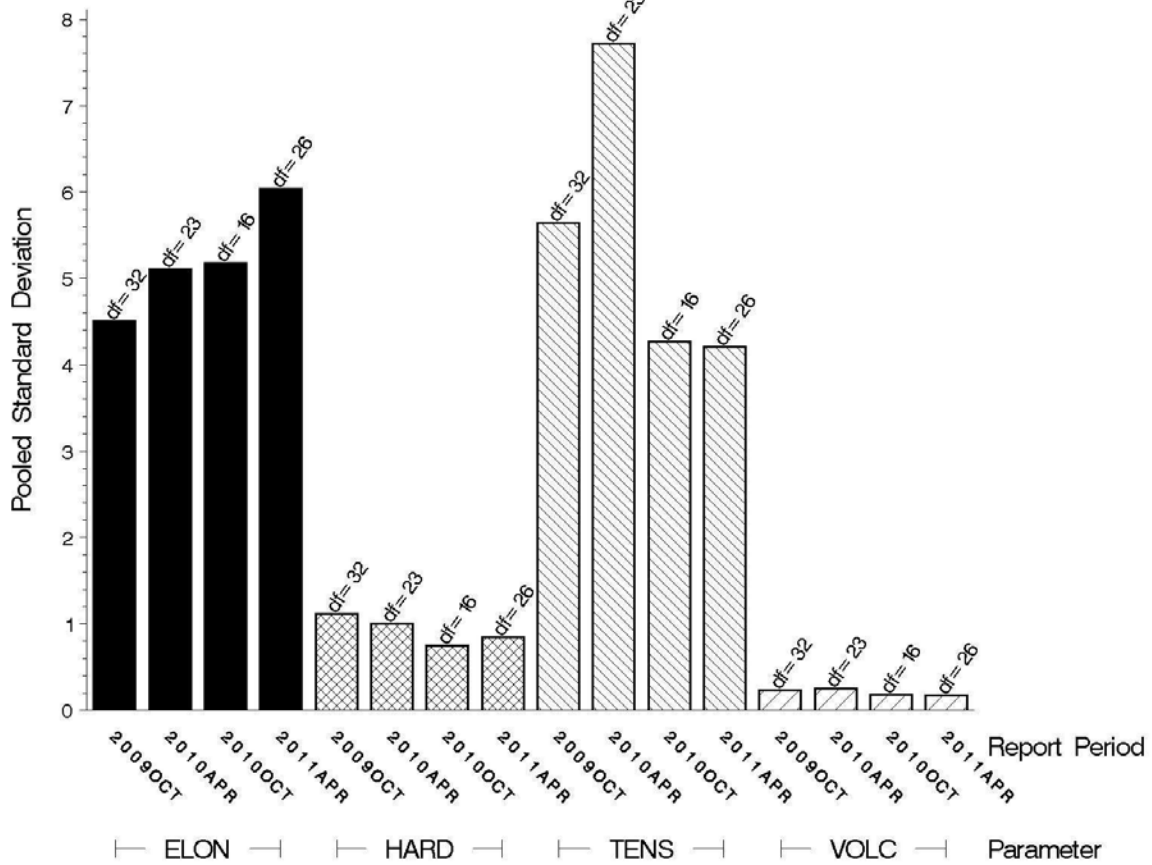
POOLED S:

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



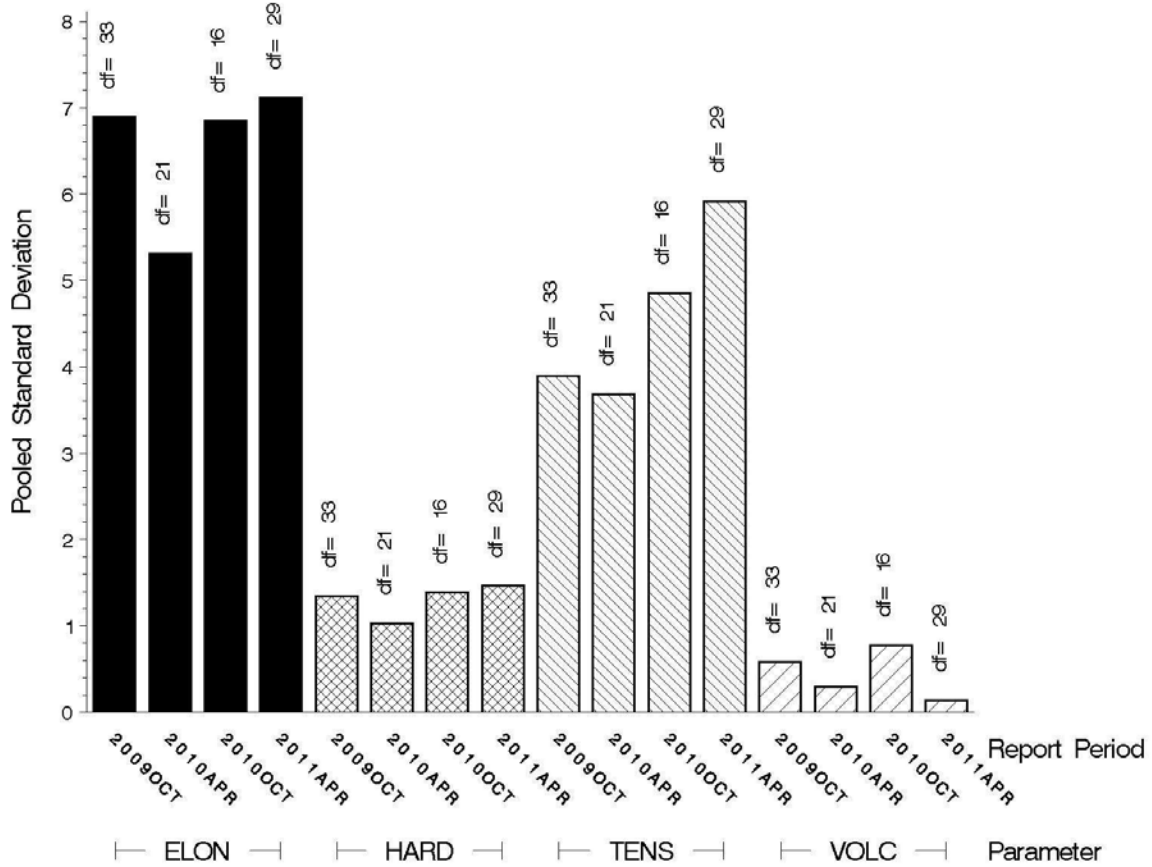
### NITRILE TEST PRECISION

POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



## POLYACRYLATE TEST PRECISION

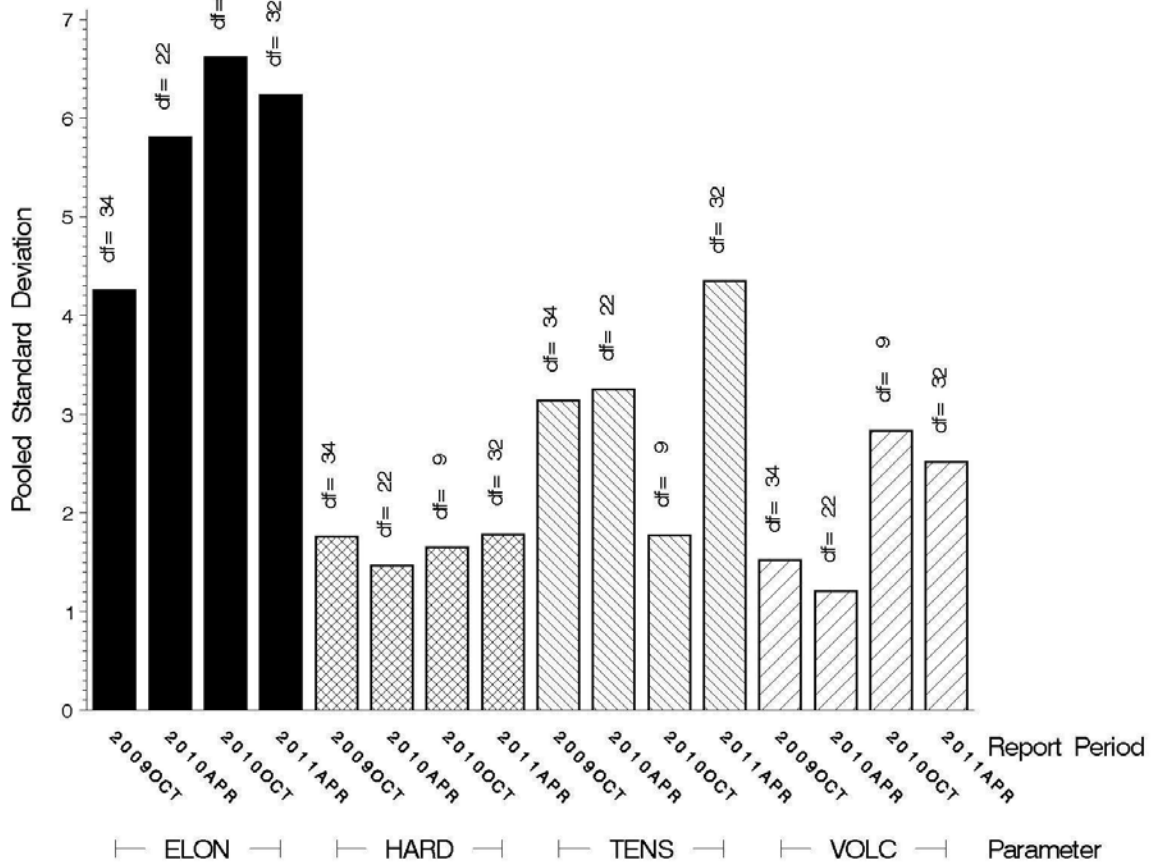
POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD





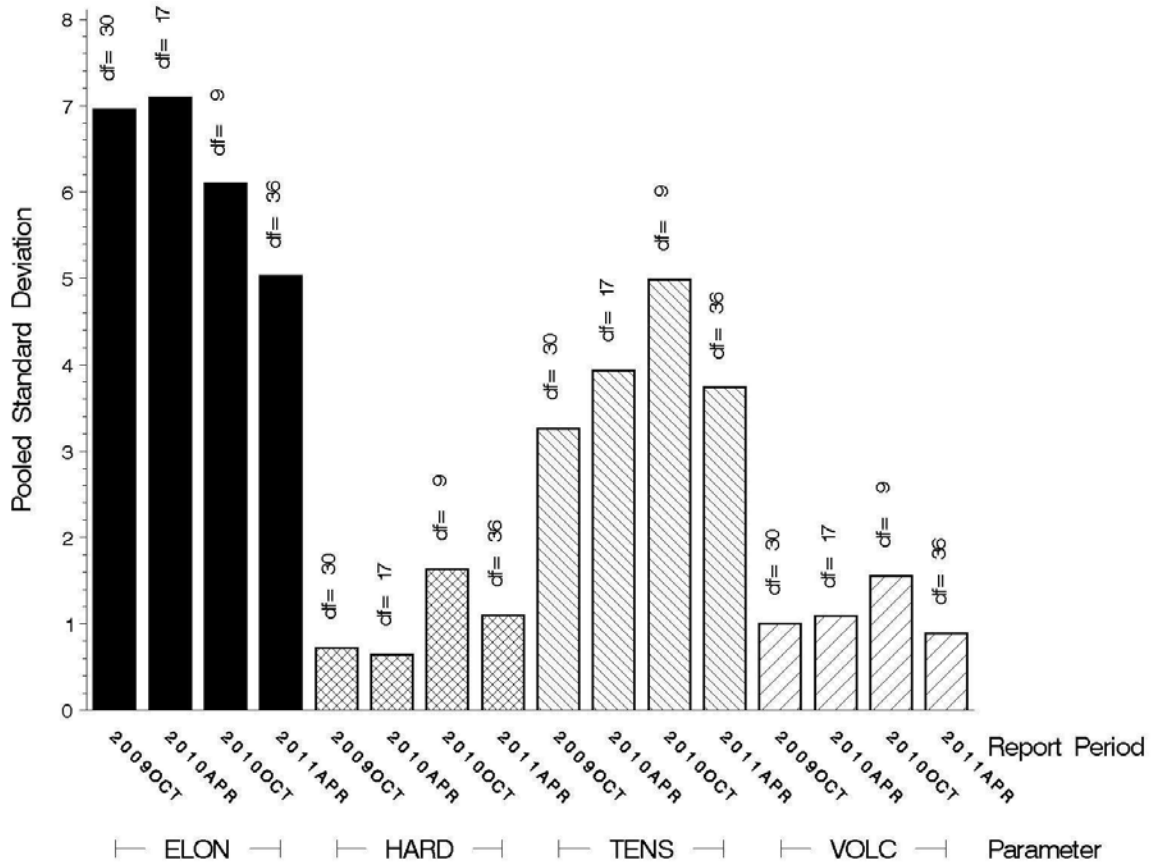
### SILICONE TEST PRECISION

9 POOLED STANDARD DEVIATION BY SIX-MONTH ASTM REPORT PERIOD



### VAMAC 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	87	9058	1795
Total	87	9058	1795

Be aware that this table presumes that all of each of these oils is dedicated to the EOEC 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**

<b>Elastomer</b>	<b>VOLC</b>	<b>HARD</b>	<b>TENS</b>	<b>ELON</b>
Fluoroelastomer	Within limits	Within limits	Within limits	<b>Mild</b>
Nitrile	<b>Severe</b>	<b>Severe</b>	Within limits	Within limits
Polyacrylate	<b>Severe</b>	Within limits	Within limits	Within limits
Silicone	Within limits	Within limits	<b>Mild</b>	Within limits
VAMAC	<b>Severe</b>	<b>Mild</b>	<b>Severe</b>	Within limits

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

<b>Elastomer</b>	<b>VOLC</b>	<b>HARD</b>	<b>TENS</b>	<b>ELON</b>
Fluoroelastomer	Within limits	Within limits	Within limits	Within limits
Nitrile	Within limits	Within limits	Within limits	<b>Warning</b>
Polyacrylate	Within limits	Within limits	Within limits	Within limits
Silicone	Within limits	Within limits	Within limits	Within limits
VAMAC	Within limits	Within limits	Within limits	Within limits

MTK/mtk/astm0411.doc/mem11-021.mtk.doc

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

Distribution: email