A Program of ASTM International

Test Monitoring Center

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

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

MEMORANDUM: 19-042

DATE: October 11, 2019

TO: Kristijan Drlja, Chairman, L-60-1 Surveillance Panel

FROM: Dylan Beck

SUBJECT: L-60-1 Reference Oil Testing from April 1, 2019 through September 30, 2019

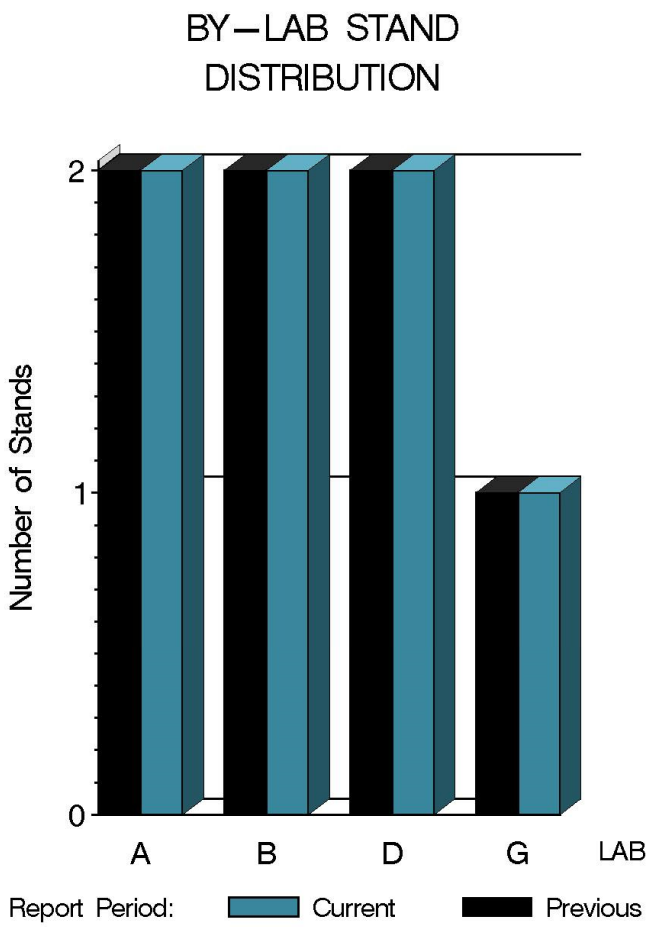
Attached is a summary of testing activity this period.

DJB/djb/mem19-042.djb.doc
cc: Frank Farber
Jeff Clark
L-60-1 Surveillance Panel
http://www.astmtmc.cmu.edu/ftp/docs/gear/l601/semiannualreports/l601-10-2019.pdf

Distribution: email

L-60-1 (D5704)

	Reporting Data	Calibrated on 9-30-19
Number of Labs	4	4
Number of Stands	7	7



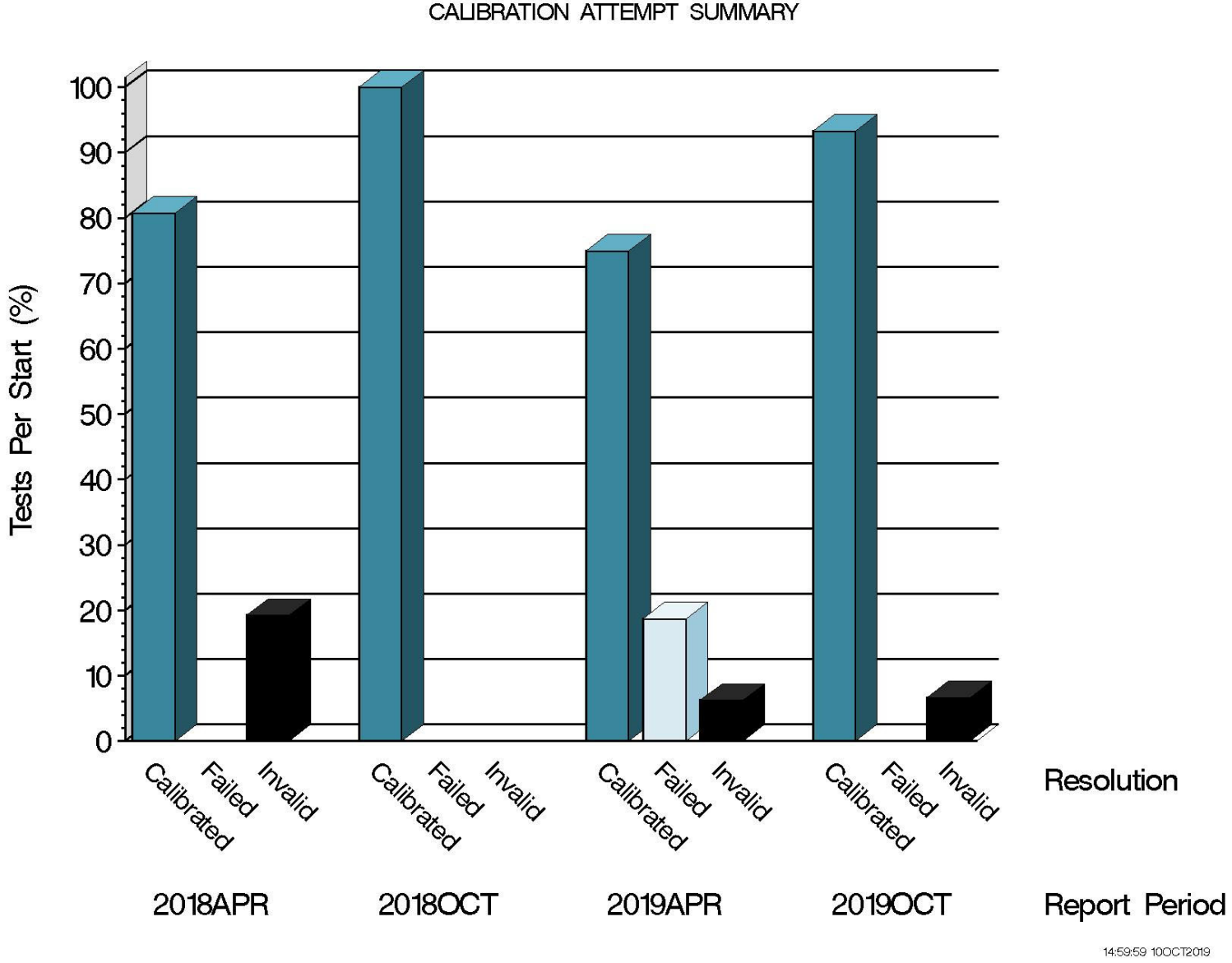
L-60-1 (D5704)

Test Distribution by Oil and Validity

		148-1	155-1	Totals Last Period	Totals This Period
Accepted for calibration	AC	6	8	12	14
Rejected (Mild)	OC	0	0	0	0
Rejected (Severe)	OC	0	0	3	0
Rejected (Combination)	OC	0	0	0	0
Rejected (Precision)	OC	0	0	0	0
Invalidated calibration	LC	1	0	0	1
Acceptable info run	NI	0	0	6	0
Aborted info run	XI	0	0	2	0
Aborted	XC	0	0	1	0
Total		7	8	24	15

L-60-1 (D5704)

L-60-1 (D5704)


CALIBRATION ATTEMPT SUMMARY
Tests Per Start (%)
100
90
80
70
60
50
40
30
20
10
0
Calibrated
Failed
Invalid
Calibrated
Failed
Invalid
Calibrated
Failed
Invalid
Calibrated
Failed
Invalid
Resolution
2018APR
2018OCT
2019APR
2019OCT
Report Period
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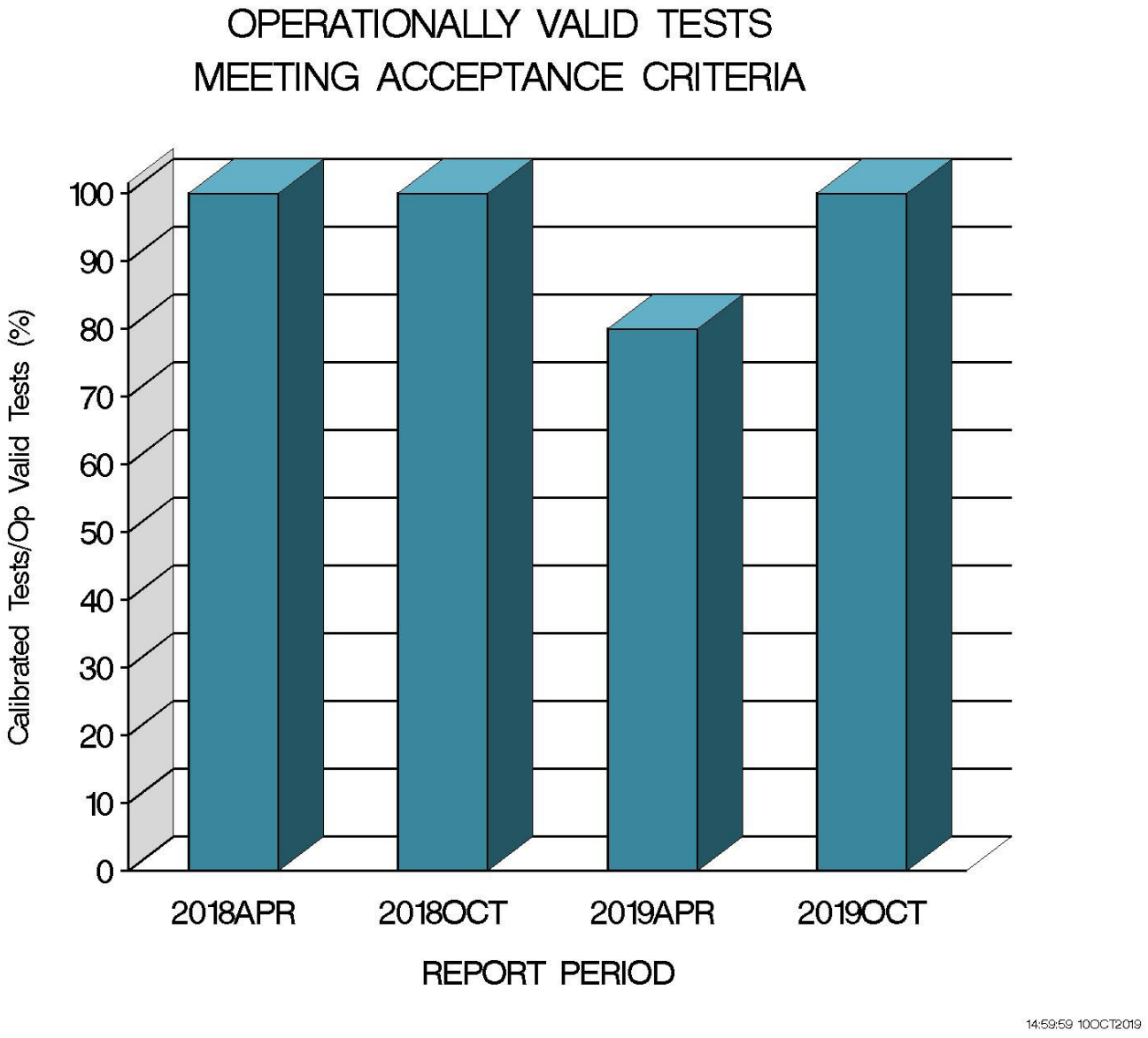
L-60-1 (D5704)


OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA
Calibrated Tests/Op Valid Tests (%)
100
90
80
70
60
50
40
30
20
10
0
2018APR
2018OCT
2019APR
2019OCT
REPORT PERIOD
14:59:59 10OCT2019

L-60-1 (D5704)

CAUSES FOR LOST TESTS

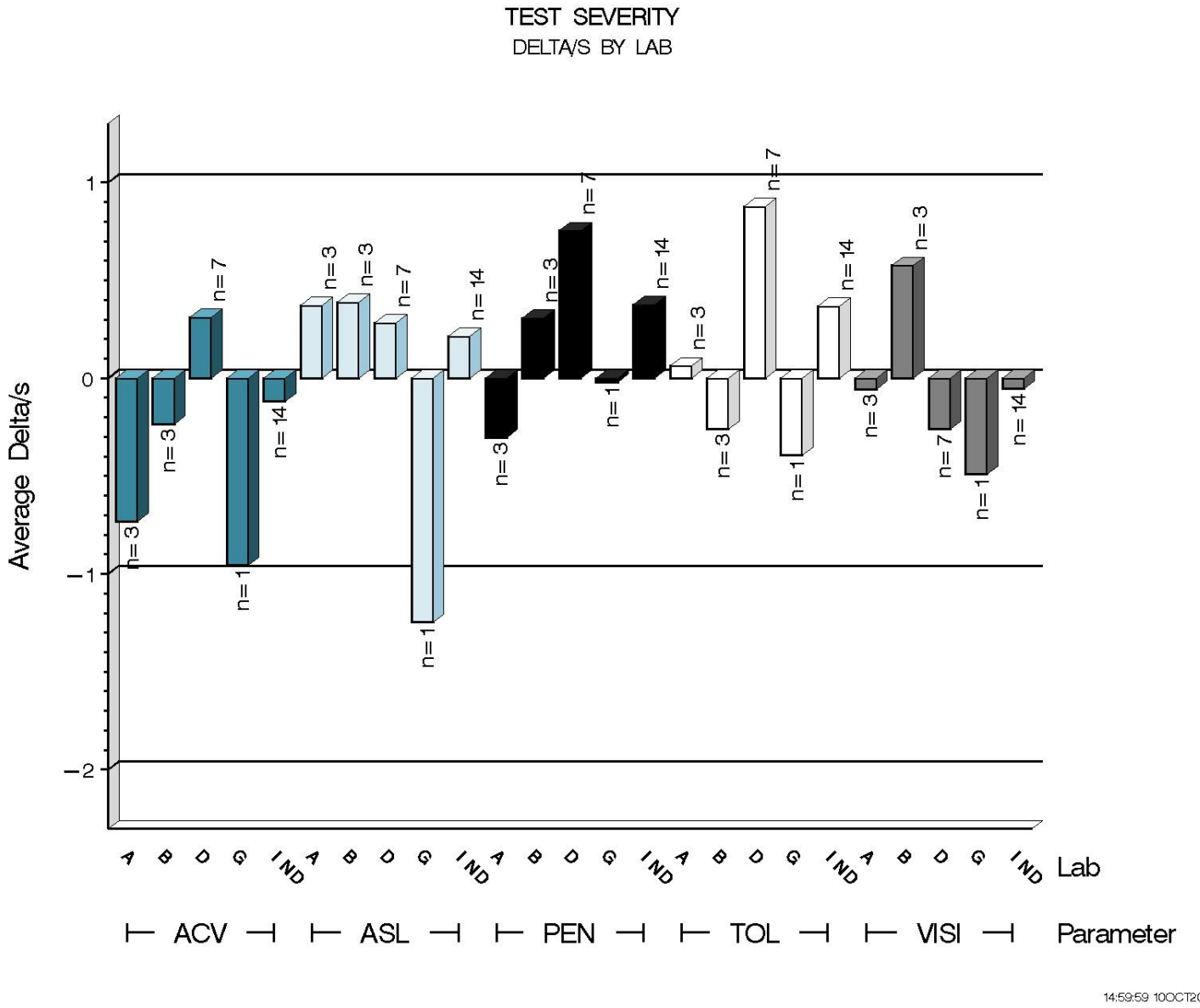
			Oil		Validity			Loss Rate		
Lab	Cause		148-1	155-1	RC	LC	XC	Lost	Starts	%
G	Oil Leak		●			●		1	15	6.7%
		Lost	1	0	0	1	0			
		Starts	7	8	15	15	15			
		%	14%	0%	0%	6.7%	0%			

L-60-1 (D5704)

Average Δ/s by Lab						
Lab	**n**	**VISI**	**PEN**	**TOL**	**ACV**	**ASL**
A	3	-0.057	-0.303	0.062	-0.731	0.372
B	3	0.575	0.308	-0.260	-0.234	0.388
D	7	-0.260	0.753	0.877	0.312	0.283
G	1	-0.491	-0.021	-0.394	-0.956	-1.247
Industry	14	-0.054	0.376	0.368	-0.119	0.215
Shift*	14	-0.415%	0.155%	0.092 %	-0.061 merit	0.023 merit

*computed using severity adjustment standard deviation.

L-60-1 (D5704)



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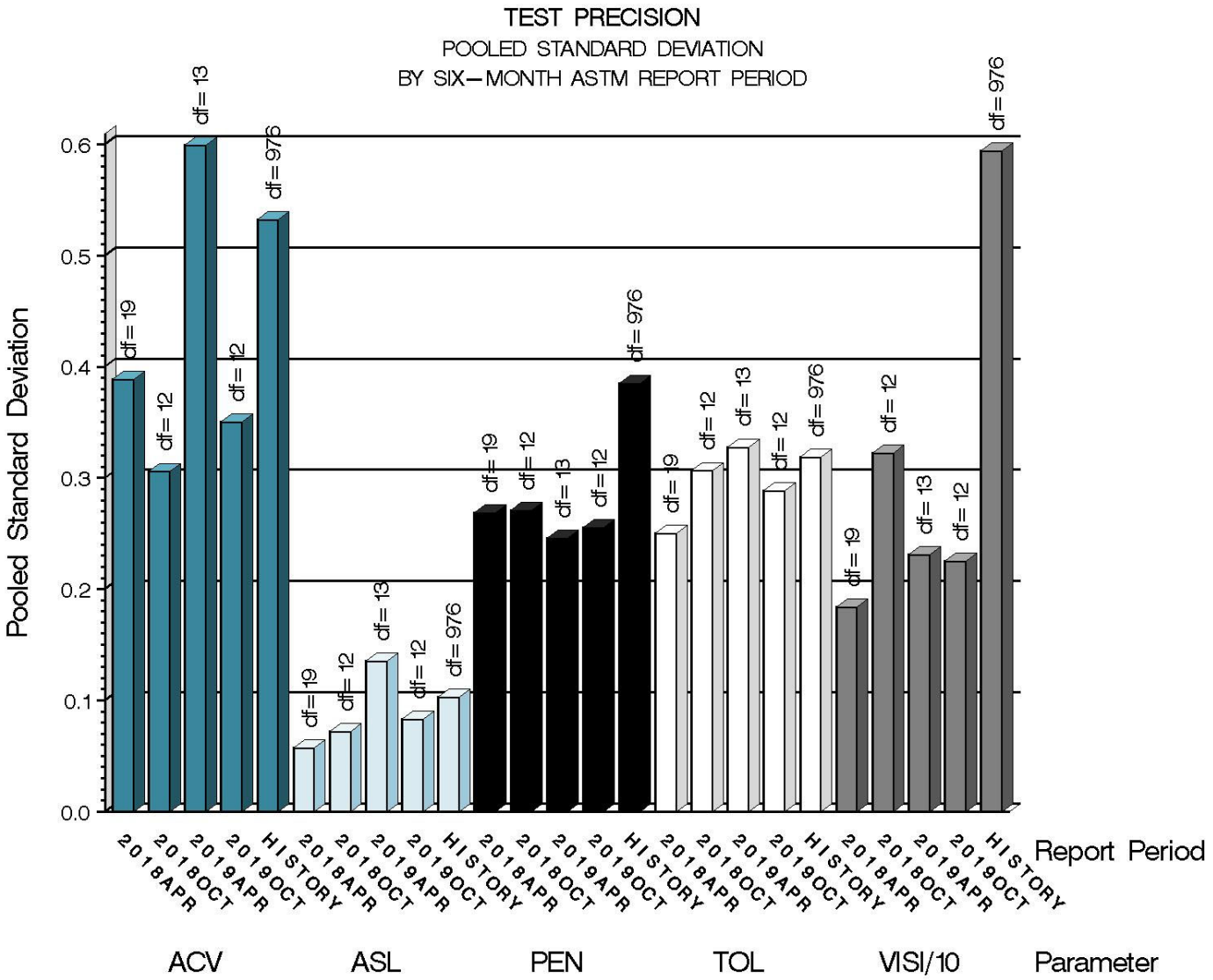
L-60-1 (D5704)



due to the vastly larger reported results for VISI in relation to the other parameters, it is shown scaled by 0.1

14:59:59 10OCT2019

L-60-1 (D5704)

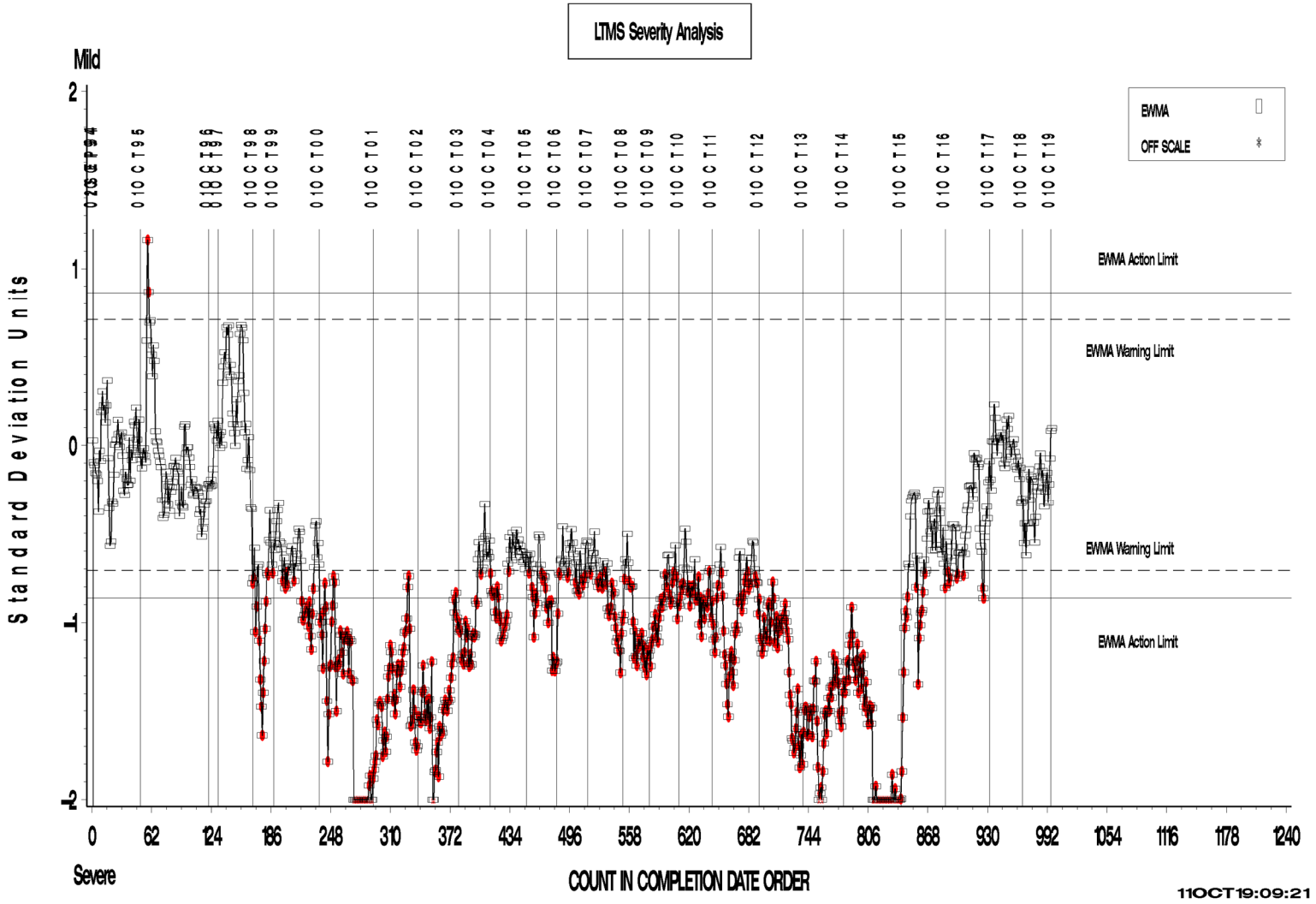
L-60-1 (D5704)

SUMMARY OF SEVERITY & PRECISION

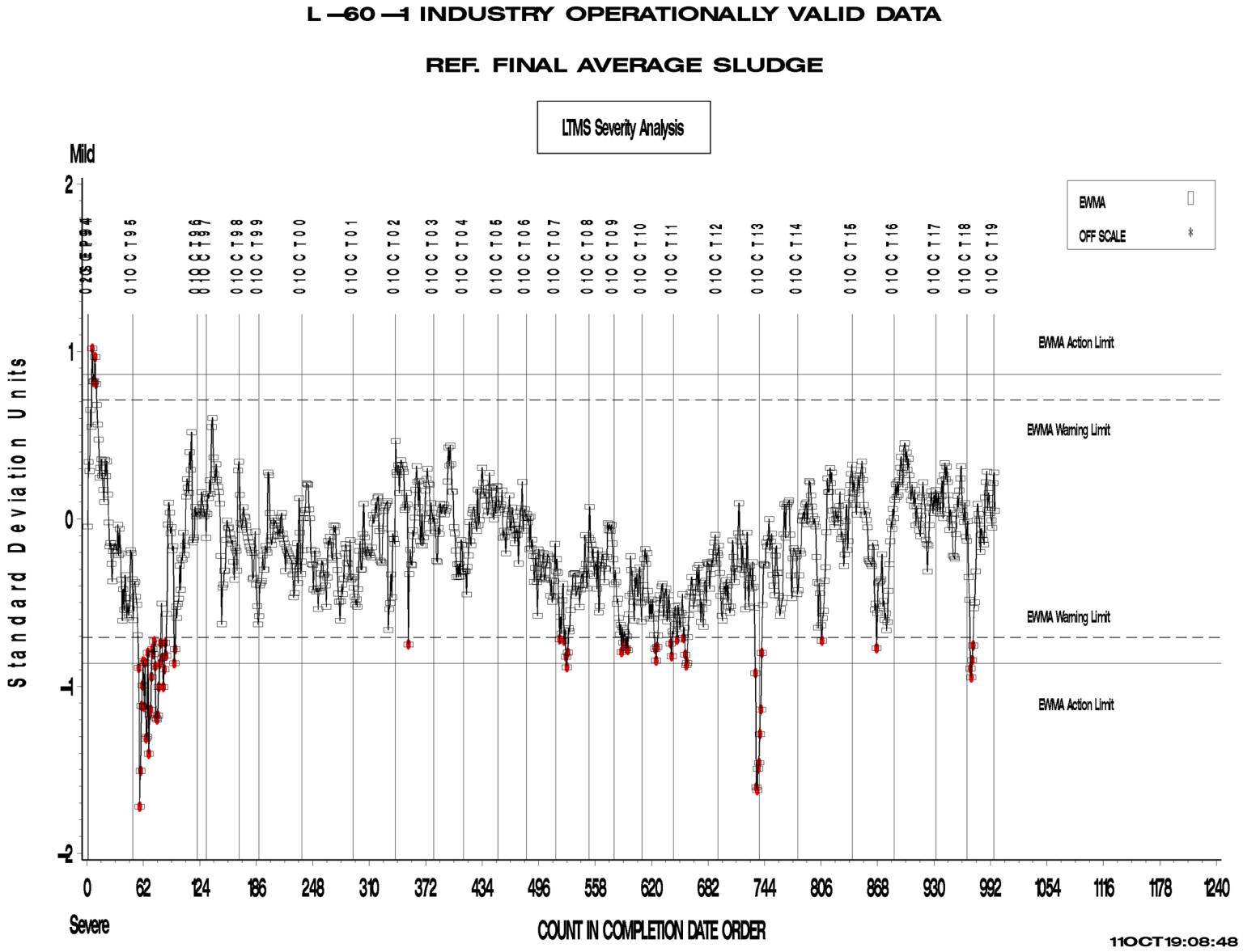
Severity
All parameters have remained within limits this period.
Precision
Precision for all parameters remained within limits this period.

Industry control charts follow.

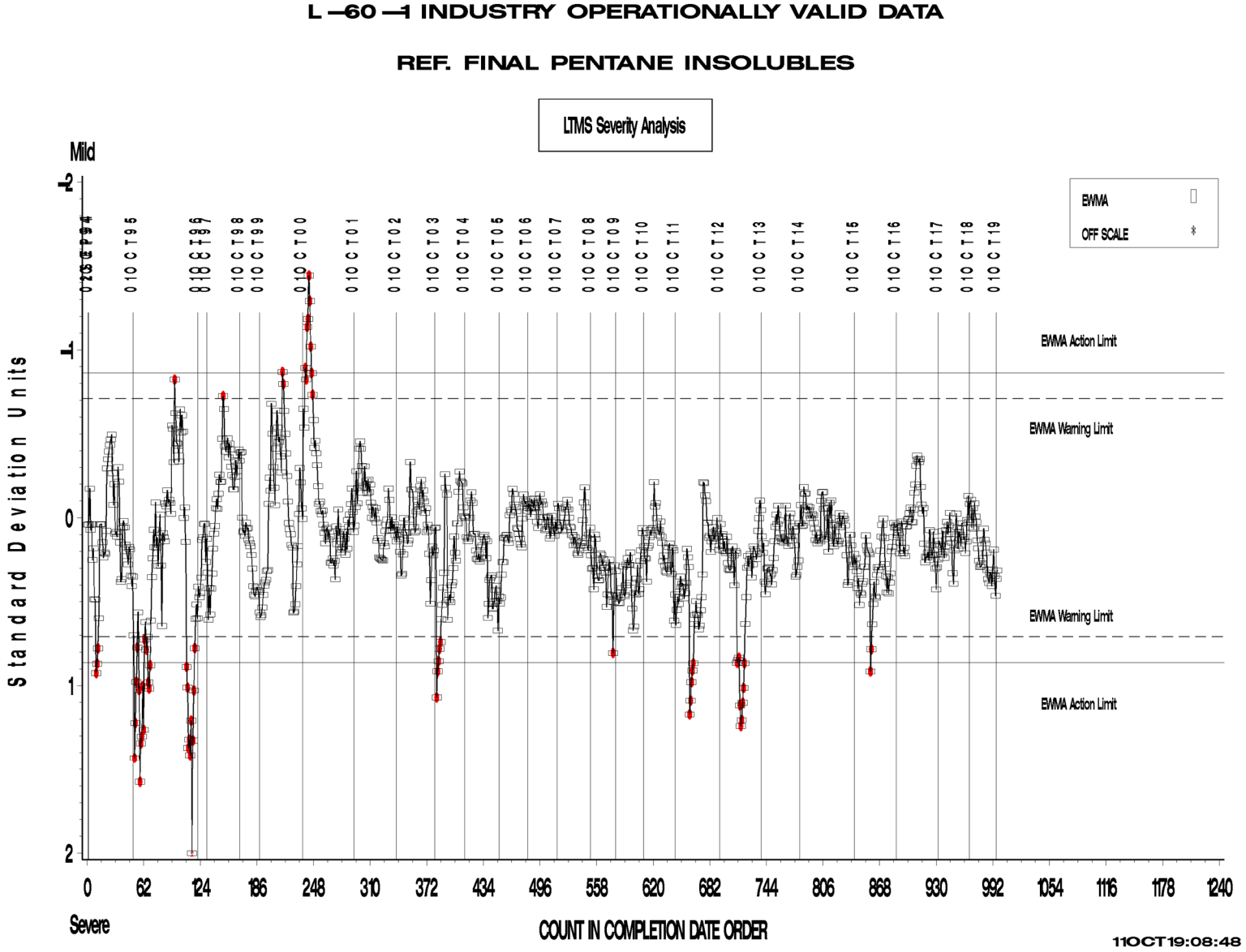
L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL AVERAGE CARBON/ VARNISH
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
2
1
0
-1
-2
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
0 10 C T 95
0 10 C T 96
0 10 C T 97
0 10 C T 98
0 10 C T 99
0 10 C T 00
0 10 C T 01
0 10 C T 02
0 10 C T 03
0 10 C T 04
0 10 C T 05
0 10 C T 06
0 10 C T 07
0 10 C T 08
0 10 C T 09
0 10 C T 10
0 10 C T 11
0 10 C T 12
0 10 C T 13
0 10 C T 14
0 10 C T 15
0 10 C T 16
0 10 C T 17
0 10 C T 18
0 10 C T 19
0
62
124
186
248
310
372
434
496
558
620
682
744
806
868
930
992
1054
1116
1178
1240
COUNT IN COMPLETION DATE ORDER
11OCT19:09:21

L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL AVERAGE SLUDGE
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
2
1
0
-1
-2
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
0 10 C T 95
0 10 C T 96
0 10 C T 97
0 10 C T 98
0 10 C T 99
0 10 C T 00
0 10 C T 01
0 10 C T 02
0 10 C T 03
0 10 C T 04
0 10 C T 05
0 10 C T 06
0 10 C T 07
0 10 C T 08
0 10 C T 09
0 10 C T 10
0 10 C T 11
0 10 C T 12
0 10 C T 13
0 10 C T 14
0 10 C T 15
0 10 C T 16
0 10 C T 17
0 10 C T 18
0 10 C T 19
0
62
124
186
248
310
372
434
496
558
620
682
744
806
868
930
992
1054
1116
1178
1240
COUNT IN COMPLETION DATE ORDER
11OCT19:08:48

L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL PENTANE INSOLUBLES
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
0 10 C T 95
0 10 C T 96
0 10 C T 97
0 10 C T 98
0 10 C T 99
0 10 C T 00
0 10 C T 01
0 10 C T 02
0 10 C T 03
0 10 C T 04
0 10 C T 05
0 10 C T 06
0 10 C T 07
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0 10 C T 14
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0 10 C T 17
0 10 C T 18
0 10 C T 19
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62
124
186
248
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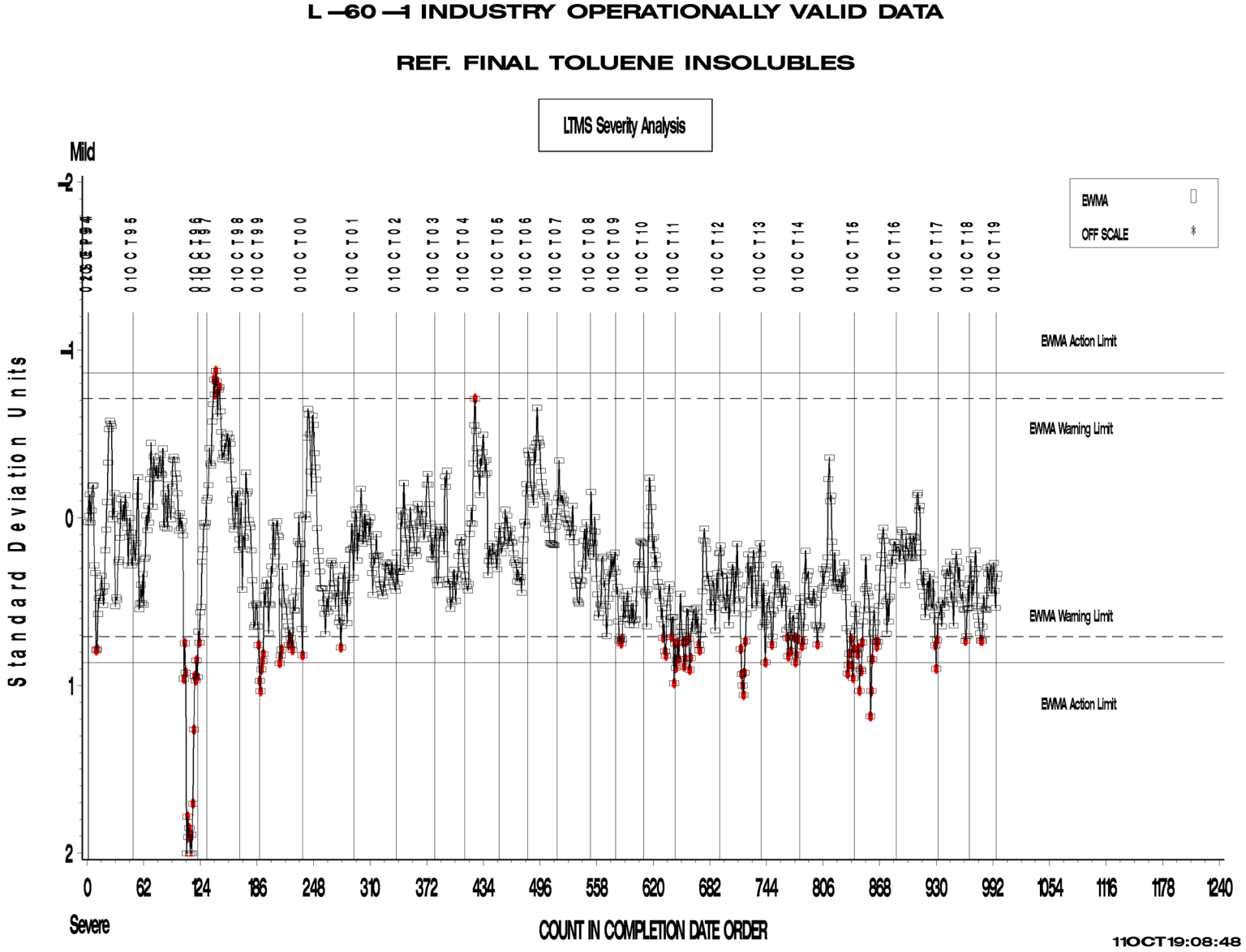
1240
COUNT IN COMPLETION DATE ORDER
11OCT19:08:48

L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL TOLUENE INSOLUBLES
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
0 10 C T 95
0 10 C T 96
0 10 C T 97
0 10 C T 98
0 10 C T 99
0 10 C T 00
0 10 C T 01
0 10 C T 02
0 10 C T 03
0 10 C T 04
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0 10 C T 10
0 10 C T 11
0 10 C T 12
0 10 C T 13
0 10 C T 14
0 10 C T 15
0 10 C T 16
0 10 C T 17
0 10 C T 18
0 10 C T 19
0
62
124
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1116
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COUNT IN COMPLETION DATE ORDER
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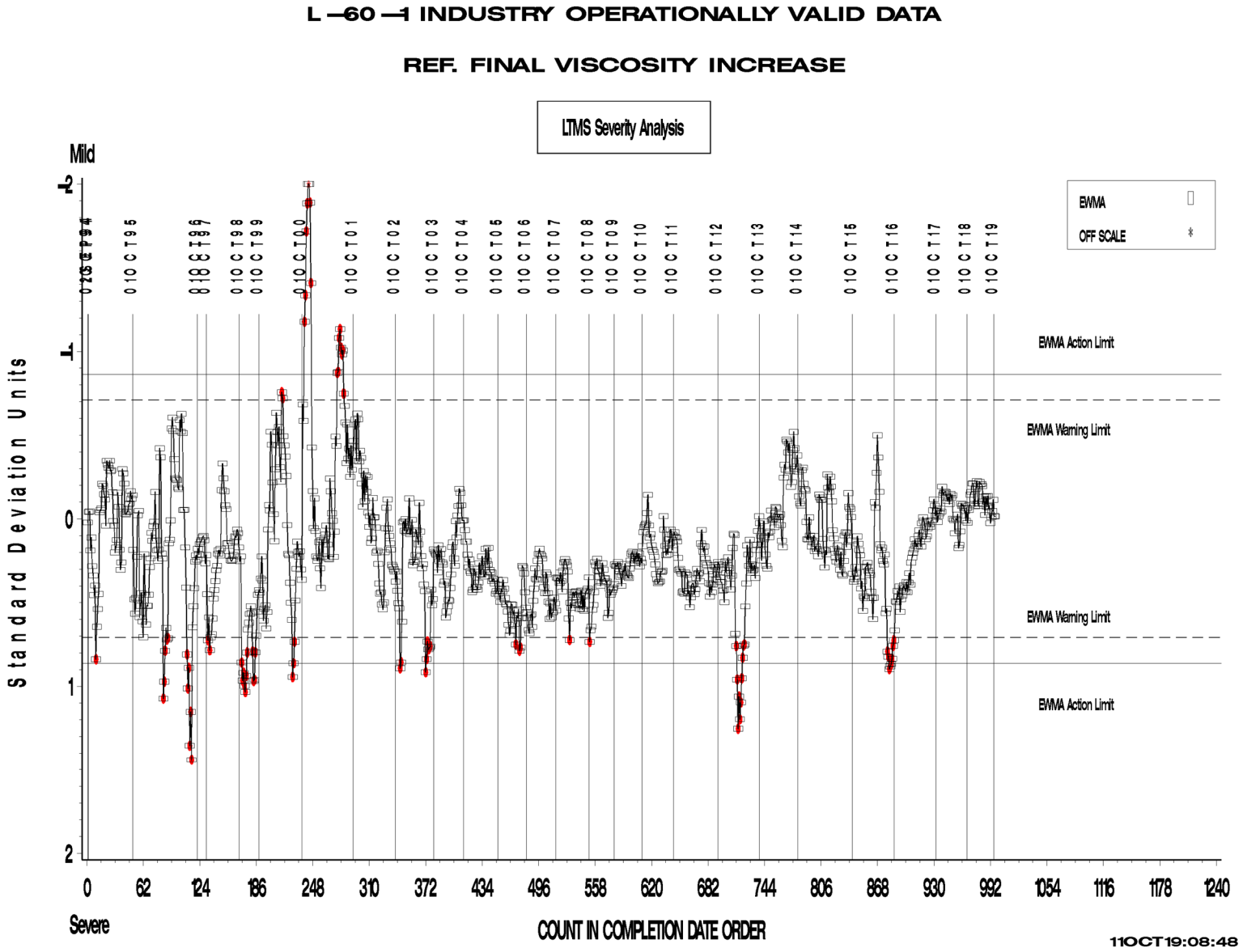
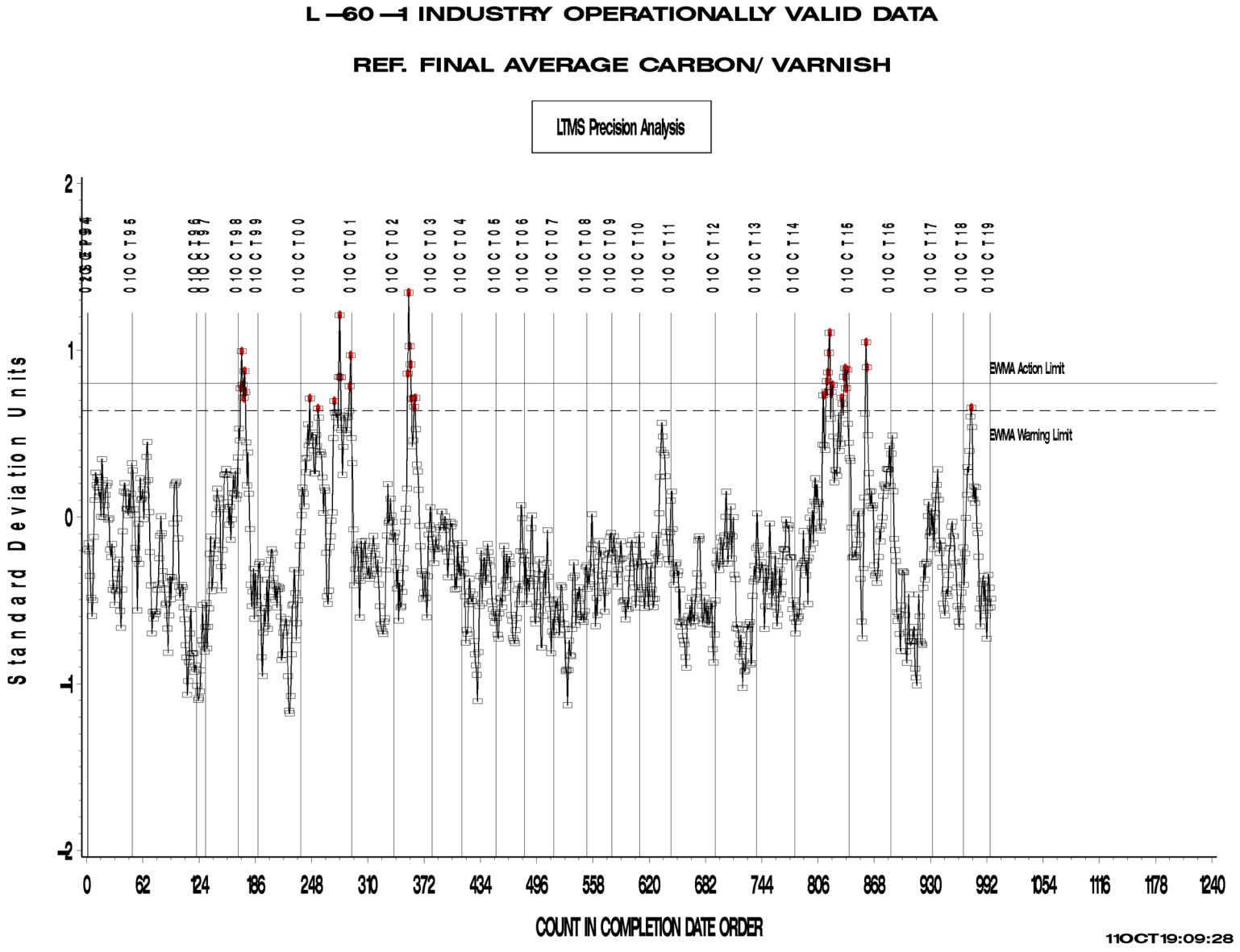
L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL VISCOSITY INCREASE
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
COUNT IN COMPLETION DATE ORDER
11OCT19:08:48

L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL AVERAGE CARBON/ VARNISH
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
0 10 C T 95
0 10 C T 98
0 10 C T 99
0 10 C T 00
0 10 C T 01
0 10 C T 02
0 10 C T 03
0 10 C T 04
0 10 C T 05
0 10 C T 06
0 10 C T 07
0 10 C T 08
0 10 C T 09
0 10 C T 10
0 10 C T 11
0 10 C T 12
0 10 C T 13
0 10 C T 14
0 10 C T 15
0 10 C T 16
0 10 C T 17
0 10 C T 18
0 10 C T 19
EWMA Action Limit
EWMA Warning Limit
0
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124
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248
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372
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1116
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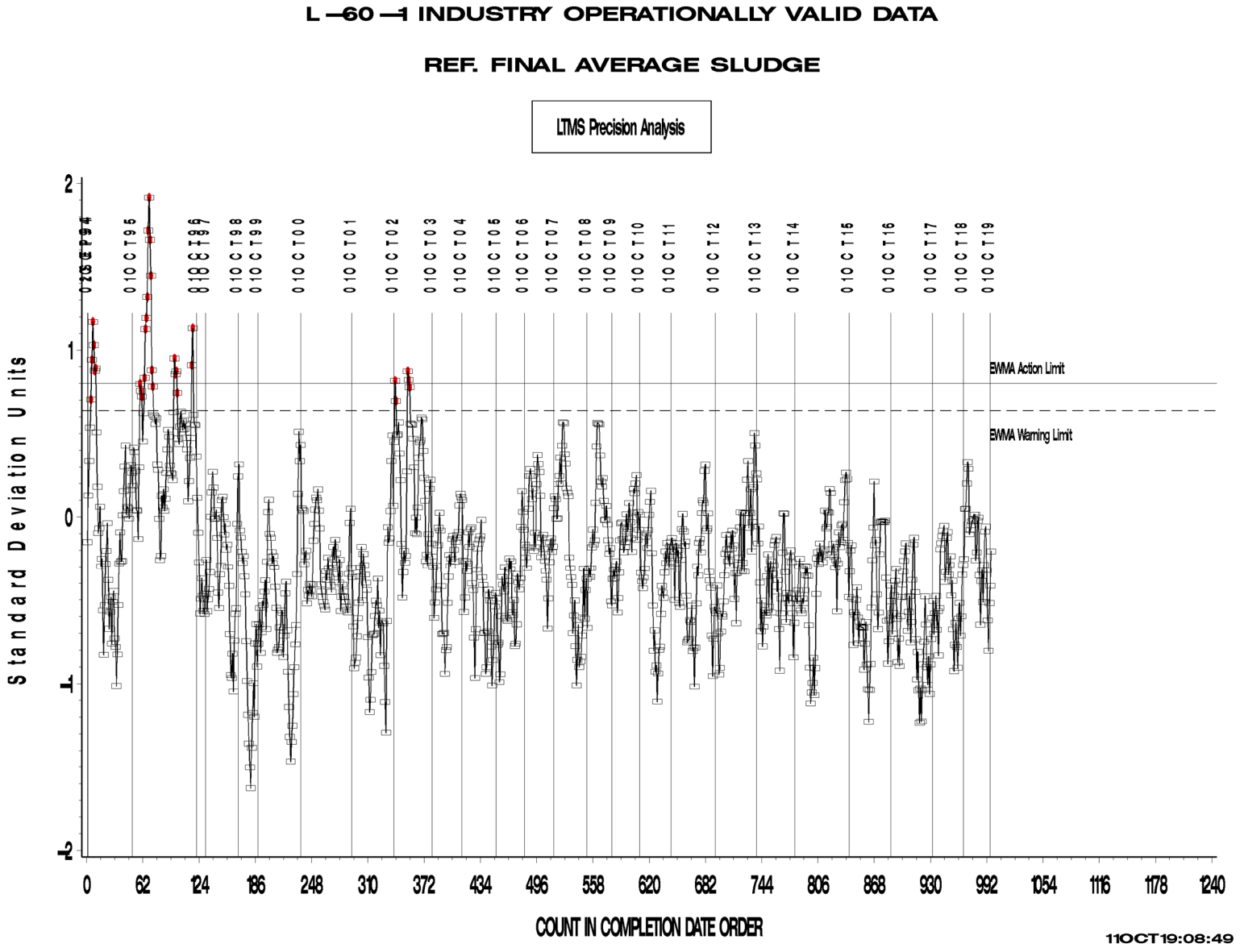
1240
COUNT IN COMPLETION DATE ORDER
11OCT19:09:28

L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL AVERAGE SLUDGE
LTMS Precision Analysis
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
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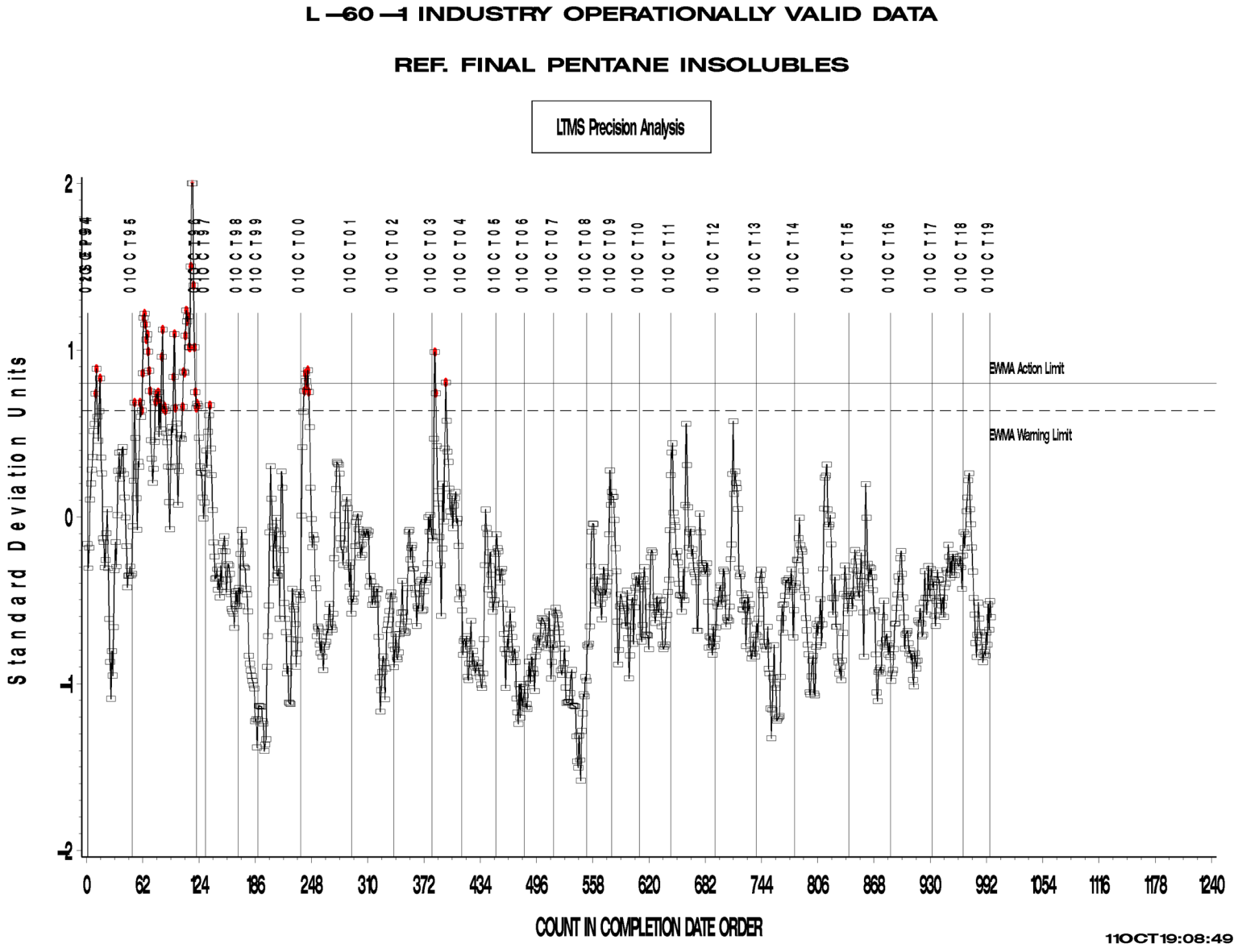
L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL PENTANE INSOLUBLES
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
0 10 C T 95
0 10 C T 96
0 10 C T 97
0 10 C T 98
0 10 C T 99
0 10 C T 00
0 10 C T 01
0 10 C T 02
0 10 C T 03
0 10 C T 04
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0 10 C T 13
0 10 C T 14
0 10 C T 15
0 10 C T 16
0 10 C T 17
0 10 C T 18
0 10 C T 19
EWMA Action Limit
EWMA Warning Limit
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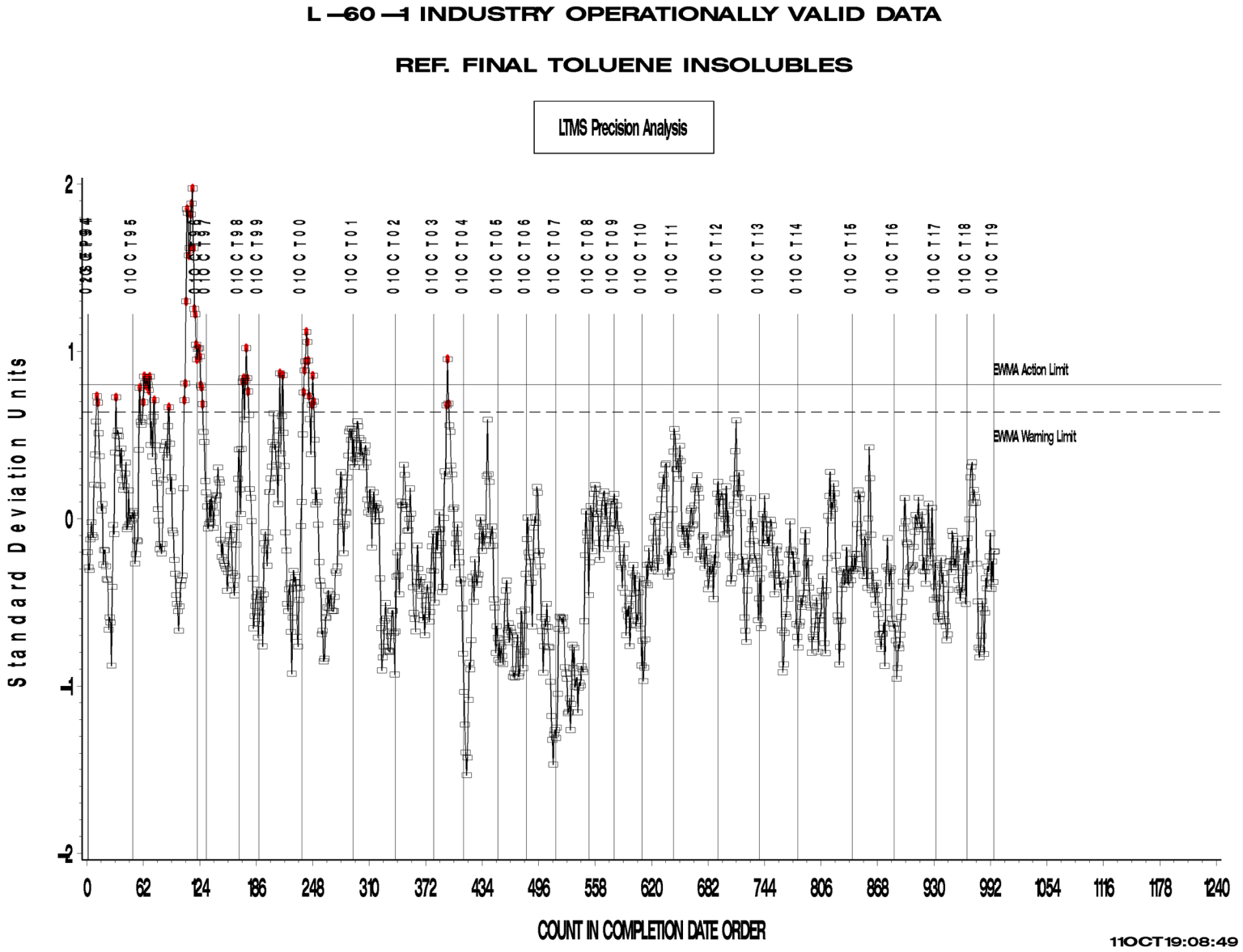
COUNT IN COMPLETION DATE ORDER
11OCT19:08:49

L-60-1 (D5704)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REF. FINAL TOLUENE INSOLUBLES
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
0 10 C T95
0 10 C T96
0 10 C T97
0 10 C T98
0 10 C T99
0 10 C T00
0 10 C T01
0 10 C T02
0 10 C T03
0 10 C T04
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0 10 C T19
EWMA Action Limit
EWMA Warning Limit
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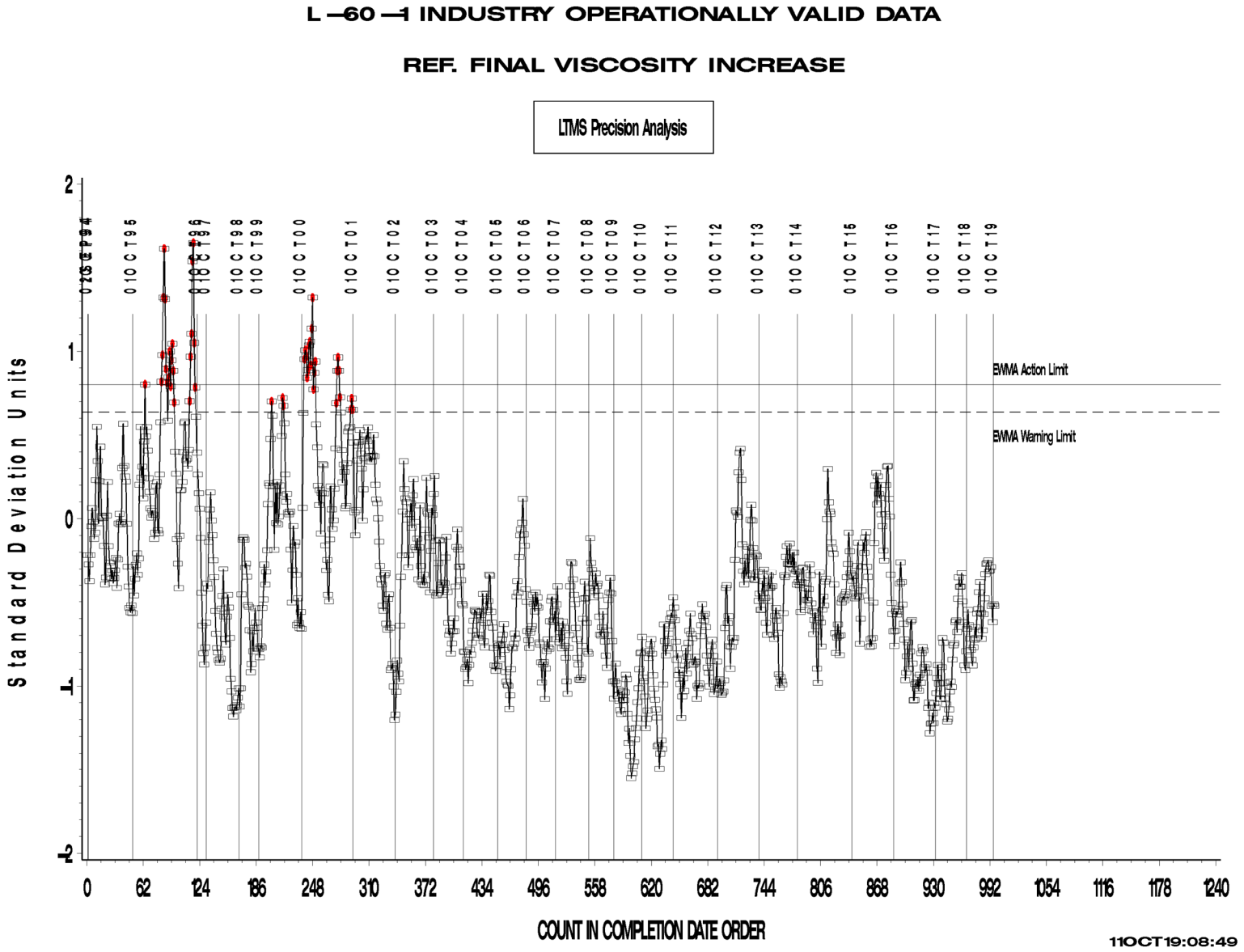
COUNT IN COMPLETION DATE ORDER
11OCT19:08:49

L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL VISCOSITY INCREASE
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
0 10 C T 95
0 10 C T 96
0 10 C T 97
0 10 C T 98
0 10 C T 99
0 10 C T 00
0 10 C T 01
0 10 C T 02
0 10 C T 03
0 10 C T 04
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0 10 C T 11
0 10 C T 12
0 10 C T 13
0 10 C T 14
0 10 C T 15
0 10 C T 16
0 10 C T 17
0 10 C T 18
0 10 C T 19
EWMA Action Limit
EWMA Warning Limit
0
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124
186
248
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1116
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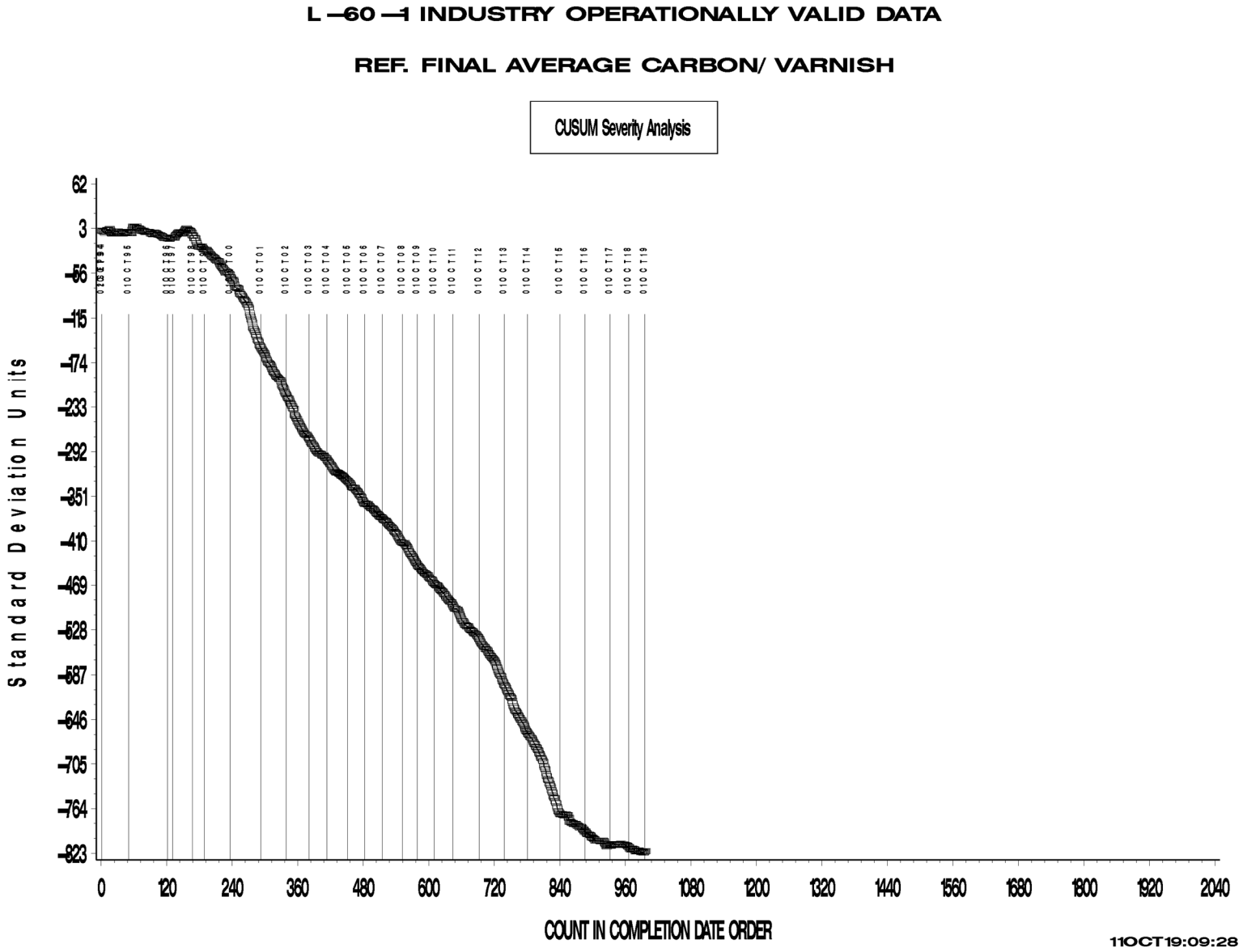
COUNT IN COMPLETION DATE ORDER
11OCT19:08:49

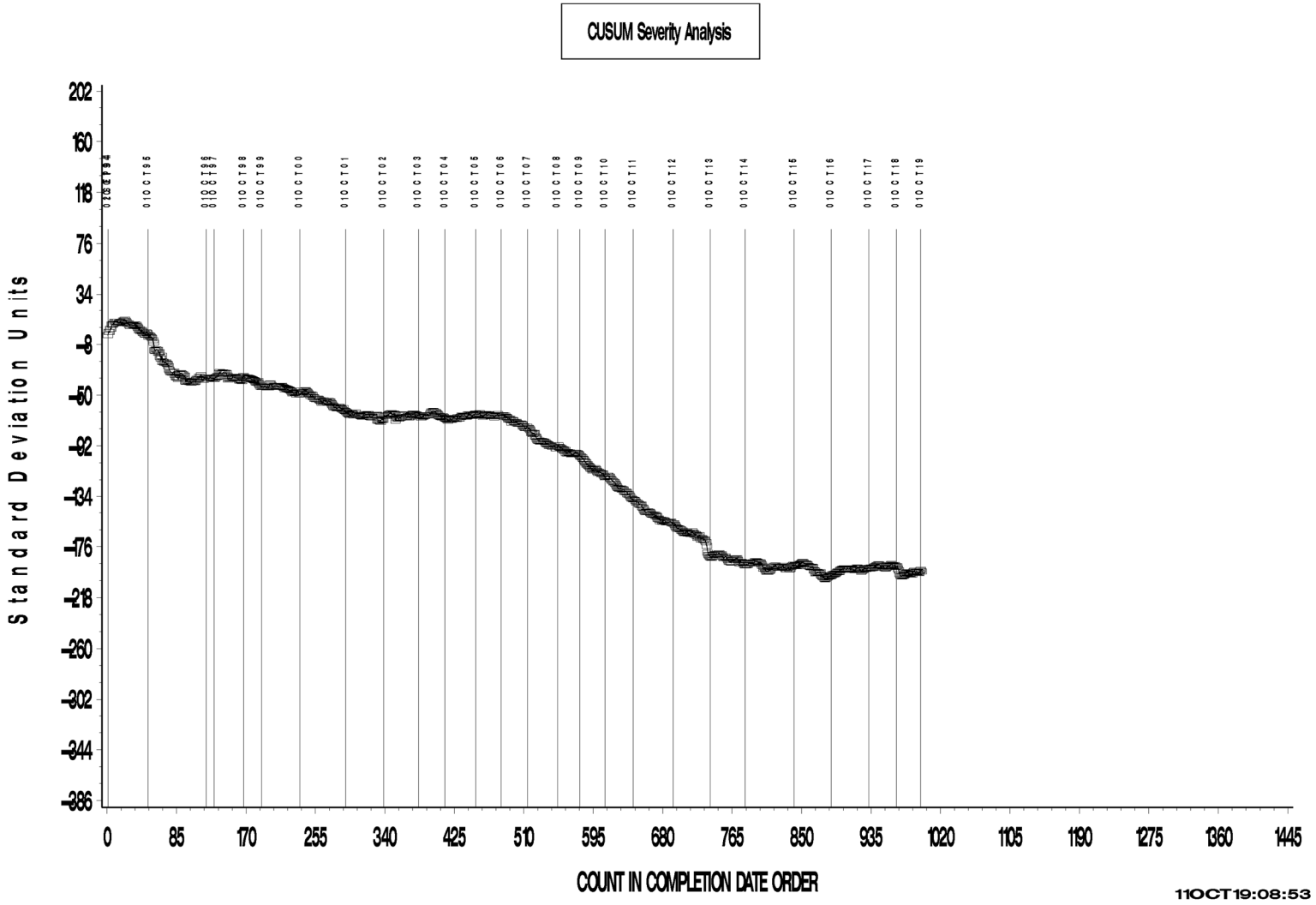
L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL AVERAGE CARBON/ VARNISH
CUSUM Severity Analysis
Standard Deviation Units
62
3
-56
-115
-174
-233
-292
-351
-410
-469
-528
-587
-646
-705
-764
-823
0
120
240
360
480
600
720
840
960
1080
1200
1320
1440
1560
1680
1800
1920
2040
COUNT IN COMPLETION DATE ORDER
11OCT19:09:28

L-60-1 (D5704)

L –60 –1 INDUSTRY OPERATIONALLY VALID DATA

REF. FINAL AVERAGE SLUDGE

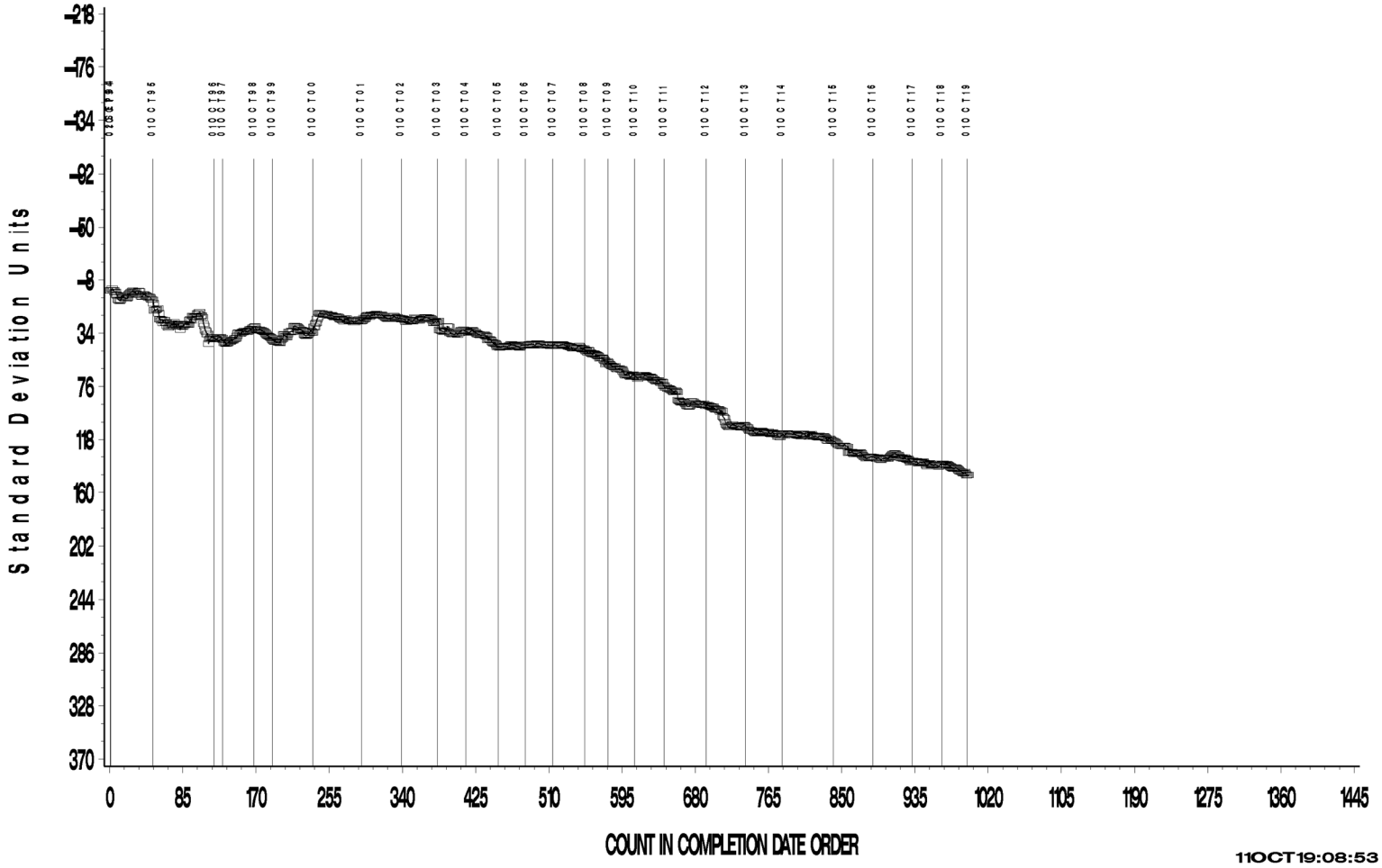


L-60-1 (D5704)

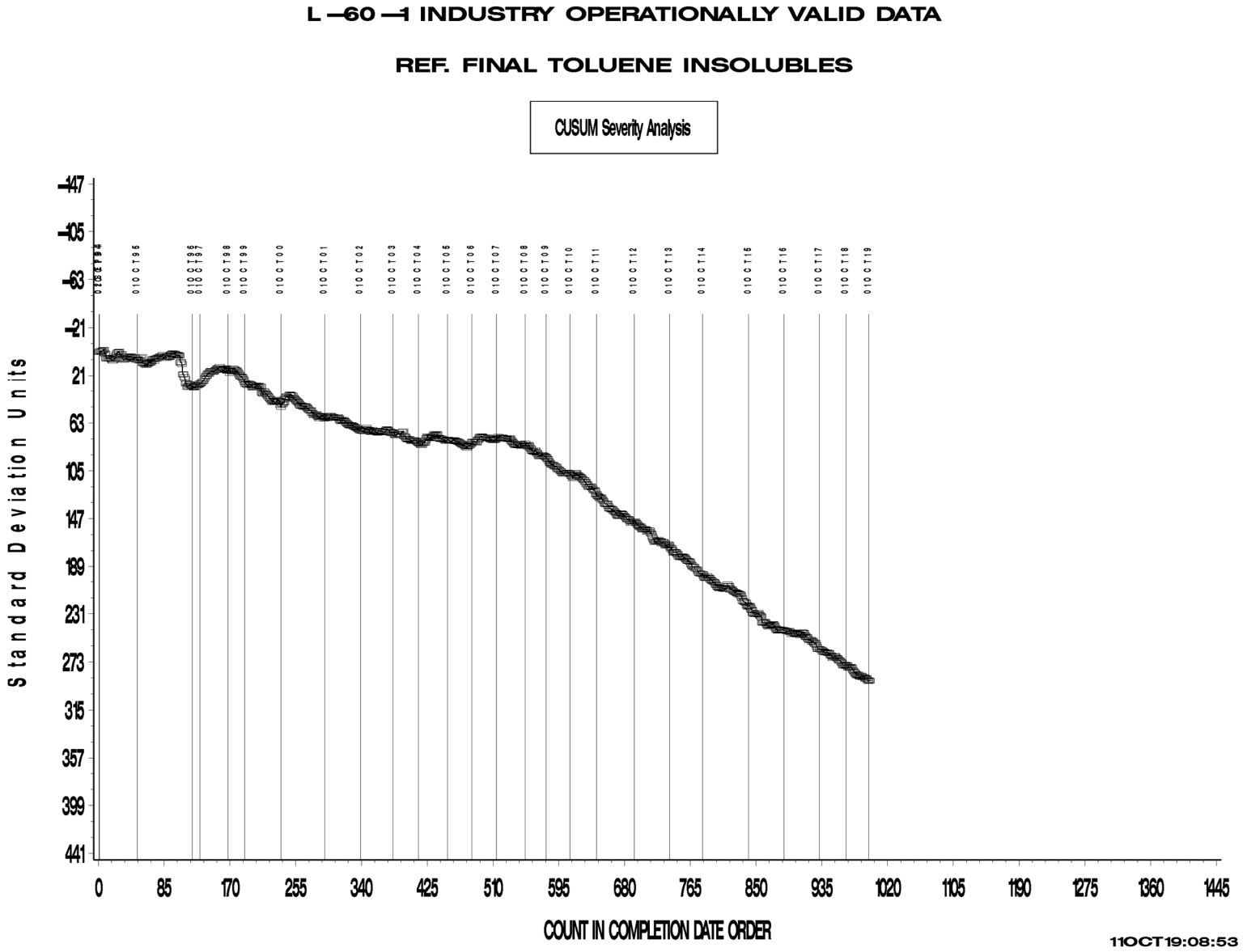
L –60 –1 INDUSTRY OPERATIONALLY VALID DATA

REF. FINAL PENTANE INSOLUBLES

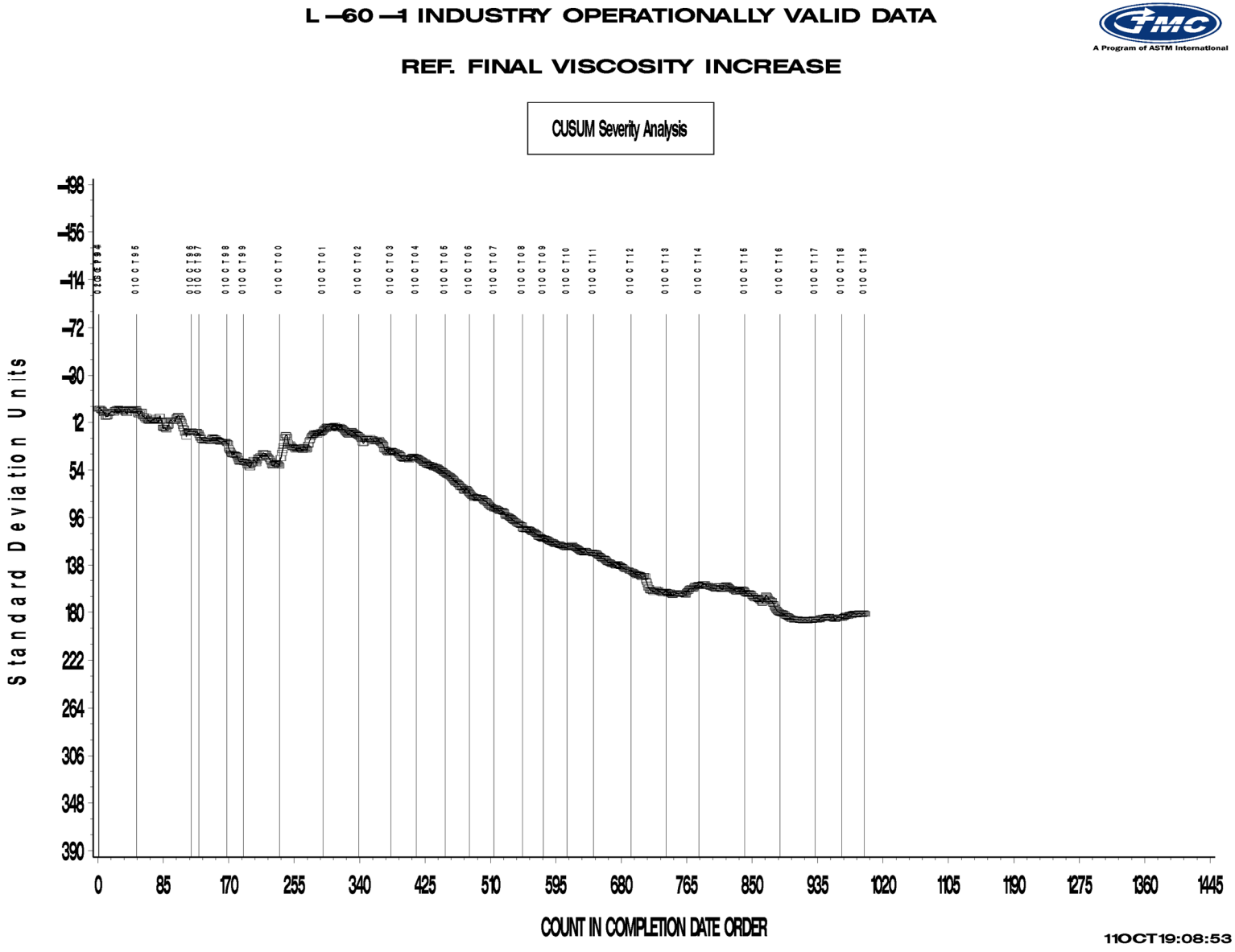
CUSUM Severity Analysis



L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL TOLUENE INSOLUBLES
CUSUM Severity Analysis
Standard Deviation Units
-147
-105
-63
-21
21
63
105
147
189
231
273
315
357
399
441
0
85
170
255
340
425
510
595
680
765
850
935
1020
1105
1190
1275
1360
1445
COUNT IN COMPLETION DATE ORDER
11OCT19:08:53

L-60-1 (D5704)


L –60 –1 INDUSTRY OPERATIONALLY VALID DATA
REF. FINAL VISCOSITY INCREASE
CUSUM Severity Analysis
Standard Deviation Units
-198
-156
-114
-72
-30
12
54
96
138
180
222
264
306
348
390
0 10 C T 9 5
0 10 C T 9 6
0 10 C T 9 7
0 10 C T 9 8
0 10 C T 9 9
0 10 C T 0 0
0 10 C T 0 1
0 10 C T 0 2
0 10 C T 0 3
0 10 C T 0 4
0 10 C T 0 5
0 10 C T 0 6
0 10 C T 0 7
0 10 C T 0 8
0 10 C T 0 9
0 10 C T 1 0
0 10 C T 1 1
0 10 C T 1 2
0 10 C T 1 3
0 10 C T 1 4
0 10 C T 1 5
0 10 C T 1 6
0 10 C T 1 7
0 10 C T 1 8
0 10 C T 1 9
0
85
170
255
340
425
510
595
680
765
850
935
1020
1105
1190
1275
1360
1445
COUNT IN COMPLETION DATE ORDER
11OCT19:08:53

L-60-1 (D5704)

L-60-1 (D5704)

TIMELINE ADDITIONS

Effective Date	Information Letter	Event
		No timeline additions were made this period.

L-60-1 (D5704)

LAB VISITS

No L-601 lab visits were conducted during this period.

INFORMATION LETTERS

No information letters were issued this period.

L-60-1 (D5704)

STATUS OF REFERENCE OIL SUPPLY

		@ TMC	
Oil	Cans @ Labs	Cans	Gallons
148-1	17	212	13.3
155-1	18	578	36.1
Total	35	790	49.4

The surveillance panel has asked that the TMC reserve a portion of oil 155-1 for L-60-1 testing. The TMC quantity shown for this oil is for that reserved portion. A separate quantity of 80.83 gallons is available for use in other gear testing. 212 tests of oil 148-1 remain in TMC inventory; however, this is only 13 gallons. When the need arises, it will not be possible to obtain a reblend of this oil. The panel is advised to begin considering a possible replacement for this oil.