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: 15-038

DATE: November 13, 2015

TO: Chris Prengaman, Chairman, L-37 Surveillance Panel

FROM: Scott Parke

SUBJECT: L-37 Testing from April 1, 2015 through September 30, 2015

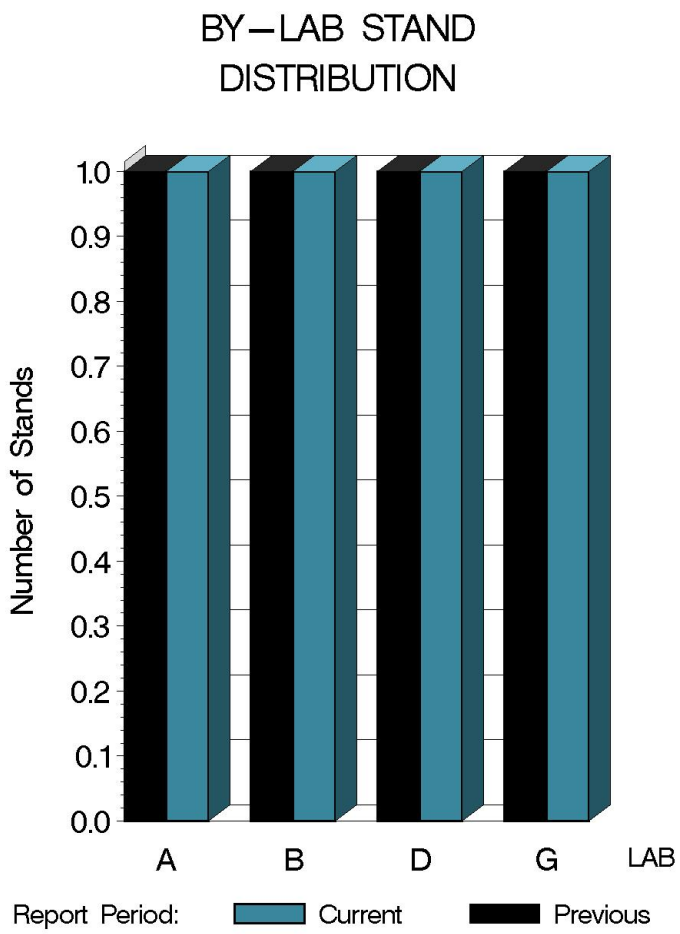
Please find attached a summary of reference oil testing activity this period.

SDP/sdp/mem15-038.sdp.doc
cc: Frank Farber
Jeff Clark
L-37 Surveillance Panel
ftp://ftp.astmtmc.cmu.edu/docs/gear/l37/semiannualreports/l37-10-2015.pdf

Distribution: email

L-37 (D6121)

	Reporting Data	Calibrated on 9-30-15
Number of Labs	4	3
Number of Stands	4	3



10:16:02 13NOV2015

L-37 (D6121)

Test Distribution by Oil and Validity

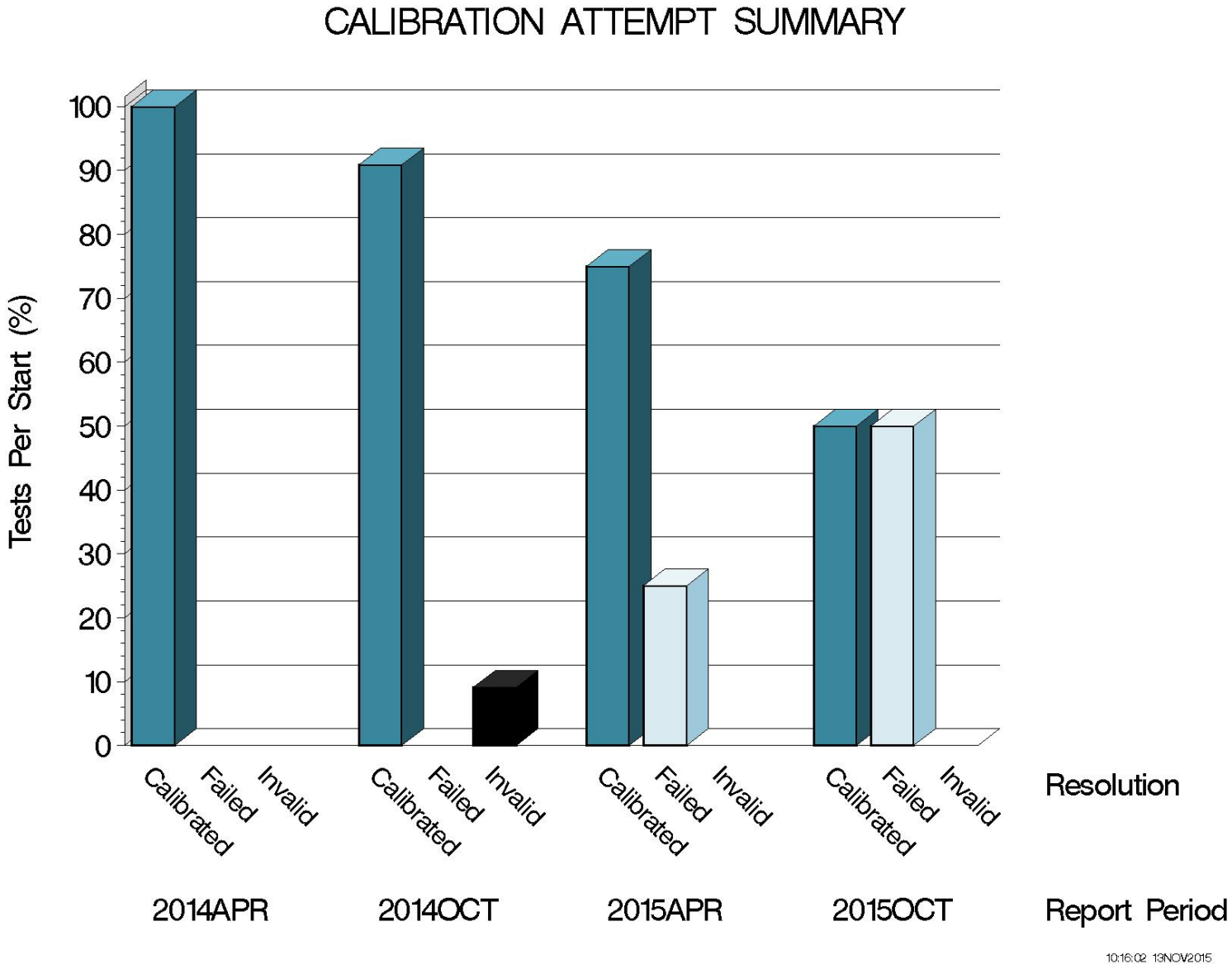
		134	152-1	152-2	155	155-1	Totals Last Period	Totals This Period
Accepted for calibration	AC	0	0	4	0	0	6	4
Rejected (Mild)	OC	0	0	0	0	0	1	0
Rejected (Severe)	OC	0	0	3	0	0	0	3
Rejected (Precision)	OC	0	0	1	0	0	1	1
Invalidated calibration	RC	0	0	0	0	0	0	0
Acceptable info run	NI	2	0	1	0	0	14	3
Unacceptable info run	MI	2	0	0	0	0	2	2
Aborted info run	XI	0	0	0	0	0	0	0
Total		4	0	9	0	0	24	13

L-37 (D6121)

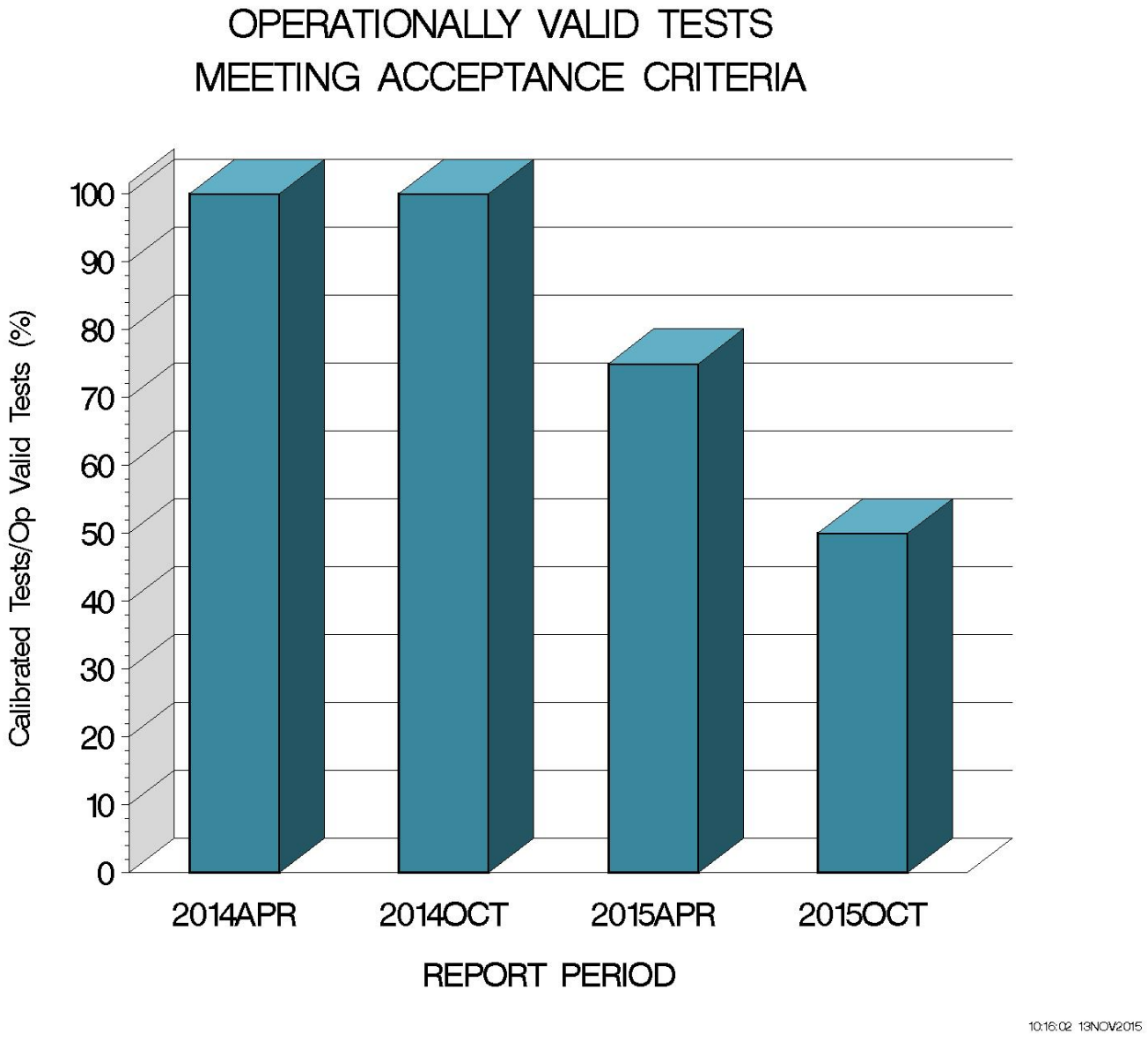
Calibration Attempt Detail

	Gear Batch	Acceptable	Failed	Total
LUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	2	4	6
	Total	2	4	6
NONLUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	2	0	2
	Total	2	0	2

L-37 (D6121)


CALIBRATION ATTEMPT SUMMARY
Tests Per Start (%)
100
90
80
70
60
50
40
30
20
10
0
Calibrated
Failed
Invalid
Resolution
2014APR
2014OCT
2015APR
2015OCT
Report Period
10:16:02 13NOV2015

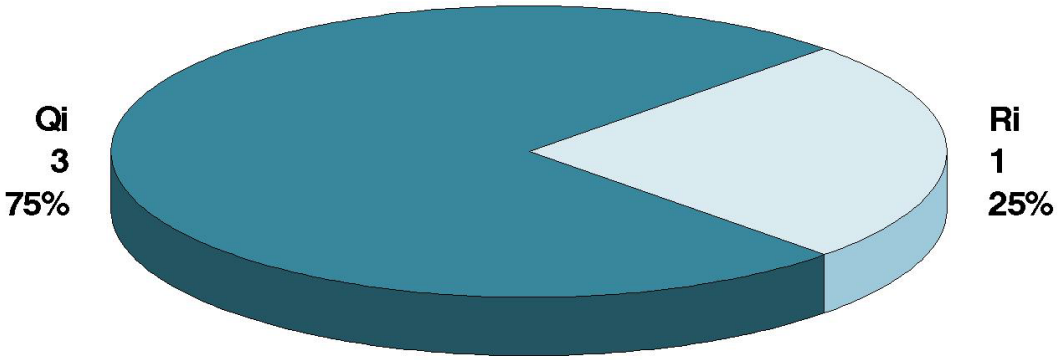
L-37 (D6121)


OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA
Calibrated Tests/Op Valid Tests (%)
100
90
80
70
60
50
40
30
20
10
0
2014APR
2014OCT
2015APR
2015OCT
REPORT PERIOD
10:16:02 13NOV2015

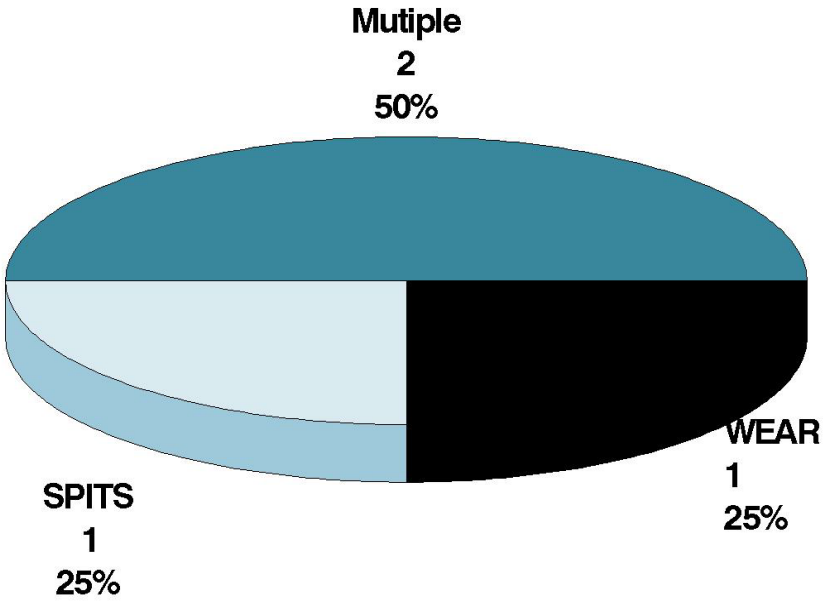
L-37 (D6121)

CAUSES FOR FAILED TESTS

By Alarm Type



By Parameter



L-37 (D6121)

CAUSES FOR LOST TESTS

			Oil					Validity			Loss Rate		
Lab	Cause		134	152-1	152-2	155	155-1	RC	LC	XI	Lost	Starts	%
	No tests were lost.										0	13	0%
		Lost	0	0	0	0	0	0	0	0			
		Starts	4	0	9	0	0	13	13	13			
		%	0%	0%	0%	0%	0%	0%	0%	0%			

Two tests intended for use in the Lab-built Axle approval process failed to meet the reference acceptance limits and were therefore unusable for that purpose. Both ran oil 134 and were mild on SPIT. These tests were assigned an ‘MI’ validity. Three other tests (two 134, one 152-2) were run as part of Lab-built approval and were acceptable but could not be used without the unacceptable accompanying tests. These tests were assigned an ‘NI’ validity. None of these tests is used in control charting.

L-37 (D6121)

GEAR BATCH SEVERITY

LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s[A]	Overall Δ/s	Overall Shift (in Merits)[B]
RIDG	V1L528/P4T883A	6	-3.428	3.071	-3.428	-4.902
RIPP	V1L528/P4T883A	6	0.226	1.188	0.226	0.108
SPIT	V1L528/P4T883A	6	-39.350	43.676	-39.350	-22.783
WEAR	V1L528/P4T883A	6	-4.132	3.696	-4.132	-2.145

[A] Because the number of tests completed this period was too small to compute a representative pooled standard deviation, the straight standard deviation is shown.

[B] As computed using SA standard deviation published in the LTMS document.

L-37 (D6121)

GEAR BATCH SEVERITY (continued)

NON-LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s[A]	Overall Δ/s	Overall Shift (in Merits)[B]
RIDG	V1L528/P4T883A	2	-1.061	2.000	-1.061	-0.707
RIPP	V1L528/P4T883A	2	-0.142	0.772	-0.142	-0.079
SPIT	V1L528/P4T883A	2	0.150	0.141	0.150	0.127
WEAR	V1L528/P4T883A	2	-1.000	1.414	-1.000	-0.713

[A] Because the number of tests completed this period was too small to compute a representative pooled standard deviation, the straight standard deviation is shown.

[B] As computed using SA standard deviation published in the LTMS document.

L-37 (D6121)

LAB SEVERITY

LUBRITED HARDWARE						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	A	1	-3.165	-1.102	-1.951	-4.132
	B	3	-5.802	1.111	-78.374	-6.887
	D	1	-1.582	-1.102	0.488	0.000
	G	1	1.582	0.226	0.488	0.000

NON-LUBRITED HARDWARE						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	A	1	-2.475	-0.688	0.249	0.000
	D	1	0.354	0.404	0.050	-2.000

L-37 (D6121)

SUMMARY OF SEVERITY & PRECISION

Severity
Nonlubrited – The SPIT severity warning triggered last period has been cleared by testing this period. The other test parameters are also currently within limits. Lubrited – A succession of severe testing from lab B (currently 5 tests) has resulted in WEAR, RIDG, and SPIT charts exceeding the severe EWMA action limit.

L-37 (D6121)

SUMMARY OF SEVERITY & PRECISION (cont.)

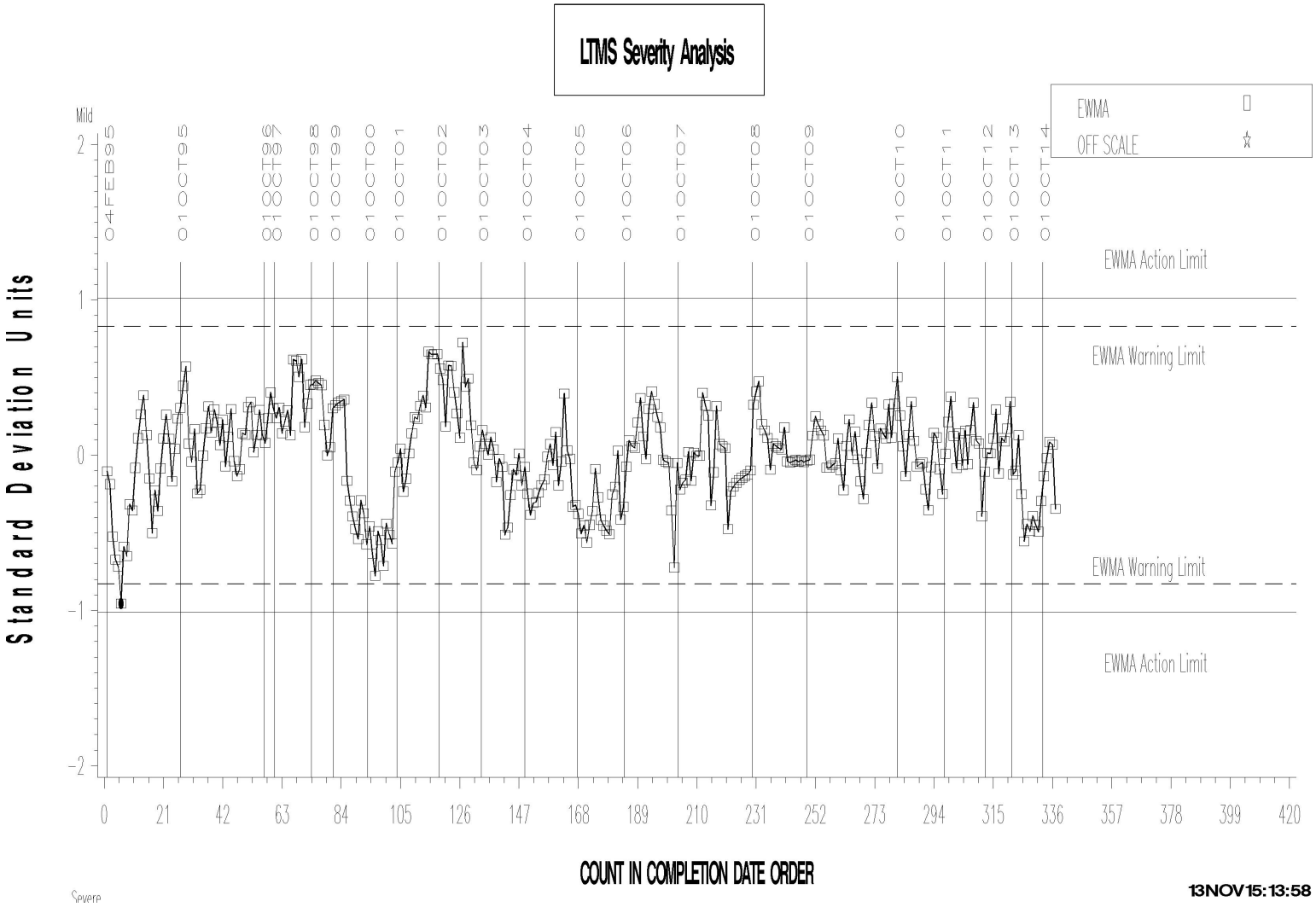
Precision
Nonlubrited – Precision performance remained within control chart limits. Lubrited – Due to the severe lab B results interspersing with results from other labs, the RIDG and SPIT charts are in alarm.

Industry control charts follow.

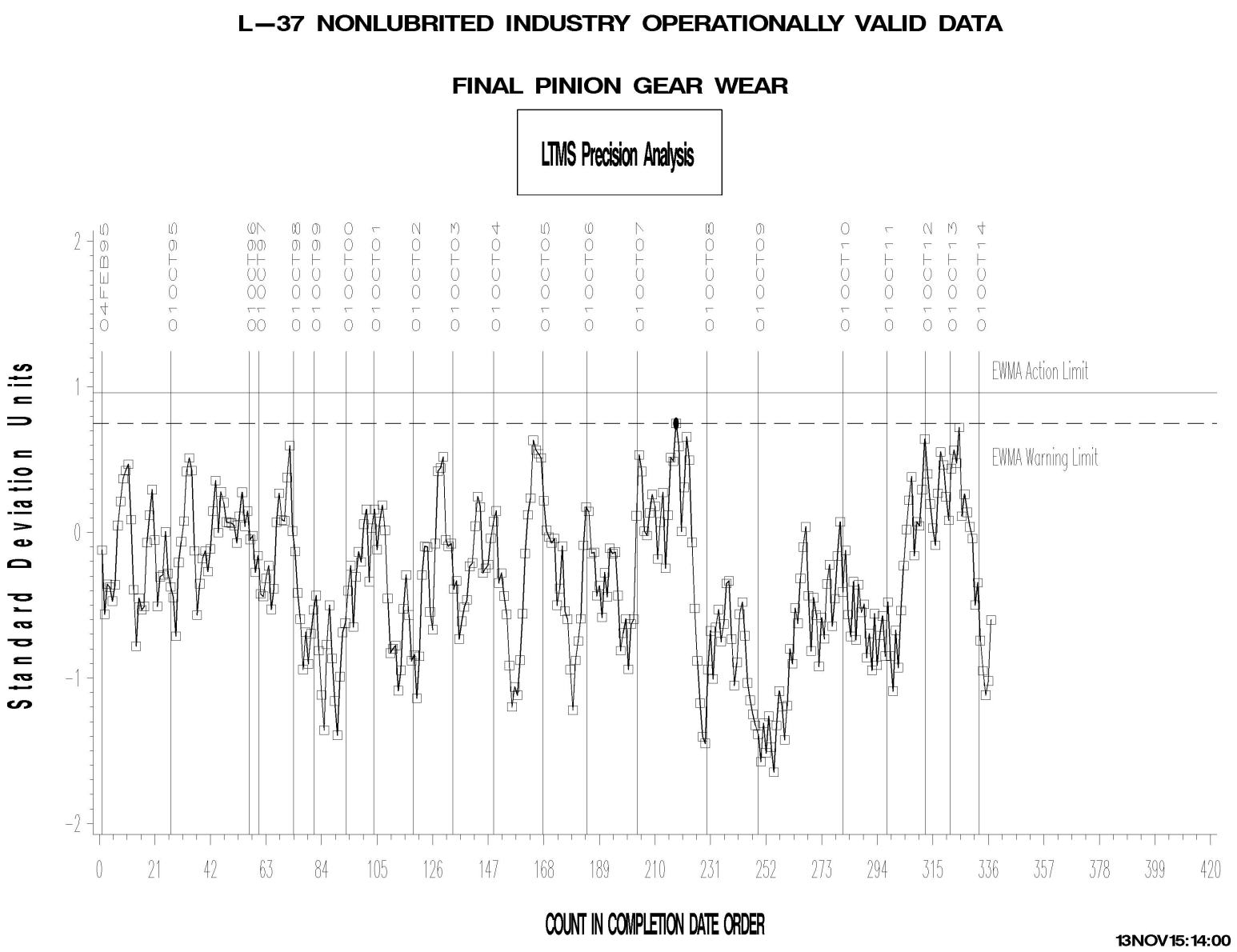
L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR



L-37 (D6121)

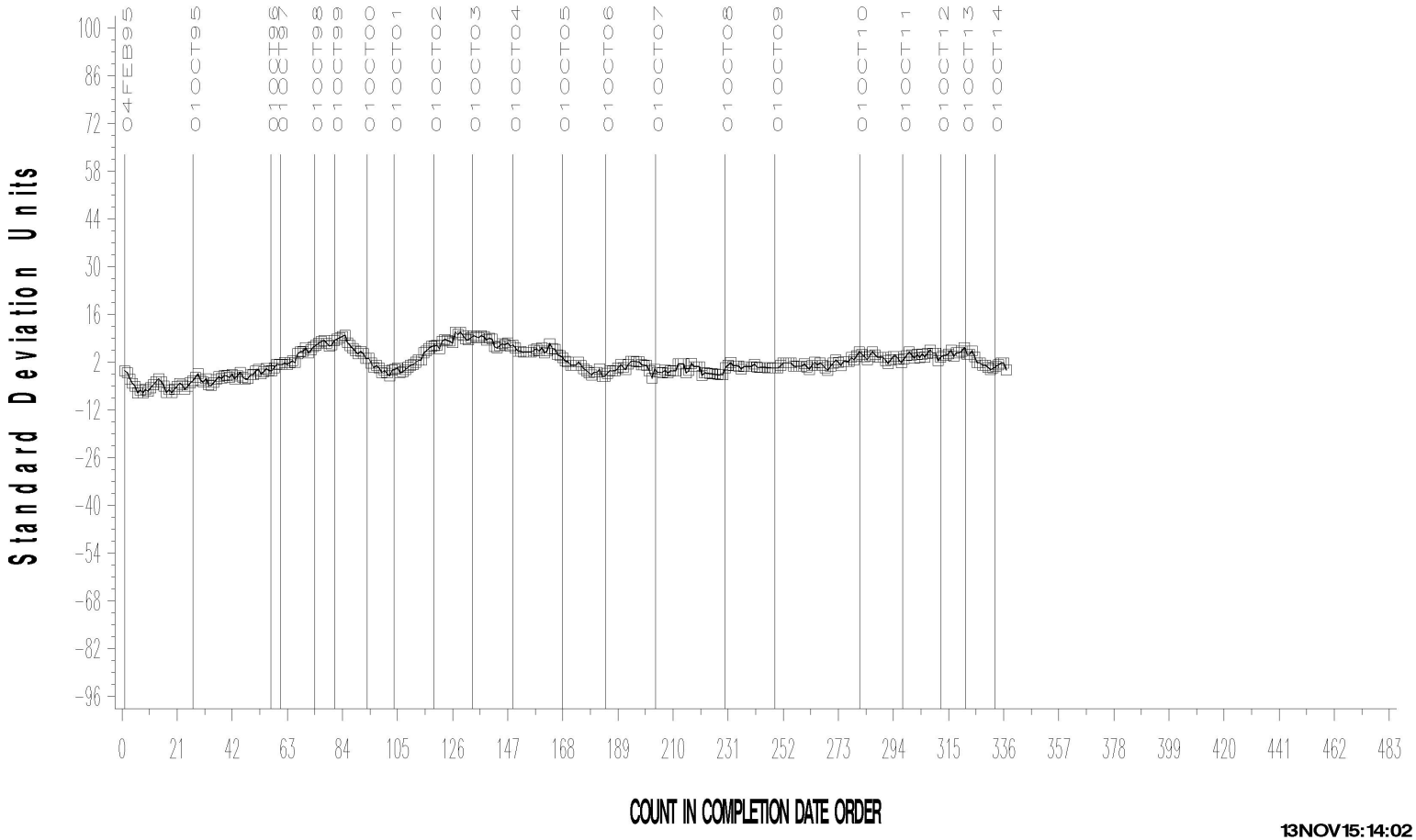

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR WEAR
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
04FEB95
01OCT95
01OCT96
01OCT97
01OCT98
01OCT99
01OCT00
01OCT01
01OCT02
01OCT03
01OCT04
01OCT05
01OCT06
01OCT07
01OCT08
01OCT09
01OCT10
01OCT11
01OCT12
01OCT13
01OCT14
EWMA Action Limit
EWMA Warning Limit
0
21
42
63
84
105
126
147
168
189
210
231
252
273
294
315
336
357
378
399
420
COUNT IN COMPLETION DATE ORDER
13NOV15:14:00

L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

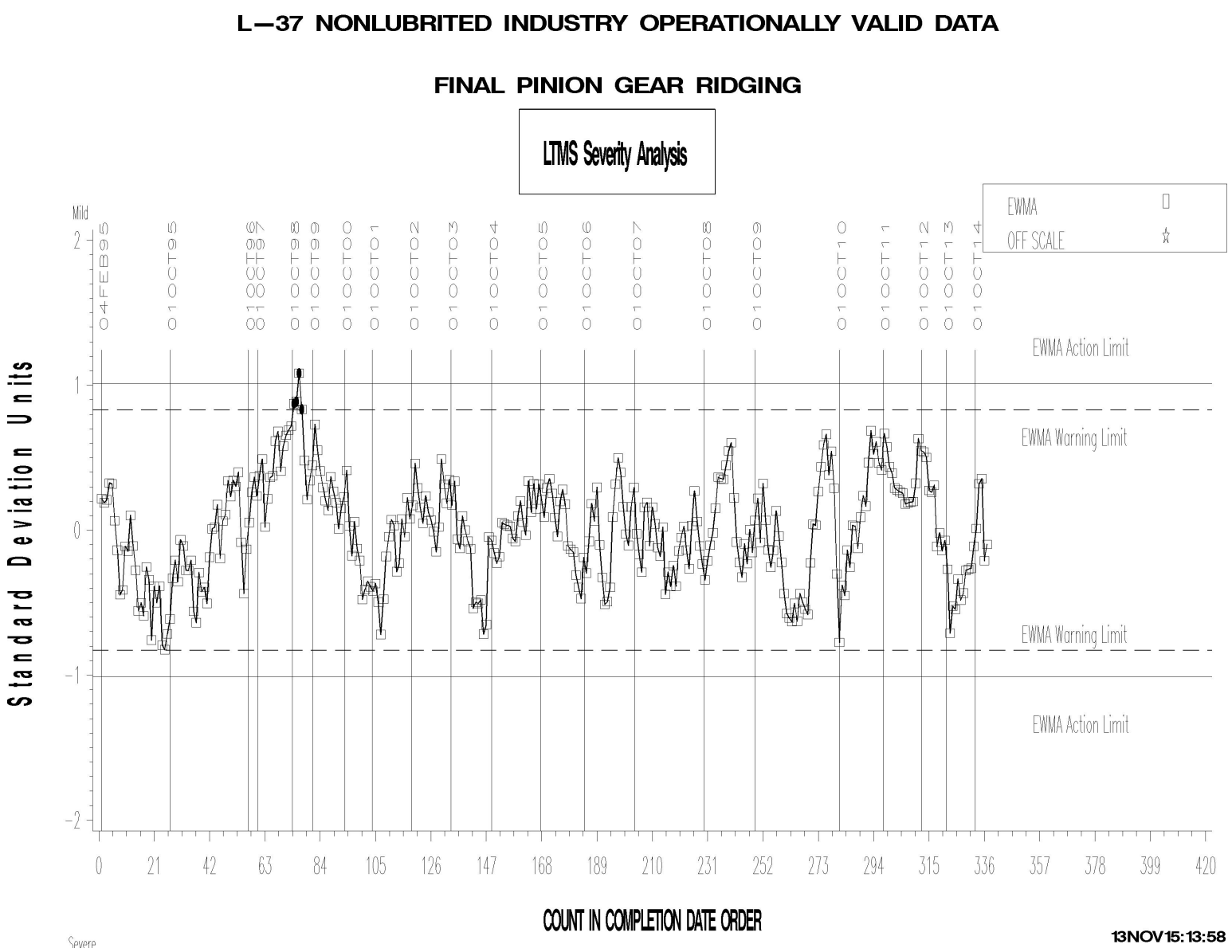
FINAL PINION GEAR WEAR

CUSUM Severity Analysis

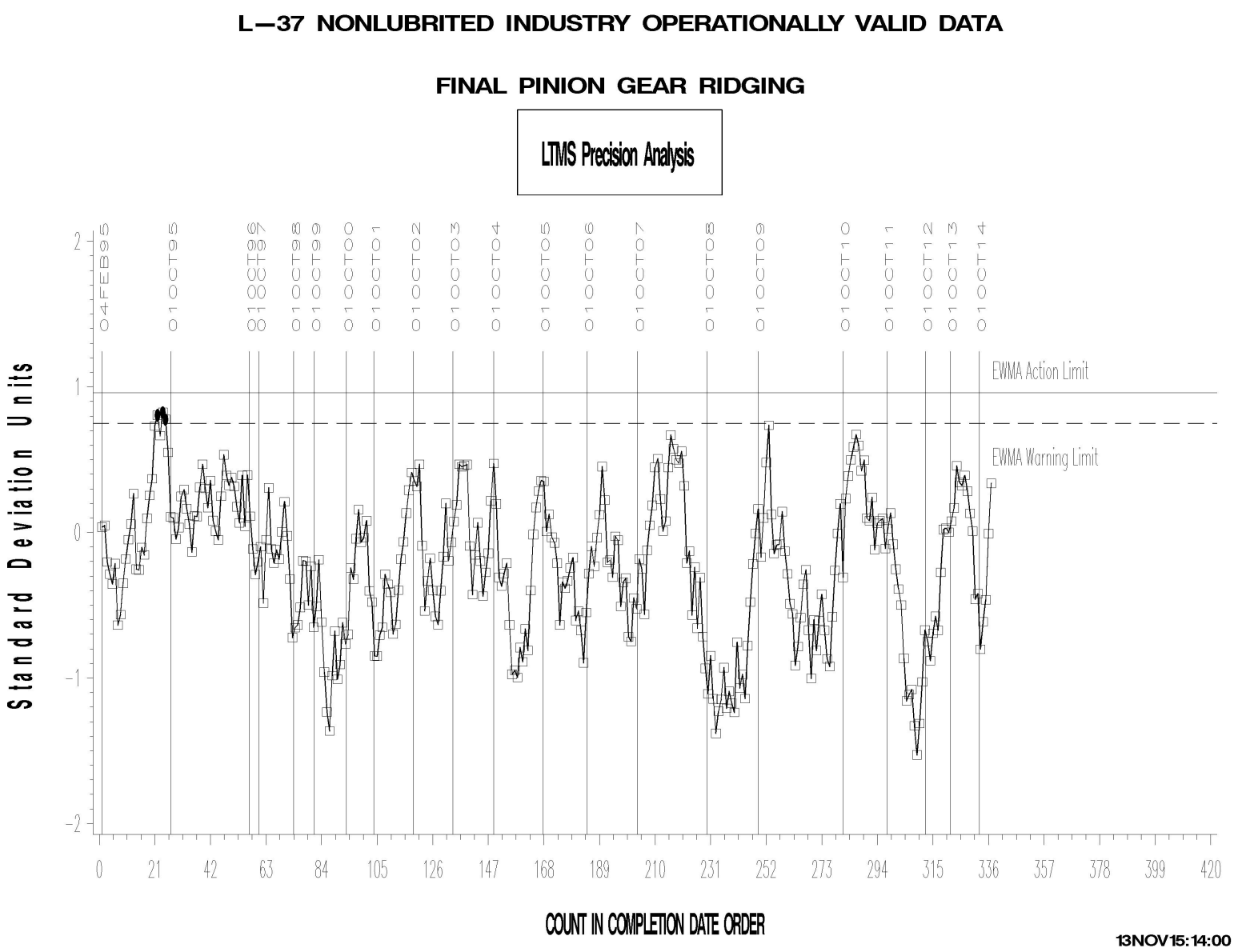


13NOV15:14:02

L-37 (D6121)


L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIDGING
LTMS Severity Analysis
EWMA
OFF SCALE
Mild
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
04FEB95
01OCT95
11OCT96
01OCT97
01OCT98
01OCT99
01OCT00
01OCT01
01OCT02
01OCT03
01OCT04
01OCT05
01OCT06
01OCT07
01OCT08
01OCT09
01OCT10
01OCT11
01OCT12
01OCT13
01OCT14
2
1
0
−1
−2
0
21
42
63
84
105
126
147
168
189
210
231
252
273
294
315
336
357
378
399
420
COUNT IN COMPLETION DATE ORDER
Sverp
13NOV15:13:58

L-37 (D6121)

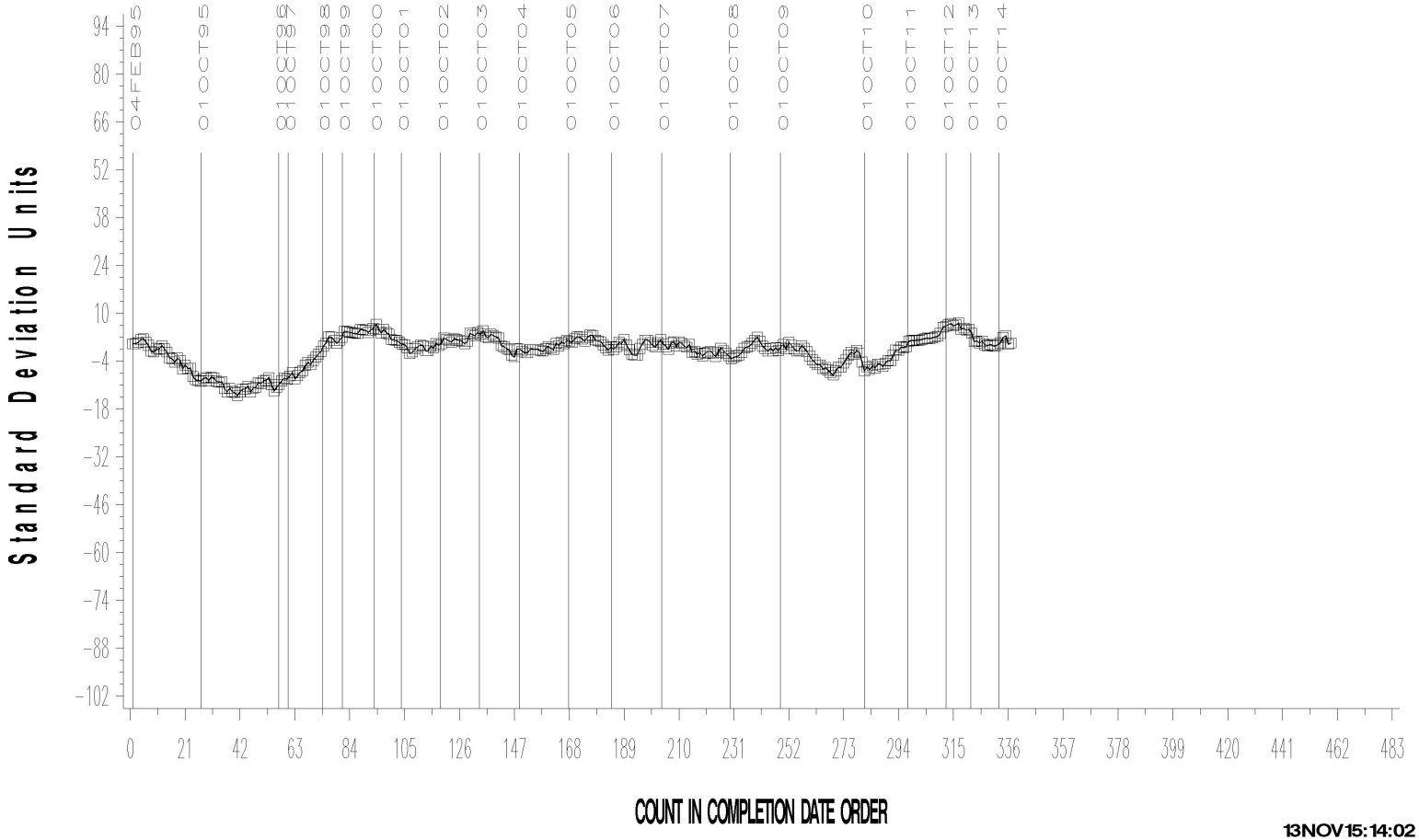

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIDGING
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
04FEB95
01OCT95
11OCT96
01OCT97
01OCT98
01OCT99
01OCT00
01OCT01
01OCT02
01OCT03
01OCT04
01OCT05
01OCT06
01OCT07
01OCT08
01OCT09
01OCT10
01OCT11
01OCT12
01OCT13
01OCT14
EWMA Action Limit
EWMA Warning Limit
0
21
42
63
84
105
126
147
168
189
210
231
252
273
294
315
336
357
378
399
420
COUNT IN COMPLETION DATE ORDER
13NOV15:14:00

L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis

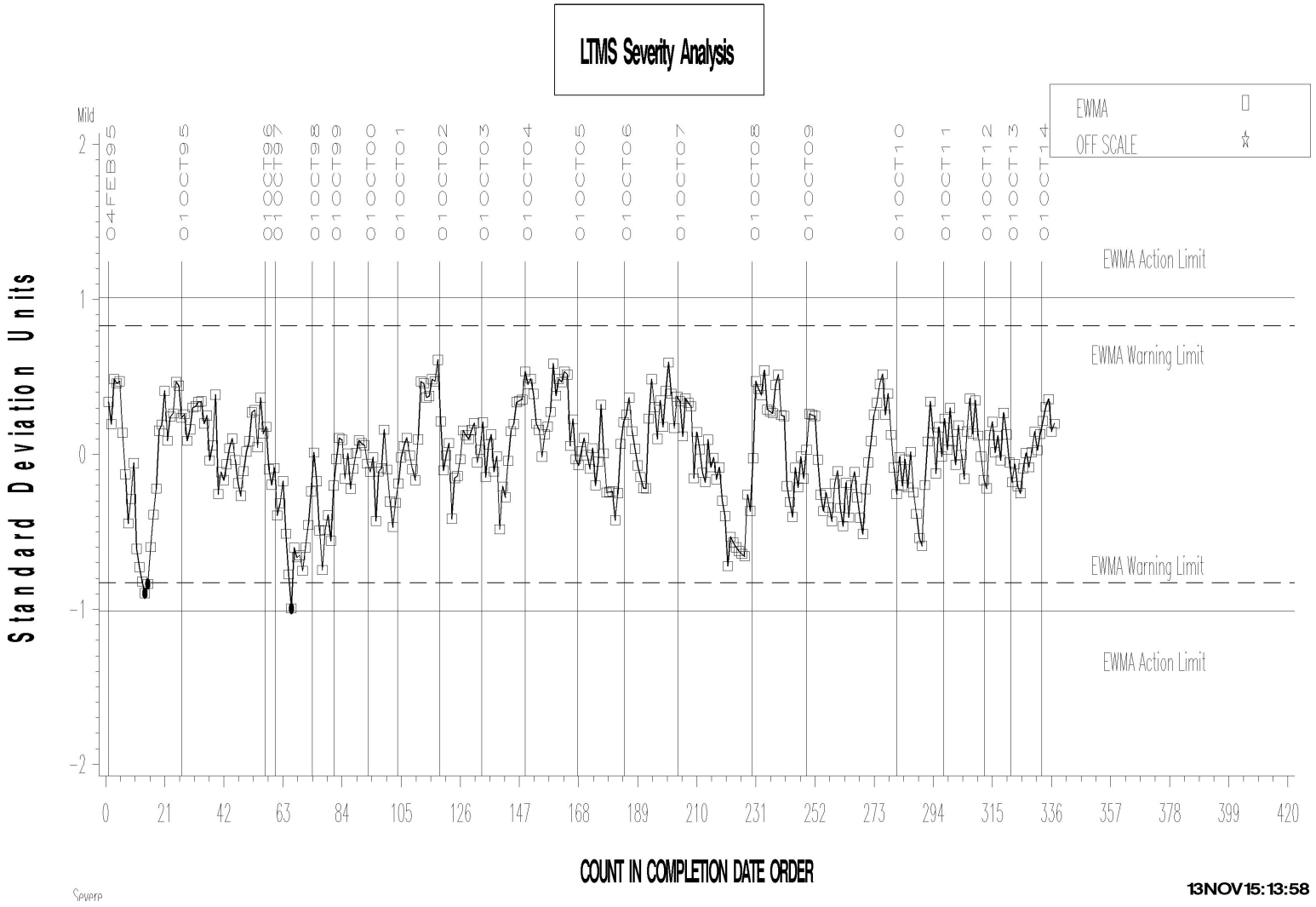


13NOV15:14:02

L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

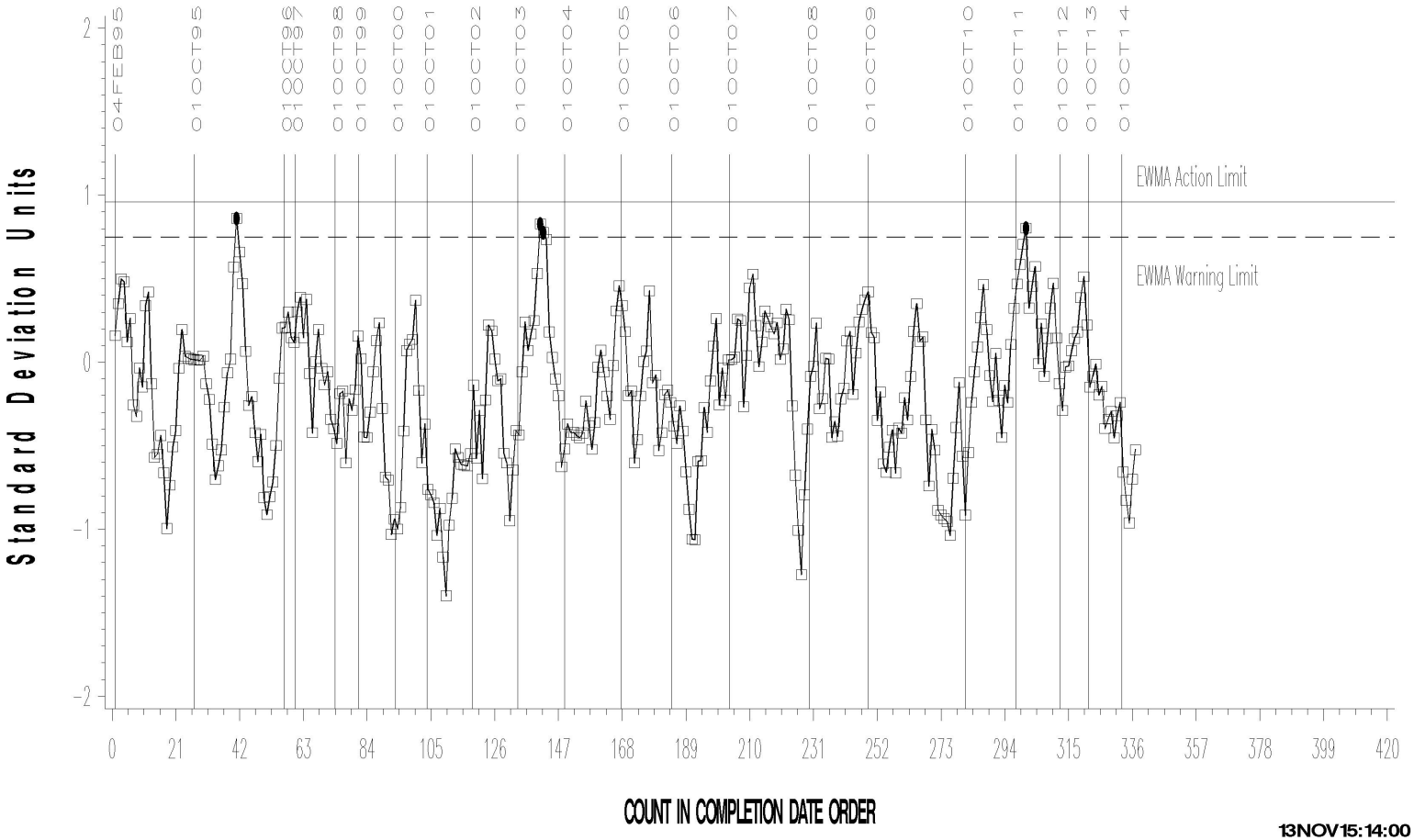


L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



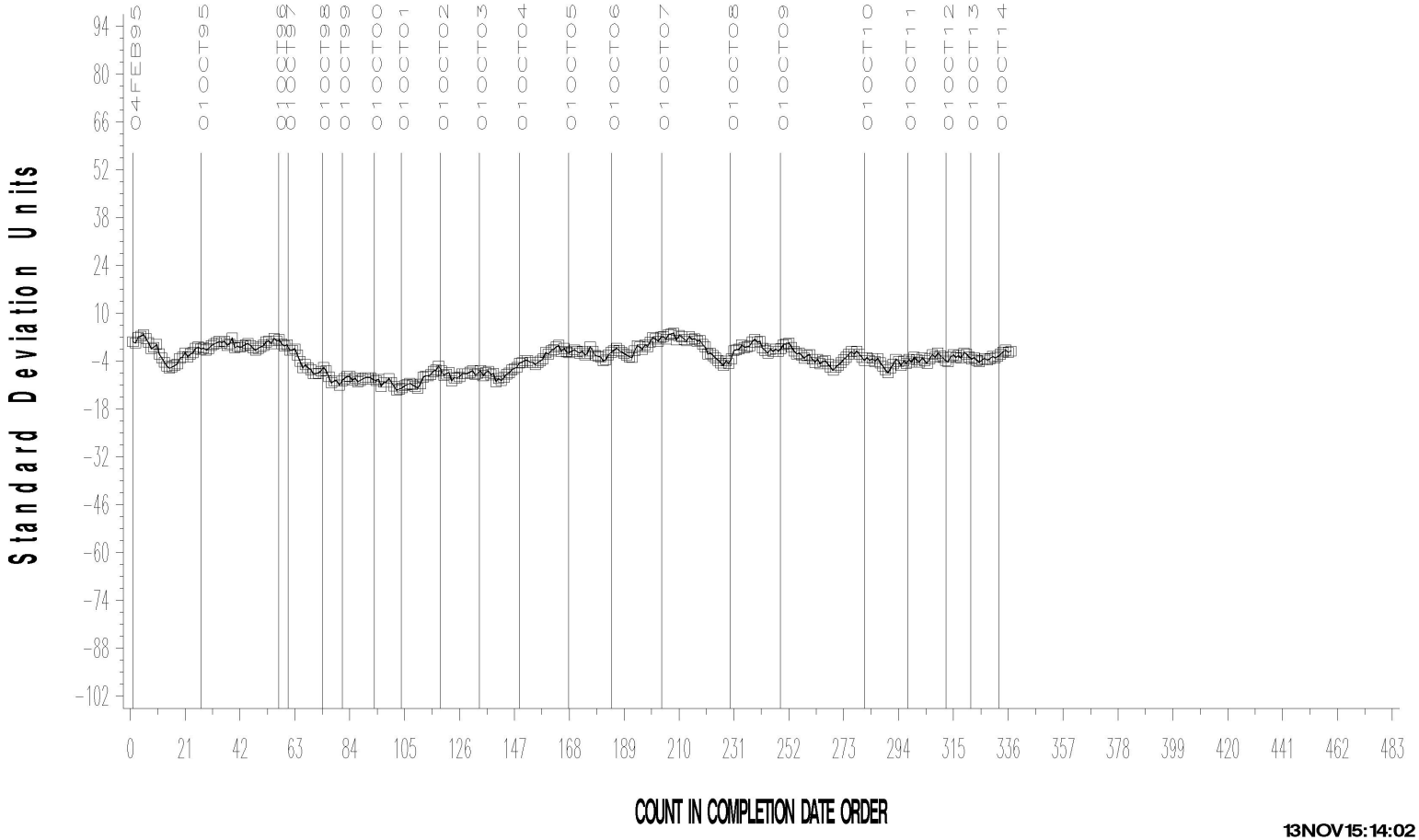
13NOV15:14:00

L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis

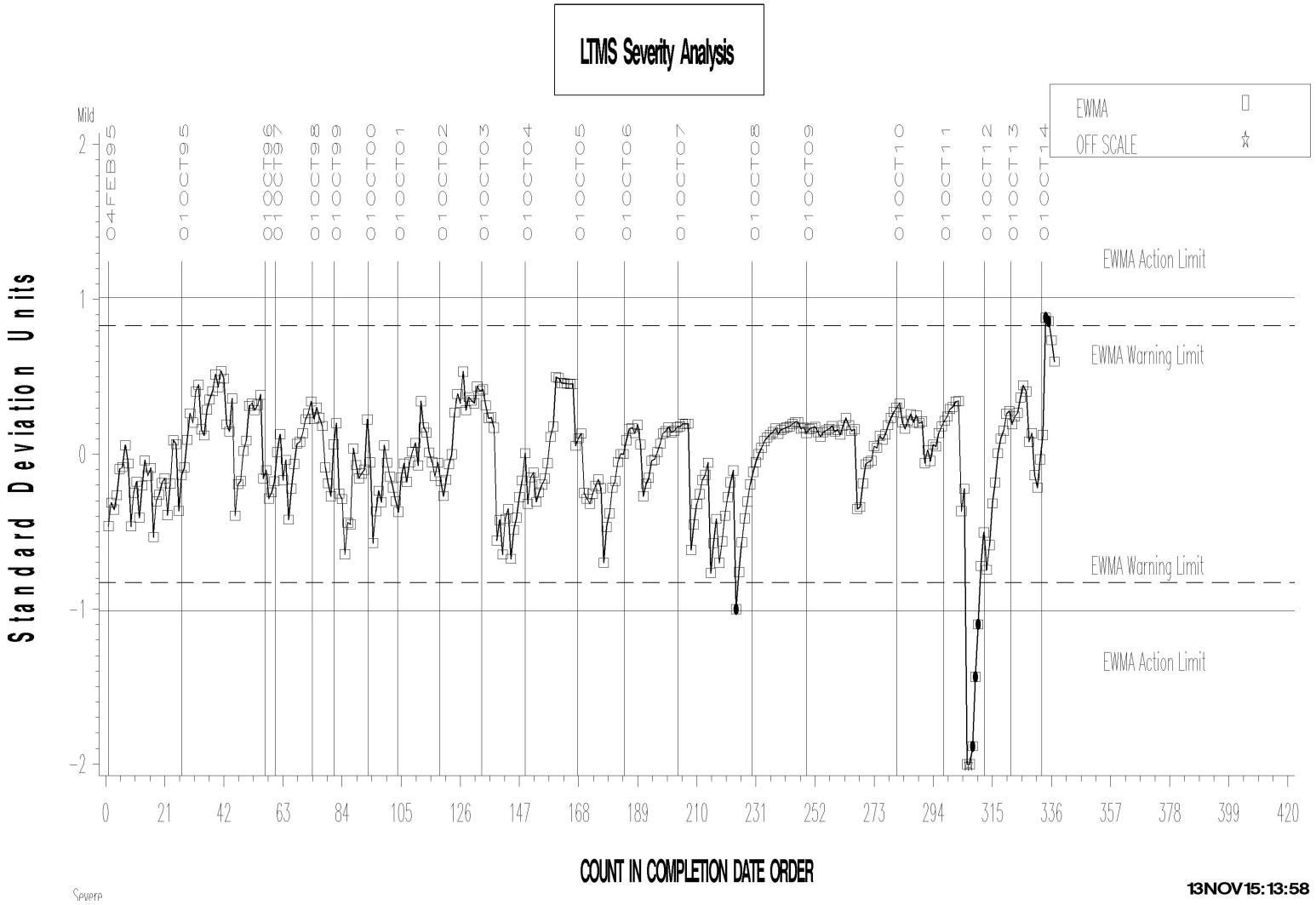


13NOV15:14:02

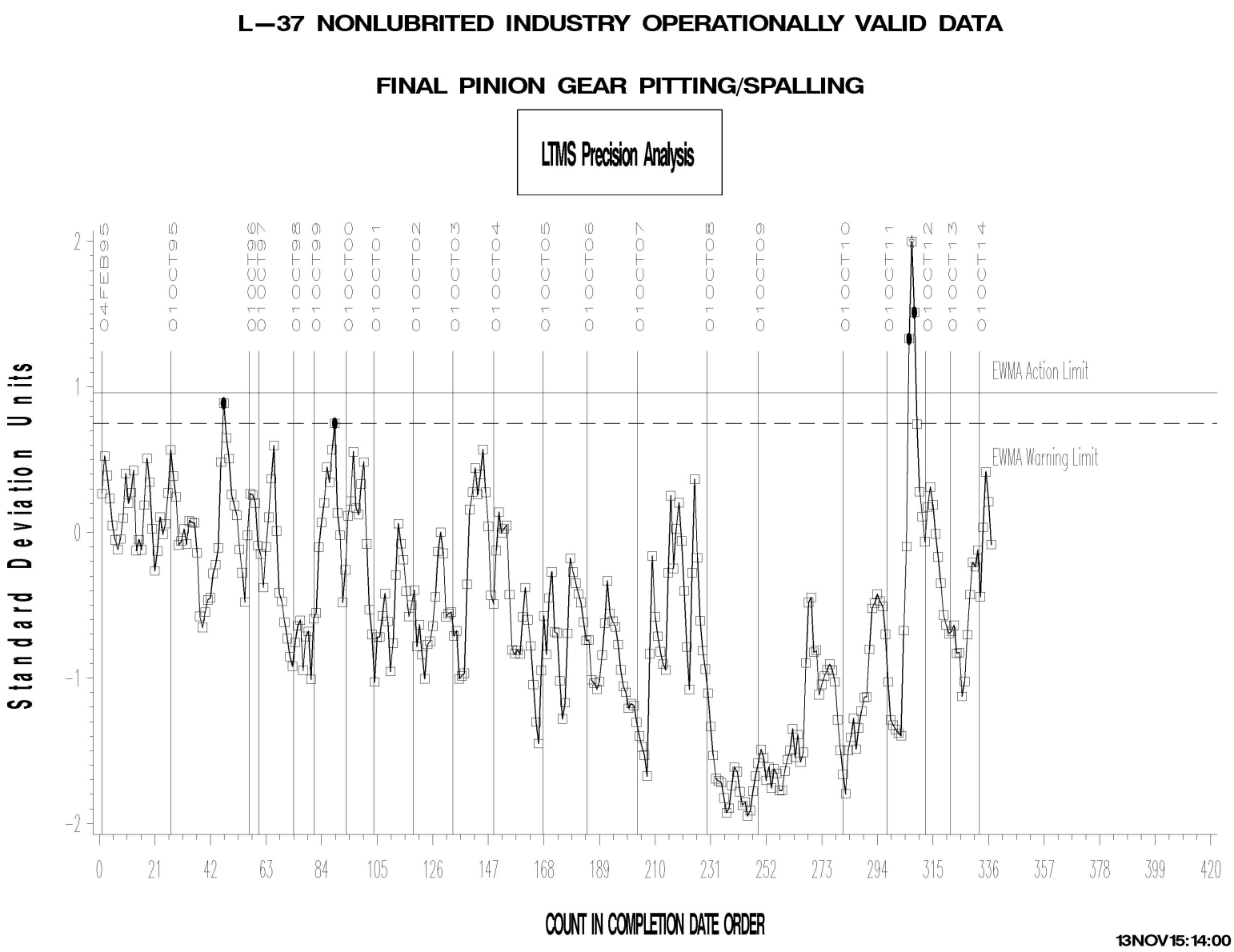
L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING



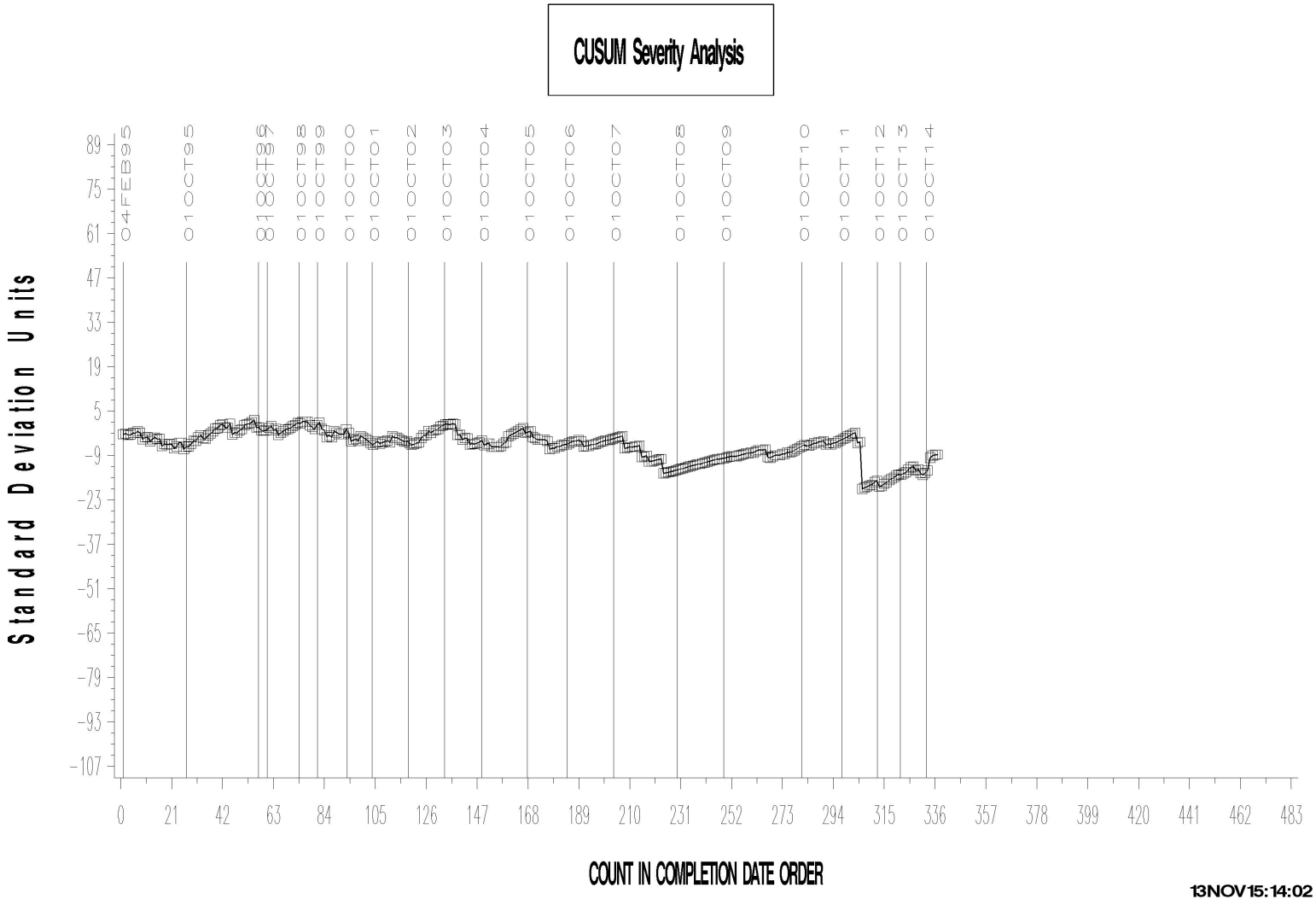
L-37 (D6121)


L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
04FEB95
01OCT95
01OCT96
01OCT97
01OCT98
01OCT99
01OCT00
01OCT01
01OCT02
01OCT03
01OCT04
01OCT05
01OCT06
01OCT07
01OCT08
01OCT09
01OCT10
01OCT11
01OCT12
01OCT13
01OCT14
EWMA Action Limit
EWMA Warning Limit
0
21
42
63
84
105
126
147
168
189
210
231
252
273
294
315
336
357
378
399
420
COUNT IN COMPLETION DATE ORDER
13NOV15:14:00

L-37 (D6121)

L—37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

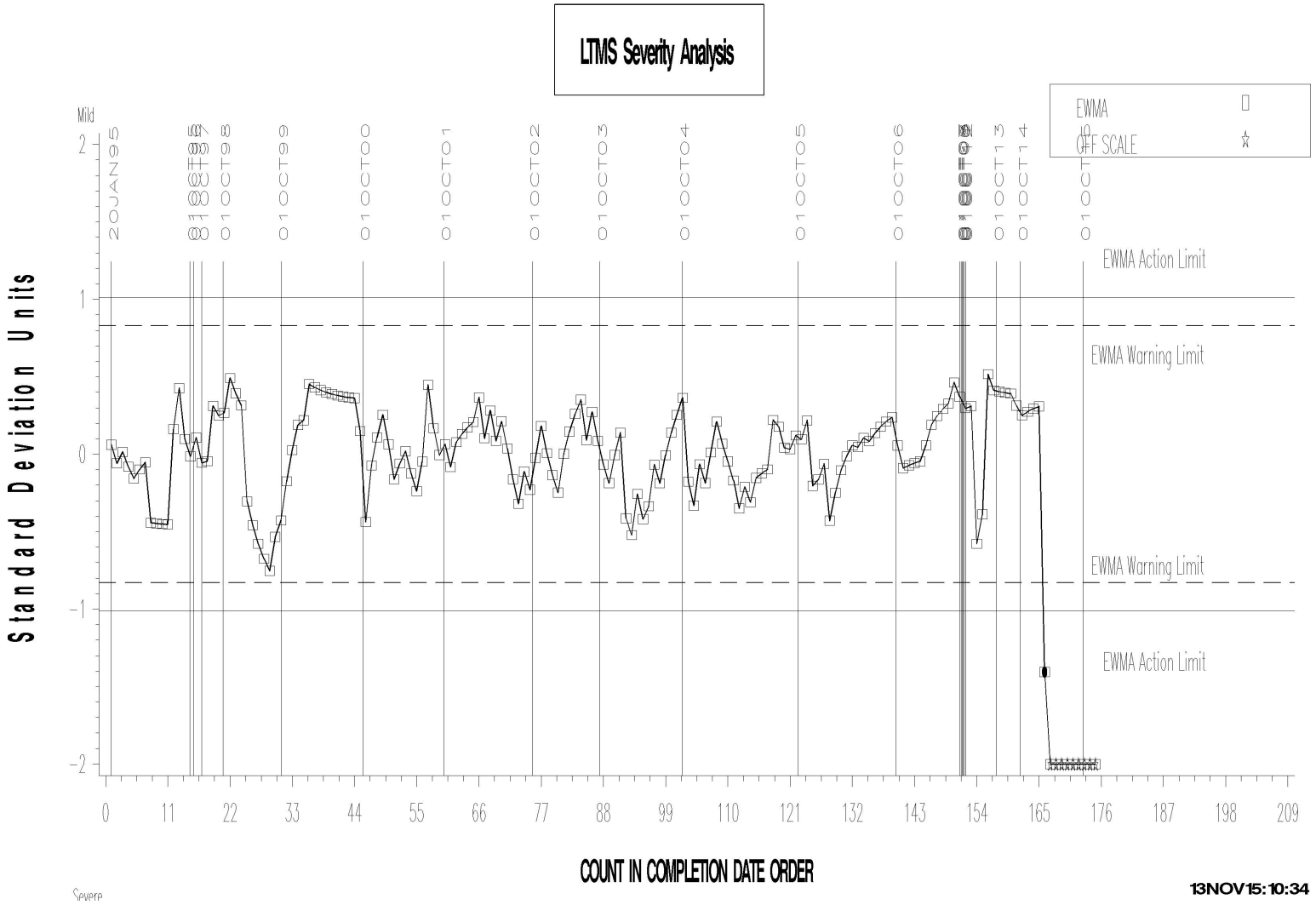
FINAL PINION GEAR PITTING/SPALLING



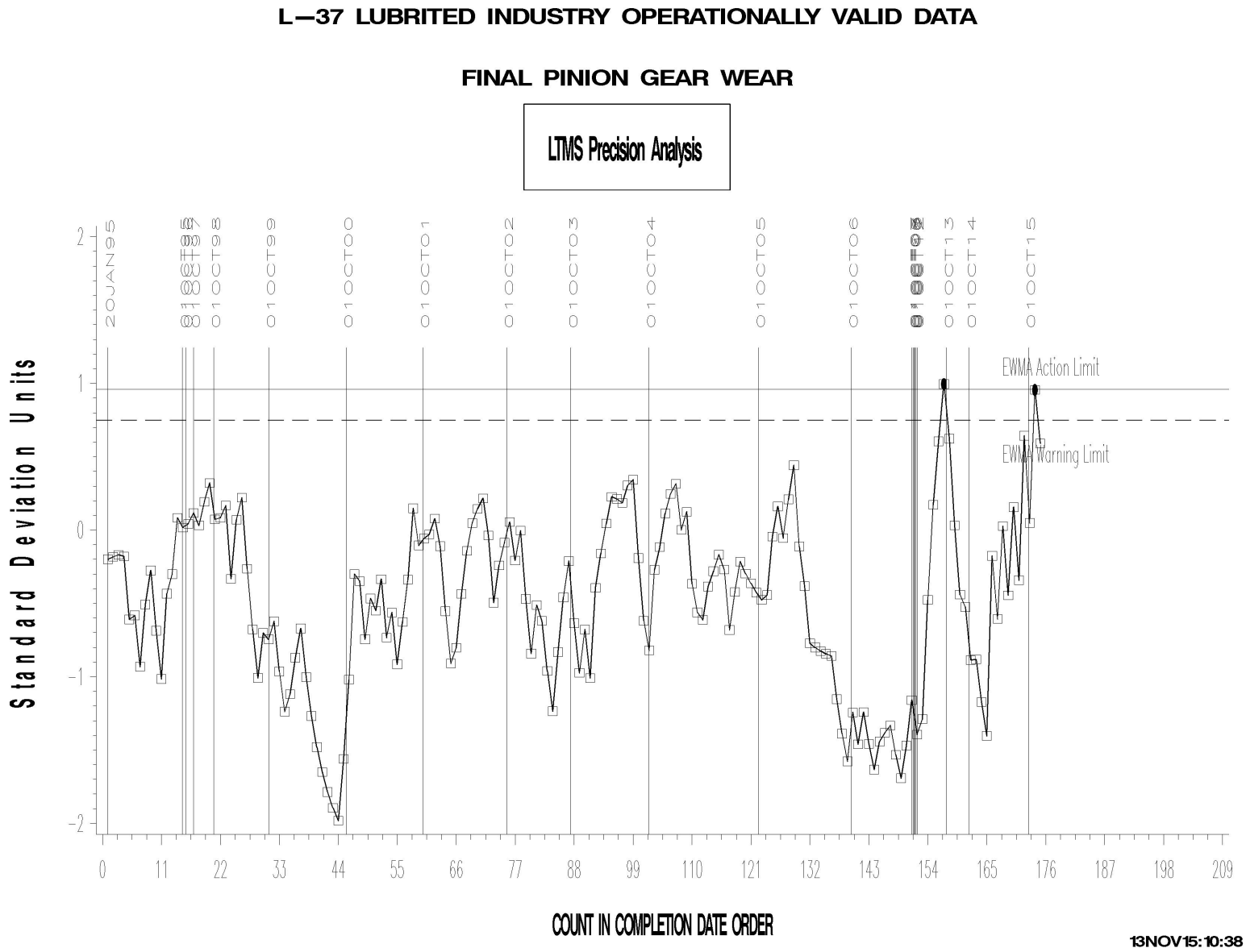
L-37 (D6121)

L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

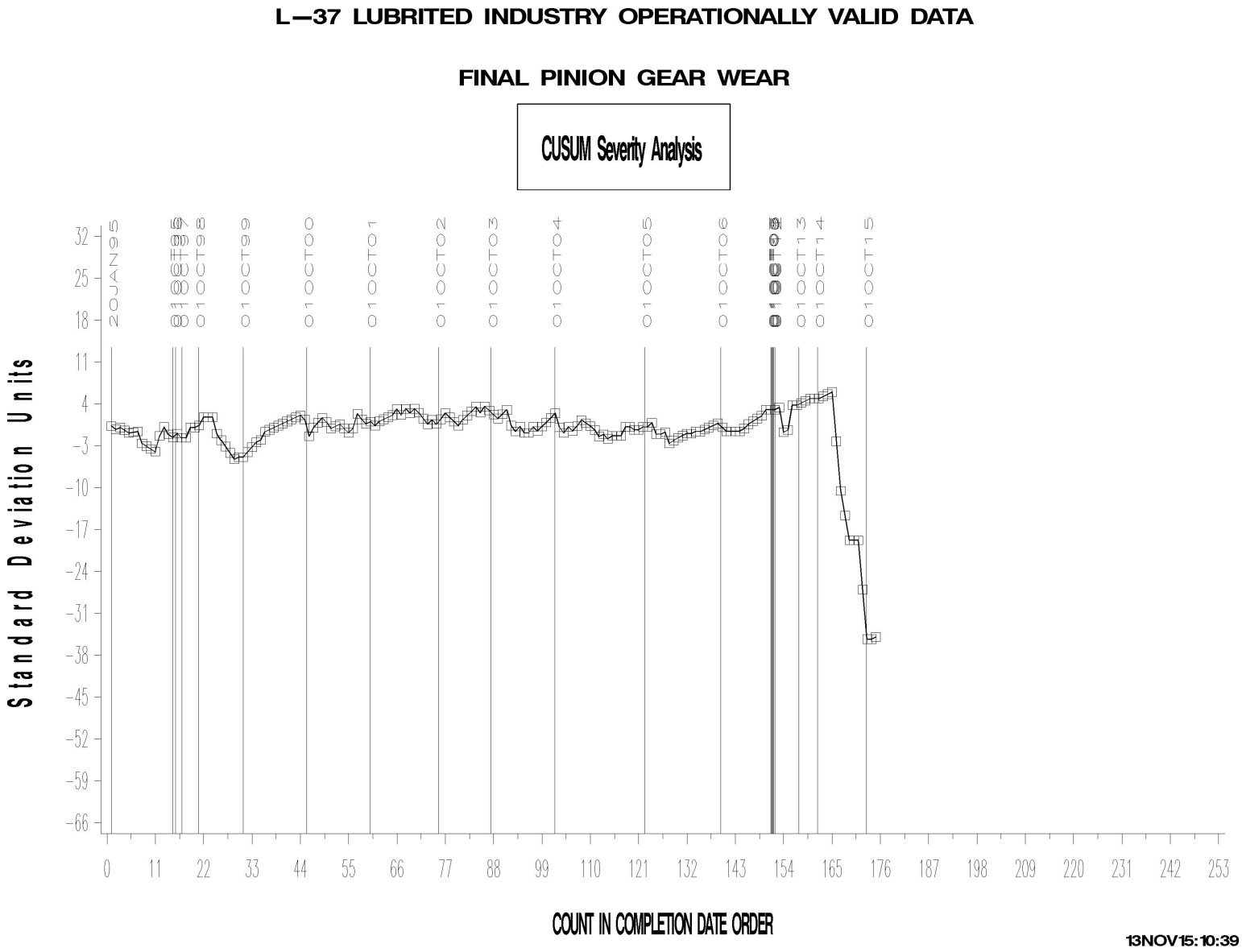
FINAL PINION GEAR WEAR



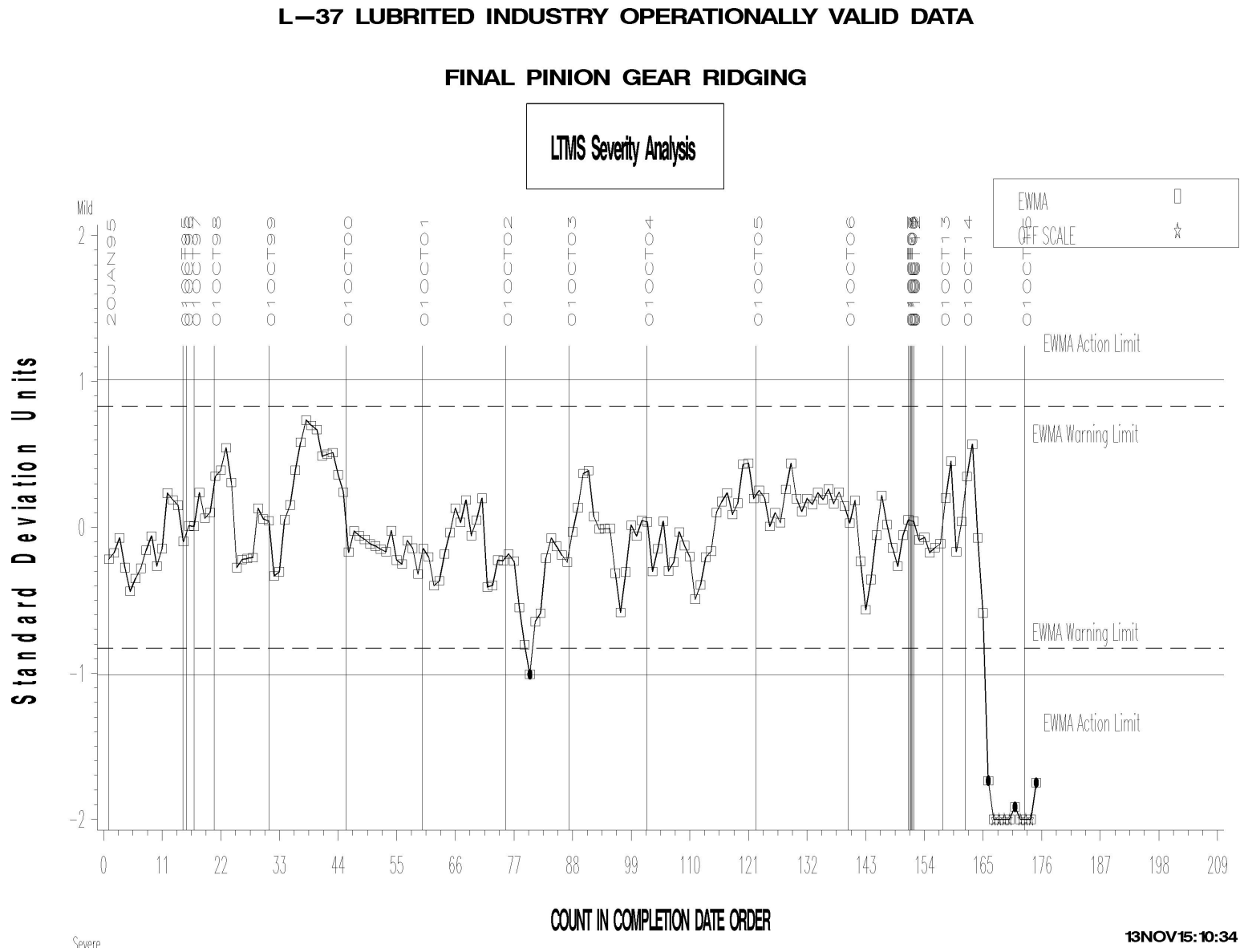
L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR WEAR
LTMS Precision Analysis
Standard Deviation Units
2
1
0
-1
-2
2OJAN95
01OCT98
01OCT99
01OCTOO
01OCTO1
01OCTO2
01OCTO3
01OCTO4
01OCTO5
01OCTO6
01OCT13
01OCT14
01OCT15
EWMA Action Limit
EWMA Warning Limit
0
11
22
33
44
55
66
77
88
99
110
121
132
143
154
165
176
187
198
209
COUNT IN COMPLETION DATE ORDER
13NOV15:10:38

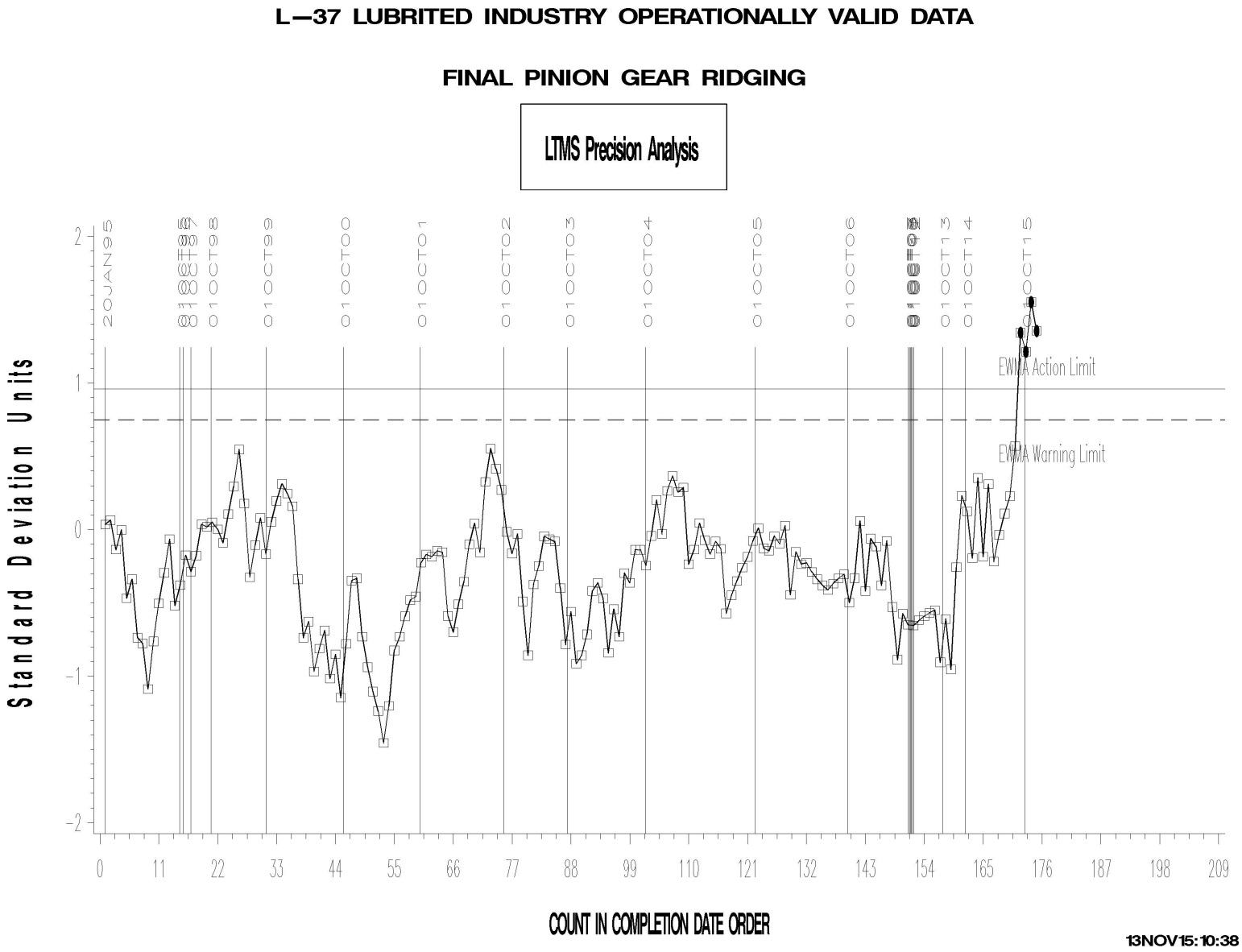
L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR WEAR
CUSUM Severity Analysis
Standard Deviation Units
32
25
18
11
4
-3
-10
-17
-24
-31
-38
-45
-52
-59
-66
20JAN95
01OCT99
01OCT00
01OCT01
01OCT02
01OCT03
01OCT04
01OCT05
01OCT06
01OCT13
01OCT14
01OCT15
0
11
22
33
44
55
66
77
88
99
110
121
132
143
154
165
176
187
198
209
220
231
242
253
COUNT IN COMPLETION DATE ORDER
13NOV15:10:39

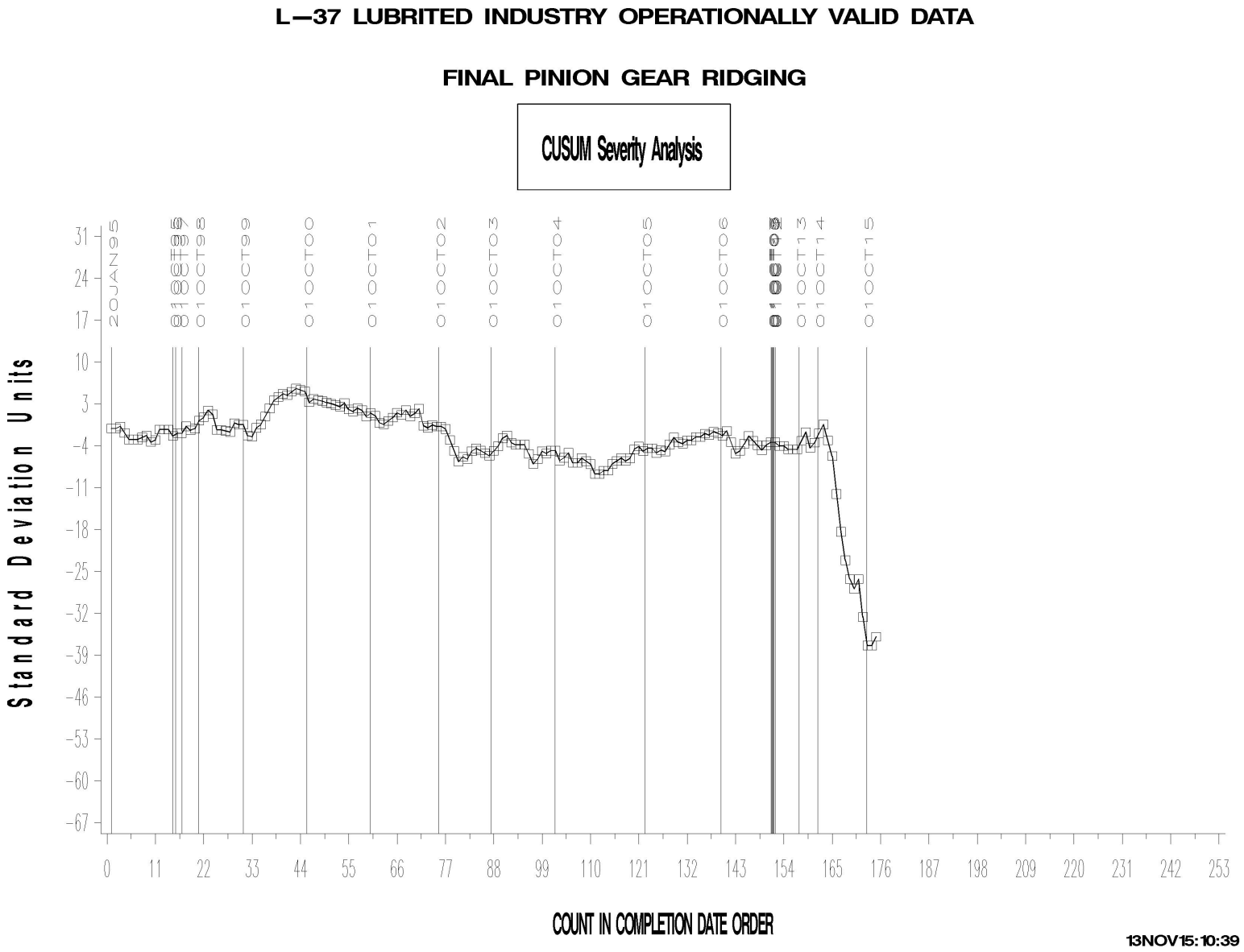
L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIDGING
LTMS Severity Analysis
Mild
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
13NOV15:10:34

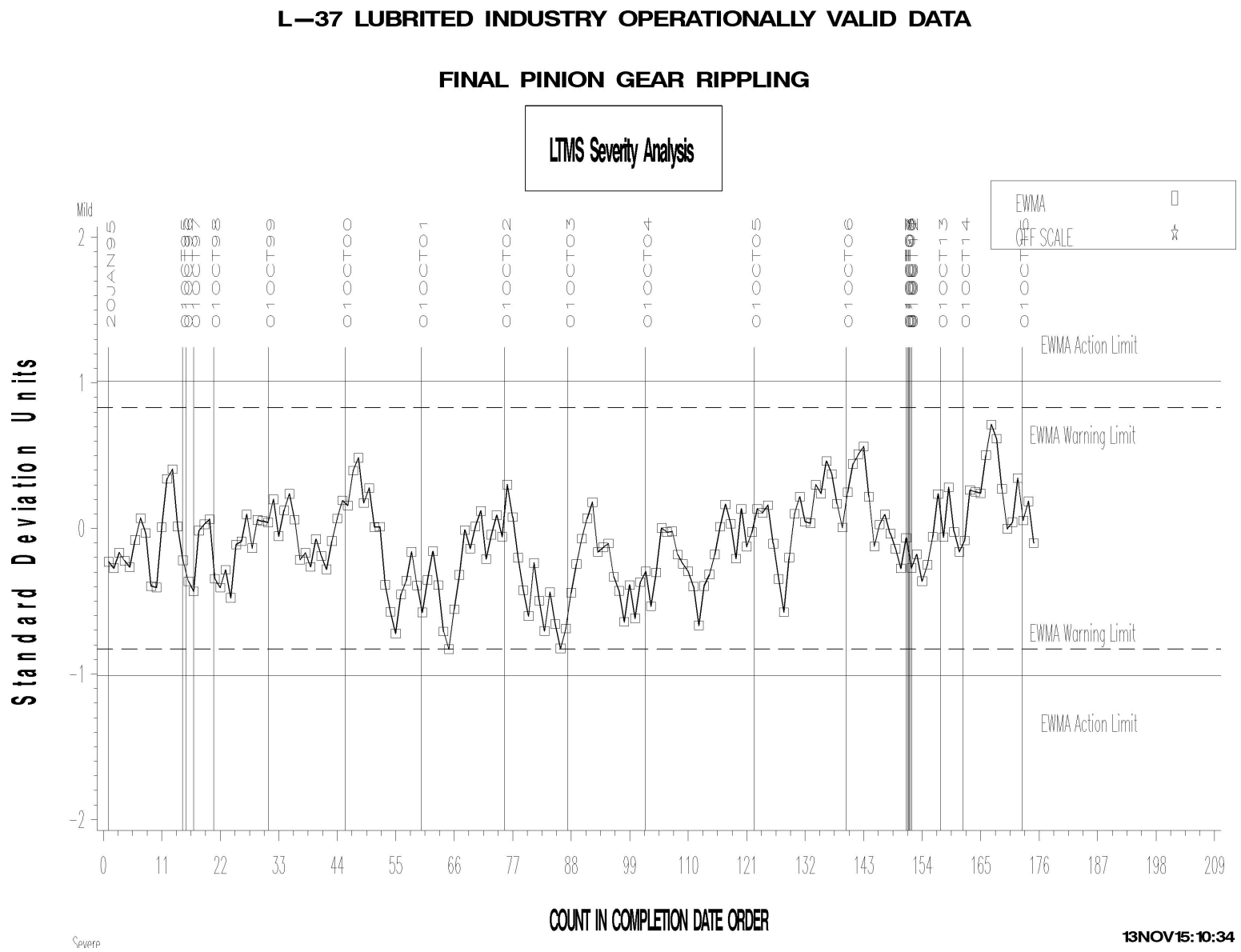
L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIDGING
LTMS Precision Analysis
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
13NOV15:10:38

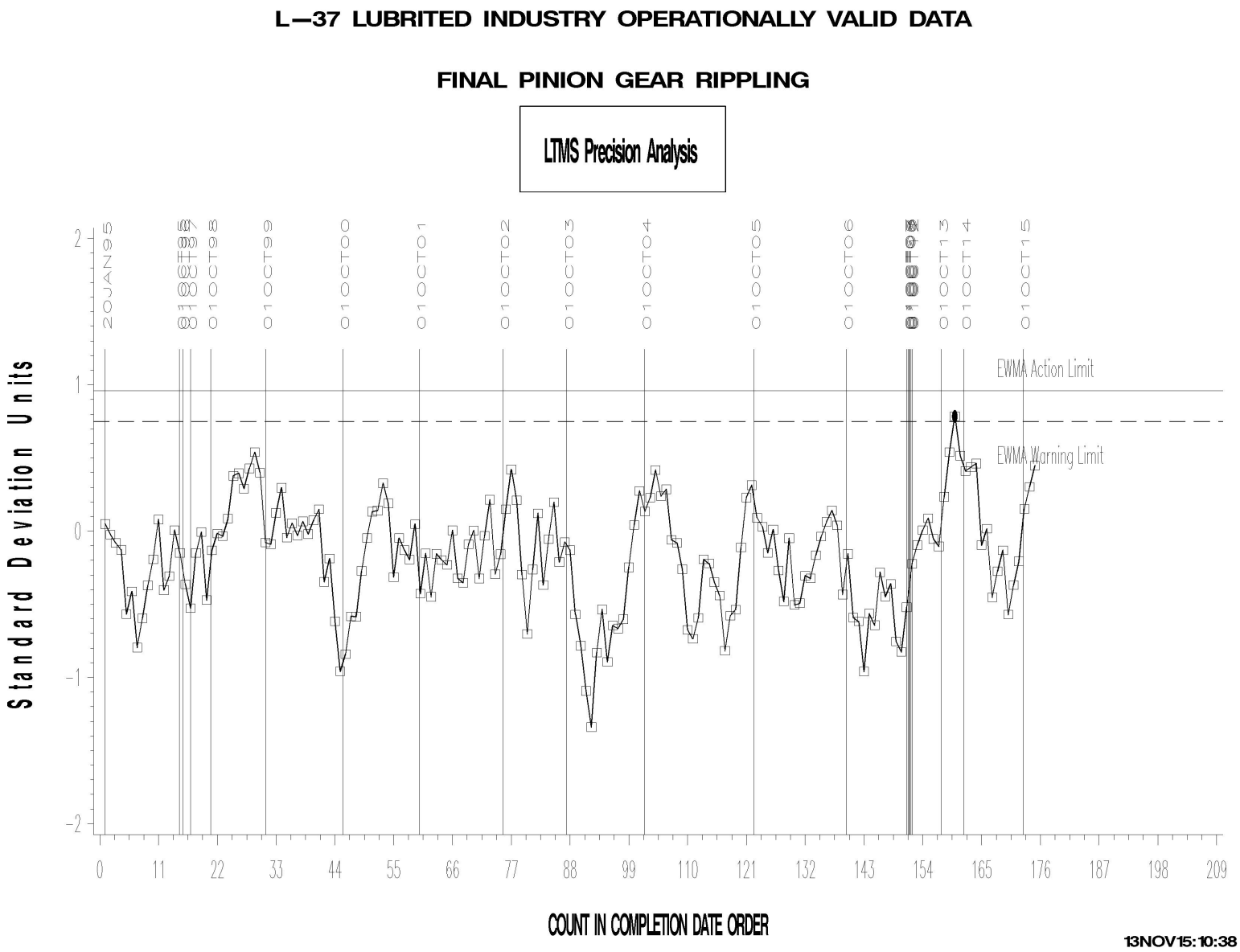
L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIDGING
CUSUM Severity Analysis
Standard Deviation Units
31
24
17
10
3
-4
-11
-18
-25
-32
-39
-46
-53
-60
-67
20JAN95
01OCT99
01OCT00
01OCT01
01OCT02
01OCT03
01OCT04
01OCT05
01OCT06
01OCT13
01OCT14
01OCT15
0
11
22
33
44
55
66
77
88
99
110
121
132
143
154
165
176
187
198
209
220
231
242
253
COUNT IN COMPLETION DATE ORDER
13NOV15:10:39

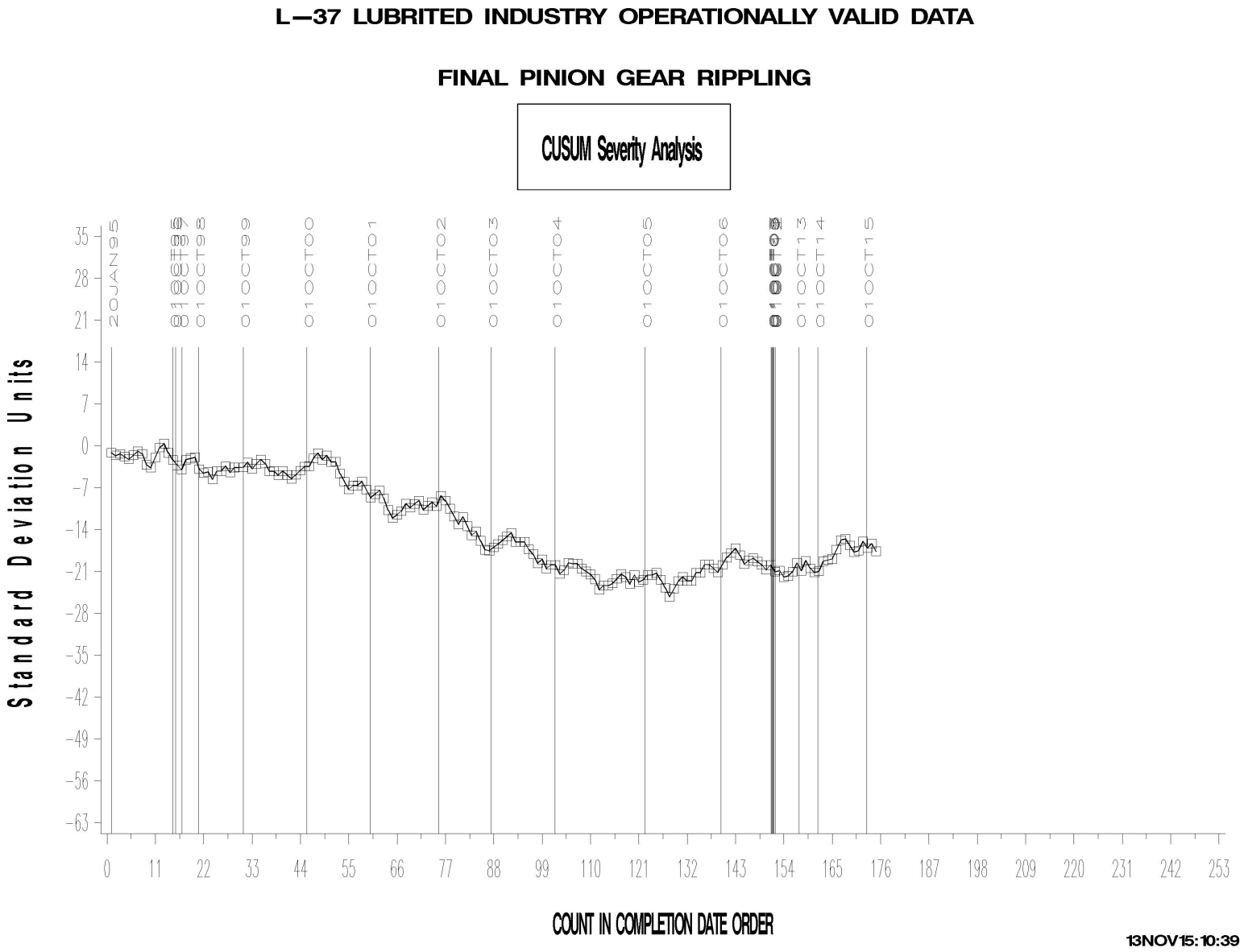
L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIPPLING
LTMS Severity Analysis
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
13NOV15:10:34

L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIPPLING
LTMS Precision Analysis
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
13NOV15:10:38

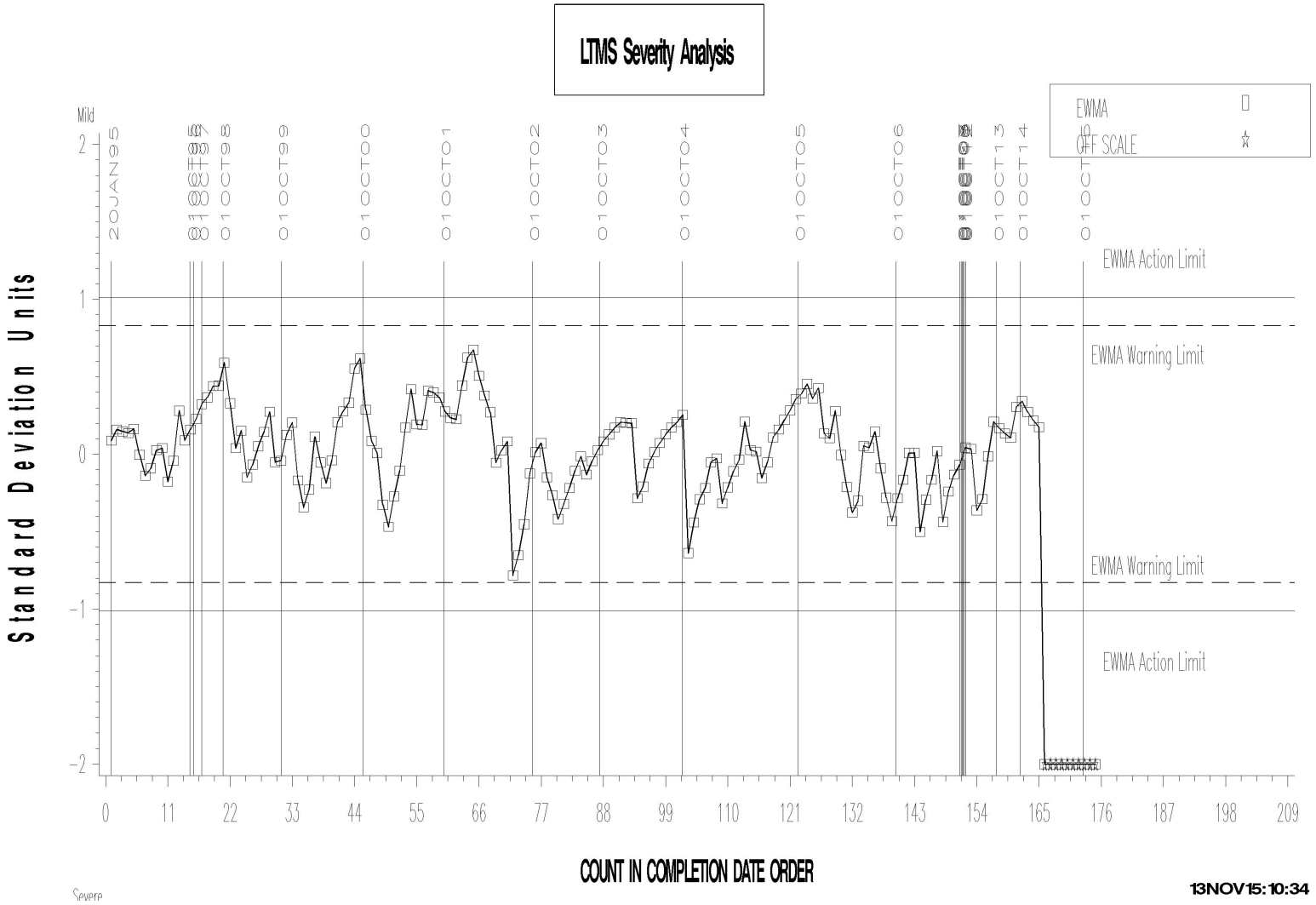
L-37 (D6121)


L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR RIPPLING
CUSUM Severity Analysis
Standard Deviation Units
35
28
21
14
7
0
-7
-14
-21
-28
-35
-42
-49
-56
-63
20JAN95
01OCT98
01OCT99
01OCT00
01OCT01
01OCT02
01OCT03
01OCT04
01OCT05
01OCT06
01OCT13
01OCT14
01OCT15
0
11
22
33
44
55
66
77
88
99
110
121
132
143
154
165
176
187
198
209
220
231
242
253
COUNT IN COMPLETION DATE ORDER
13NOV15:10:39

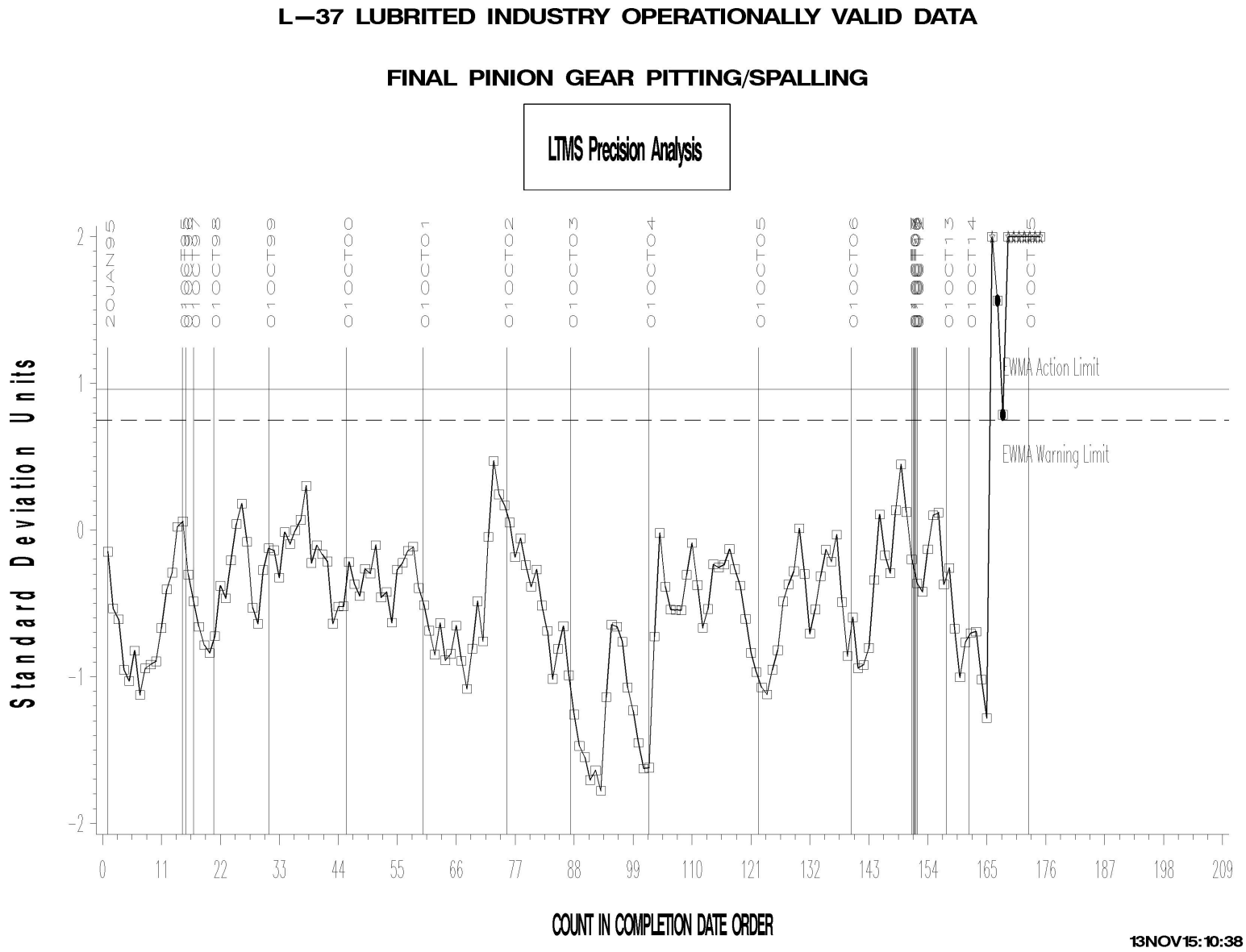
L-37 (D6121)

L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING



L-37 (D6121)

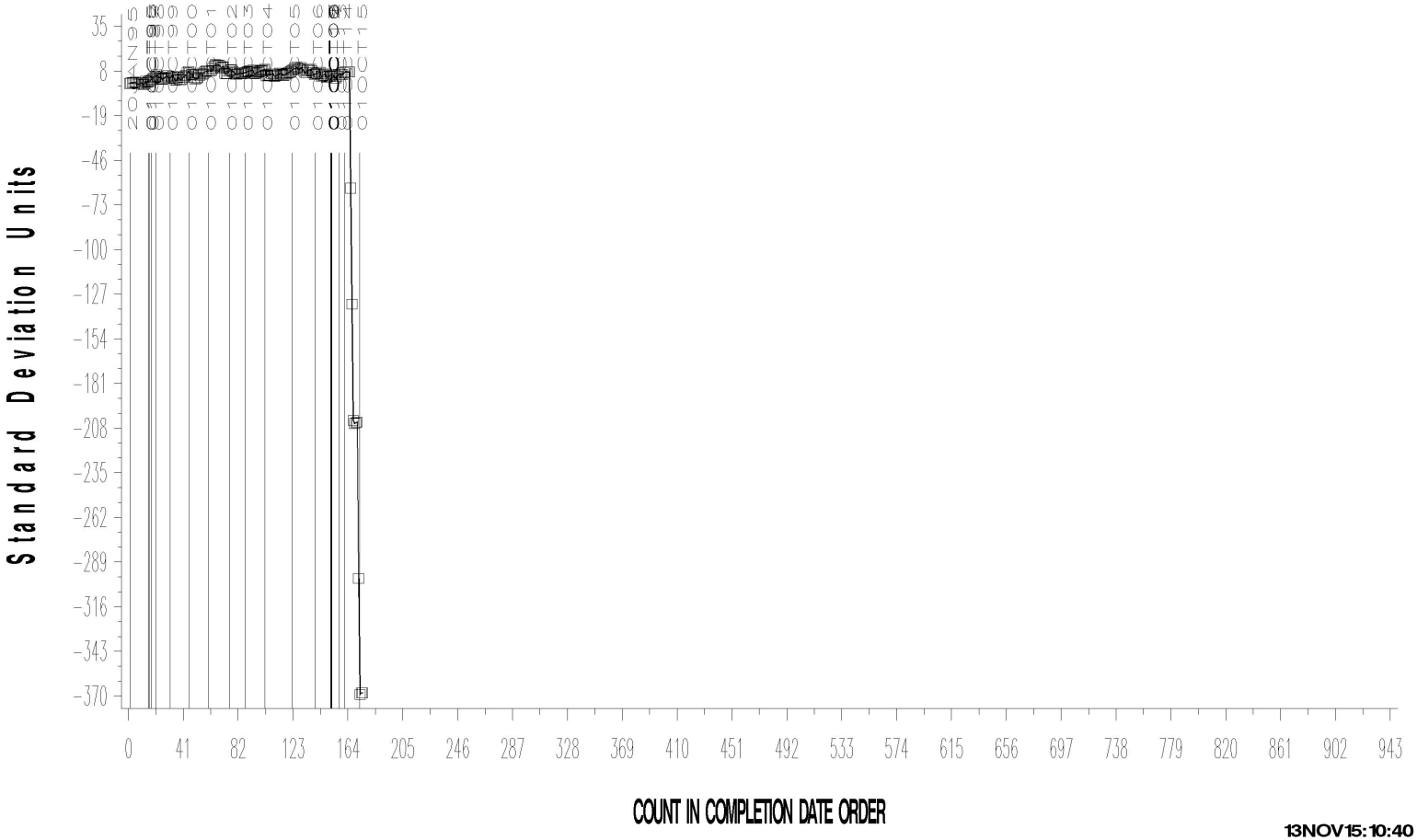

L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING
LTMS Precision Analysis
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
13NOV15:10:38

L-37 (D6121)

L—37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



13NOV15:10:40

L-37 (D6121)

TIMELINE ADDITIONS

Effective Date	Information Letter	Event
20150618	15-2	Clarification regarding when stand calibration expires.

L-37 (D6121)

LAB VISITS
No L-37 lab visits were conducted this report period.

L-37 (D6121)

INFORMATION LETTERS

Information Letter 15-2 was issued 20150618 to clarify when the stand calibration expires. Candidate tests are permitted to start up until the end of the final day of stand calibration.

L-37 (D6121)

LTMS DEVIATIONS
No LTMS deviations were written this report period.

L-37 (D6121)

STATUS OF REFERENCE OIL SUPPLY

		@ TMC	
Oil	Cans @ Labs	Cans	Gallons
117	0	453	453.0
134	14	9	9.8
152-1	0	0	0.0
152-2	14	185	185.9
152-3	0	54	54.8
155	9	15	15.0
155-1	13	242	242.8
Total	50	958	961.2

The TMC quantity remaining presumes usage only for L-37 testing. Oil 155/155-1 is also used in other test areas (L-33-1 and HTCT). The 155-1 total also reflects that the L-60-1 surveillance panel has requested that TMC reserve a quantity of that oil (currently 40.4 gal) for use in that test.