




Test Monitoring Center

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

MEMORANDUM: 16-005
DATE: April 14, 2016
TO: Matt Umerley, Chairman, L-37 Surveillance Panel
FROM: Scott Parke 
SUBJECT: L-37 Testing from October 1, 2015 through March 31, 2016

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

SDP/sdp/mem16-005.sdp.doc

cc: Frank Farber
Jeff Clark

L-37 Surveillance Panel

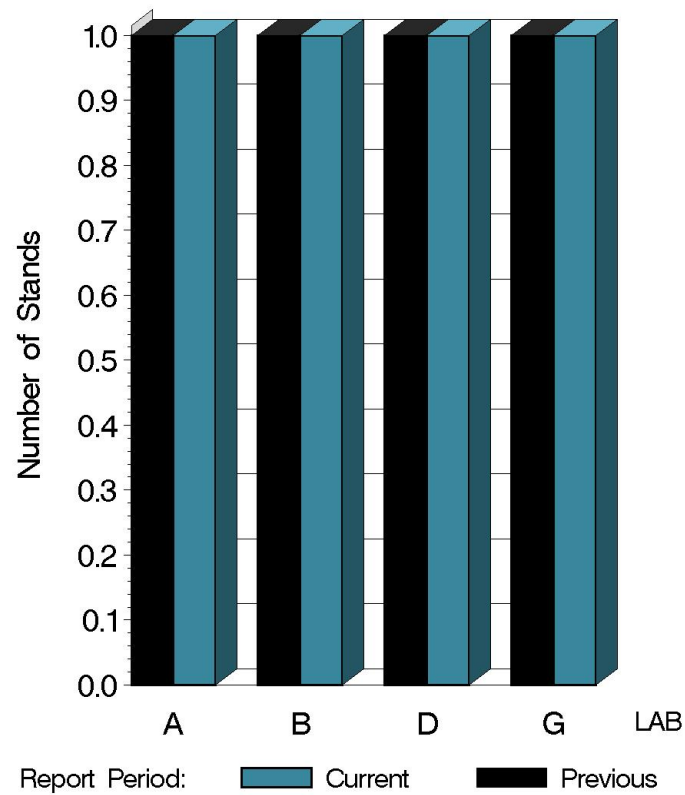
<ftp://ftp.astmtmc.cmu.edu/docs/gear/l37/semiannualreports/l37-04-2016.pdf>

Distribution: email

L-37 (D6121)

	Reporting Data	Calibrated on 3-31-16
Number of Labs	4	3
Number of Stands	4	3

BY-LAB STAND
DISTRIBUTION



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L-37 (D6121)

Test Distribution by Oil and Validity

							Totals	
		134	152-1	152-2	155	155-1	Last Period	This Period
Accepted for calibration	AC	5	0	1	1	1	4	8
Rejected (Mild)	OC	0	0	0	0	0	0	0
Rejected (Severe)	OC	0	0	0	0	0	3	0
Rejected (Precision)	OC	0	0	1	0	0	1	1
Invalidated calibration	RC	0	0	0	0	0	0	0
Acceptable info run	NI	6	0	4	0	1	3	11
Unacceptable info run	MI	9	0	2	0	0	2	11
Aborted info run	XI	0	0	0	0	0	0	0
Total		20	0	8	1	2	13	31

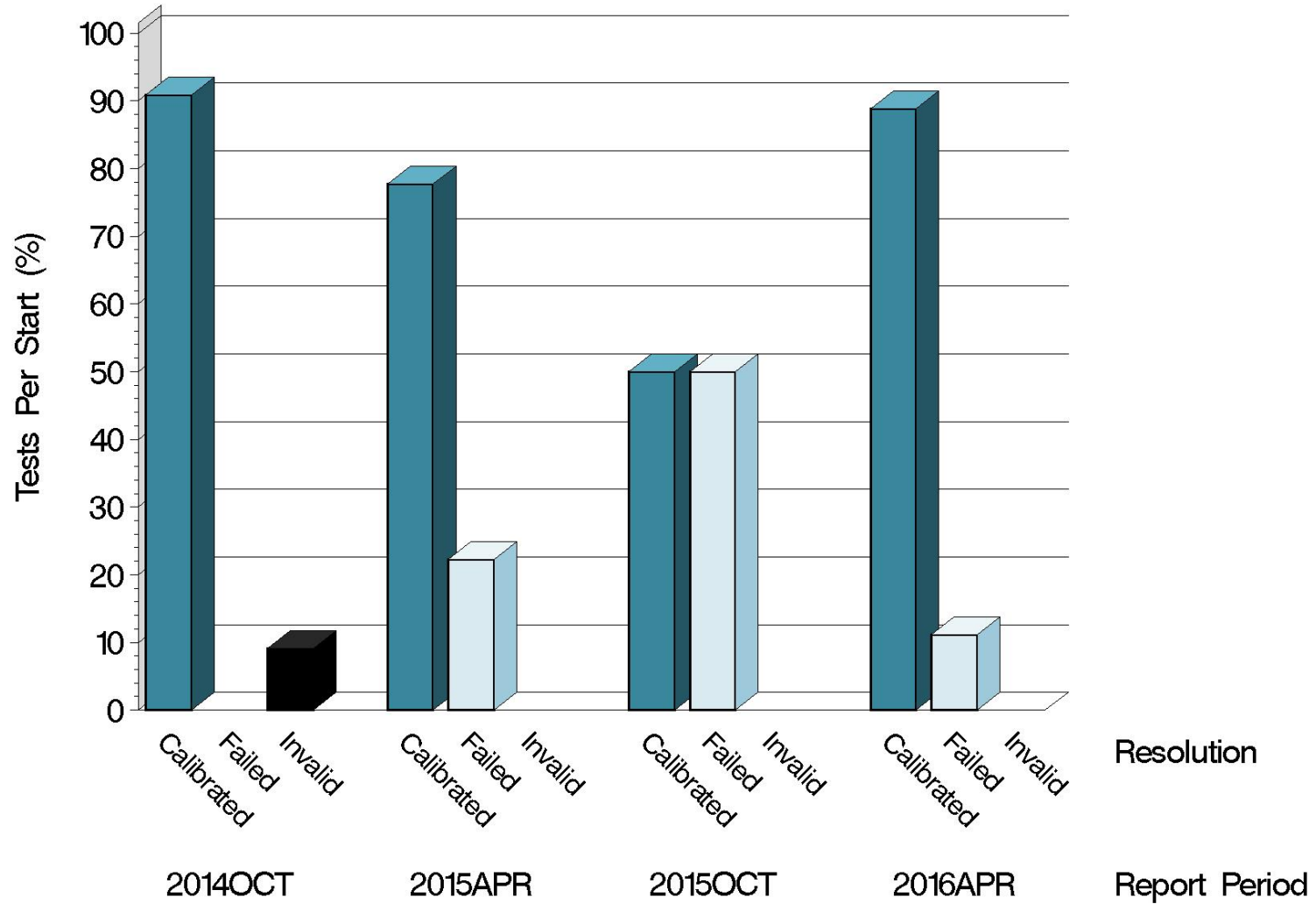
L-37 (D6121)

Calibration Attempt Detail

	Gear Batch	Acceptable	Failed	Total
LUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	4	1	5
	Total	4	1	5
NONLUBRITED	V1L500/P4T813	0	0	0
	V1L528/P4T883A	4	0	4
	Total	4	0	4

L-37 (D6121)

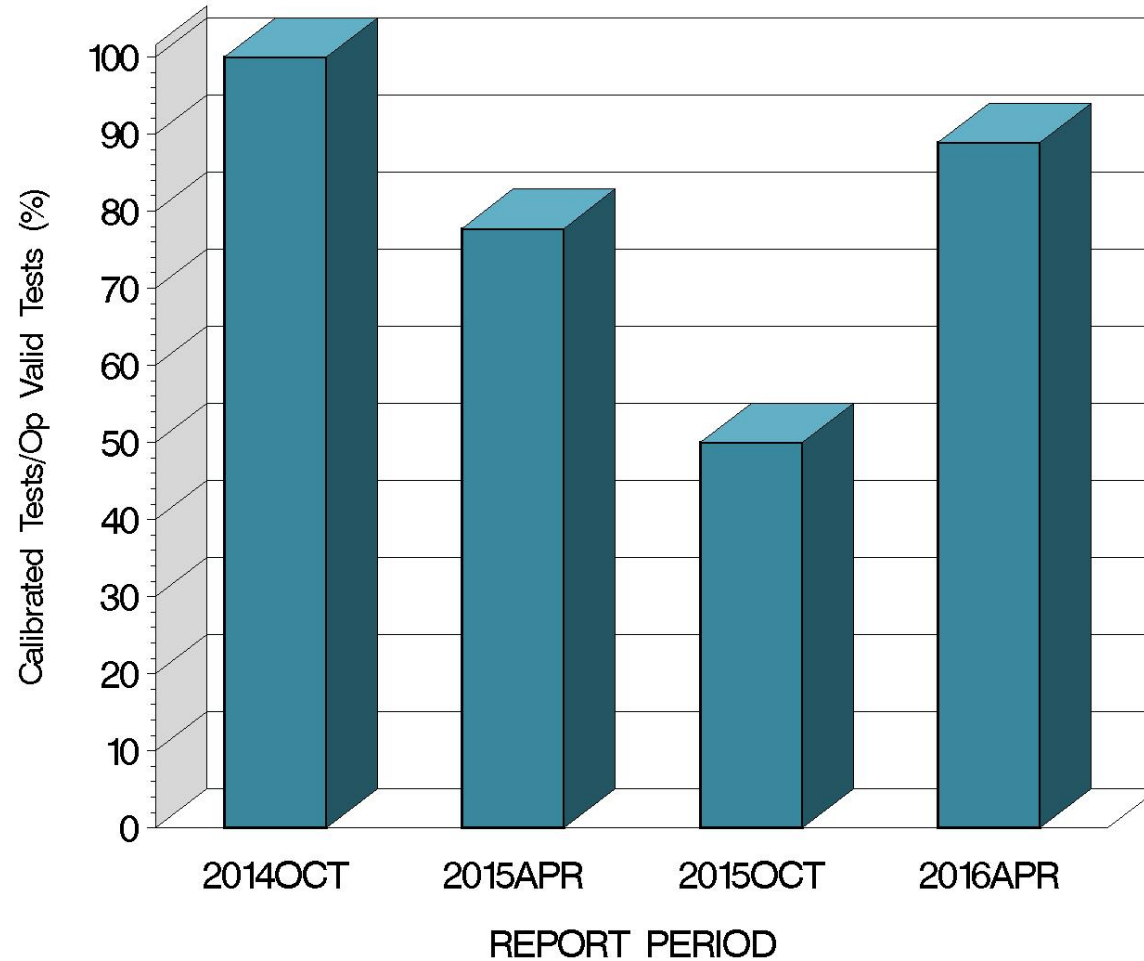
CALIBRATION ATTEMPT SUMMARY



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L-37 (D6121)

OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA

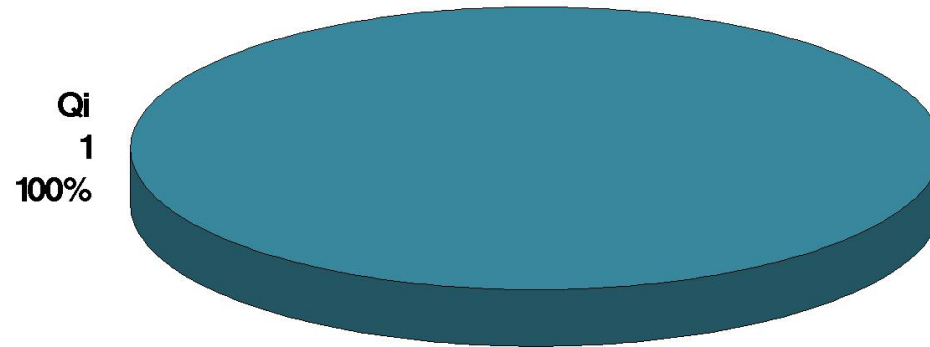


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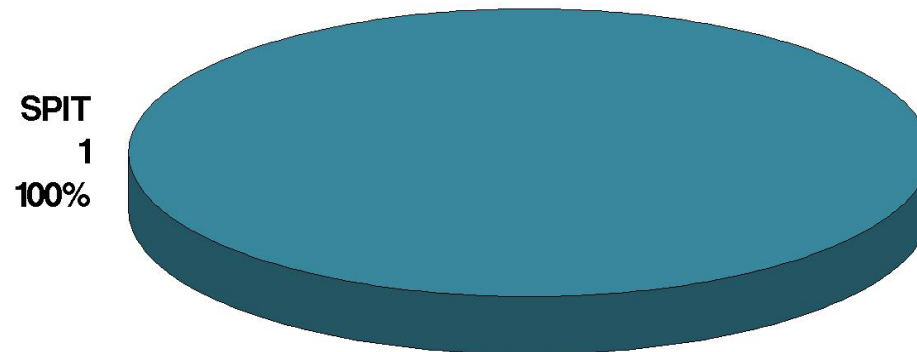
L-37 (D6121)

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	31	0%
	Lost	0	0	0	0	0	0	0	0			
	Starts	20	0	8	1	2	31	31	31			
	%	0%	0%	0%	0%	0%	0%	0%	0%			

Twenty two tests were run with the intent to be used for lab-built approval. Eleven of them did not meet the acceptance criteria for that purpose and were assigned an “MI” validity code. The eleven others were acceptable for use but were run along with one or more of the unacceptable tests. These tests were assigned an “NI” validity code. None of these 22 tests are 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	5	-0.021	2.728	-0.021	-0.030
RIPP	V1L528/P4T883A	5	-0.146	0.962	-0.146	-0.070
SPIT	V1L528/P4T883A	5	-13.753	31.582	-13.753	-7.963
WEAR	V1L528/P4T883A	5	-1.505	3.783	-1.505	-0.781

^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.

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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	4	-0.594	0.808	-0.594	-0.396
RIPP	V1L528/P4T883A	4	0.045	1.416	0.045	0.025
SPIT	V1L528/P4T883A	4	0.685	2.468	0.685	0.580
WEAR	V1L528/P4T883A	4	-0.724	1.355	-0.724	-0.516

^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 AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	A	1	0.000	0.707	0.996	0.000
	B	1	-4.747	-1.102	-70.244	-8.264
	D	1	1.732	0.707	0.483	0.000
	G	2	1.455	-0.522	0.000	0.370

NON-LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
V1L528/P4T883A	A	3	-0.314	0.582	1.543	-0.368
	D	1	-1.435	-1.566	-1.888	-1.790

L-37 (D6121)

SUMMARY OF SEVERITY & PRECISION

Severity

Nonlubrited – SPIT continues to exhibit occasional spikes in performance either mild or severe (though usually mild). When used with oil 134, the current hardware often produces either spalling (an extremely low merit result) or only mild pitting (a high merit result). This phenomena does not affect all labs equally and is suspected to be build-related. Such results occasionally adversely impact the SPIT precision chart. The other test parameters are currently within control chart alarm limits.

Lubrited – A succession of 5 severe tests from lab B in April and October of 2015 resulted in WEAR, RIDG, and SPIT charts exceeding the severe EWMA action limit. Recent activity at the other labs has begun to return charts to their normal levels. Currently, SPIT and WEAR exceed the severity action limit.

L-37 (D6121)

SUMMARY OF SEVERITY & PRECISION (cont.)

Precision

Nonlubrited – As mentioned previously, SPIT precision has been exceeding limits due to alternately mild and severe results with the V1L528 hardware and oil 134. Wear precision has also suffered from alternately mild and severe results (unrelated to oil type).

Lubrited – With the exception of SPIT, precision has returned to acceptable levels. SPIT precision is still recovering from the 5 severe tests previously mentioned.

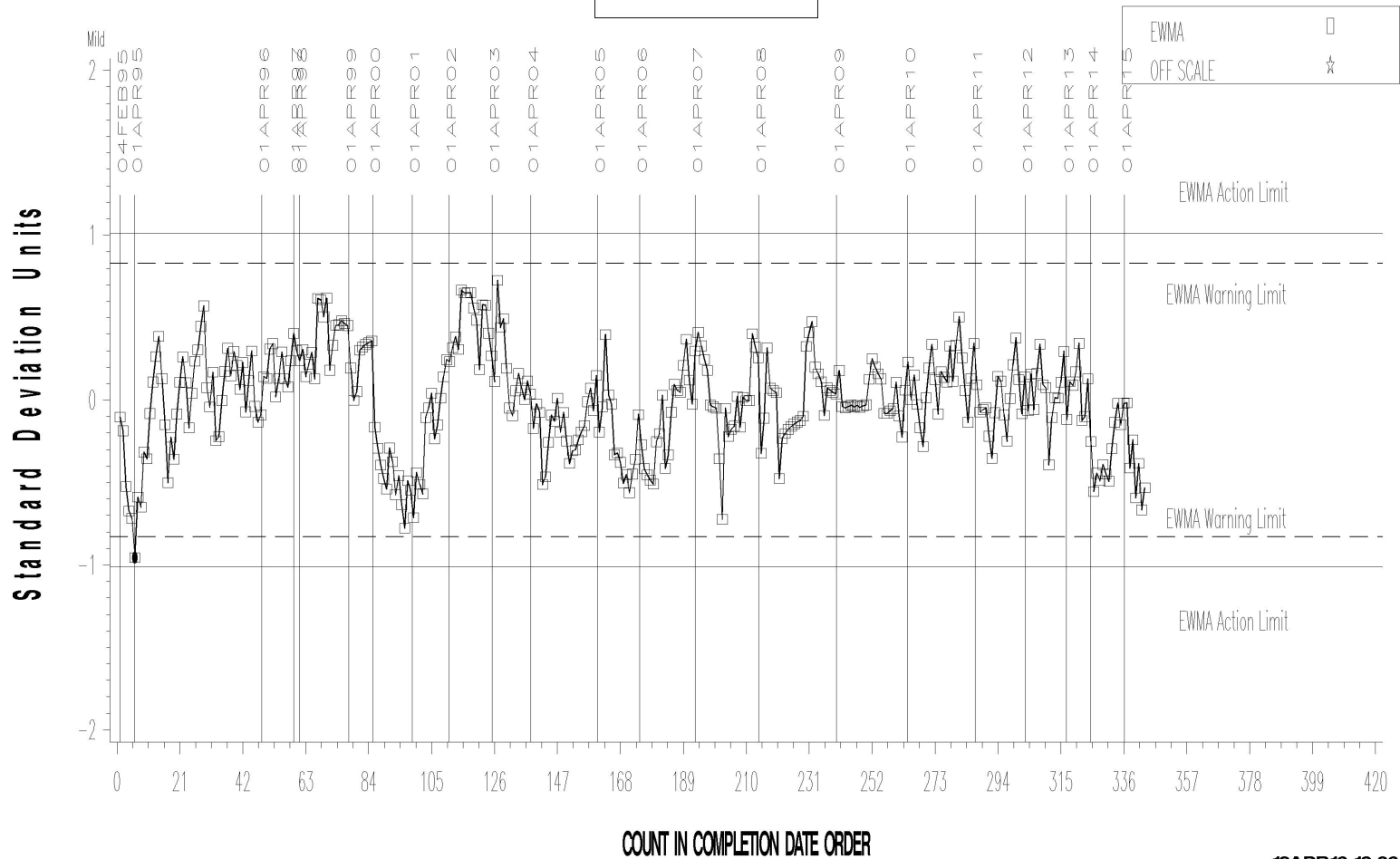
Industry control charts follow.

L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Severity Analysis



Severe

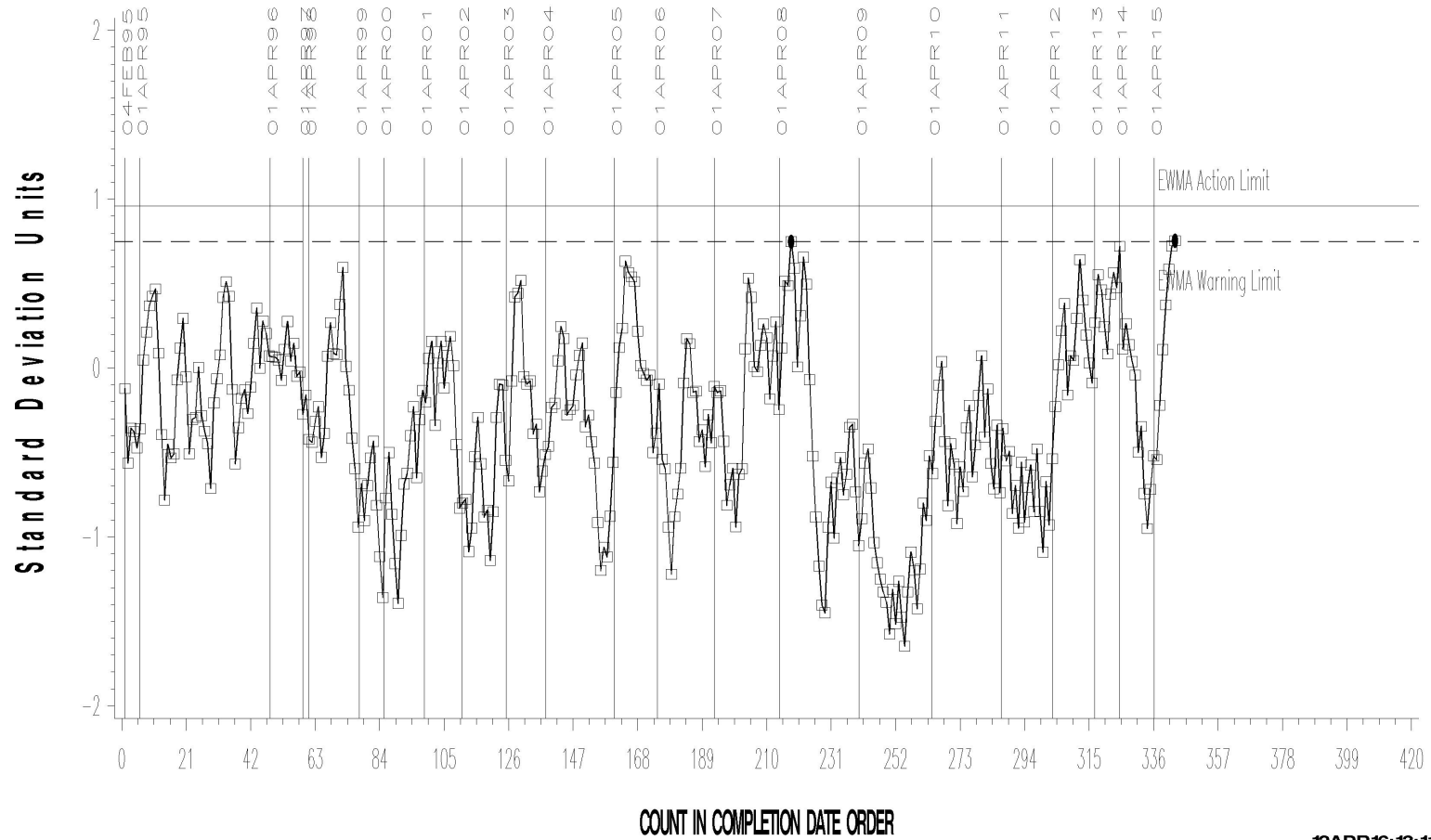
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



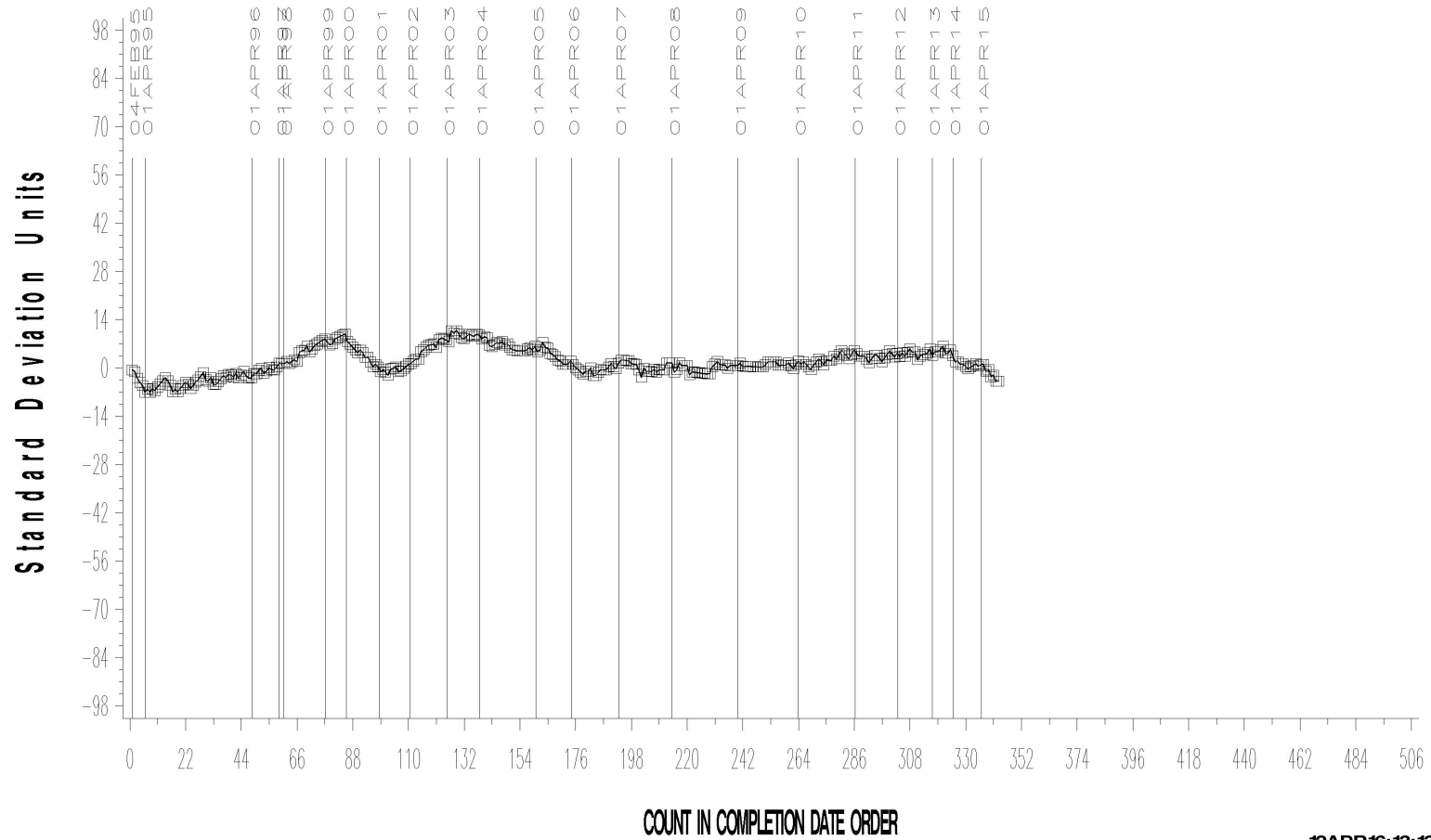
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



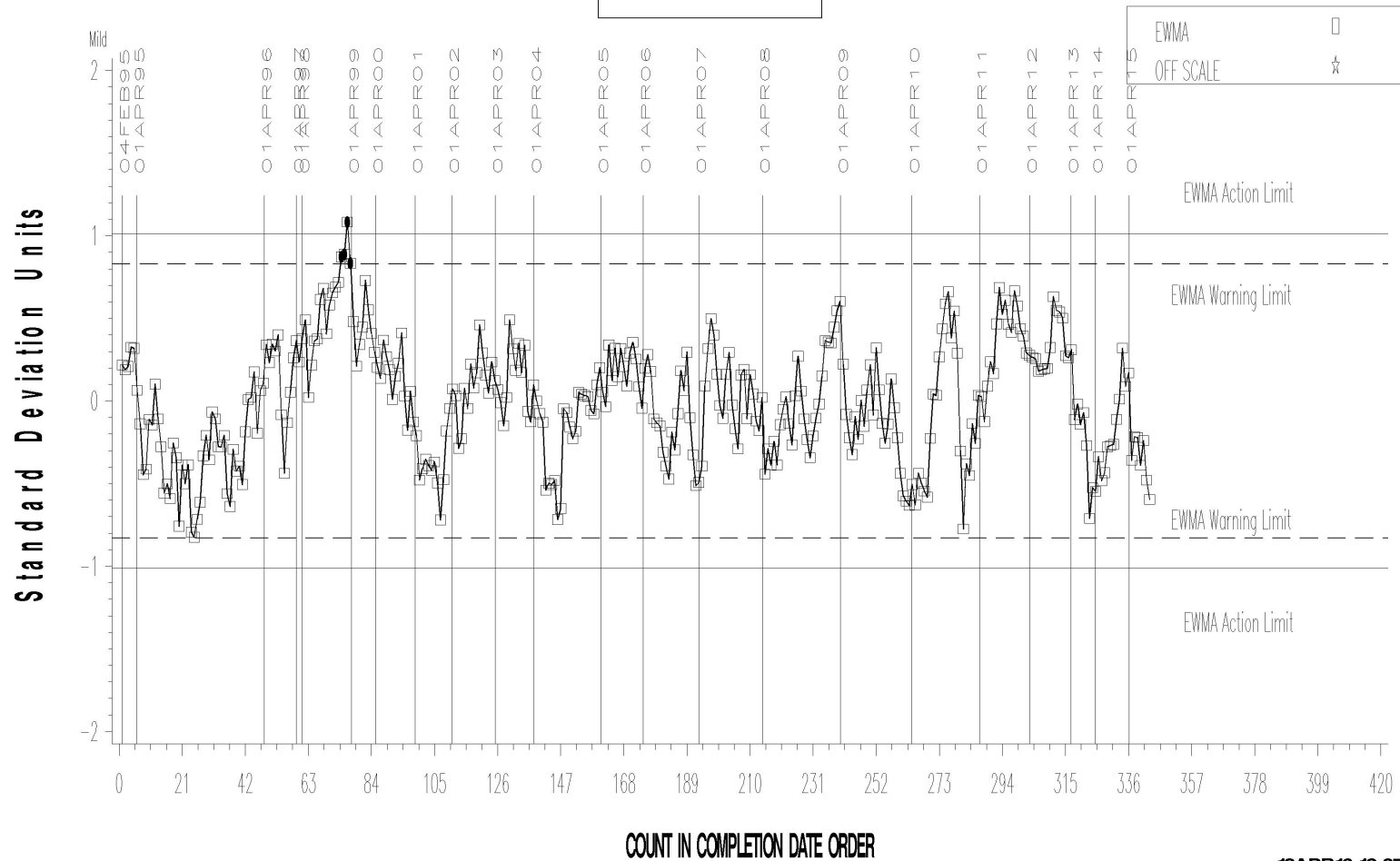
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis



Severp

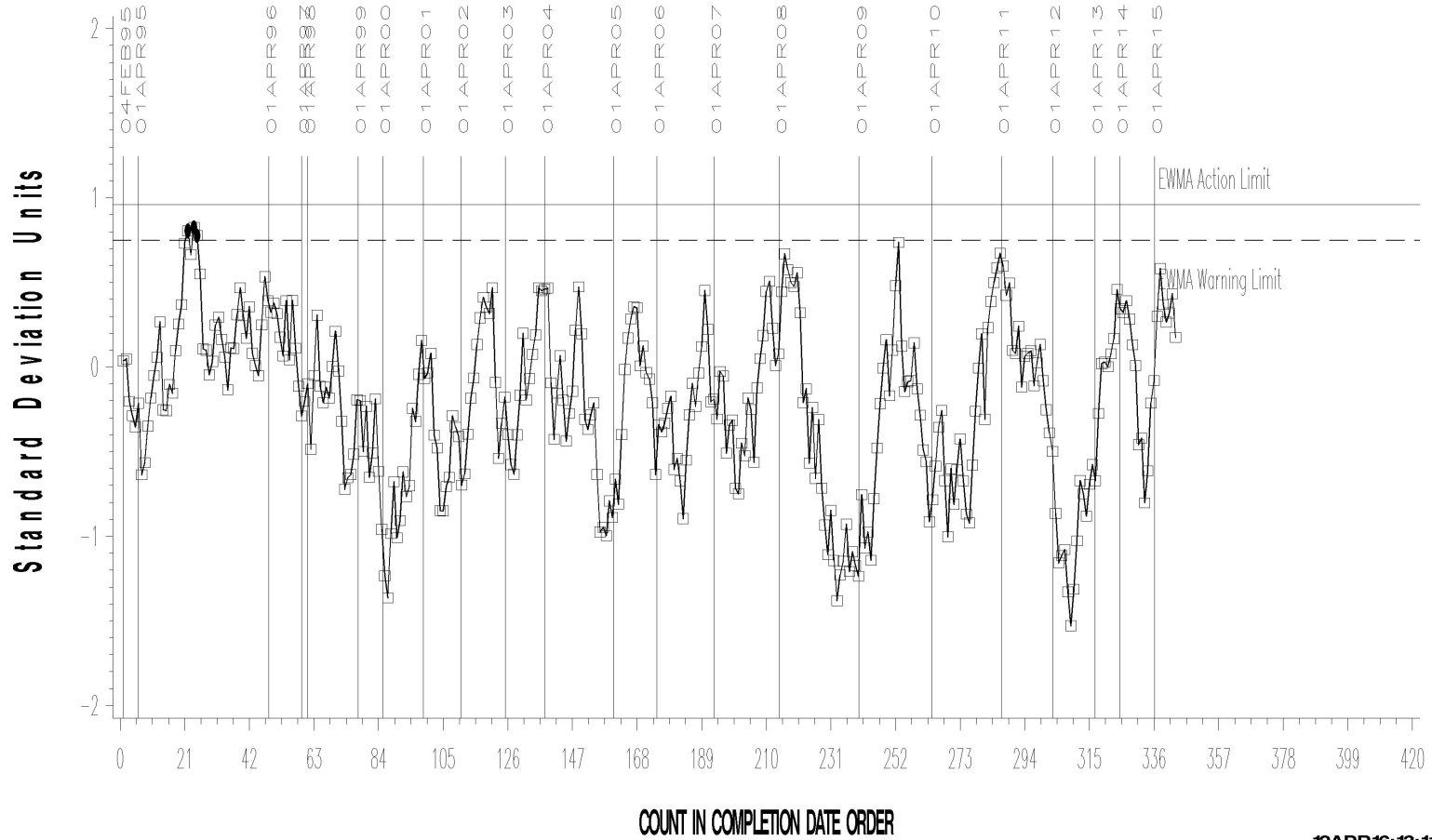
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



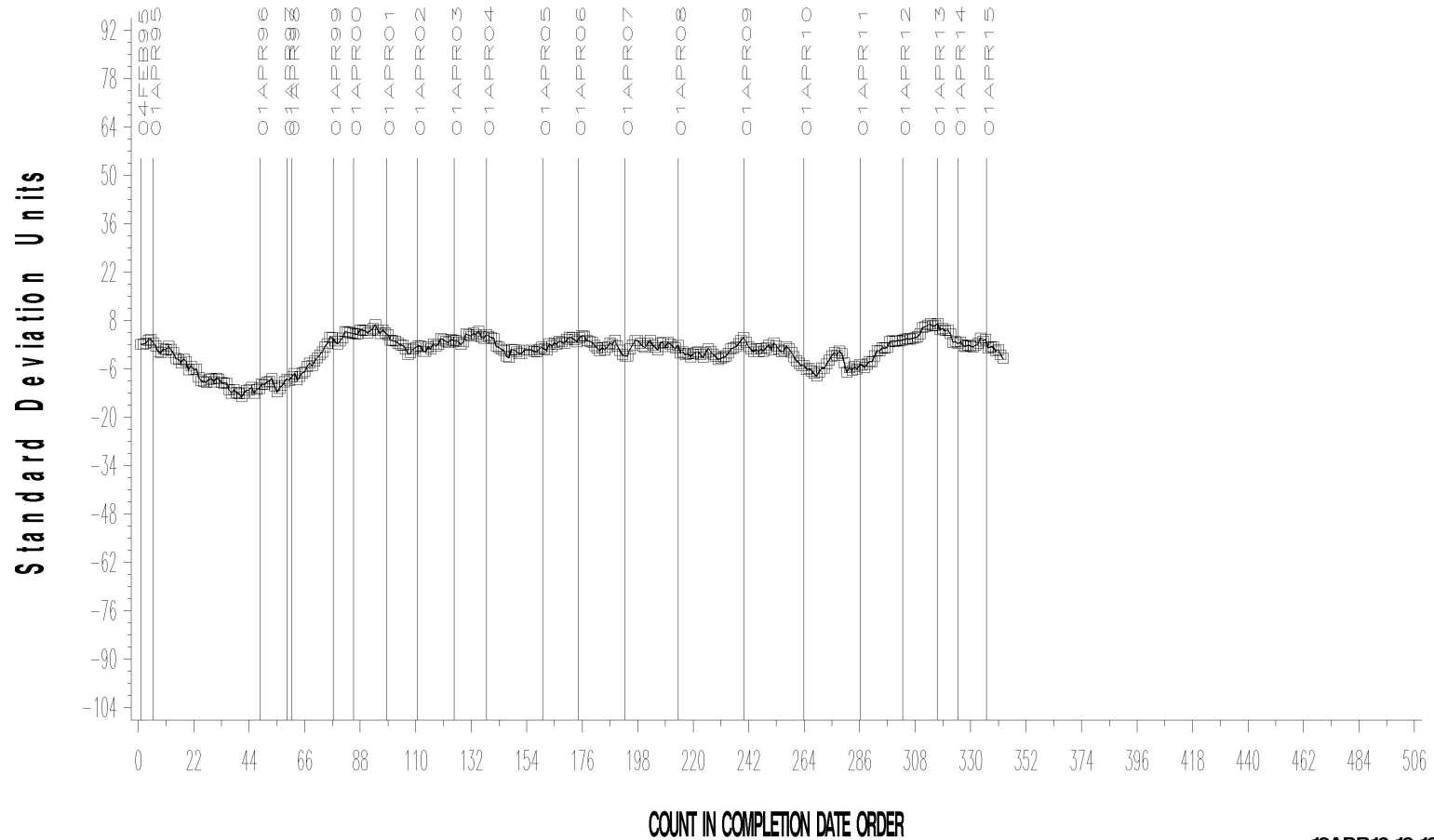
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



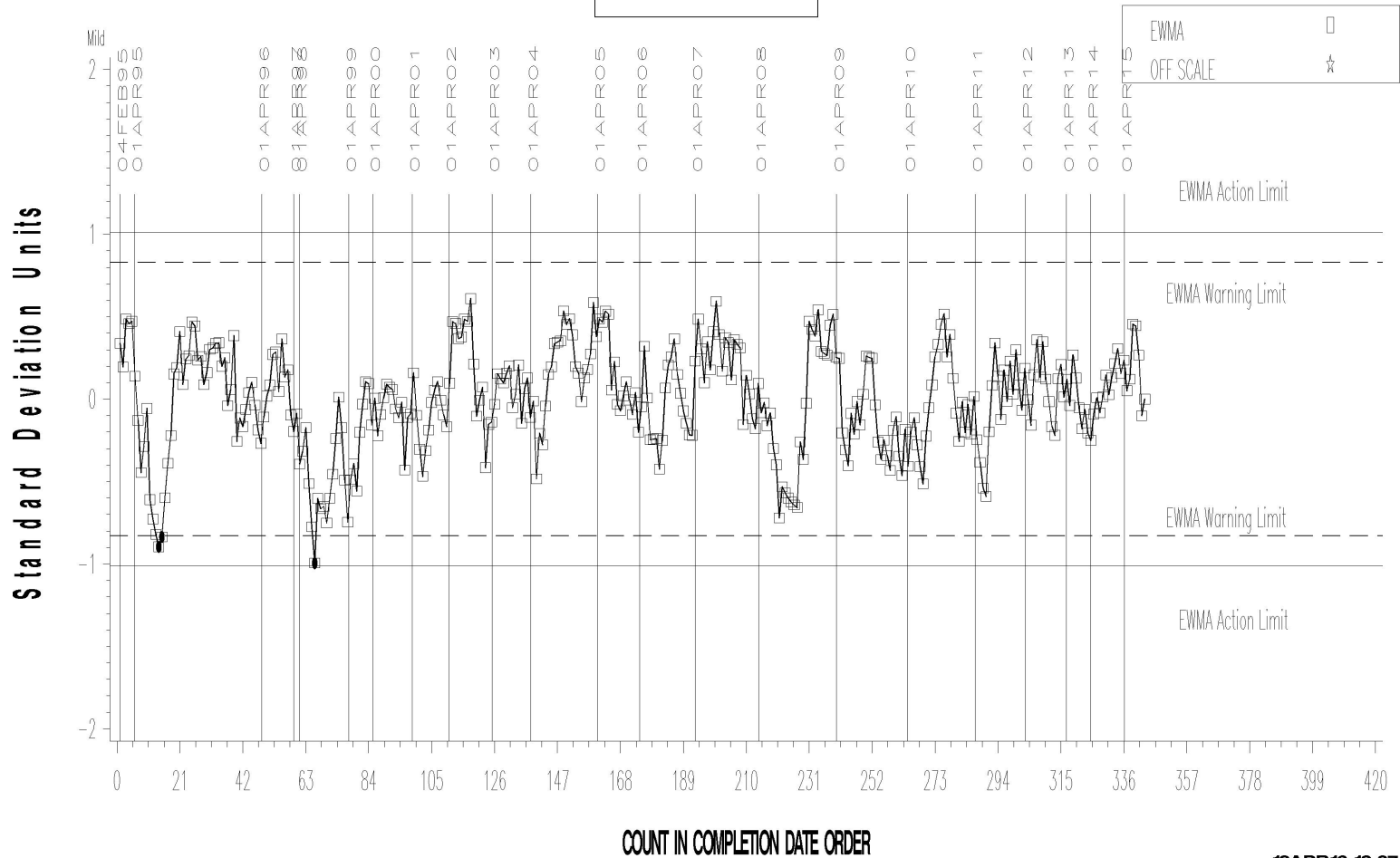
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



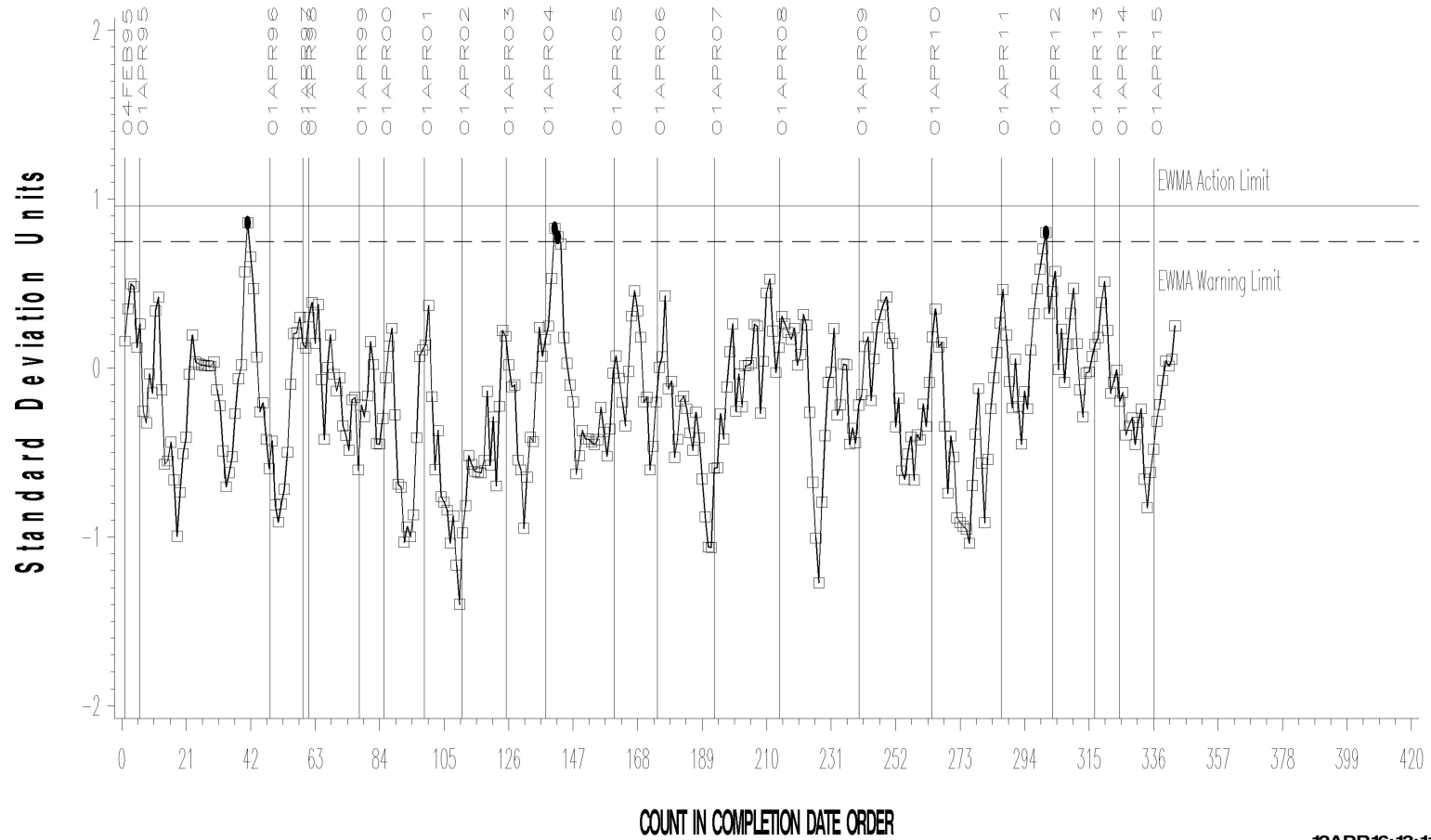
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



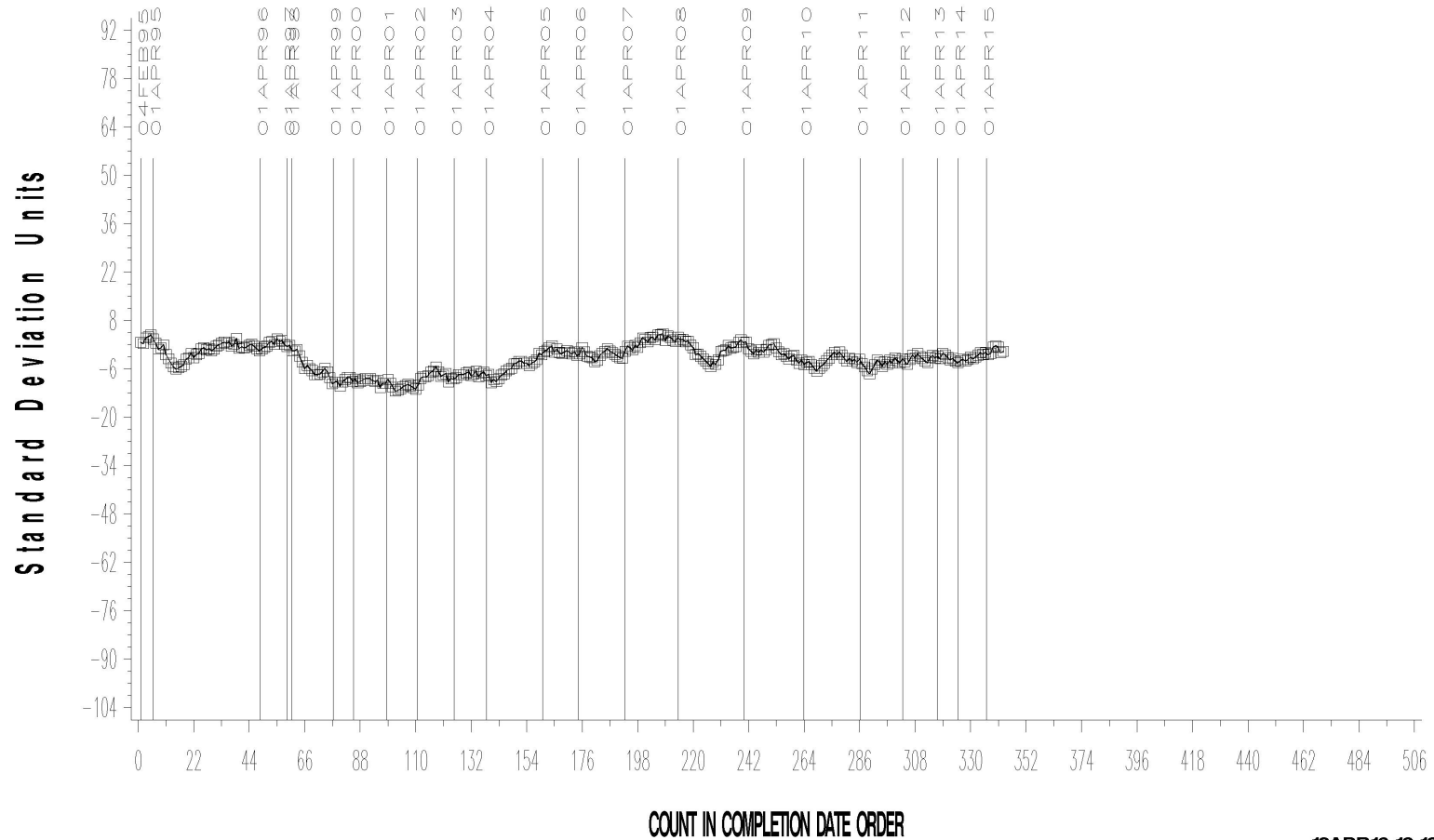
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



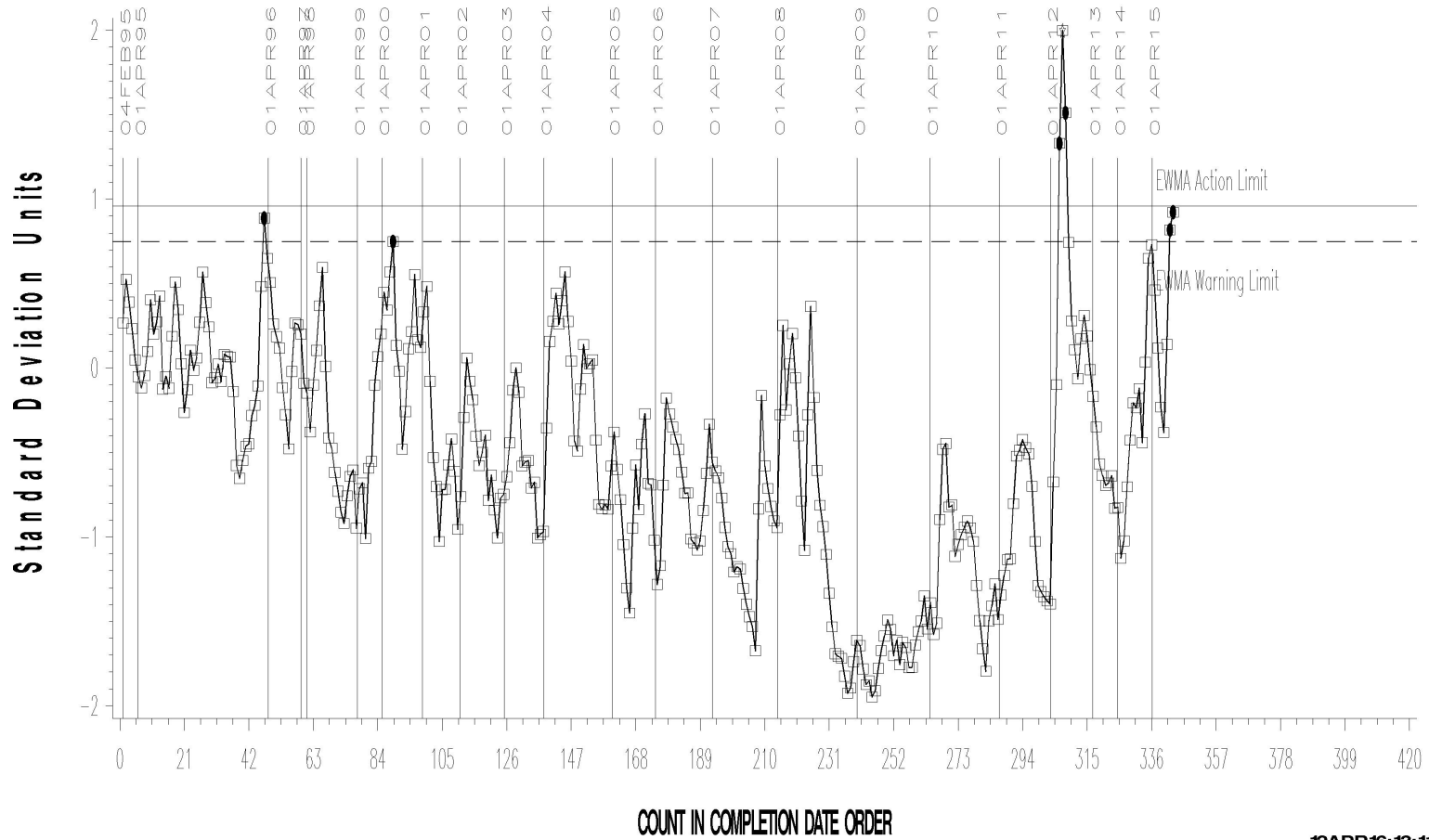
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis



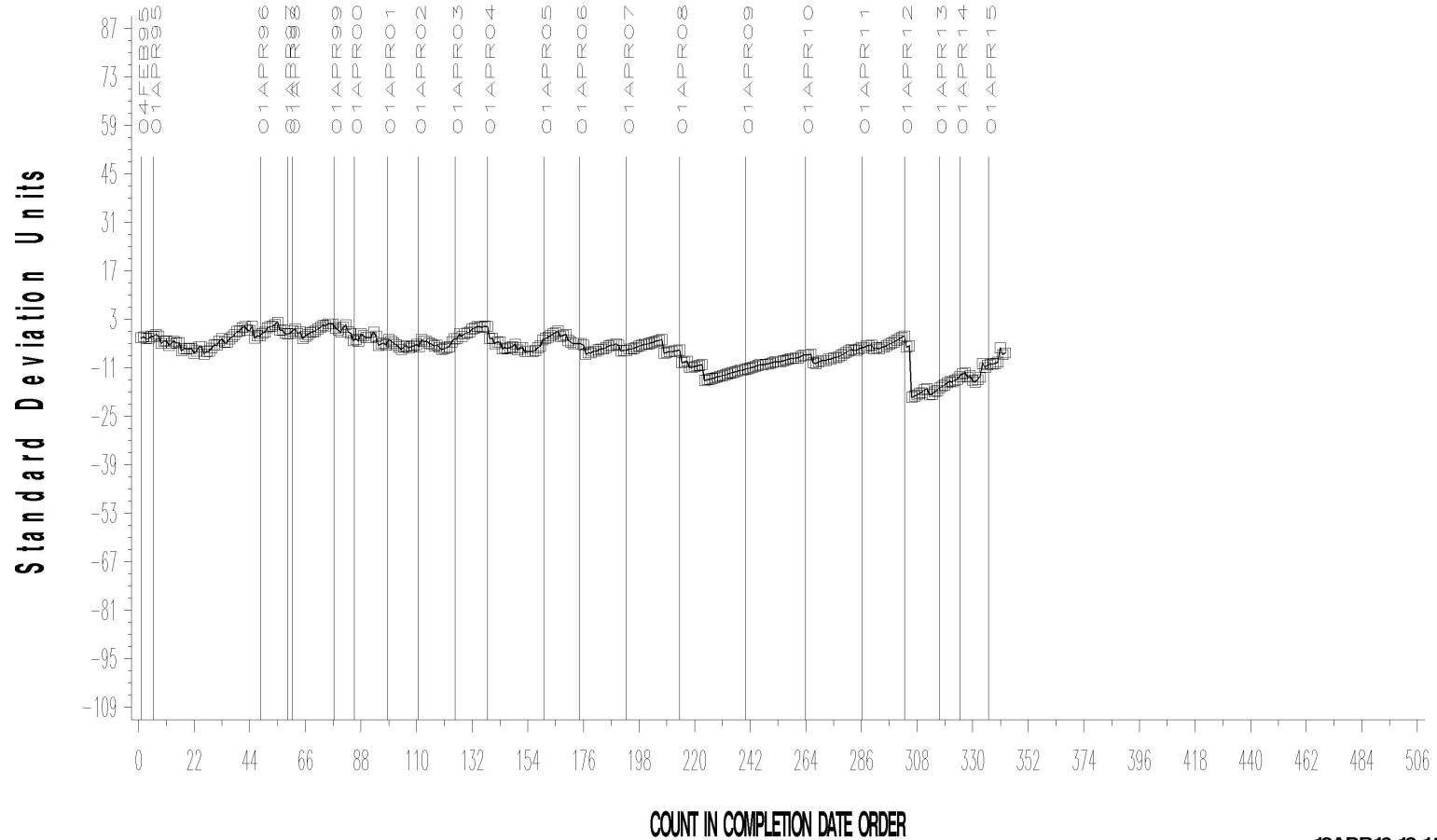
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L-37 (D6121)

L-37 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



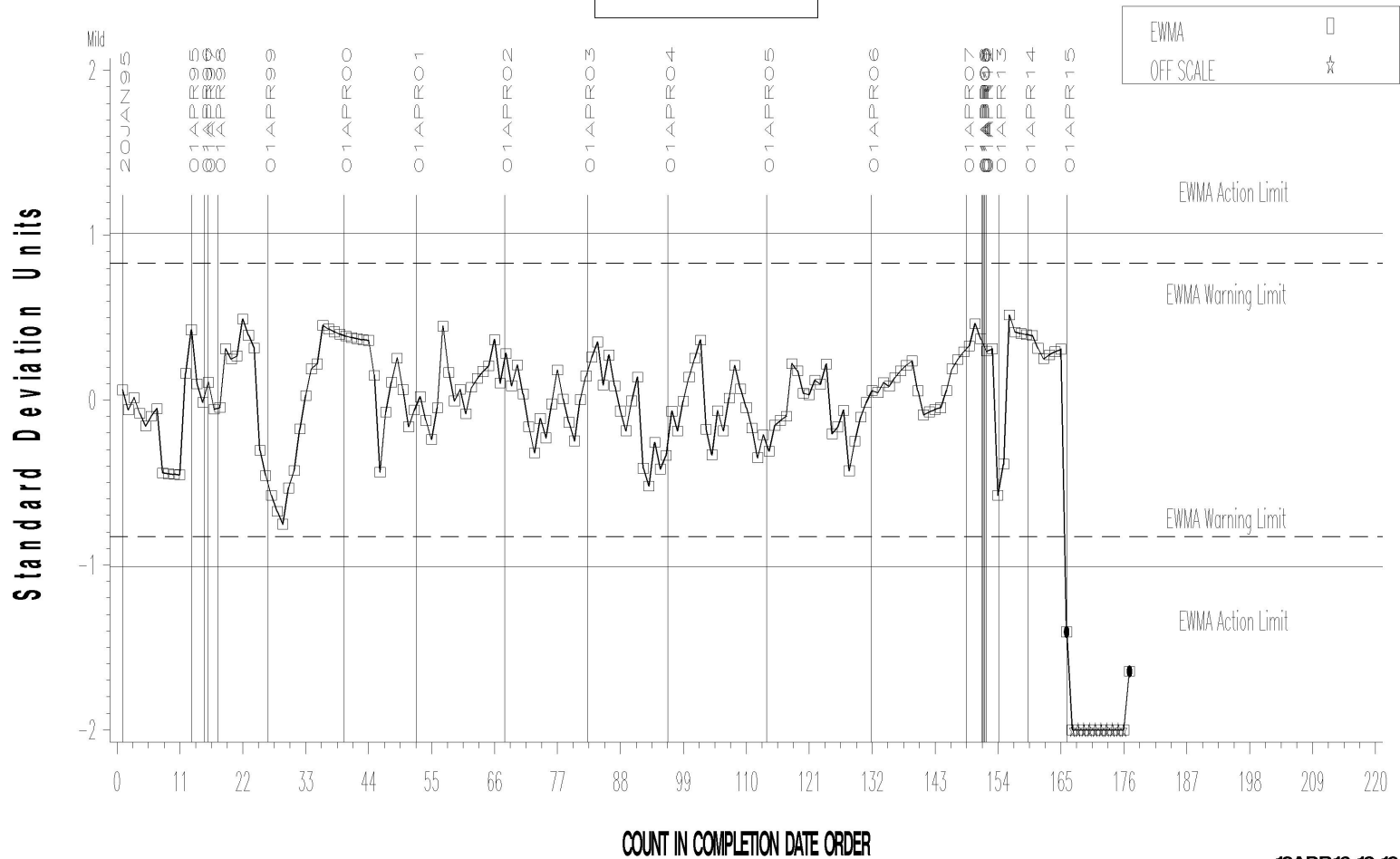
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Severity Analysis



Severp

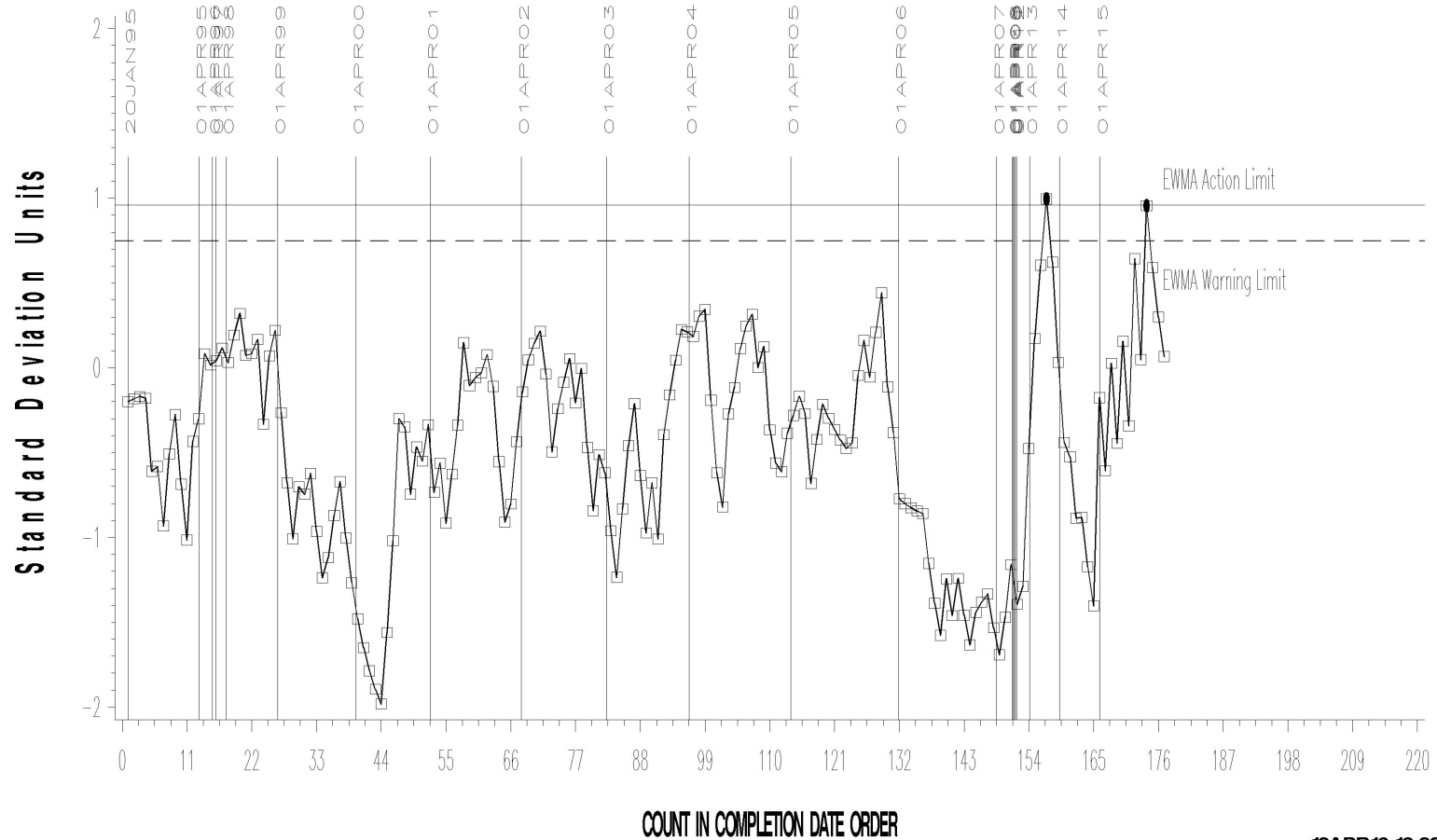
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



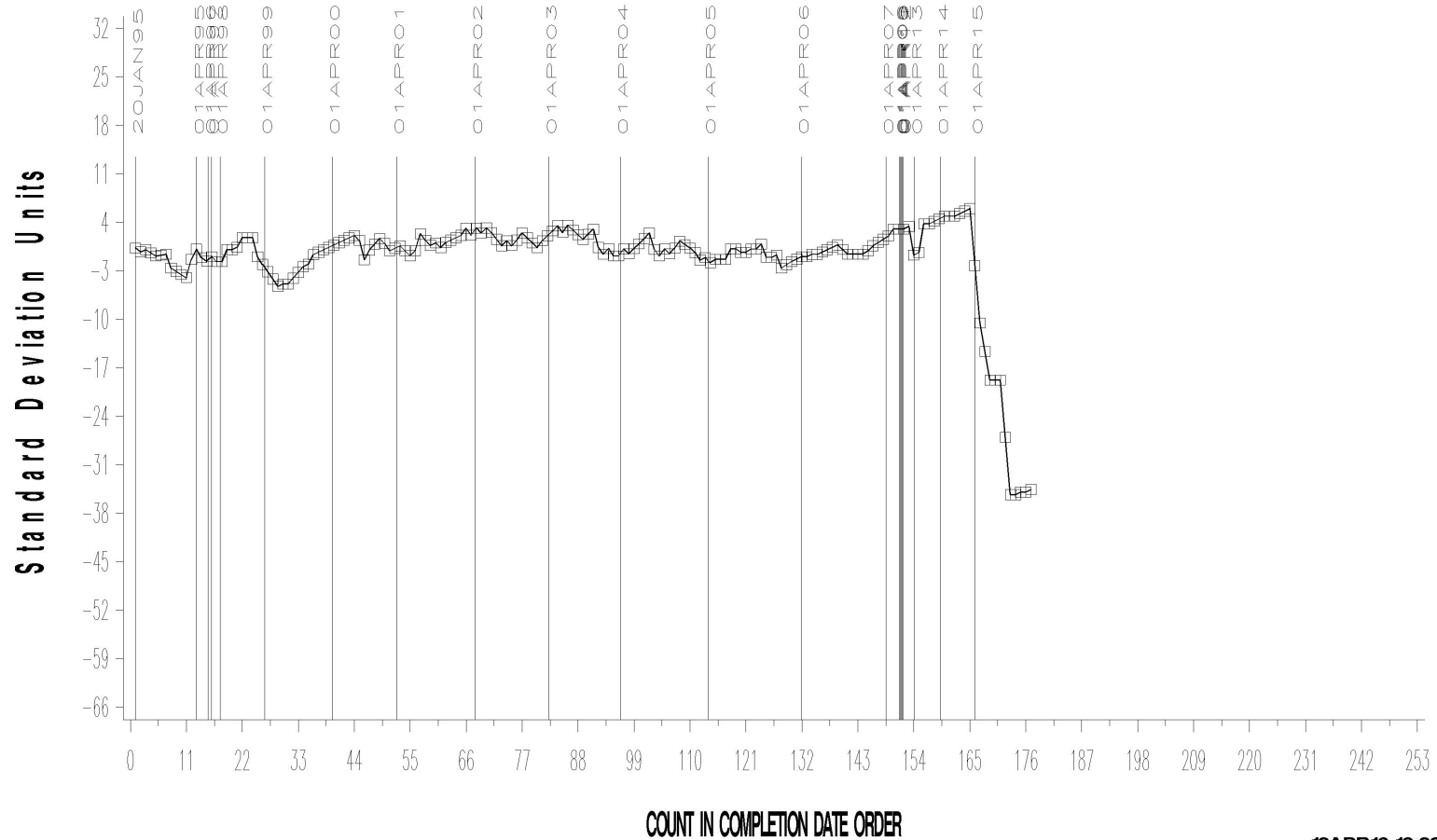
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



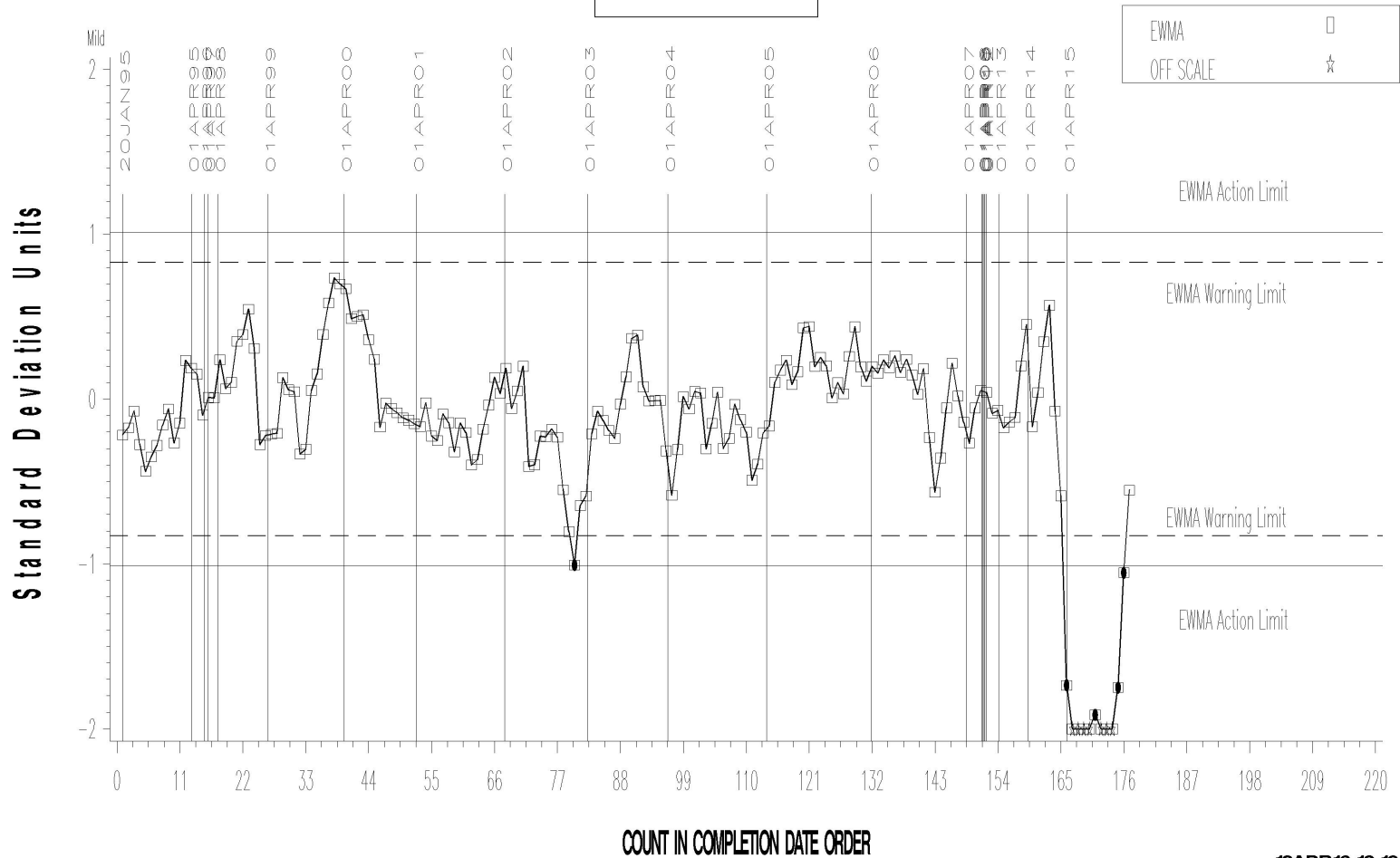
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Severity Analysis



Severp

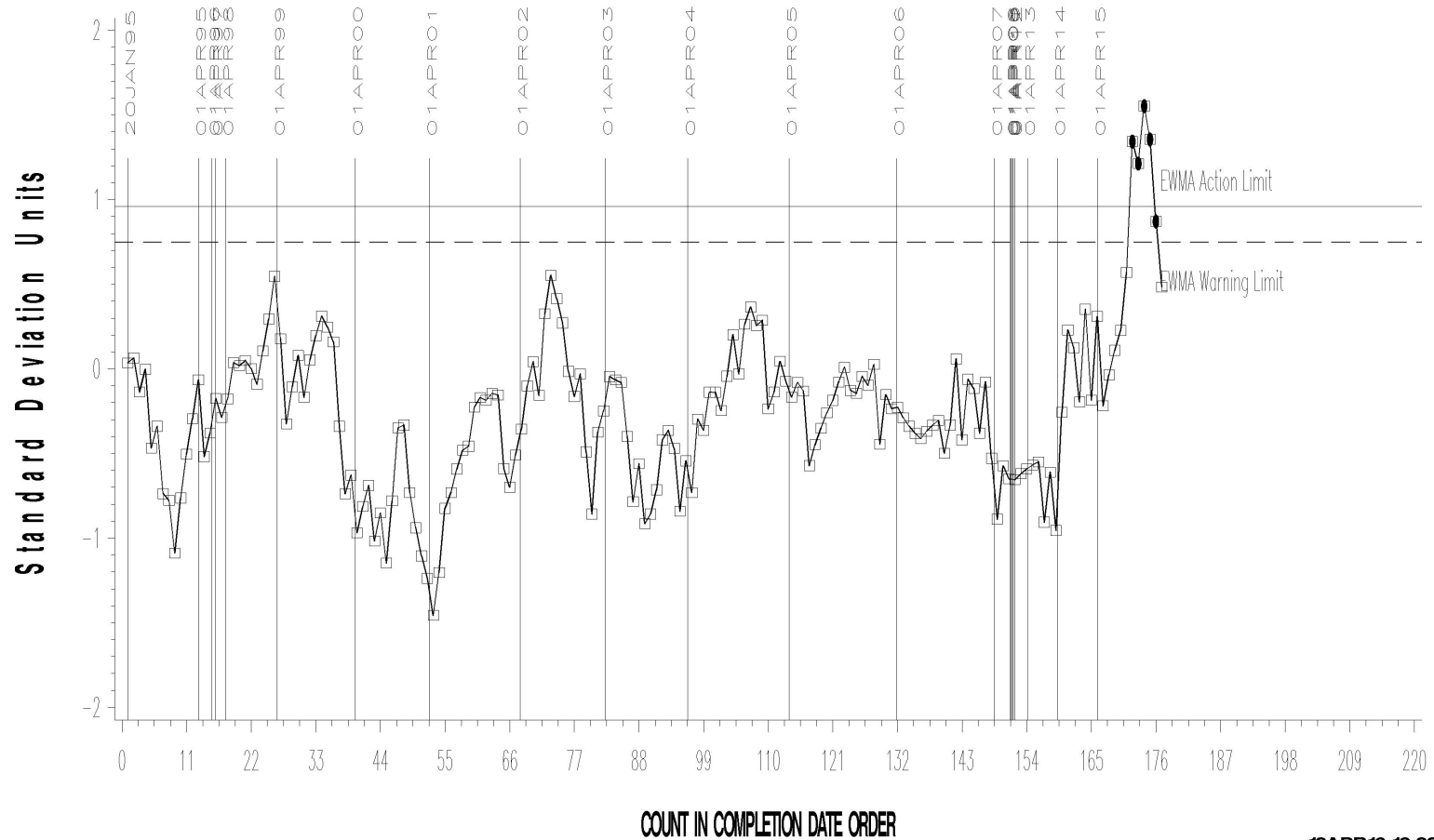
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



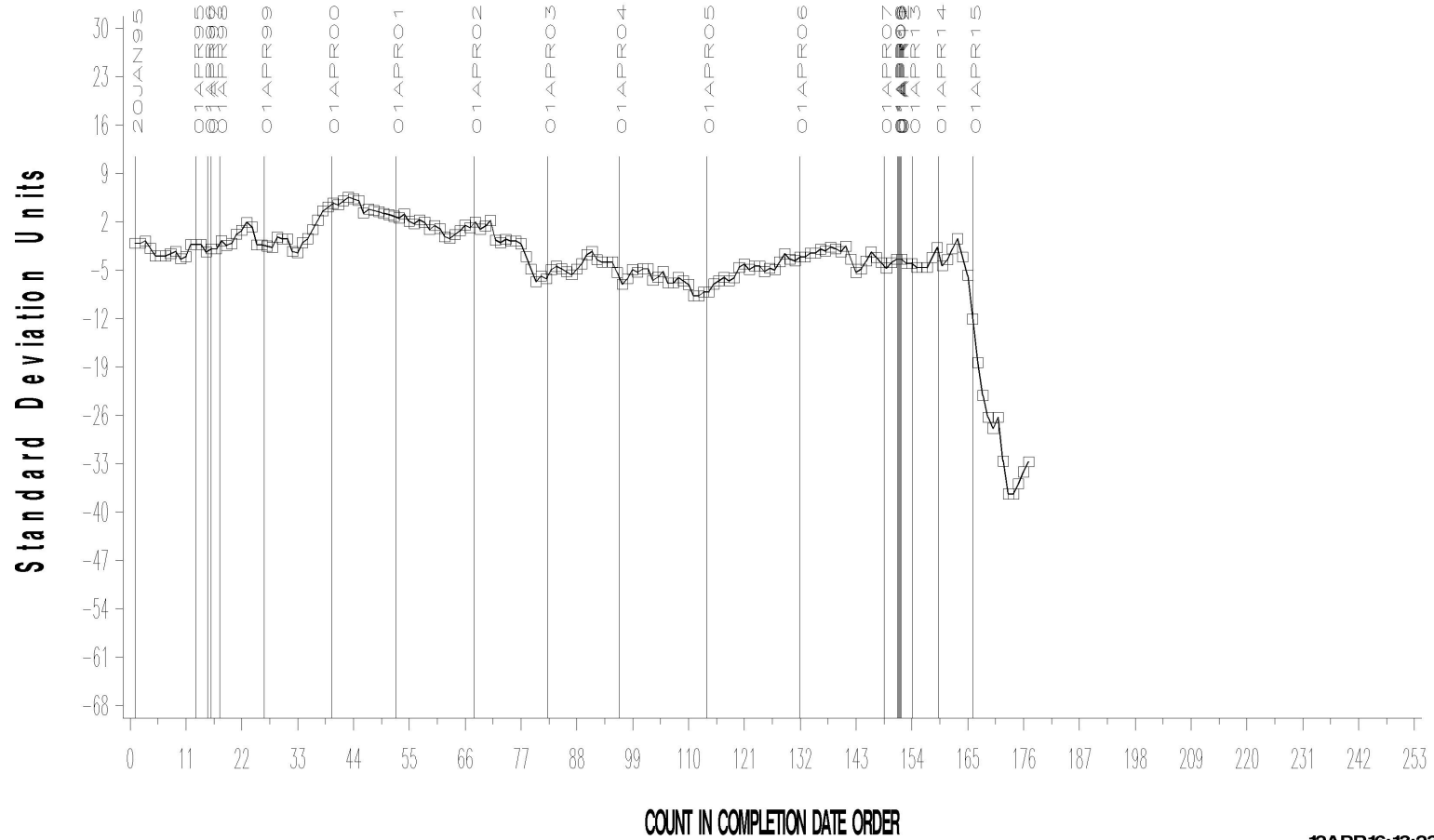
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



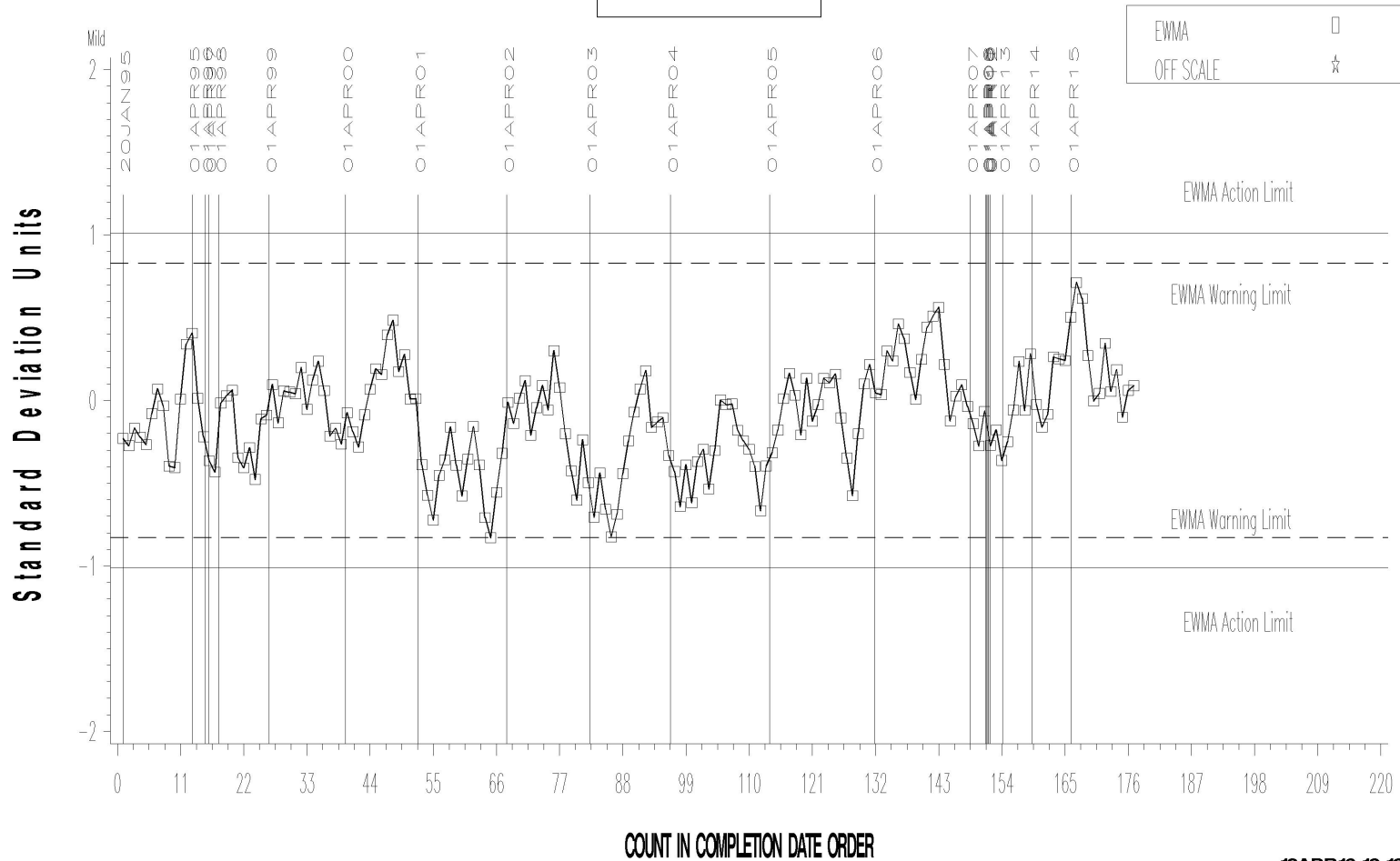
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



Severp

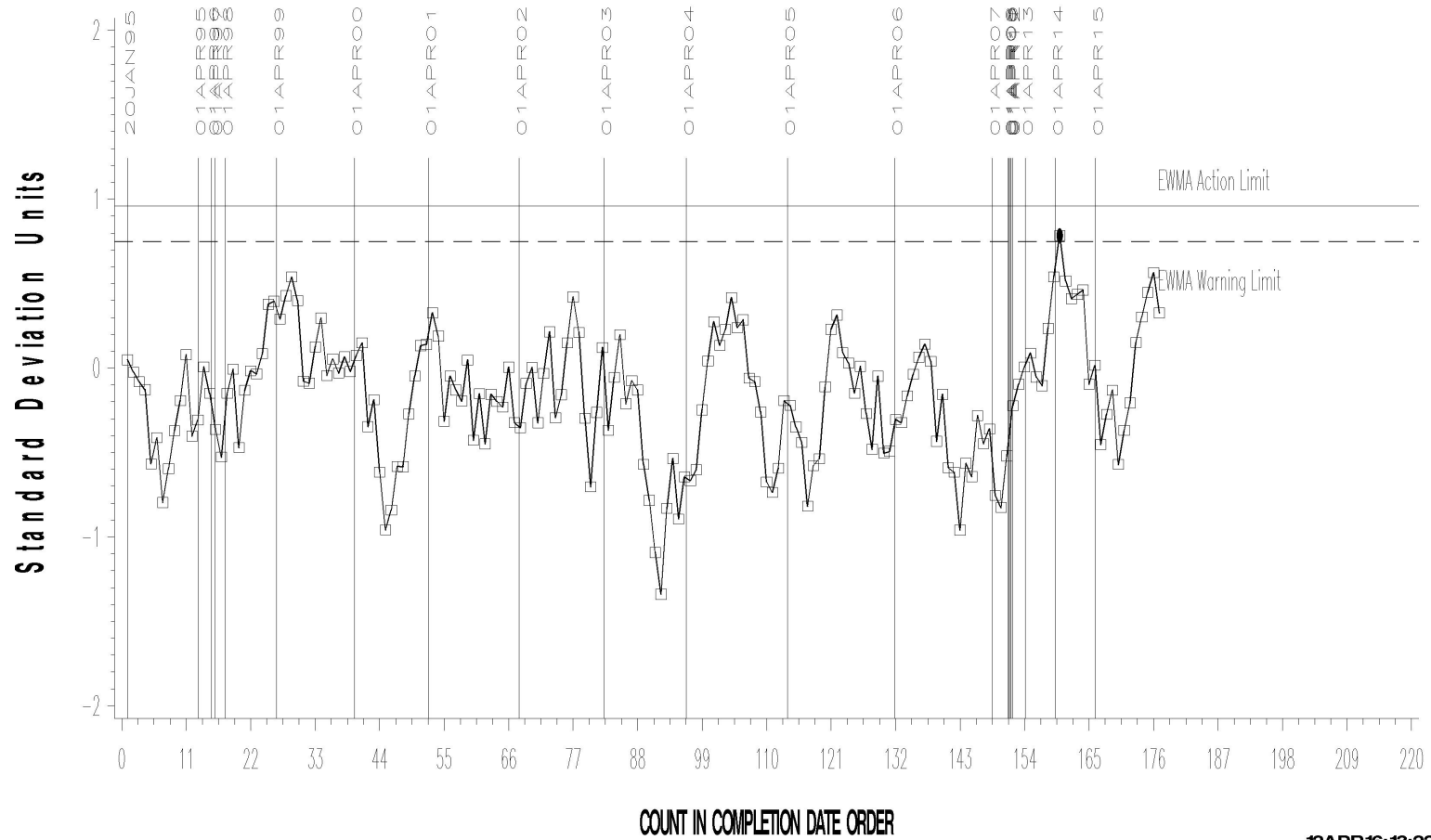
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



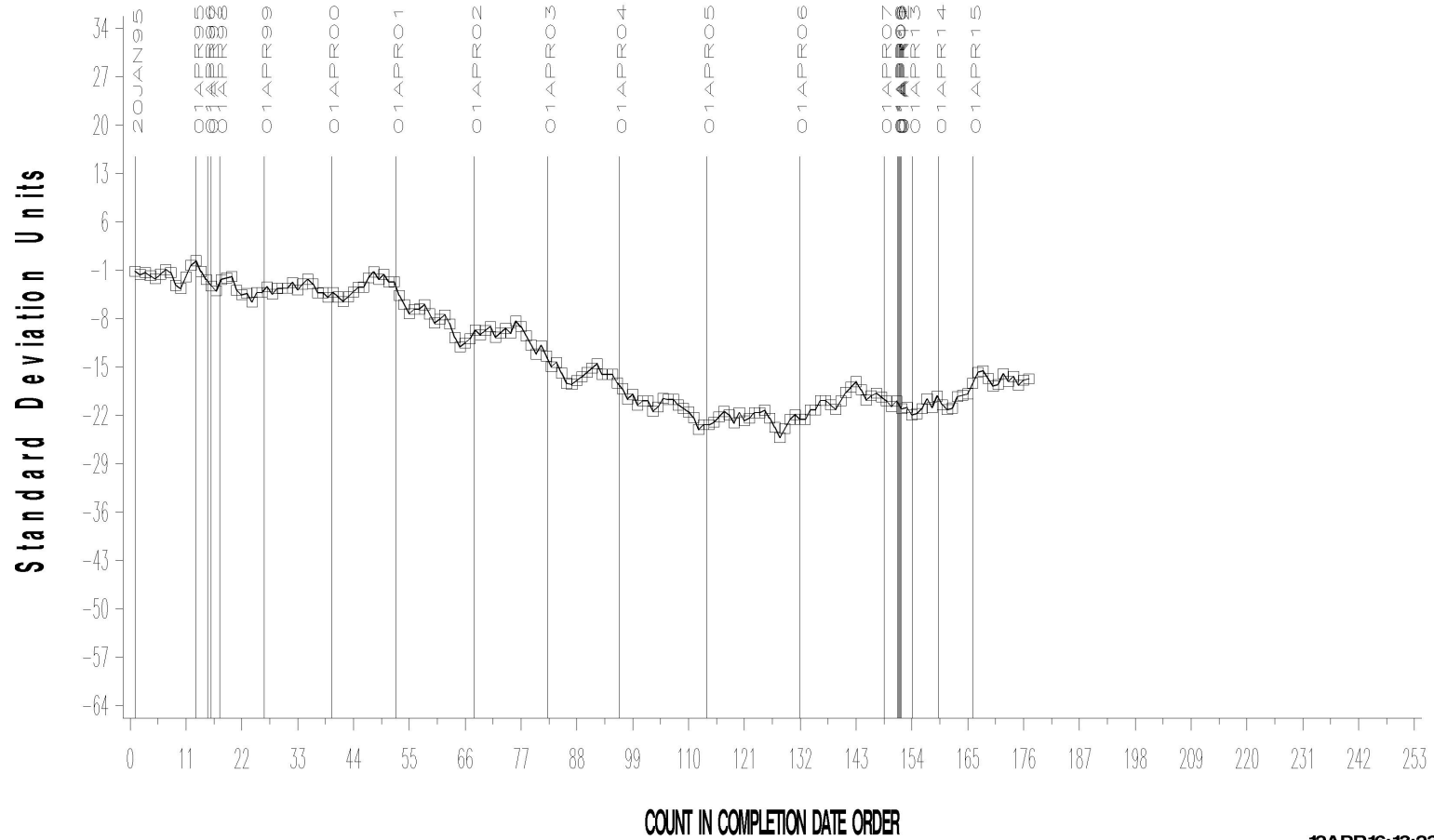
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RИPLING

CUSUM Severity Analysis



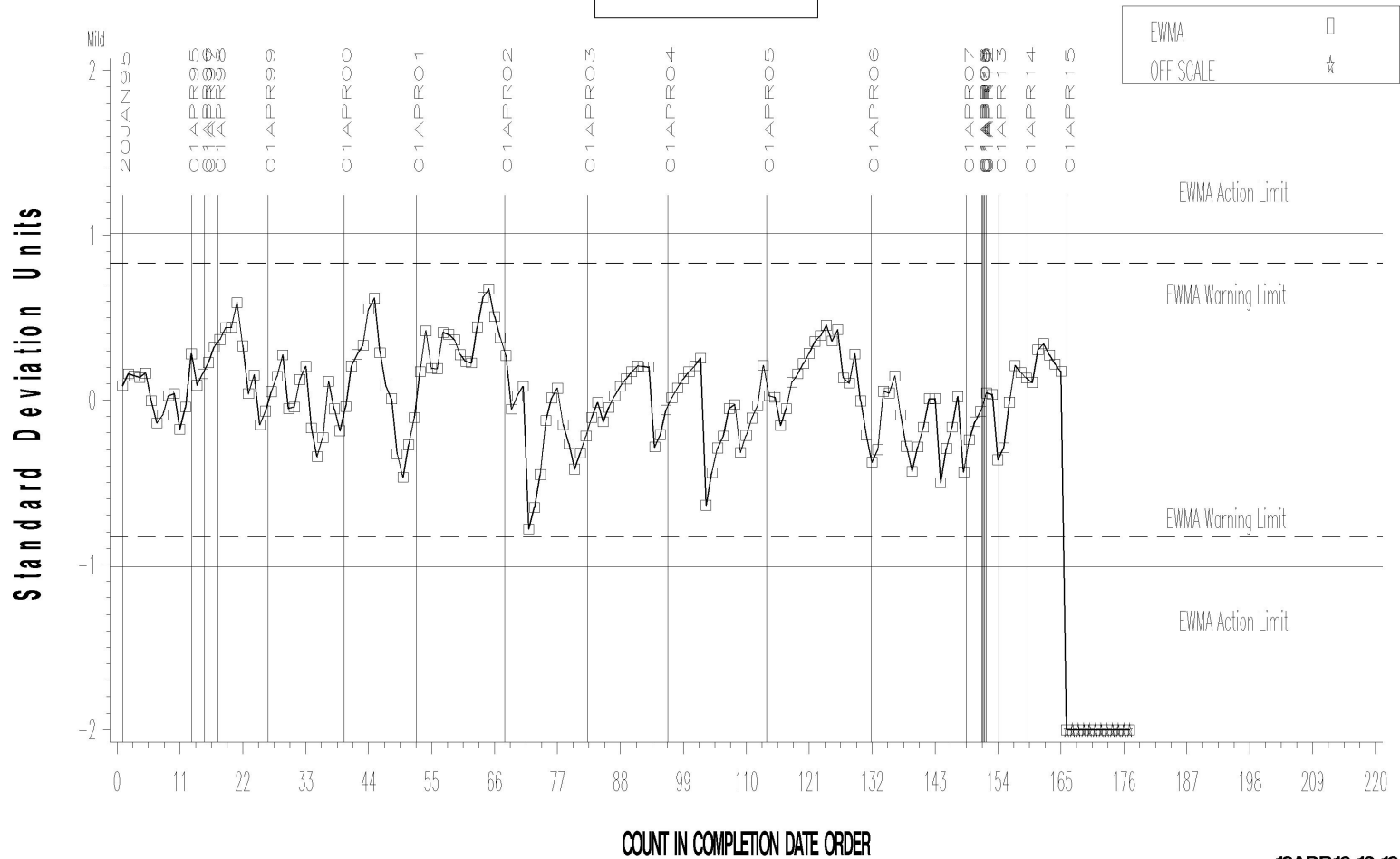
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis



Severp

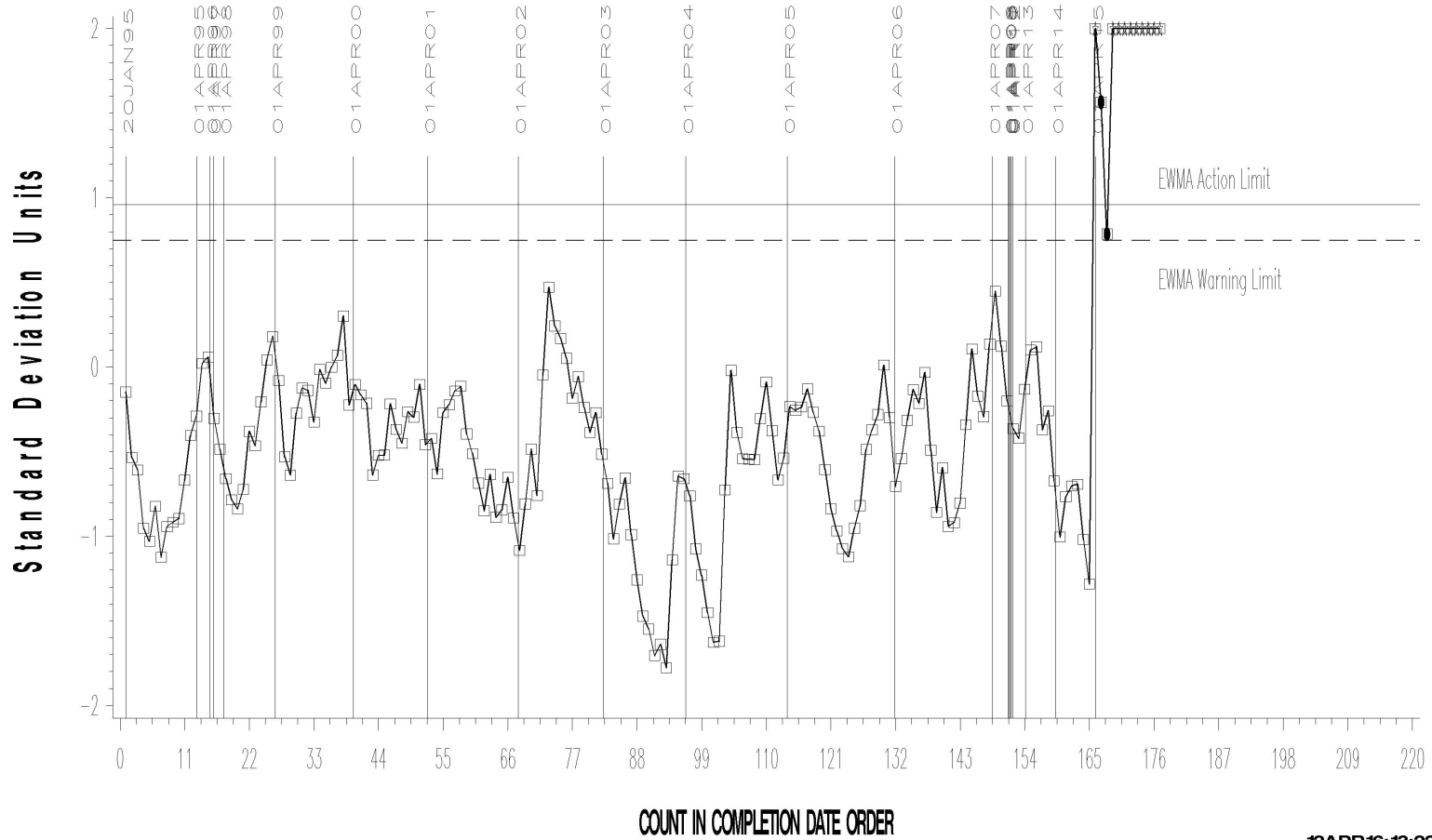
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L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis



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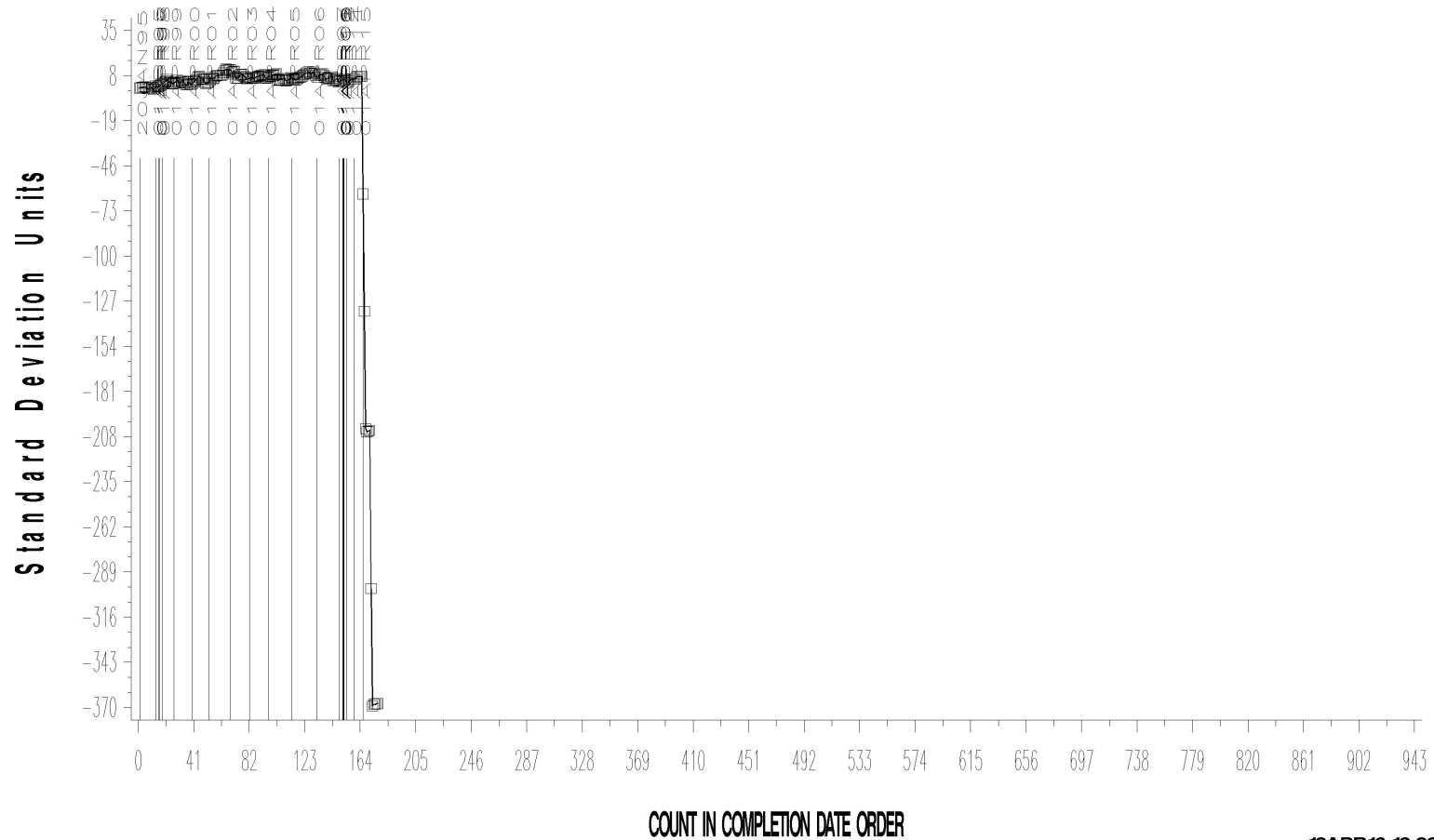
L-37 (D6121)

L-37 LUBRITED INDUSTRY OPERATIONALLY VALID DATA



FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



12APR16:13:23

L-37 (D6121)

TIMELINE ADDITIONS

Effective Date	Information Letter	Event
20160210	16-1	Revision to requirements for using lab-assembled axles (change to acceptability criteria and addition of lubrified hardware)

L-37 (D6121)

LAB VISITS

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

L-37 (D6121)

INFORMATION LETTERS

Information Letter 16-1 was issued 201500331 to revise the acceptance criteria for gaining approval to use lab-assembled axles and to establish a procedure approving lubrited lab-assembled axles.

L-37 (D6121)

LTMS DEVIATIONS

No LTMS deviations were written this report period.

L-37 (D6121)

STATUS OF REFERENCE OIL SUPPLY

Oil	Cans @ Labs	@ TMC	
		Cans	Gallons
117	0	450	450.0
134	11	0	0.0
134-1	0	220	220.0
152-2	14	170	170.9
152-3	0	54	54.8
155	8	15	15.0
155-1	12	231	231.0
Total	45	1140	1141.6

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, L-60-1, 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 39.7 gal) for use in that test.

TMC stocks of oil 134 have been depleted. The 134-1 reblend is available for shipment but the surveillance panel will need to devise an introduction plan.