



Test Monitoring Center

203 Armstrong Drive, Freeport, PA 16229, USA

www.astmtmc.org
412-365-1000

MEMORANDUM: 23-010
DATE: April 25, 2023
TO: Nick Schaup, Chairman, L-37-1 Surveillance Panel
FROM: Dylan Beck *Dylan Beck*
SUBJECT: L-37-1 Testing from October 1, 2022 through March 31, 2023

Attached is a summary of reference oil testing activity this period.

DJB/djb/mem23-010.djb.doc

cc: Sean Moyer

Jeff Clark

L-37 Surveillance Panel

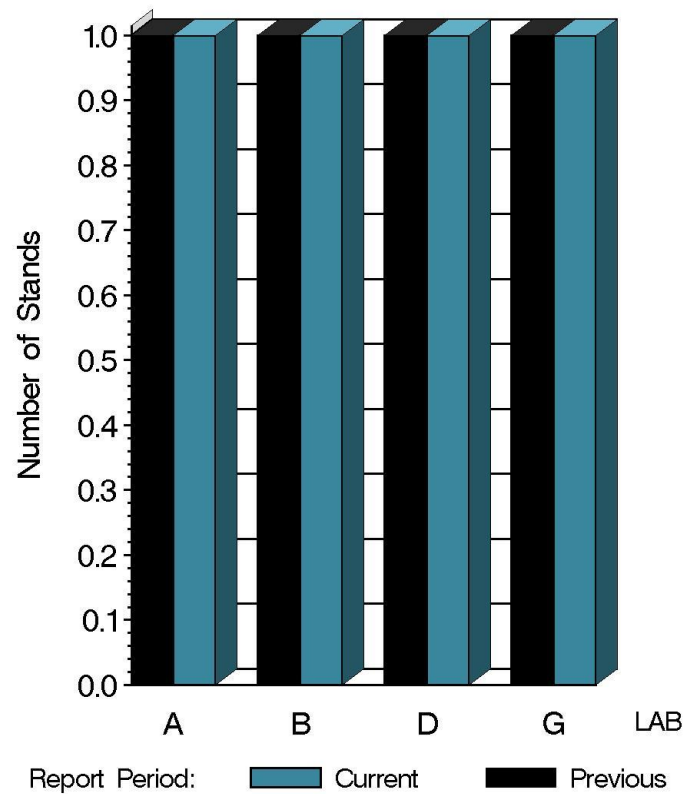
<https://www.astmtmc.org/ftp/docs/gear/1371/semiannualreports/1371-04-2023.pdf>

Distribution: email

L-37-1 (D8165)

	Reporting Data	Calibrated on 3-31-23
Number of Labs	4	4
Number of Stands	4	4

BY-LAB STAND
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L-37-1 (D8165)

Test Distribution by Oil and Validity

					Totals	
					Last Period	This Period
		134/ 134-1	152-2	155-1		
Accepted for calibration	AC	1	2	4	7	7
Rejected (Mild)	OC	2	3	0	2	5
Rejected (Severe)	OC	0	1	0	3	1
Rejected (Precision)	OC	0	0	0	0	0
Unacceptable calibration	MC	1	0	0	0	1
Unacceptable info run	MI	1	0	0	2	1
Acceptable info run	NI	6	4	1	15	11
Aborted info run	XI	1	0	0	3	1
Total		12	10	5	32	27

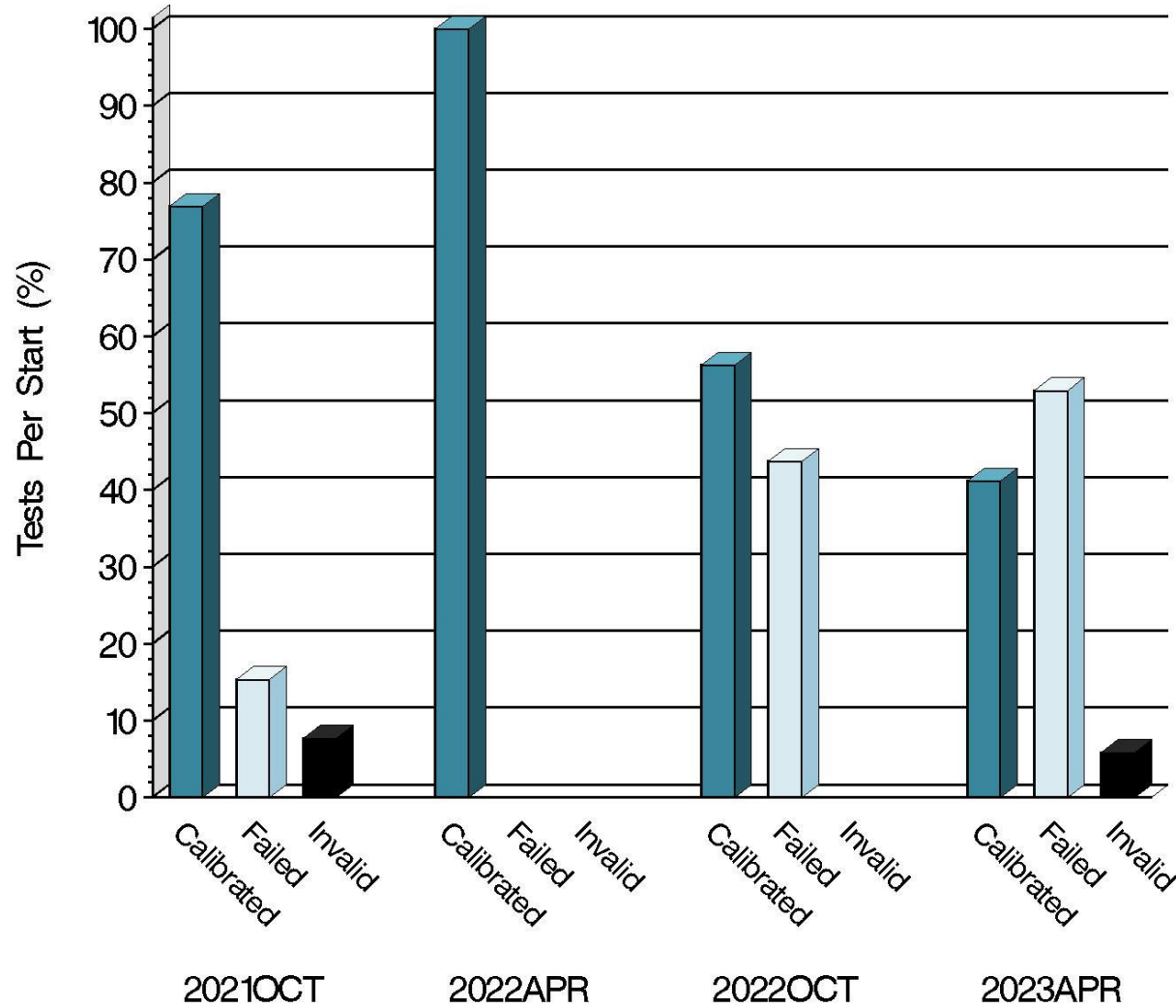
L-37-1 (D8165)

Calibration Attempt Detail

	Gear Batch	Acceptable	Invalid	Failed	Total
Uncoated	01-2020	4	1	3	8
MnP Coated	04-2014	2	0	2	4
	04-2021	1	0	1	2
	Total	7	1	6	14

L-37-1 (D8165)

CALIBRATION ATTEMPT SUMMARY



Resolution

Report Period

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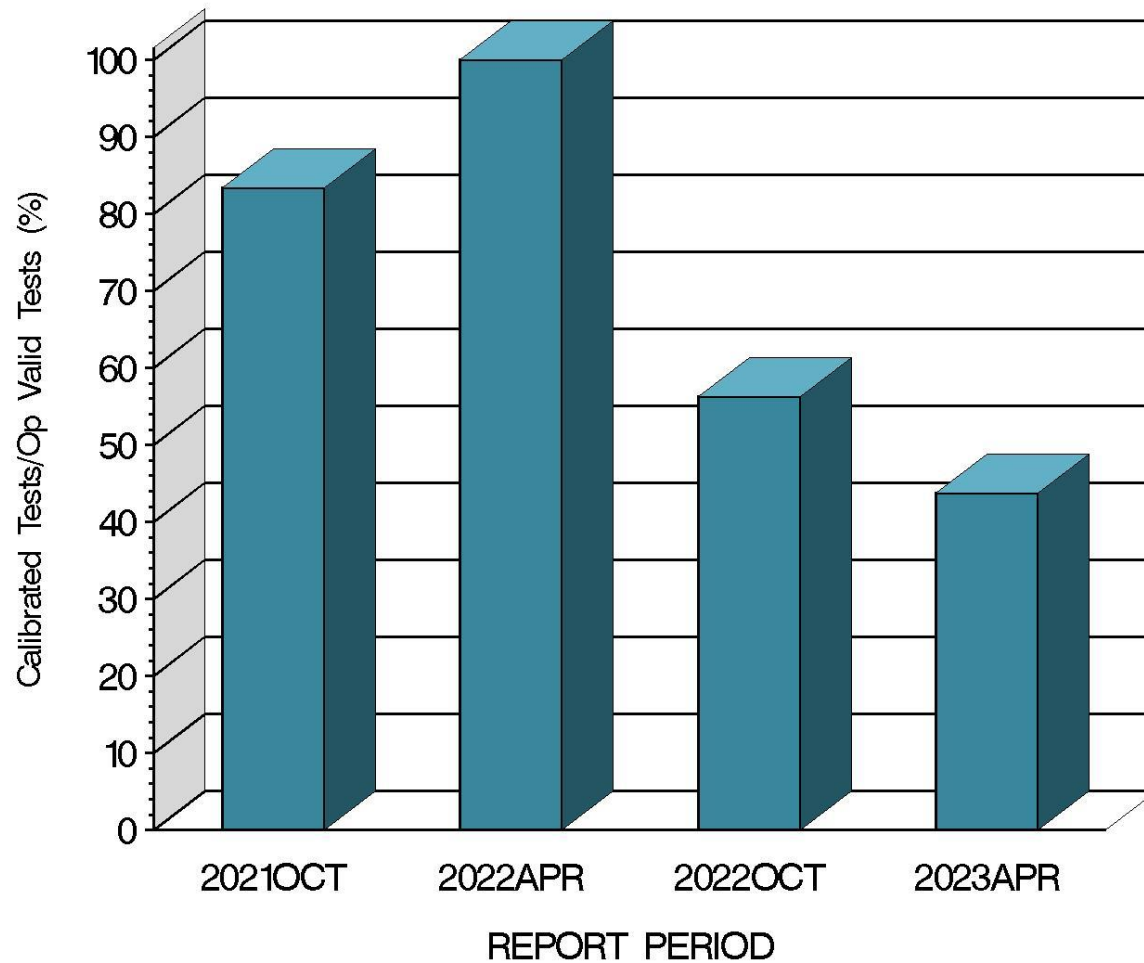
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L-37-1 (D8165)

OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA



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L-37-1 (D8165)

CAUSES FOR LOST TESTS

Lab	Cause	Oil				Validity			Loss Rate		
		134-1	152-2	155-1	155-2	XC	LC	XI	Lost	Starts	%
D	Broken Teeth	●						●	1	4	25%
	Lost	1	0	0	0	0	0	1			
	Starts	12	10	5	0	27	27	27			
	%	8%	0%	0%	0%	0%	0%	4%			

L-37-1 (D8165)

GEAR BATCH SEVERITY

MNP COATED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	04-2014	6	0.667	0.052	0.667	.
RIPP	04-2014	6	-0.771	3.034	-0.771	.
SPIT	04-2014	6	0.333	0.000	0.333	.
WEAR	04-2014	6	-0.012	0.212	-0.012	.

UNCOATED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	12-2019	2	0.444	0.786	0.075	.
RIPP	12-2019	2	1.110	1.056	-0.345	.
SPIT	12-2019	2	0.550	.	-0.200	.
WEAR	12-2019	2	1.460	0.965	0.073	.
RIDG	01-2020	6	-0.542	0.600	0.075	.
RIPP	01-2020	6	-1.207	0.561	-0.345	.
SPIT	01-2020	6	-0.750	1.500	-0.200	.
WEAR	01-2020	6	0.907	0.907	0.073	.
RIDG	04-2021	2	1.556	0.786	0.075	.
RIPP	04-2021	2	0.786	0.505	-0.345	.
SPIT	04-2021	2	0.525	0.672	-0.200	.
WEAR	04-2021	2	1.333	0.786	0.073	.

^A As computed using SA standard deviation published in the LTMS document.

L-37-1 (D8165)

LAB SEVERITY

MNP COATED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
04-2014	B	4	0.700	1.143	.	0.125
	G	2	0.600	-4.600	0.333	-0.286

UNCOATED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
01-2020	A	5	-0.650	-1.398	-1.000	-1.086
	G	1	0.000	-0.250	0.000	0.571
04-2021	D	2	1.556	0.786	0.525	1.333
12-2019	B	2	0.444	1.110	0.550	1.460

L-37-1 (D8165)

SUMMARY OF SEVERITY & PRECISION

Severity

Uncoated– Wear exceeded the action limit in the mild direction with the most recent test. All other parameters remained within the limits this period.

MnP Coated – Ripp exceeded the action limit in the severe direction with the most recent test. All other parameters remained within the limits this period.

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SUMMARY OF SEVERITY & PRECISION (cont.)

Precision

Uncoated – All parameters remained within the precision limit this period.

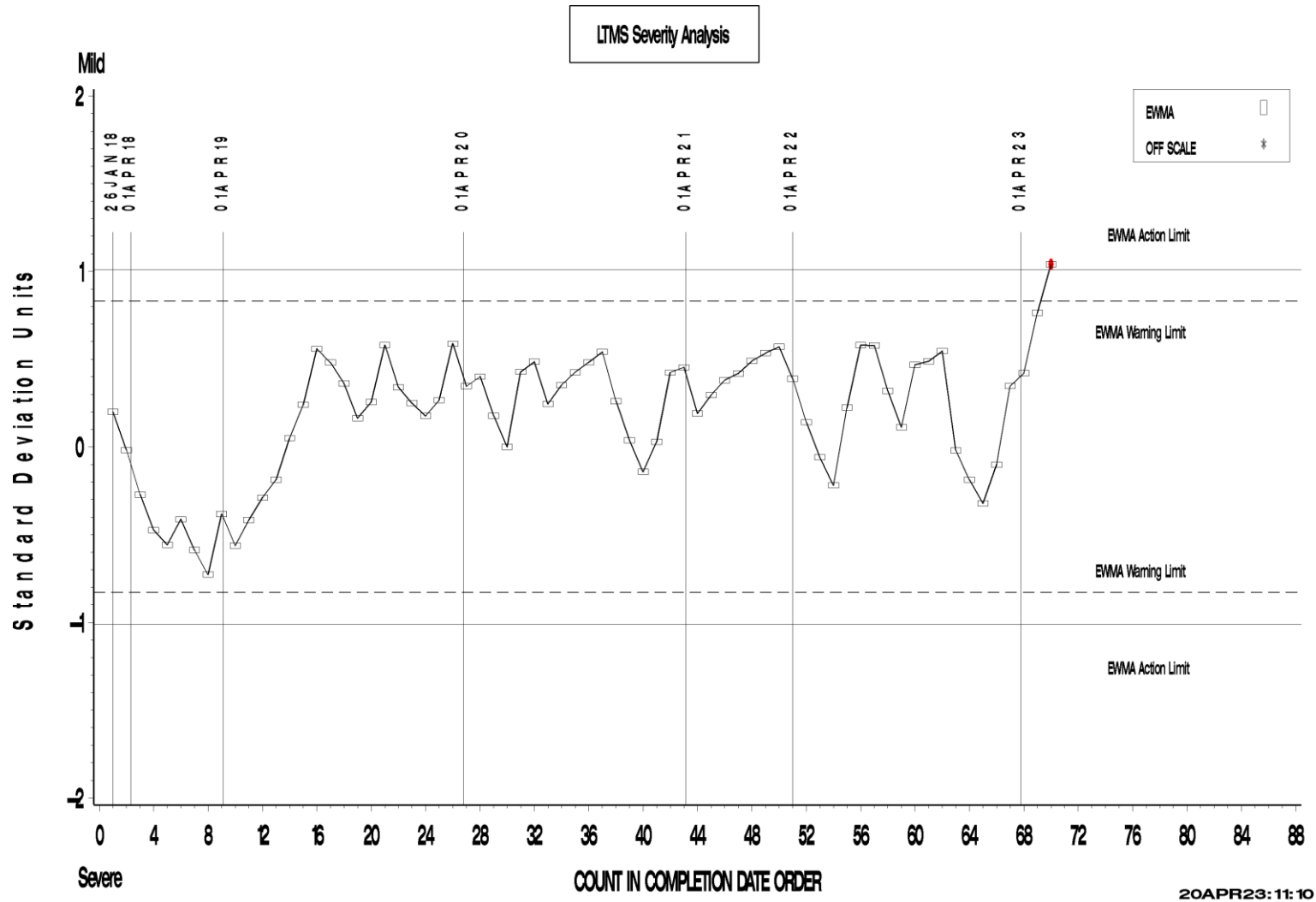
MnP Coated – All parameters remained within the precision limit this period.

Industry control charts follow.

L-37-1 (D8165)

L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR



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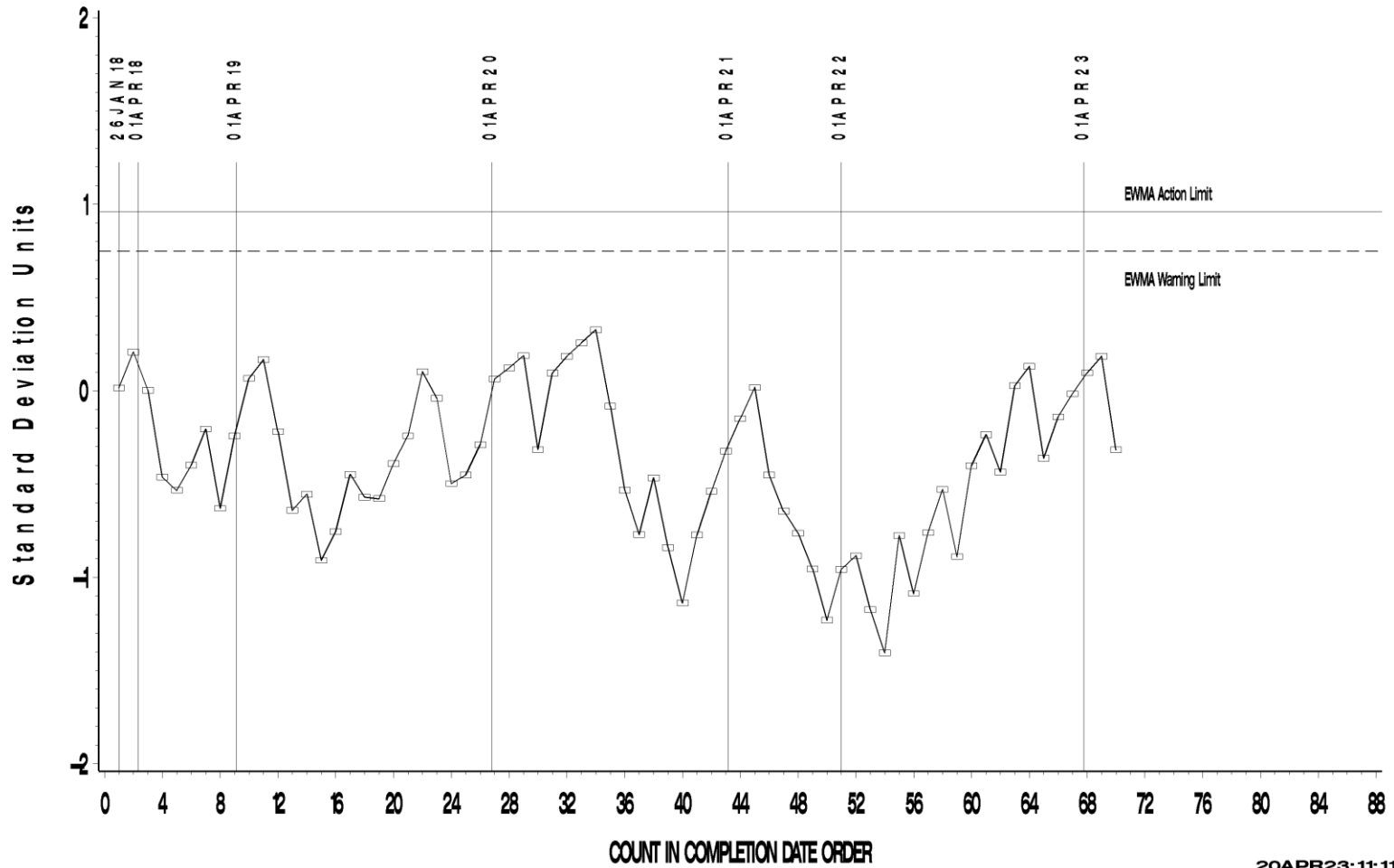
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L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



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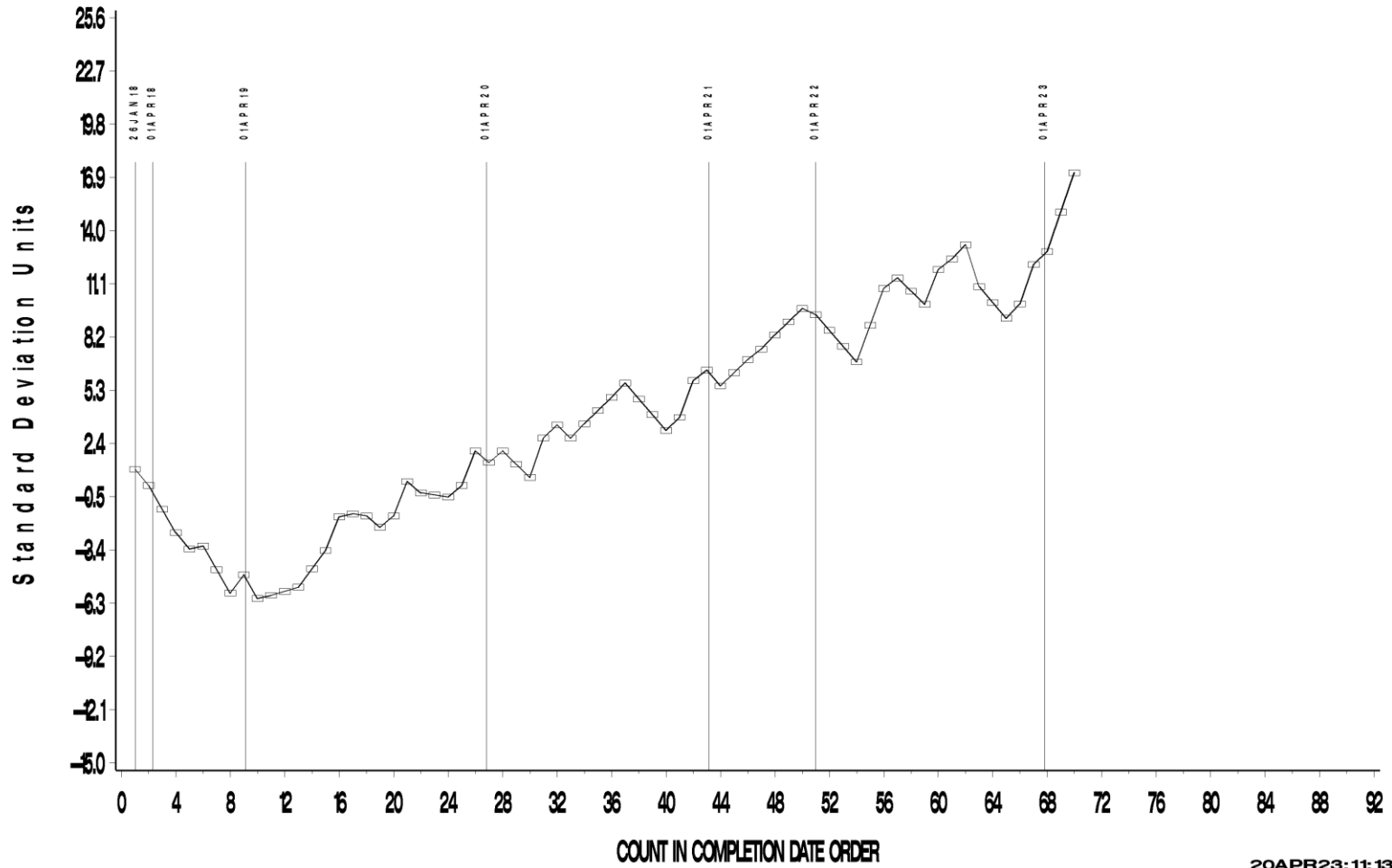
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L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



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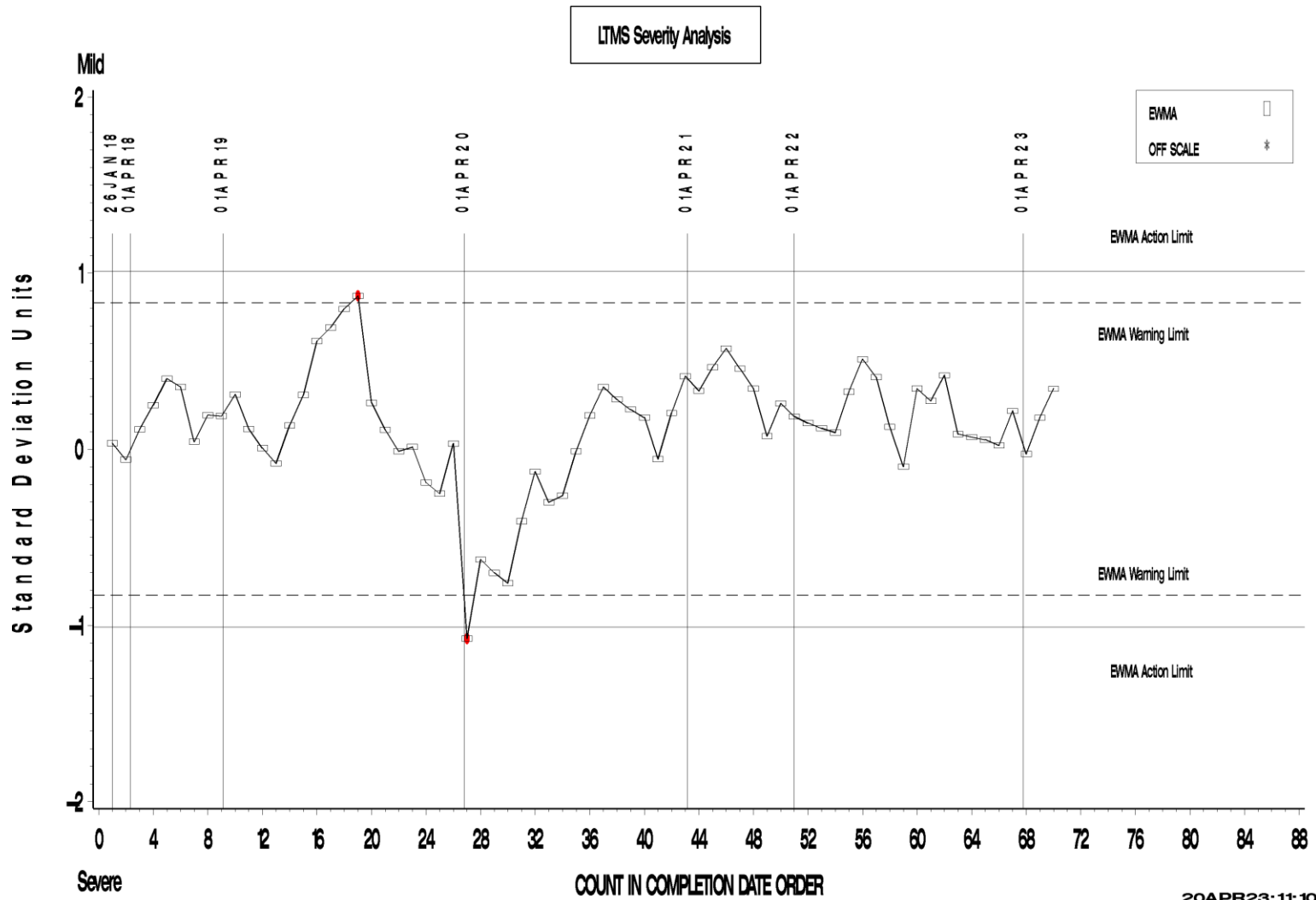
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L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING



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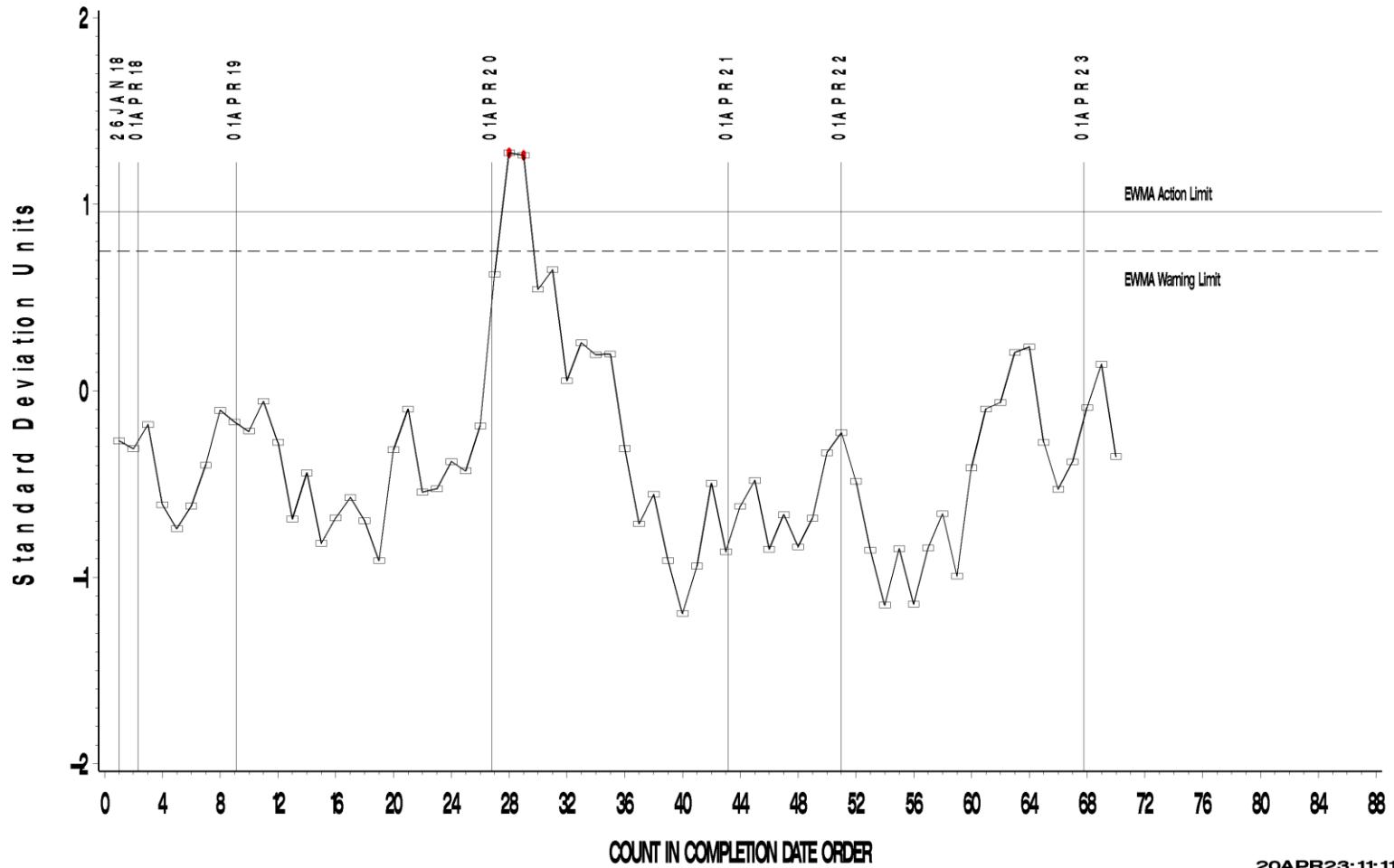
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FINAL PINION GEAR RIDGING

LTMS Precision Analysis



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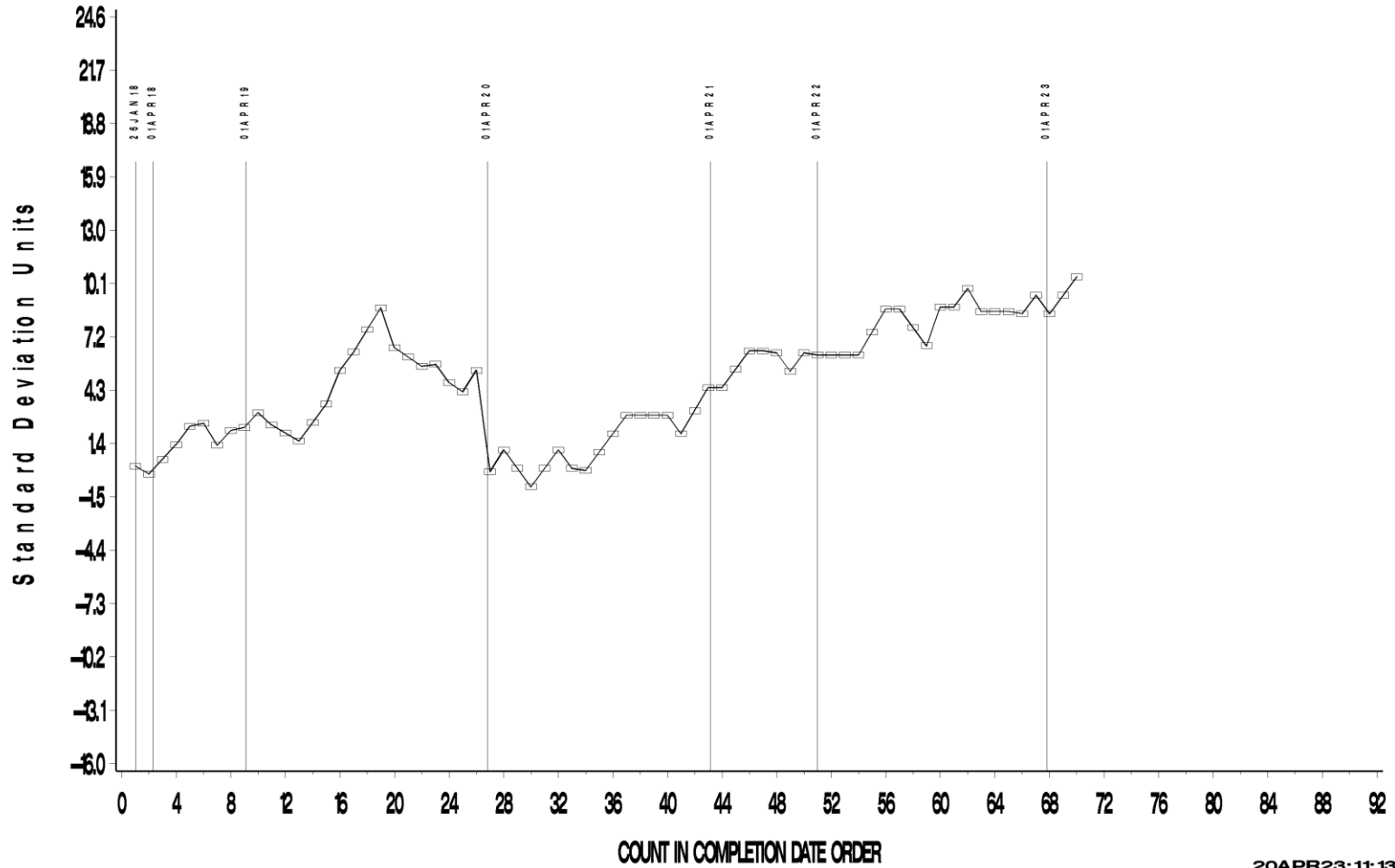
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L-37-1 (D8165)

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FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



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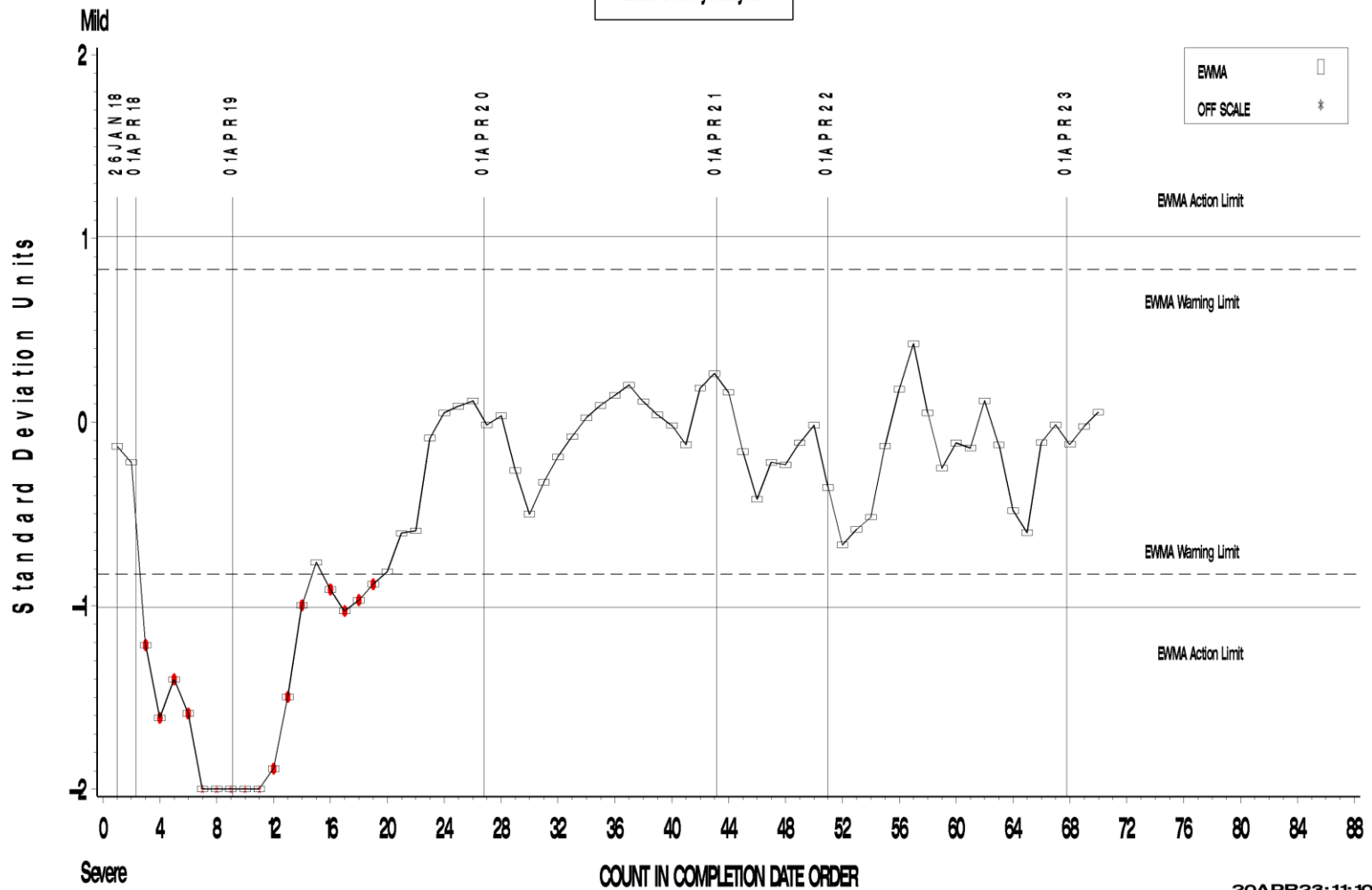
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L-37-1 (D8165)

L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



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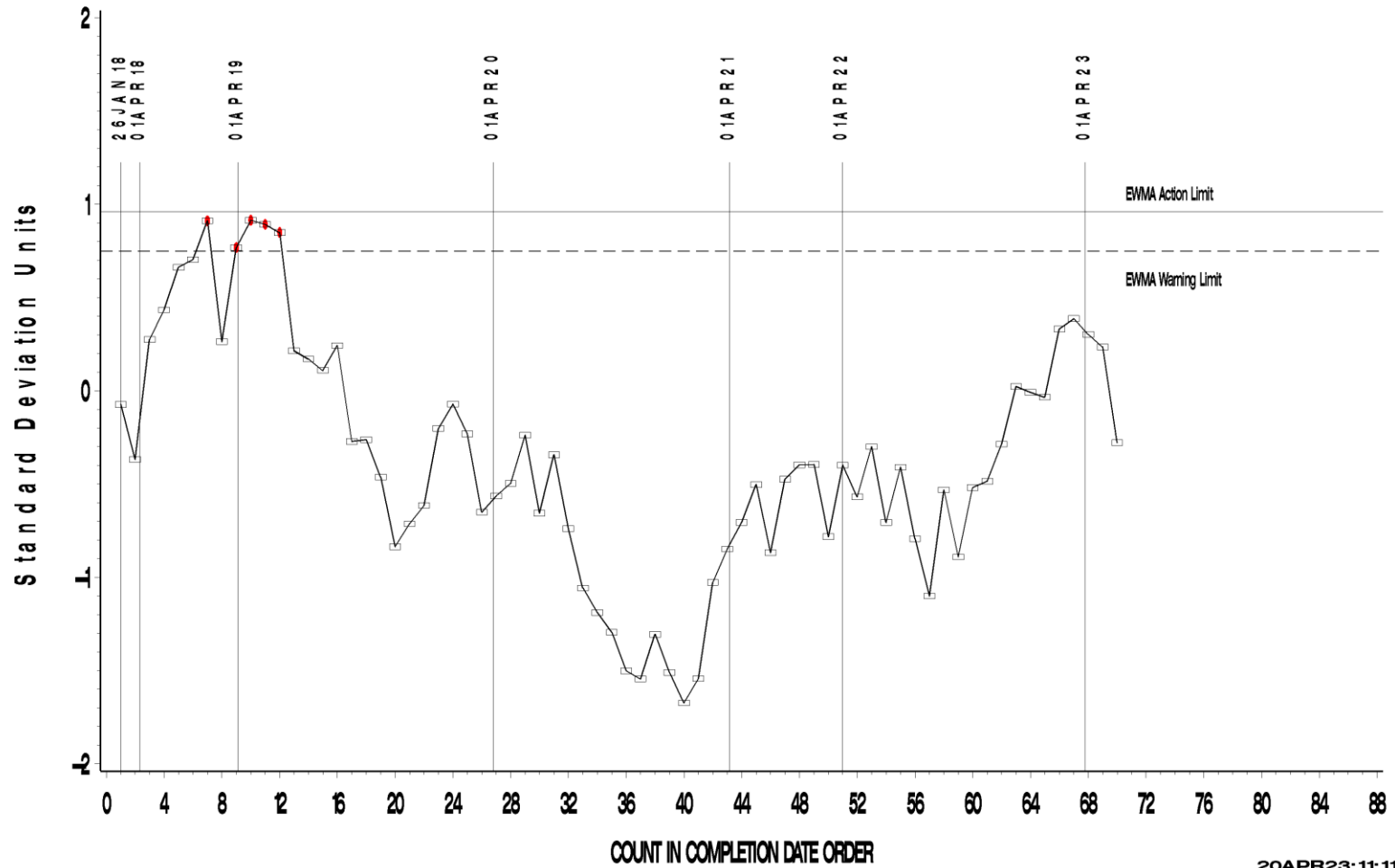
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L-37-1 (D8165)

L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



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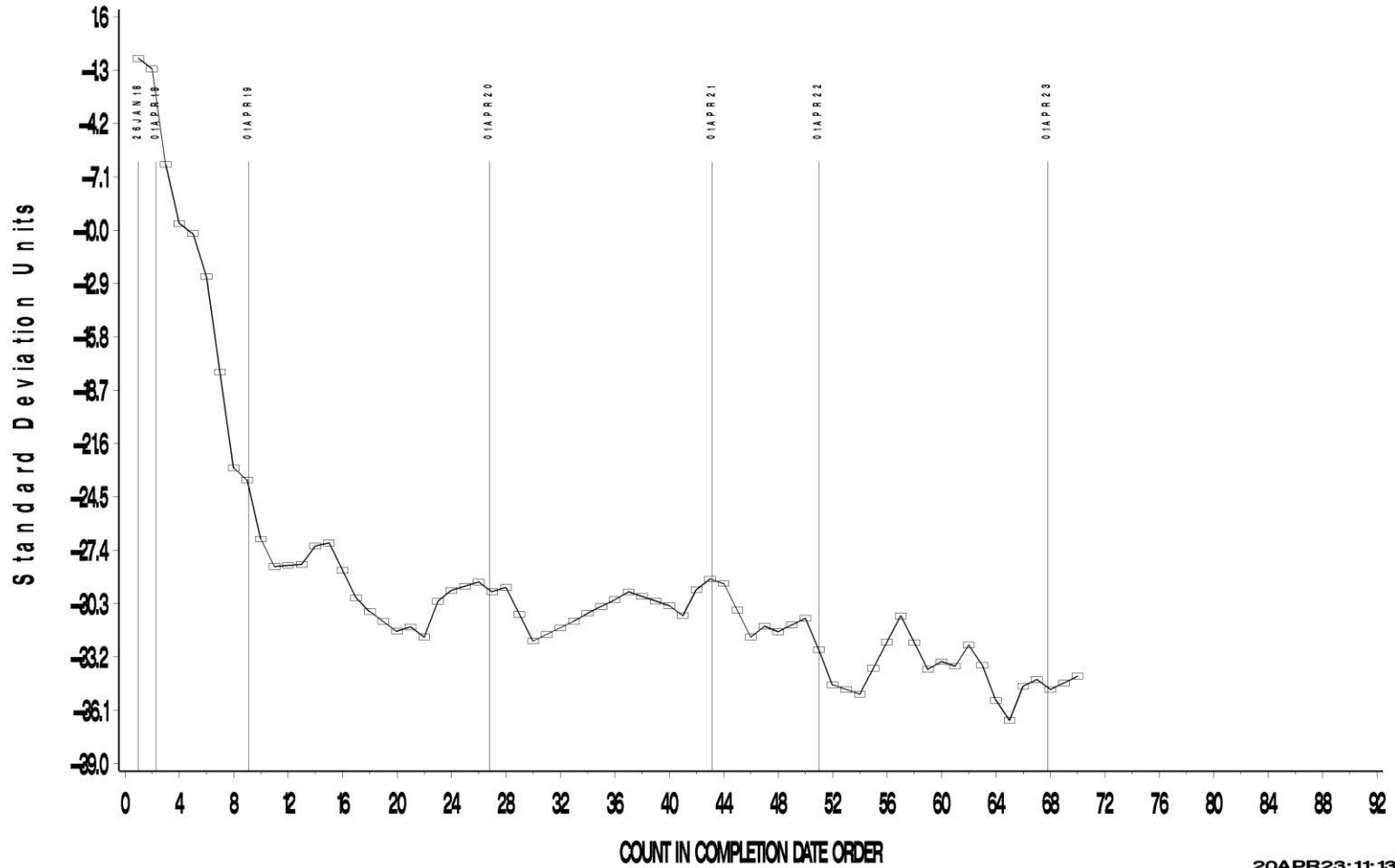
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L-37-1 (D8165)

L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



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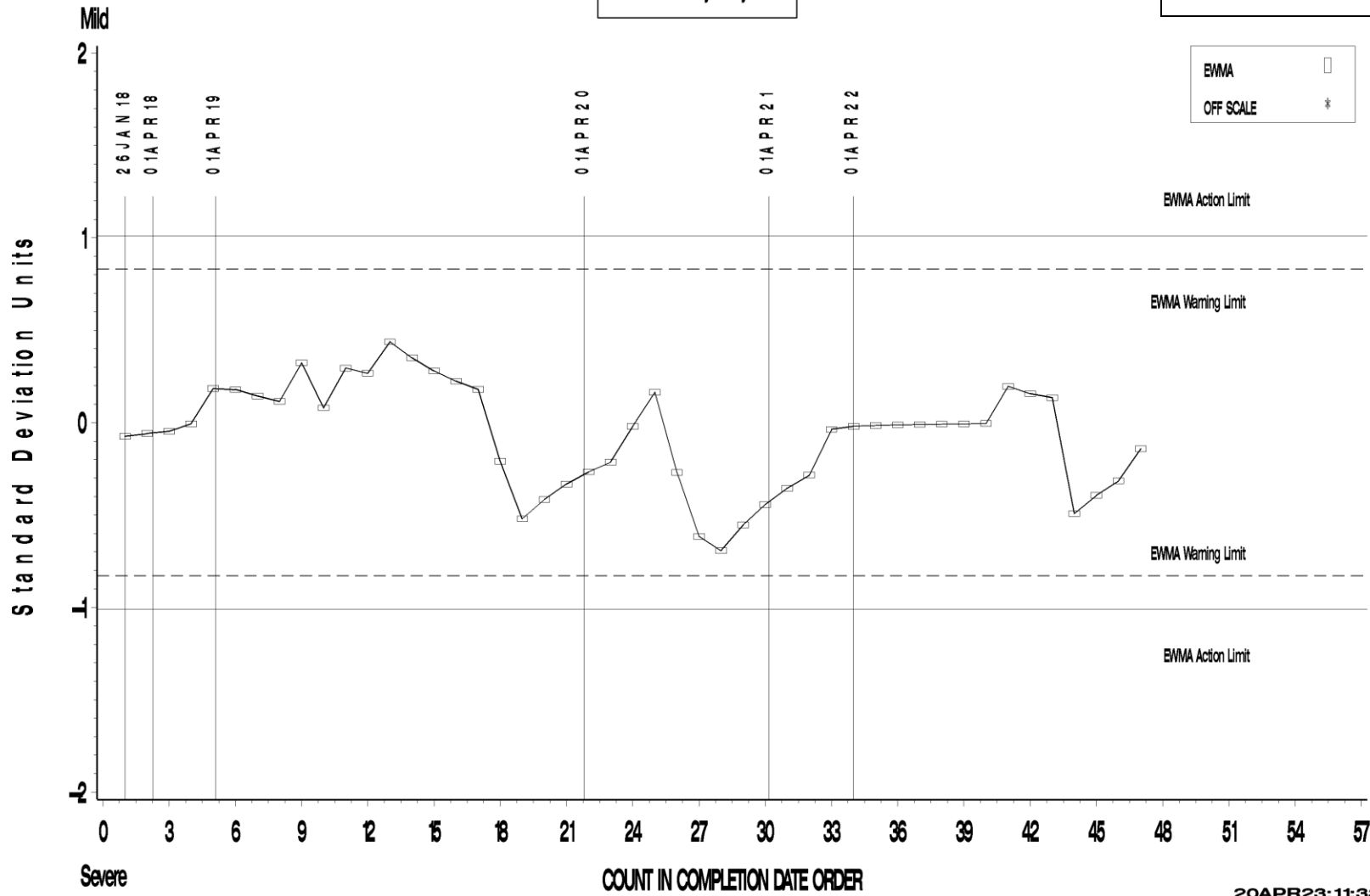
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L-37-1 (D8165)

L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA
 IND not = '155-1'
 FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 are not included in this SPIT chart due to its current targets yielding undefined calculations.

LTMS Severity Analysis



EWMA □
 OFF SCALE *

EWMA Action Limit

EWMA Warning Limit

EWMA Warning Limit

EWMA Action Limit

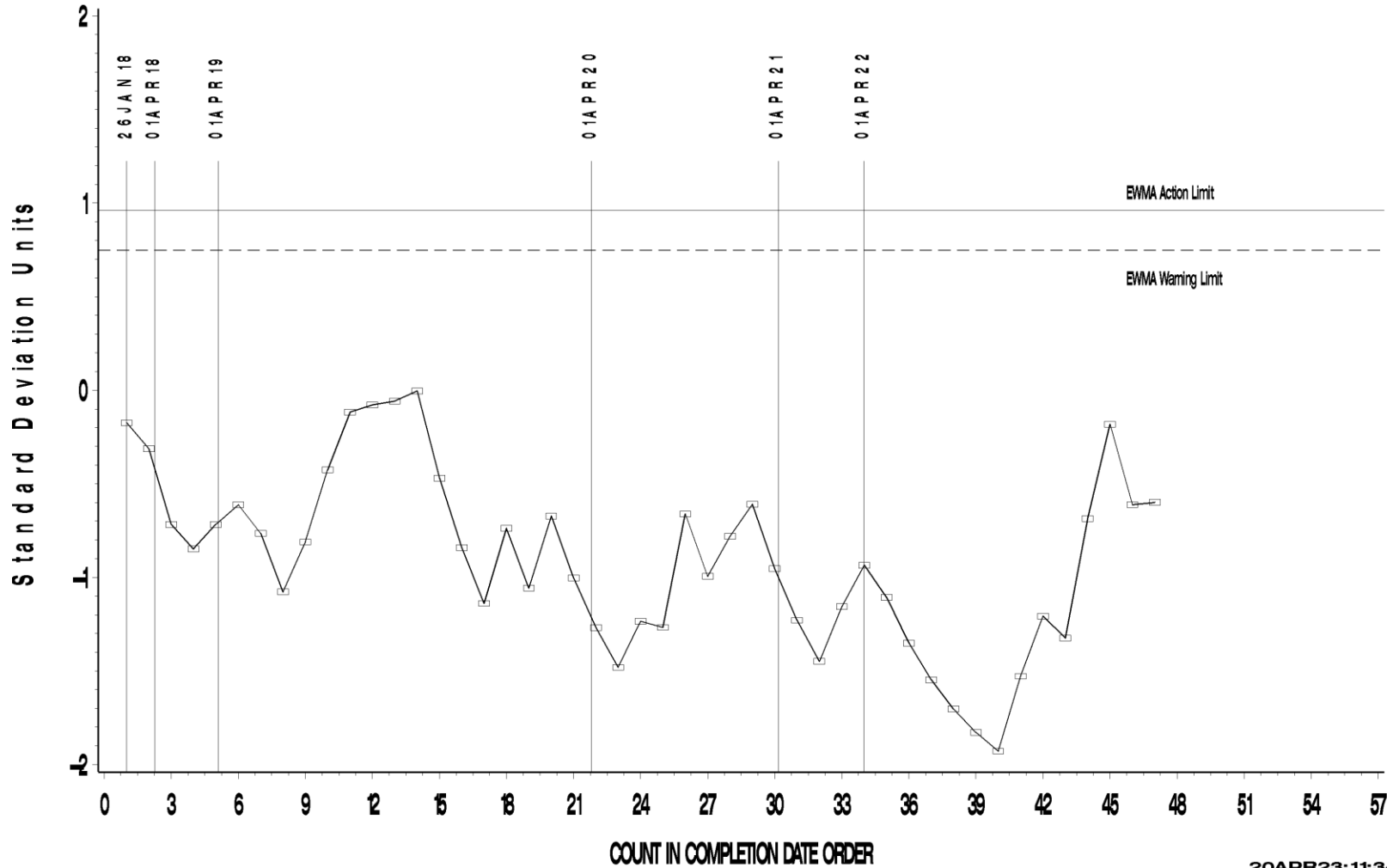


L-37-1 (D8165)

L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA
IND not = '155-1'
FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 are not included in this SPIT chart due to its current targets yielding undefined calculations.

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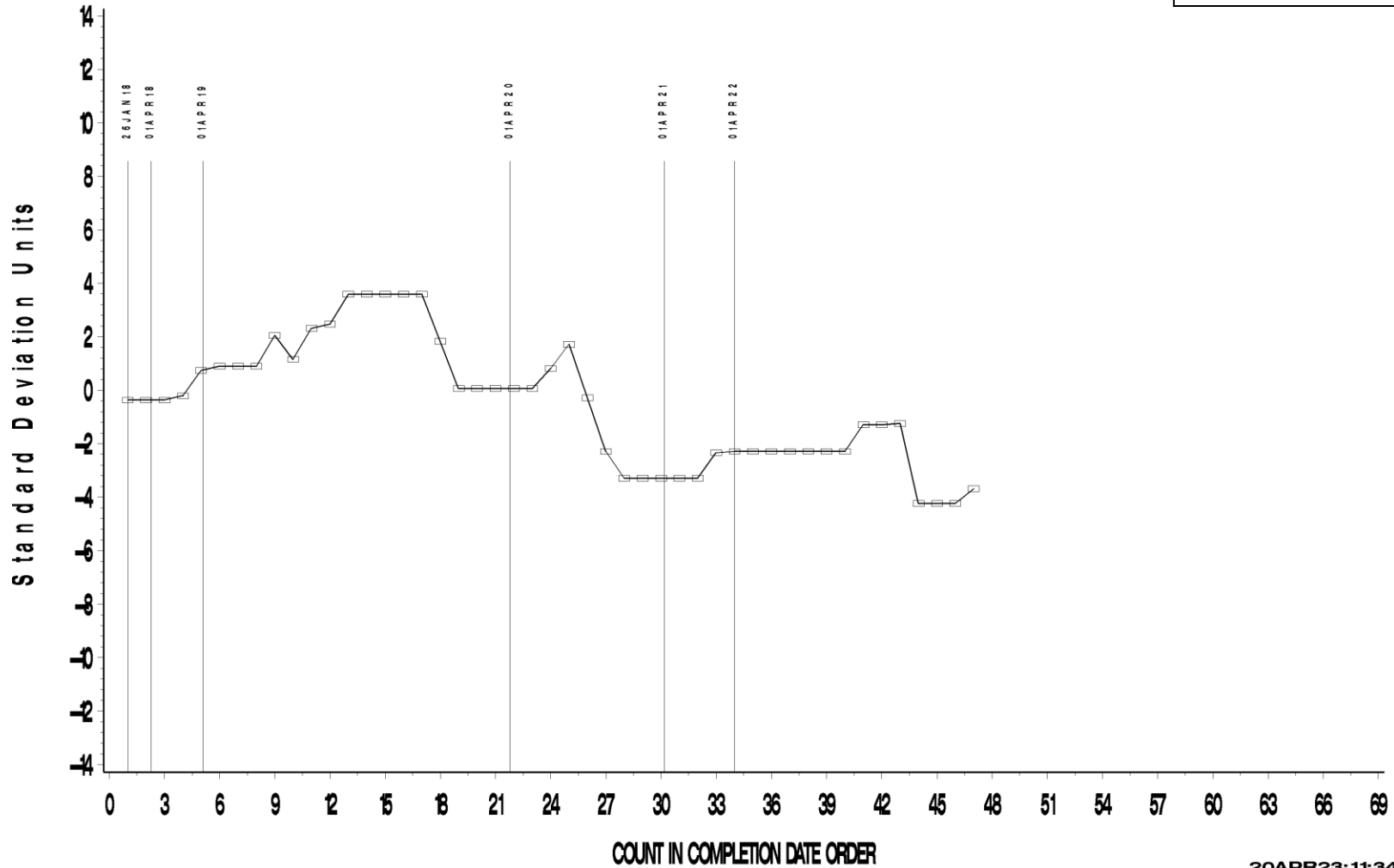
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L-37-1 (D8165)

L-37-1 UNCOATED INDUSTRY OPERATIONALLY VALID DATA
IND not = '155-1'
FINAL PINION GEAR PITTING/SPALLING

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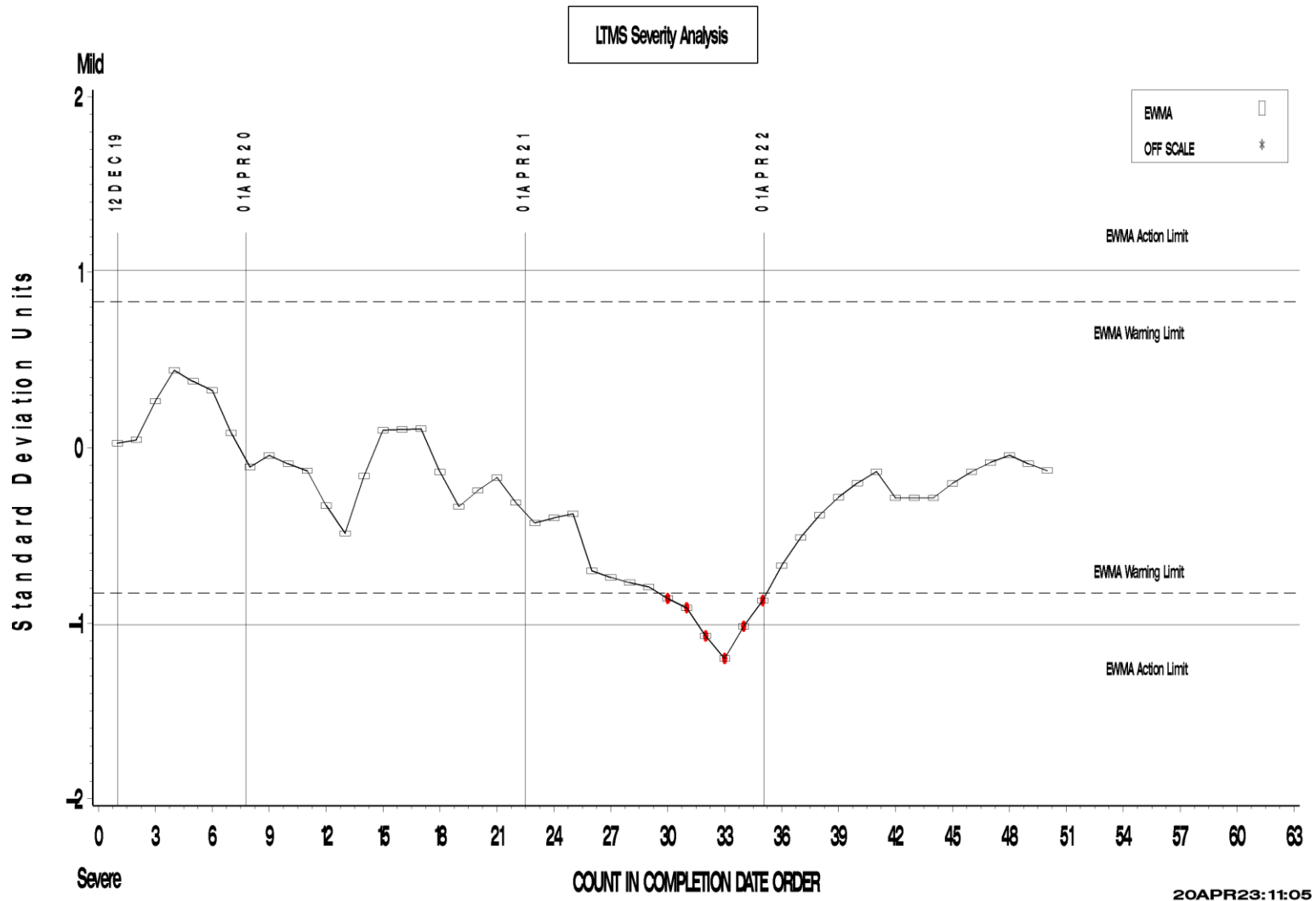
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR



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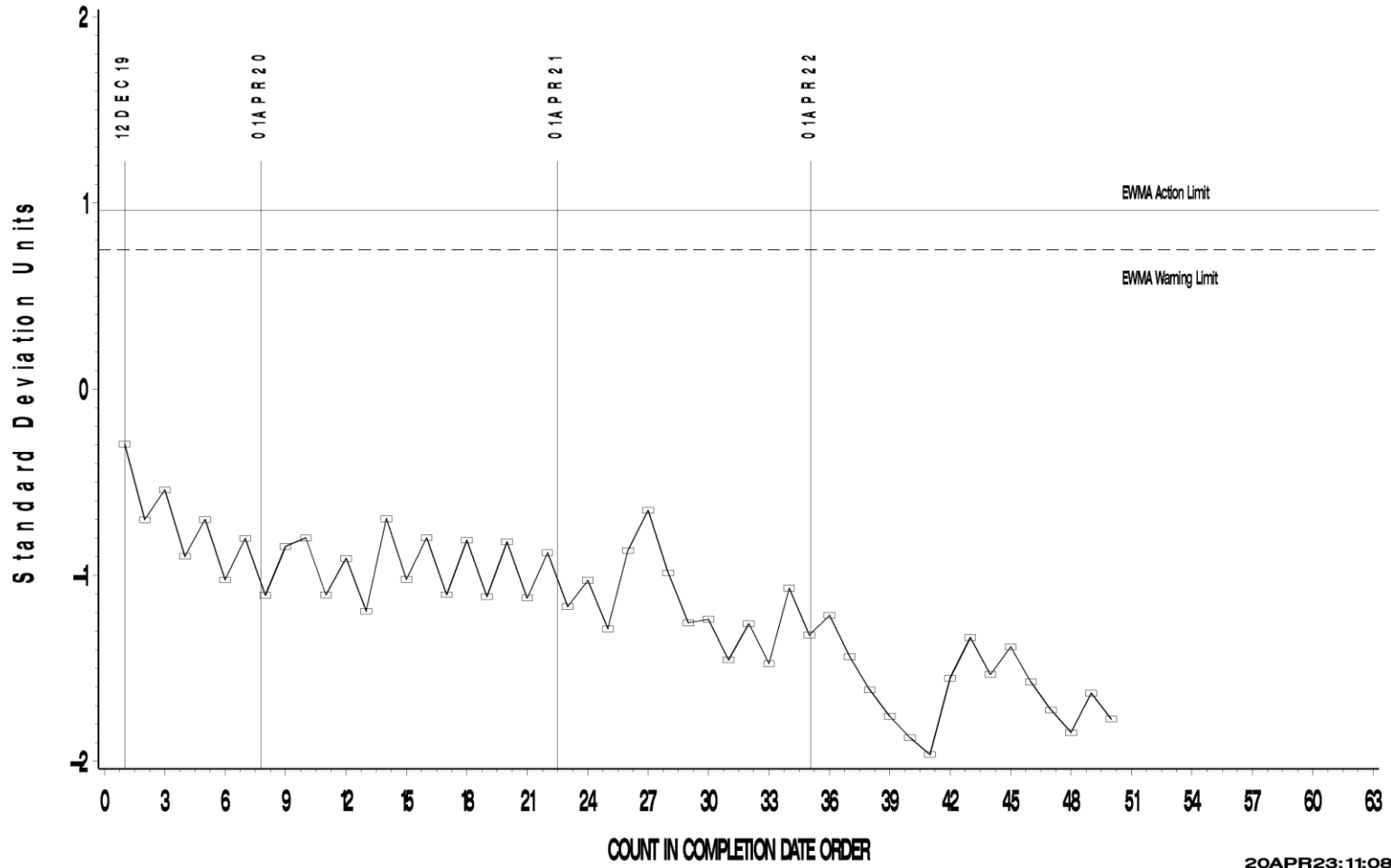
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



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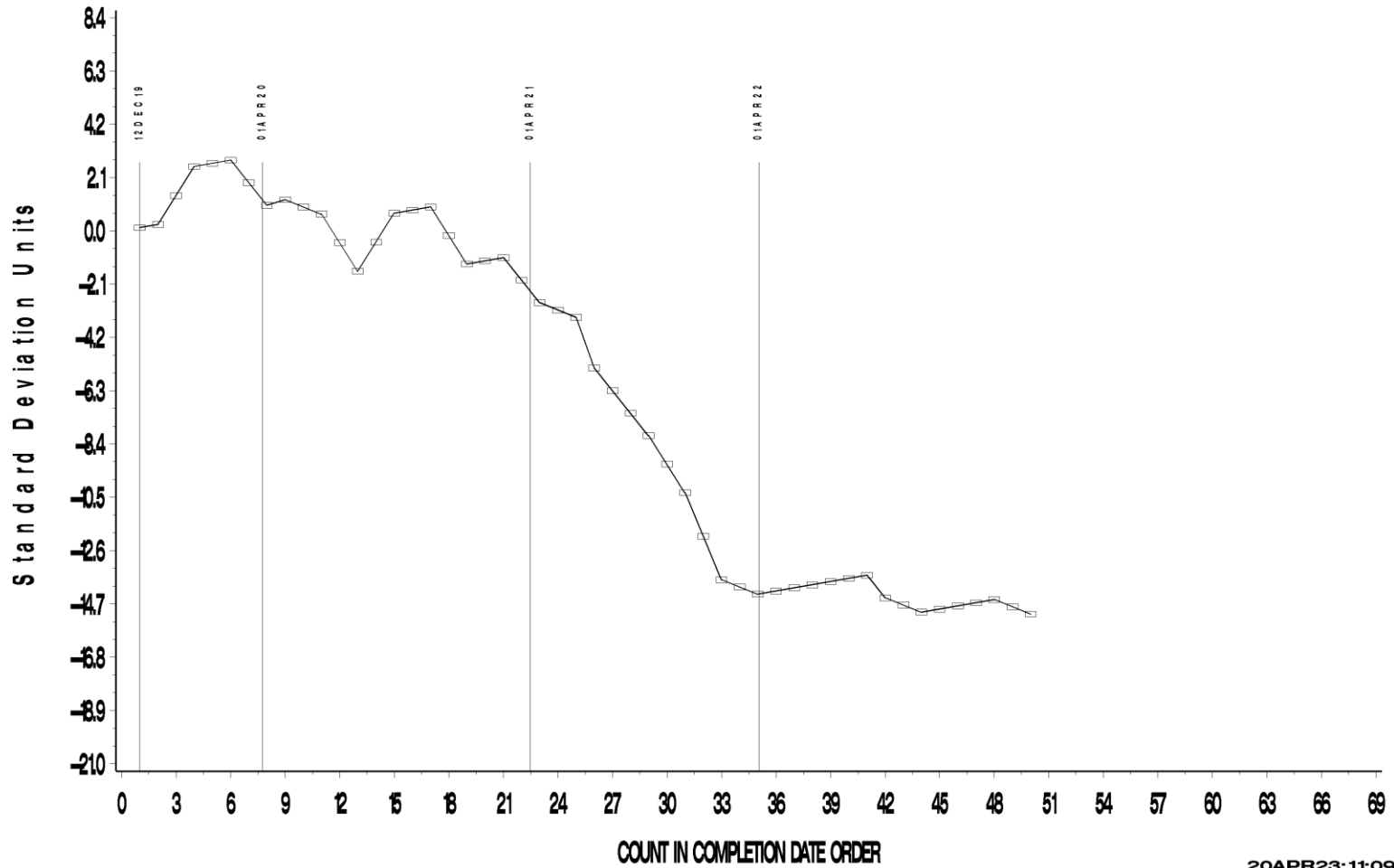
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis



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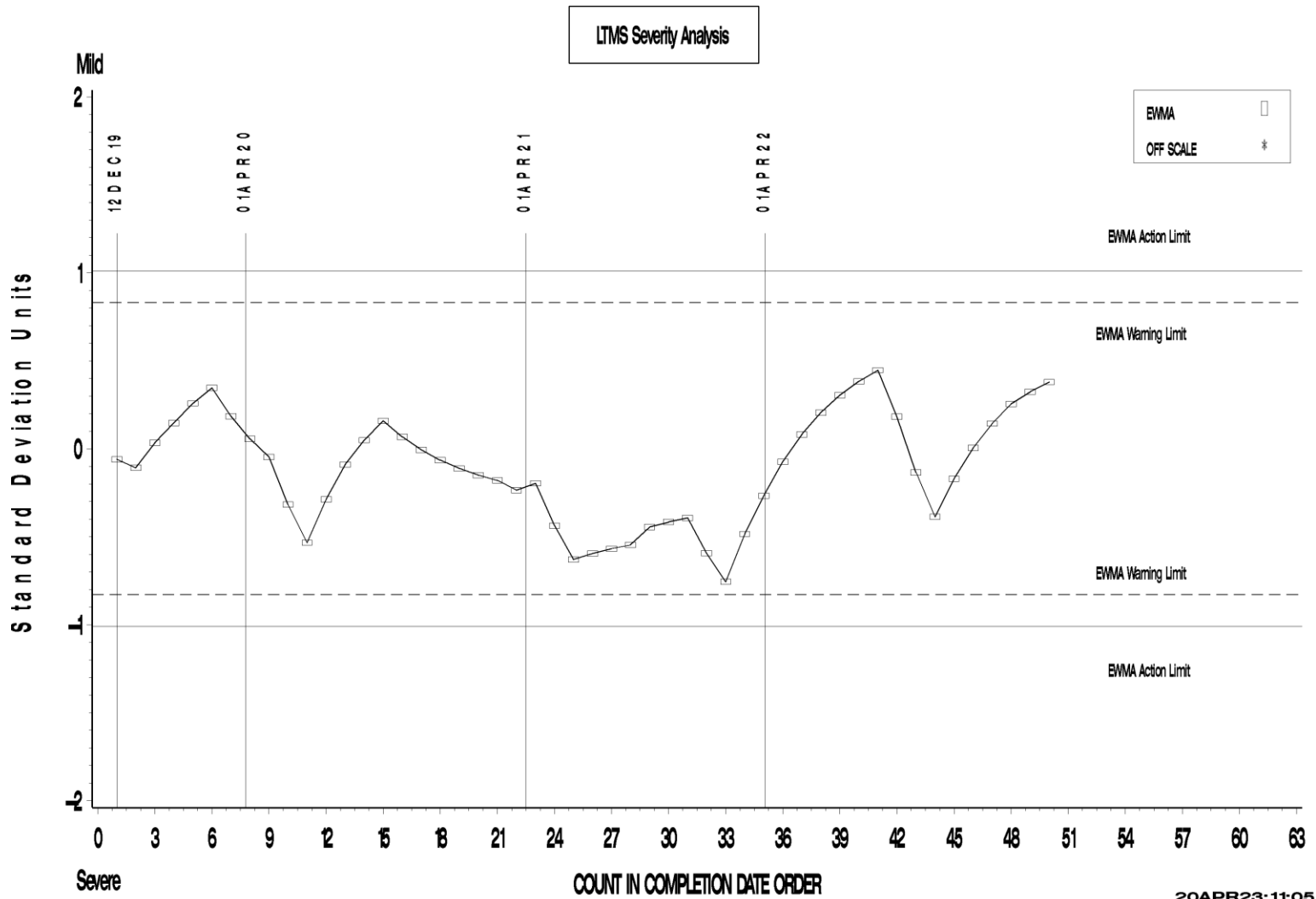
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING



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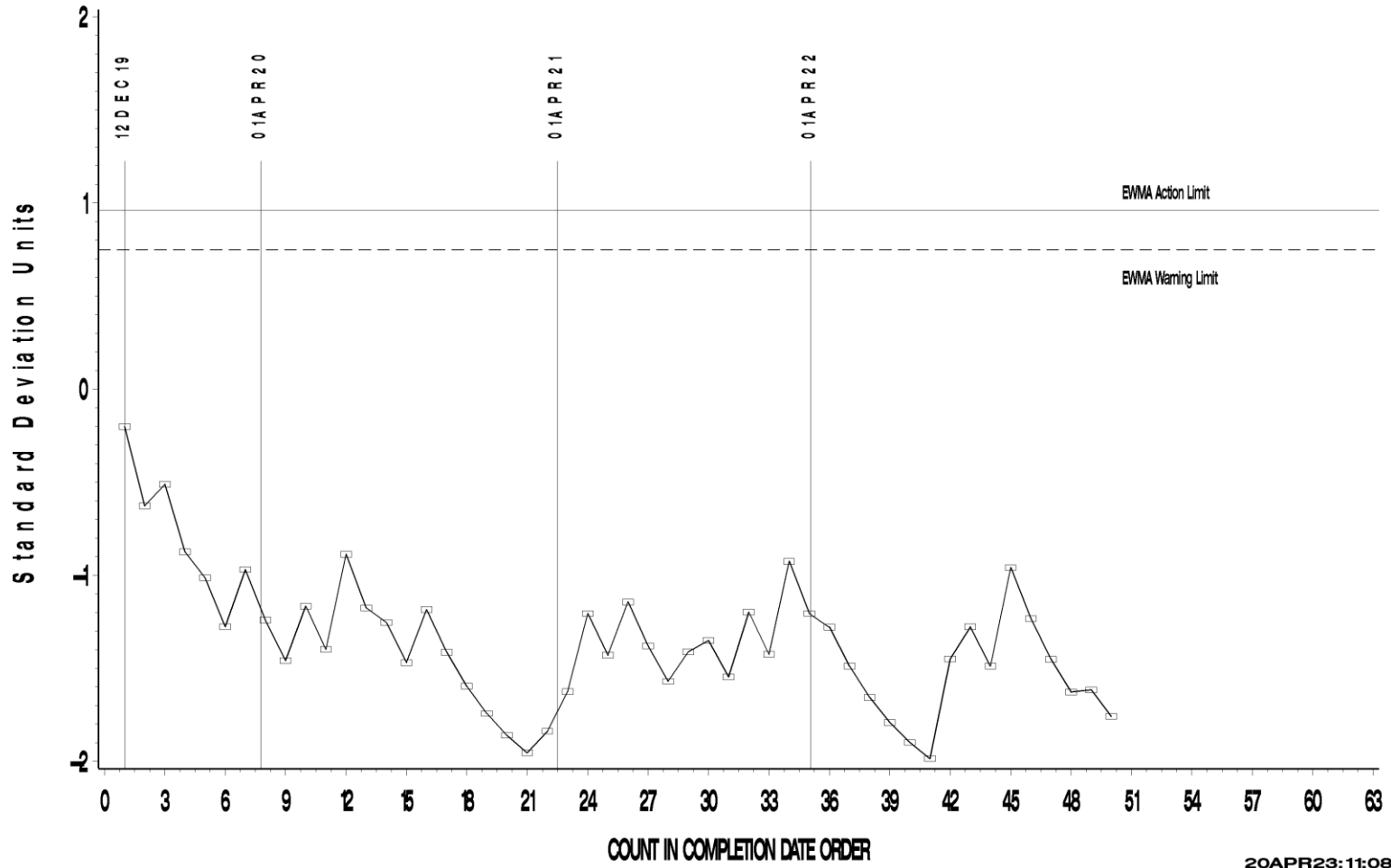
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

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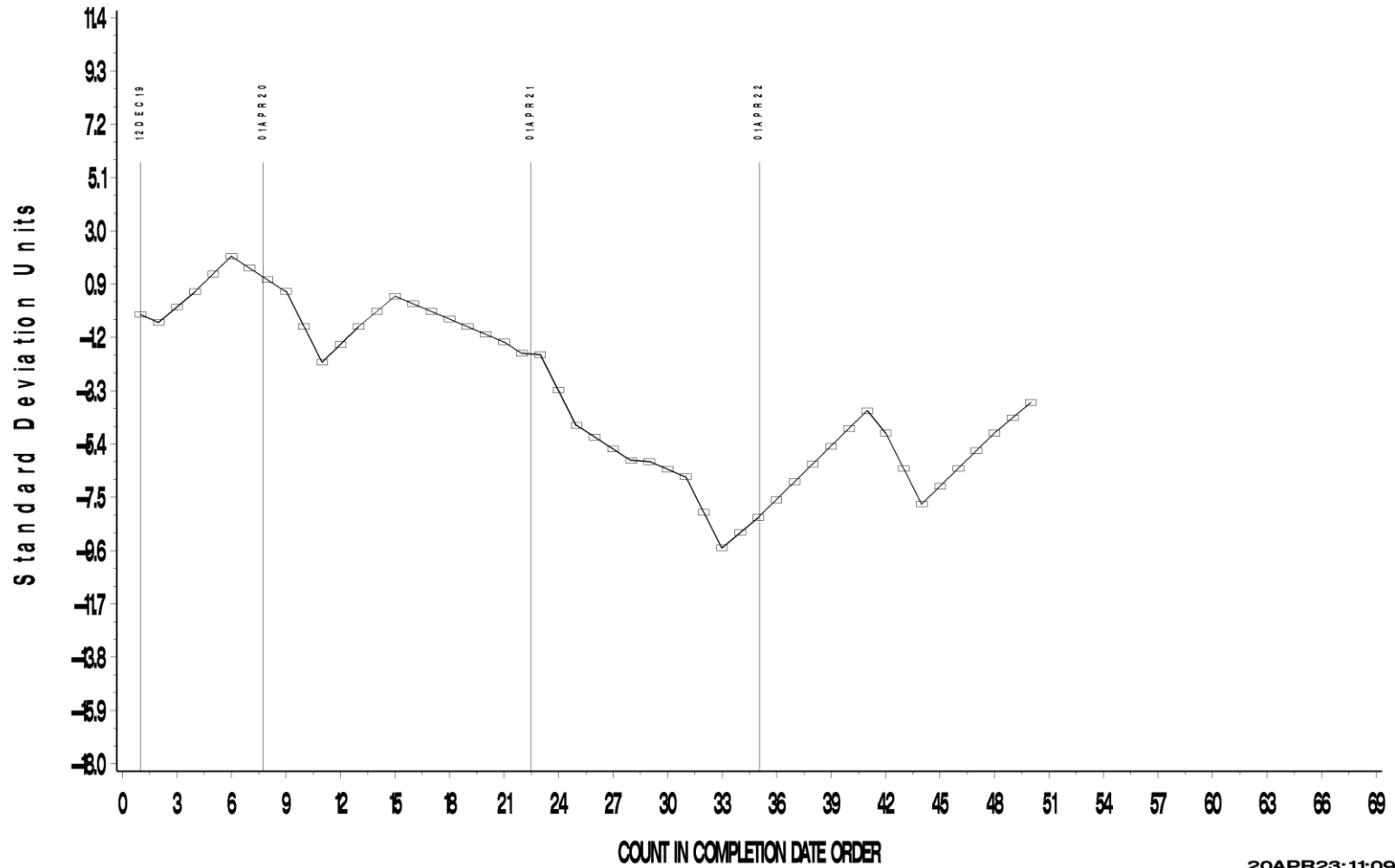
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



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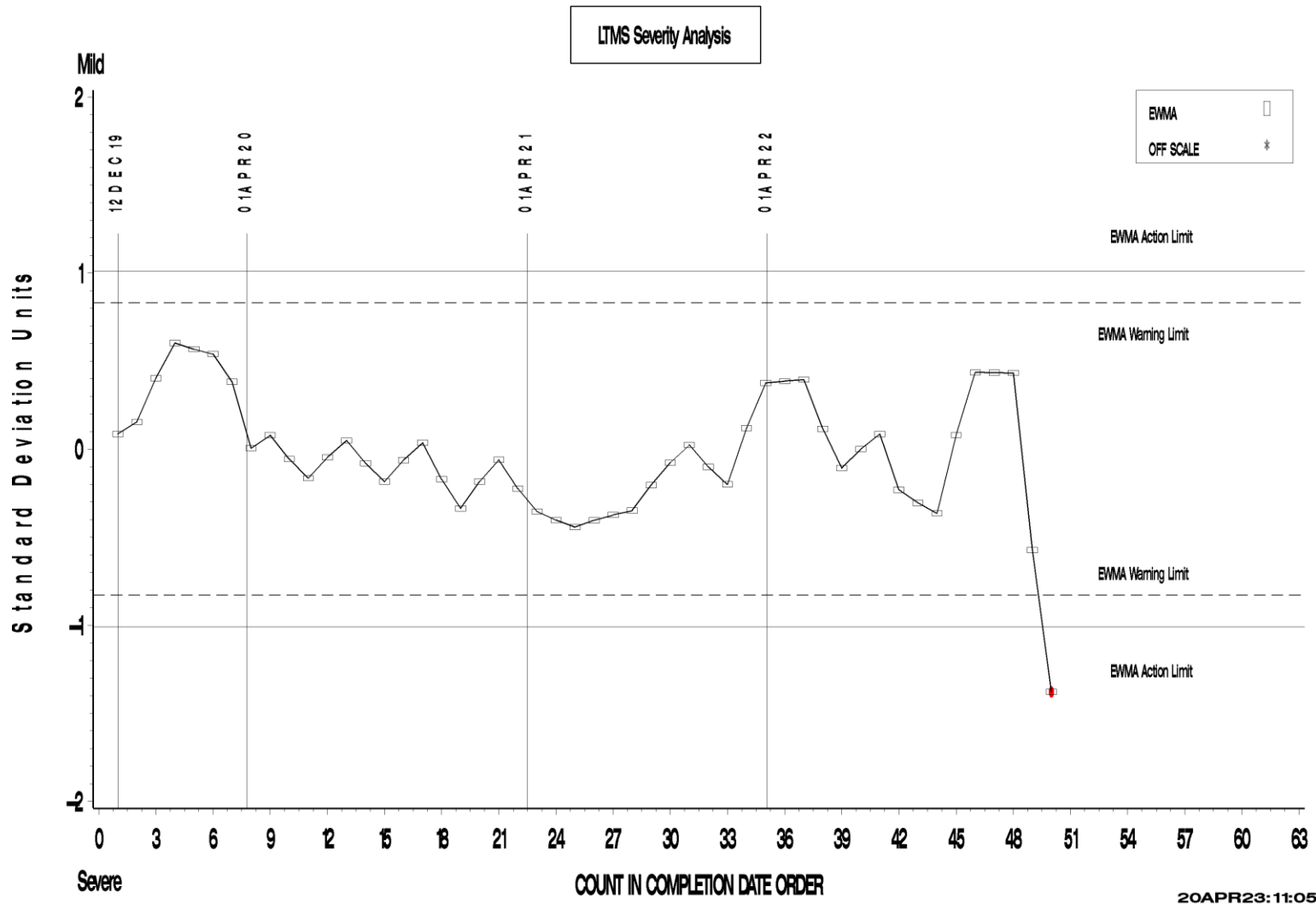
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L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING



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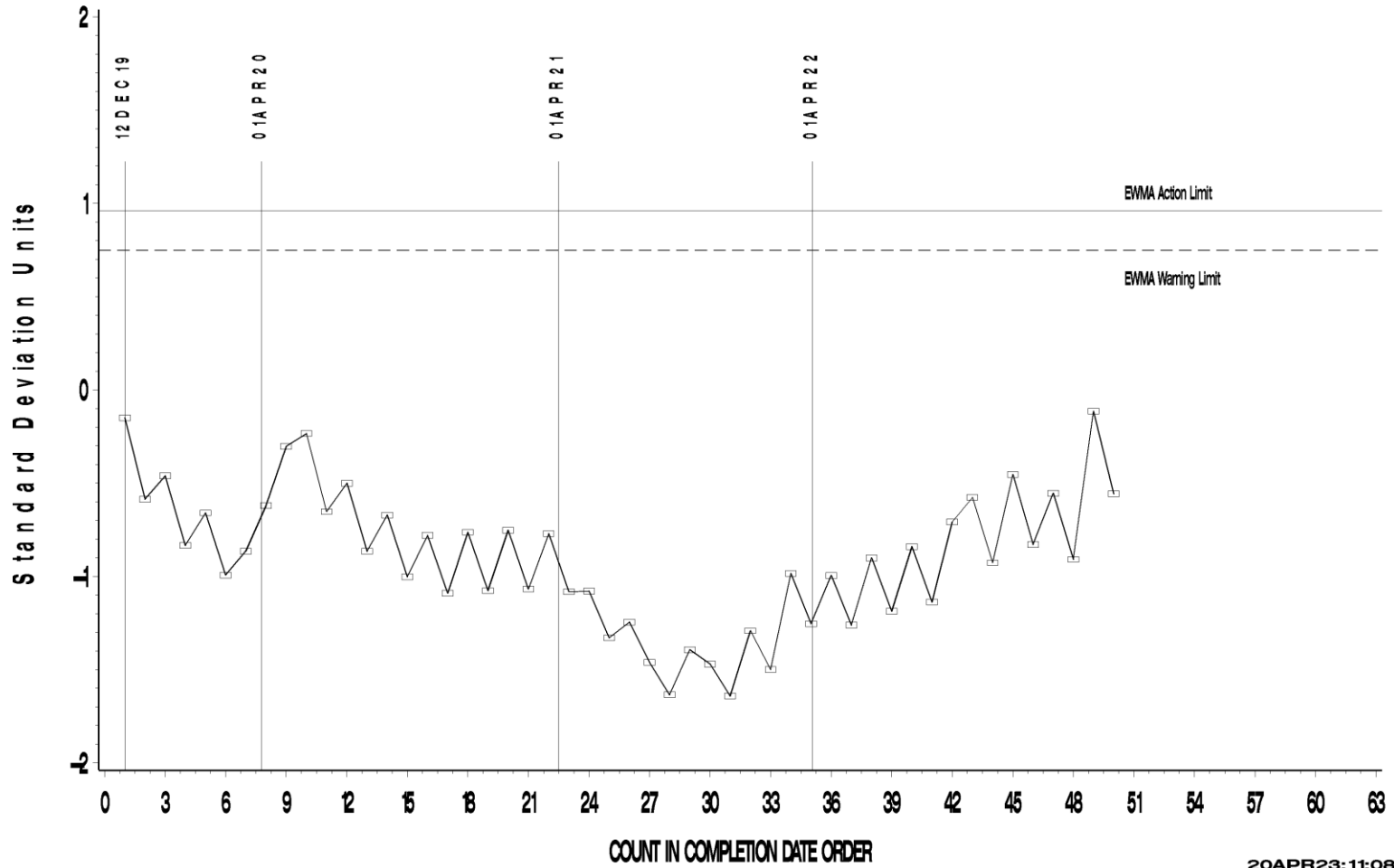
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

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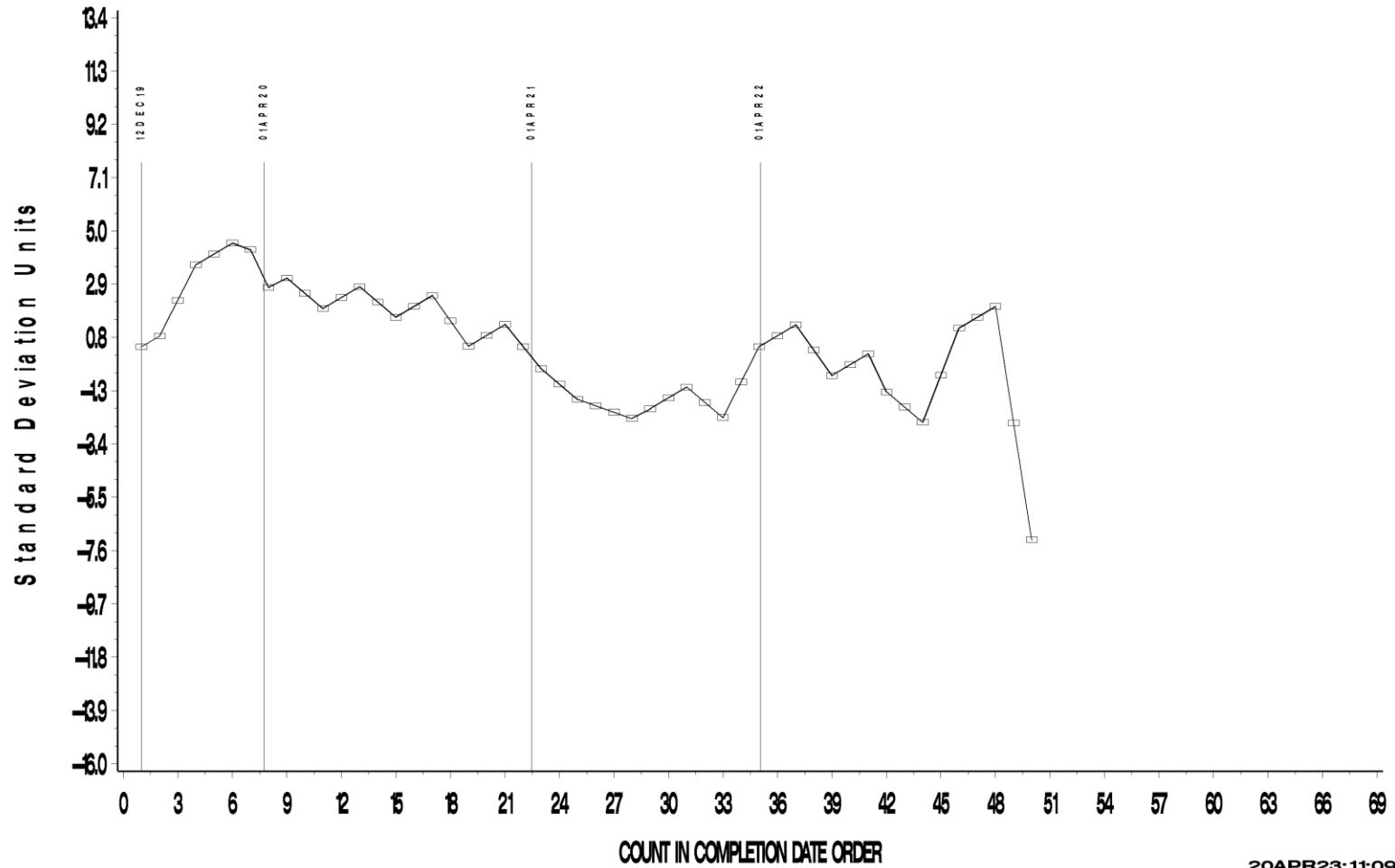
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



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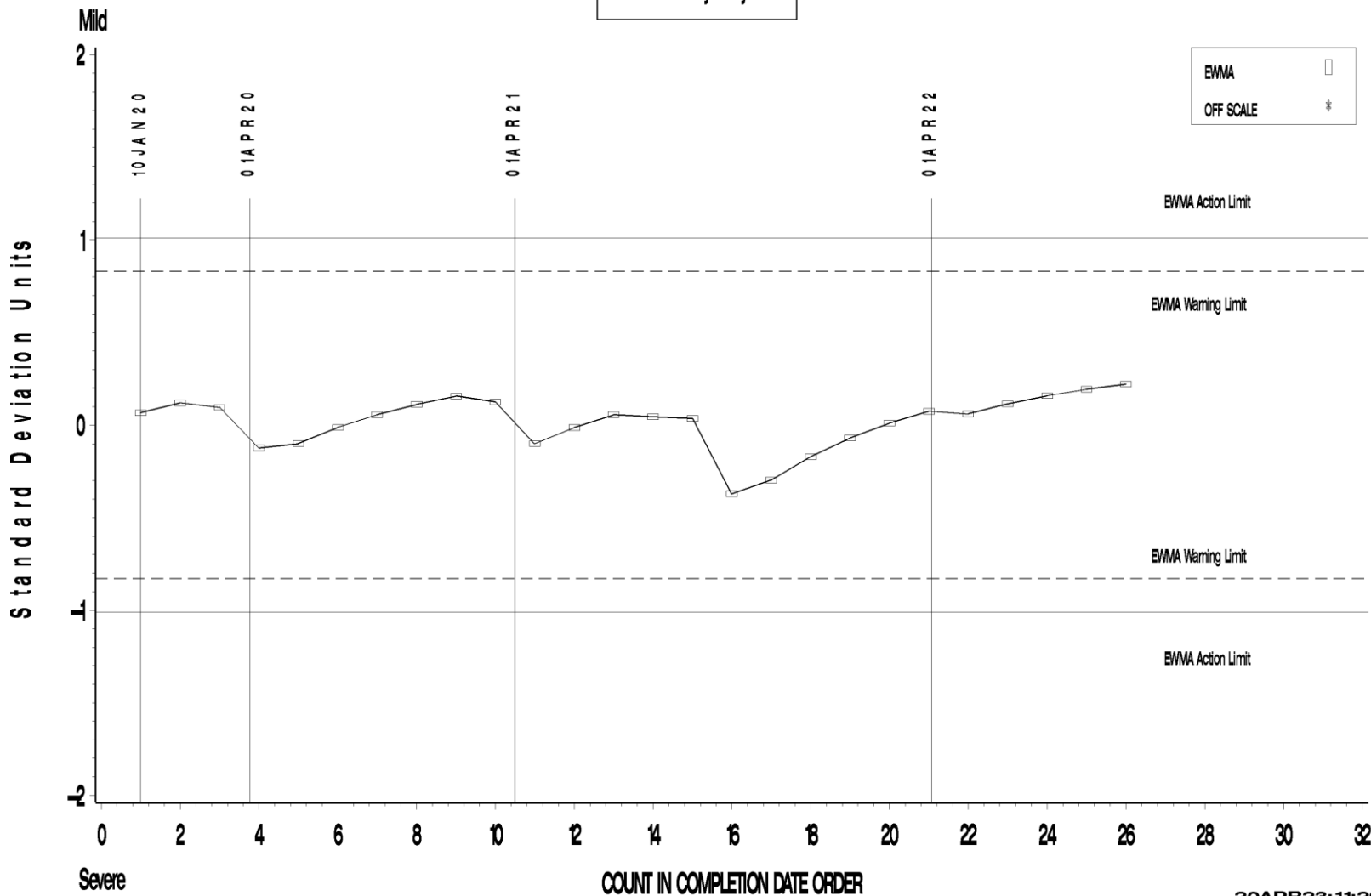
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA
 IND not = '155-1
 FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 are not included in this SPIT chart due to its current targets yielding undefined calculations.

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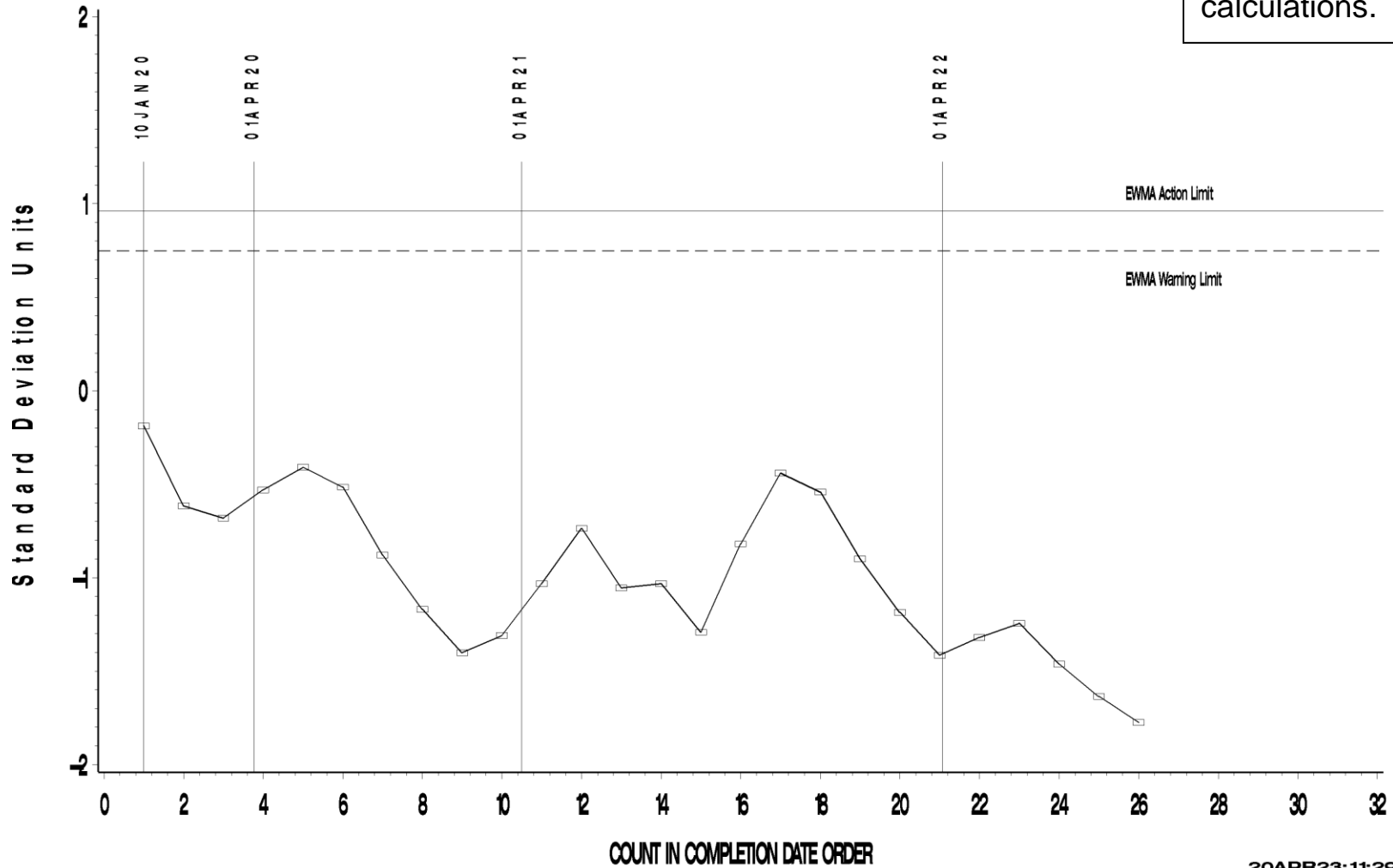
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA
IND not = '155-1
FINAL PINION GEAR PITTING/SPALLING

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LTMS Precision Analysis



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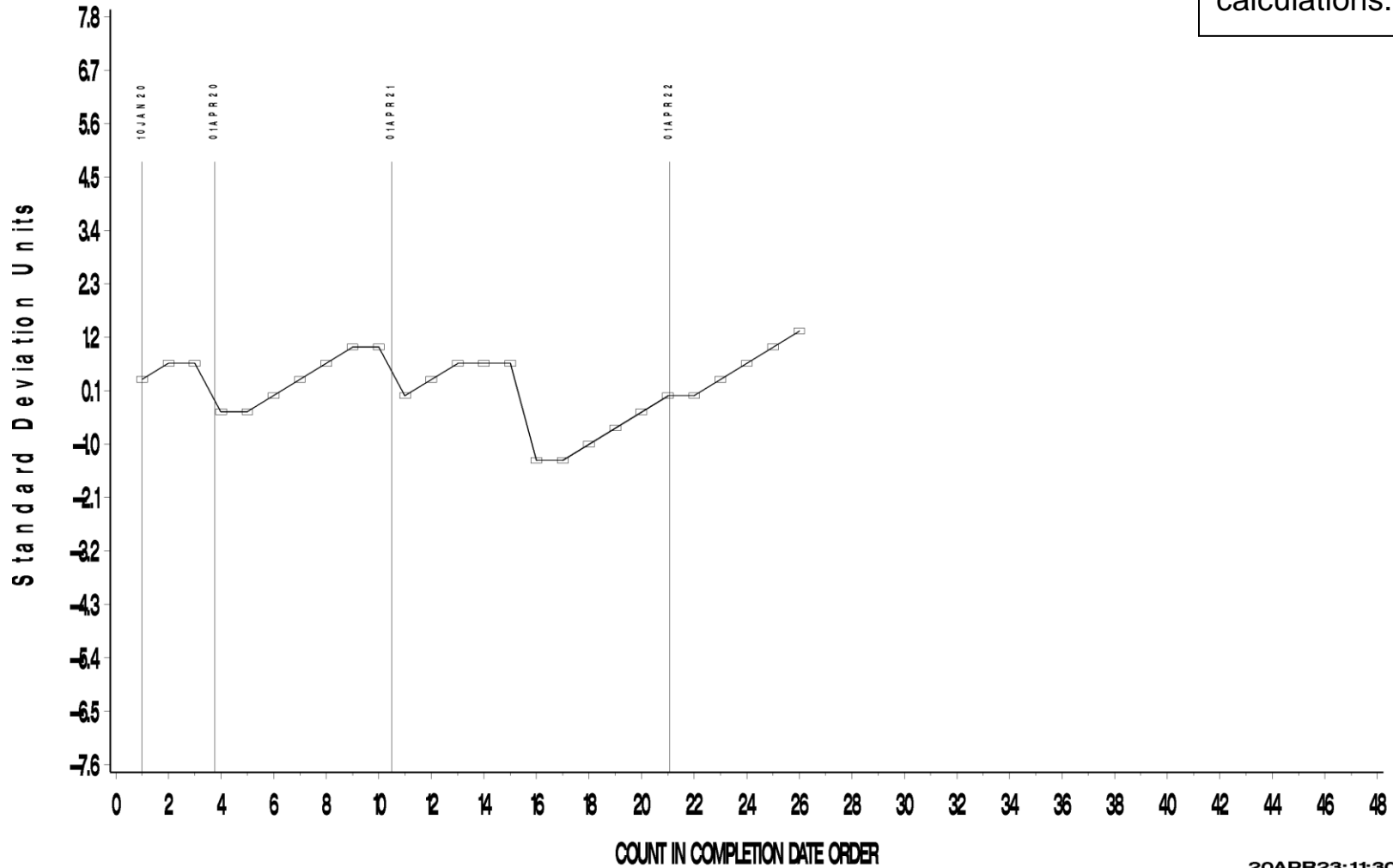
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L-37-1 (D8165)

L-37-1 MNP COATED INDUSTRY OPERATIONALLY VALID DATA
IND not = '155-1
FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 are not included in this SPIT chart due to its current targets yielding undefined calculations.

CUSUM Severity Analysis



L-37-1 (D8165)

TIMELINE ADDITIONS

Effective Date	Information Letter	Event
		No information letters issued during this reporting period.

LAB VISITS

One lab visit was conducted during this reporting period. During the visit the stand configuration and axle build up areas were inspected, and all aspects were found to be in accordance with the test procedure.

L-37-1 (D8165)

INFORMATION LETTERS

No information letters issued during this reporting period.

LTMS DEVIATIONS

No LTMS deviations were written this report period.

L-37-1 (D8165)

STATUS OF REFERENCE OIL SUPPLY

Oil	Cans @ Labs	@ TMC	
		Cans	Gallons
117	9	265.86	274.0
118	3	0	0.0
134	1	0	0.0
134-1	19	110	125.7
152-2	21	44.3	56.0
155	5	32.66	27.5
155-1	18	16.64	30.6
Total	76	469.46	513.8

The TMC quantity remaining presumes usage only for L-371 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 22.9 gal) for use in that test.

A re-blend of 155-1 is available but has not yet been approved by the surveillance panel for L-37-1 test use.