



Test Monitoring Center

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

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

MEMORANDUM: 21-007
DATE: April 15, 2020
TO: Robert Slocum, Chairman, L-37-1 Surveillance Panel
FROM: Dylan Beck *Dylan Beck*
SUBJECT: L-37-1 Testing from October 1, 2020 through March 31, 2021

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

DJB/djb/mem21-007.djb.doc

cc: Frank Farber
Jeff Clark

L-37 Surveillance Panel

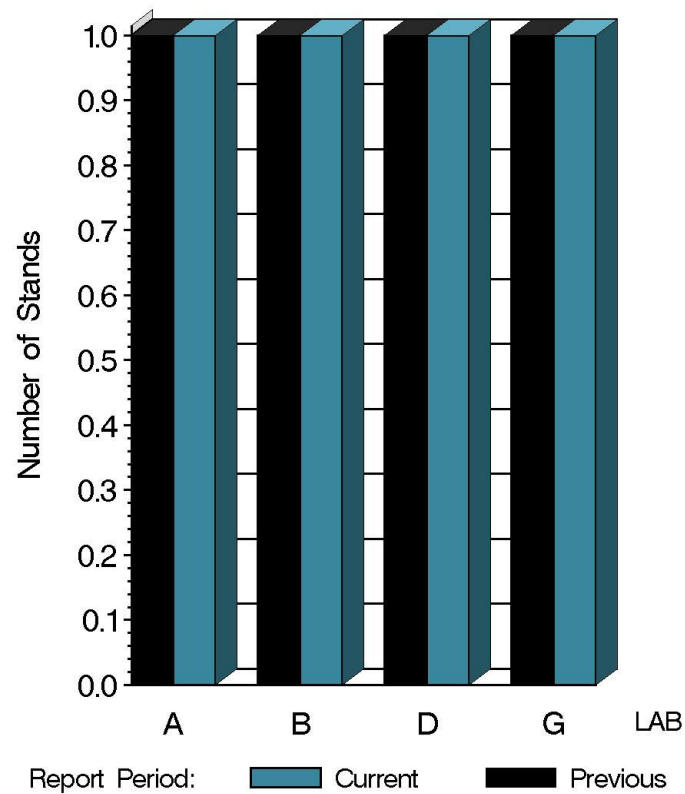
<http://www.astmtmc.cmu.edu/ftp/docs/gear/1371/semiannualreports/1371-04-2021.pdf>

Distribution: email

L-37-1 (D8165)

	Reporting Data	Calibrated on 3-31-21
Number of Labs	4	4
Number of Stands	4	4

BY-LAB STAND
DISTRIBUTION



8:44:18 08APR2021

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	2	3	4	8	9	
Rejected (Mild)	OC	0	1	0	1	1	
Rejected (Severe)	OC	0	2	2	1	4	
Rejected (Precision)	OC	0	0	0	0	0	
Aborted run	XC	0	0	0	1	0	
Acceptable info run	NI	0	0	0	15	0	
Total		2	6	6	26	14	

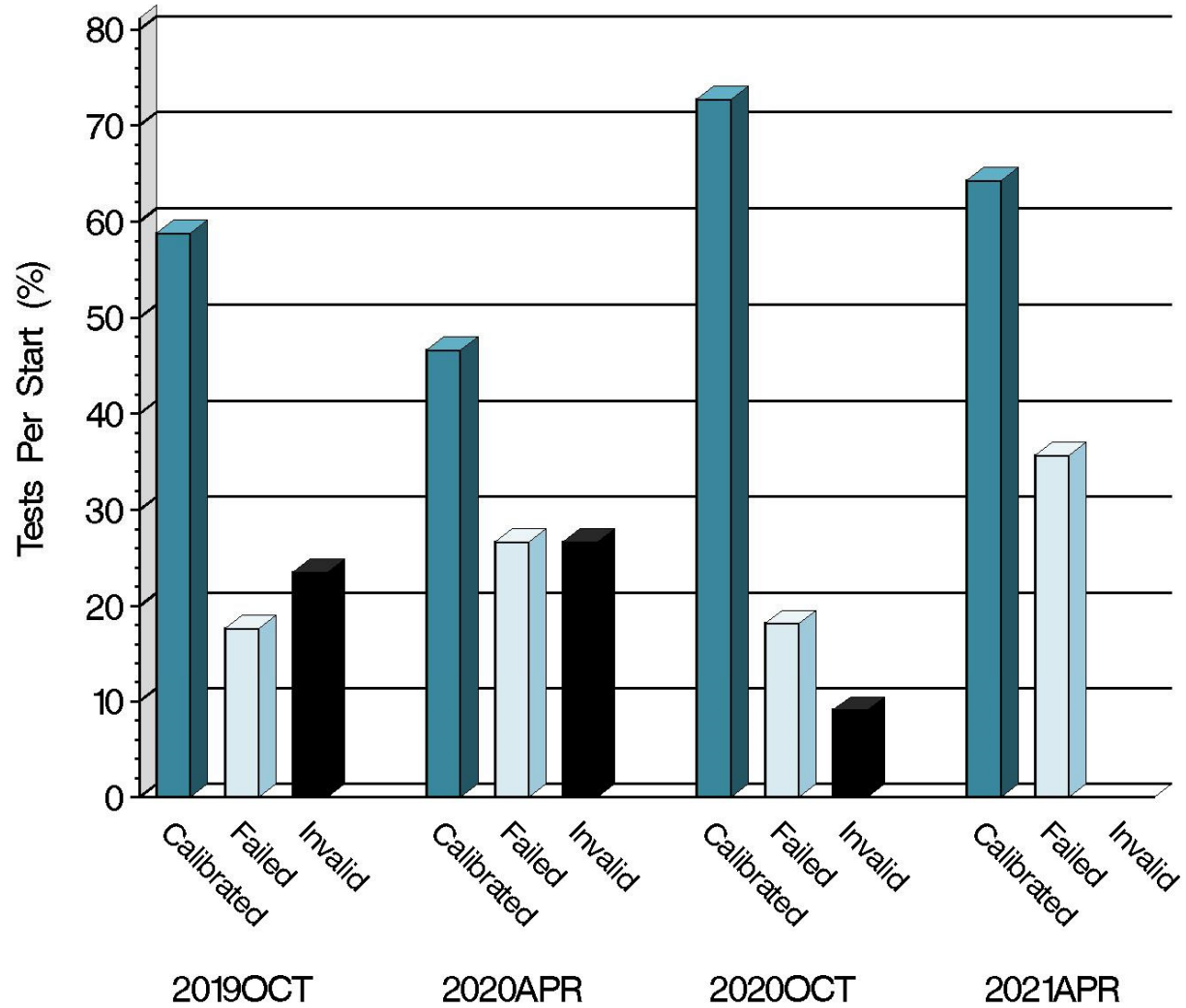
L-37-1 (D8165)

Calibration Attempt Detail

	Gear Batch	Acceptable	Aborted	Failed	Total
LUBRITED	04-2014	4	0	2	6
NONLUBRITED	06-2018	0	0	0	0
	12-2019	3	0	1	4
	01-2020	2	0	2	4
	Total	9	0	5	14

L-37-1 (D8165)

CALIBRATION ATTEMPT SUMMARY



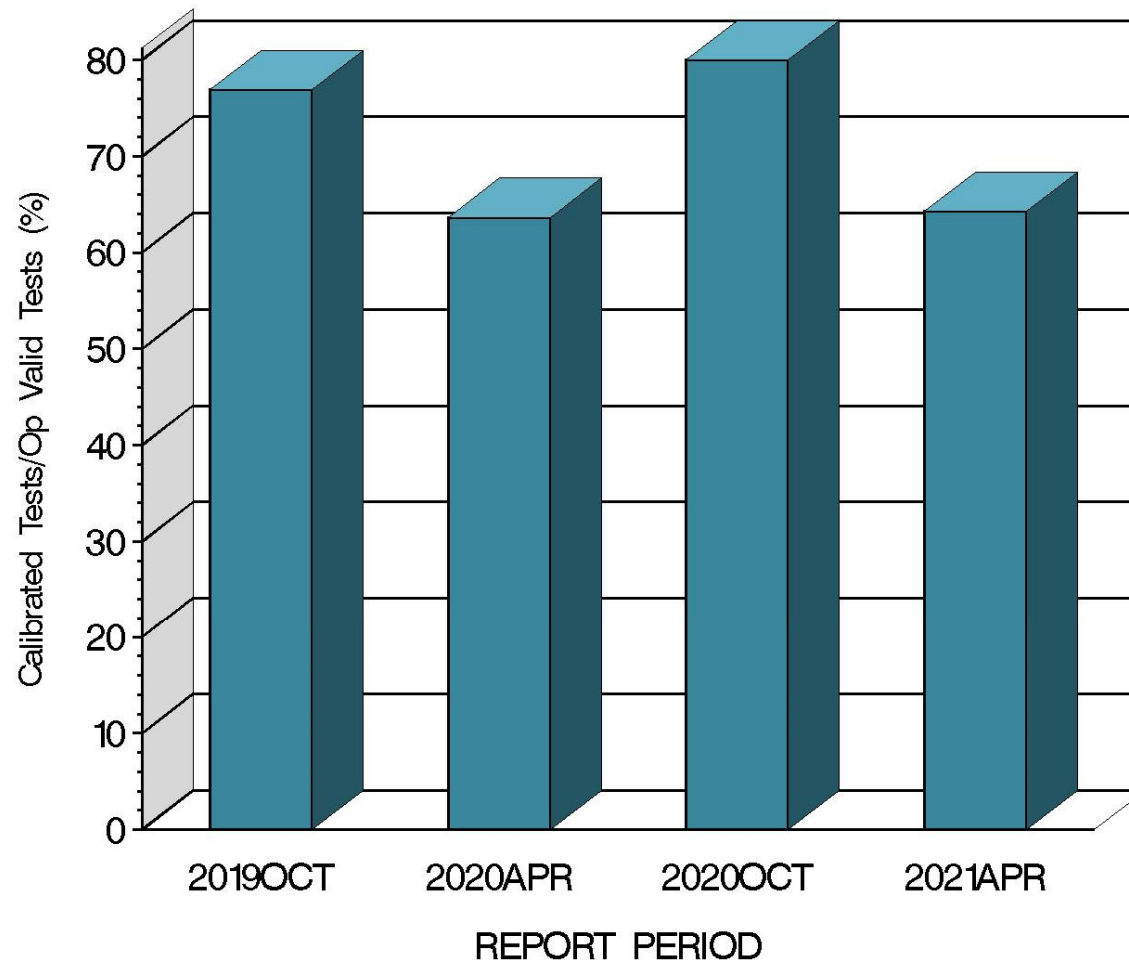
Resolution

Report Period

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OPERATIONALLY VALID TESTS
MEETING ACCEPTANCE CRITERIA



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CAUSES FOR LOST TESTS

Lab	Cause	Oil				Validity			Loss Rate		
		134	134-1	152-2	155-1	XC	LC	XI	Lost	Starts	%
	No lost tests this period								0	14	0%
	Lost	0	0	0	0	0	0	0			
	Starts	0	2	6	6	14	14	14			
	%	0%	0%	0%	0%	0%	0%	0%			

L-37-1 (D8165)

GEAR BATCH SEVERITY

LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	04-2014	6	-0.010	0.516	-0.010	-0.014
RIPP	04-2014	6	-0.198	0.699	-0.198	-0.094
SPIT	04-2014	6	0.167	0.236	0.167	0.097
WEAR	04-2014	6	-0.291	0.911	-0.291	-0.151

NON-LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	12-2019	4	0.625	1.090	0.438	0.291
RIPP	12-2019	4	0.471	0.805	0.187	0.104
SPIT	12-2019	4	0.300	0.520	-0.683	-0.579
WEAR	12-2019	4	1.016	0.662	0.276	0.197
RIDG	01-2020	4	0.250	0.500	0.438	0.291
RIPP	01-2020	4	-0.097	0.307	0.187	0.104
SPIT	01-2020	4	-1.667	0.577	-0.683	-0.579
WEAR	01-2020	4	-0.464	0.786	0.276	0.197

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

L-37-1 (D8165)

LAB SEVERITY

LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
04-2014	A	1	0.700	0.429	.	-1.125
	D	1	0.600	-0.600	0.333	1.143
	G	4	-0.340	-0.254	0.000	-0.441

NON-LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
01-2020	A	3	0.000	-0.250	-1.667	-0.857
	G	1	1.000	0.364	.	0.714
12-2019	B	2	1.250	1.000	0.000	1.286
	D	2	0.000	-0.058	0.900	0.746

L-37-1 (D8165)

SUMMARY OF SEVERITY & PRECISION

Severity

Nonlubrited – All parameters remained within the limits this period.

Lubrited – All parameters remained within the limits this period.

L-37-1 (D8165)

SUMMARY OF SEVERITY & PRECISION (cont.)

Precision

Nonlubrited - WEAR, SPIT, and RIPP remained within the precision limit this period. RIDG started the reporting period exceeding the action limit but has since returned within the limits.

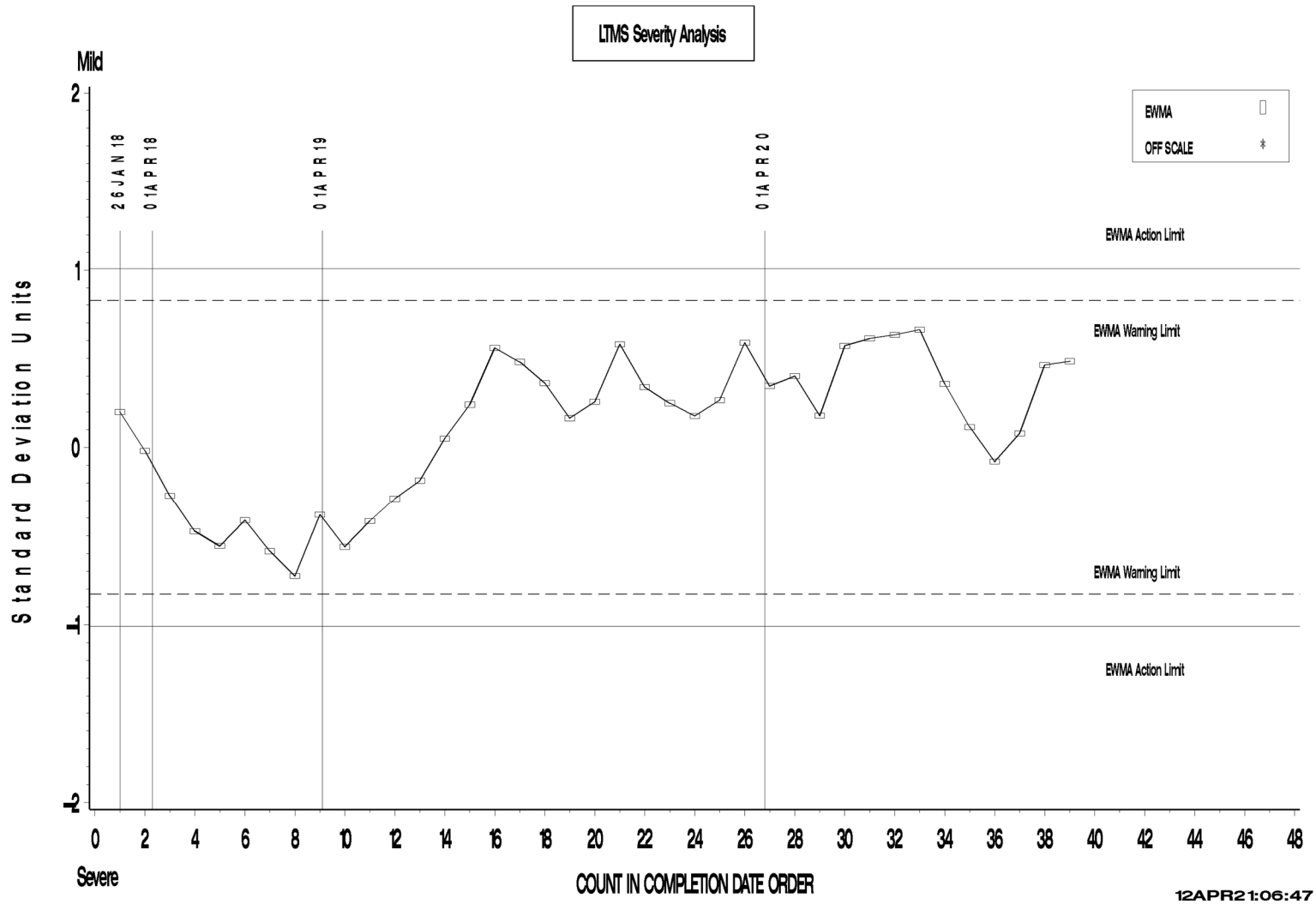
Lubrited – All parameters remained within the precision limit this period.

Industry control charts follow.

L-37-1 (D8165)

L-37-1 NONLUBRICATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

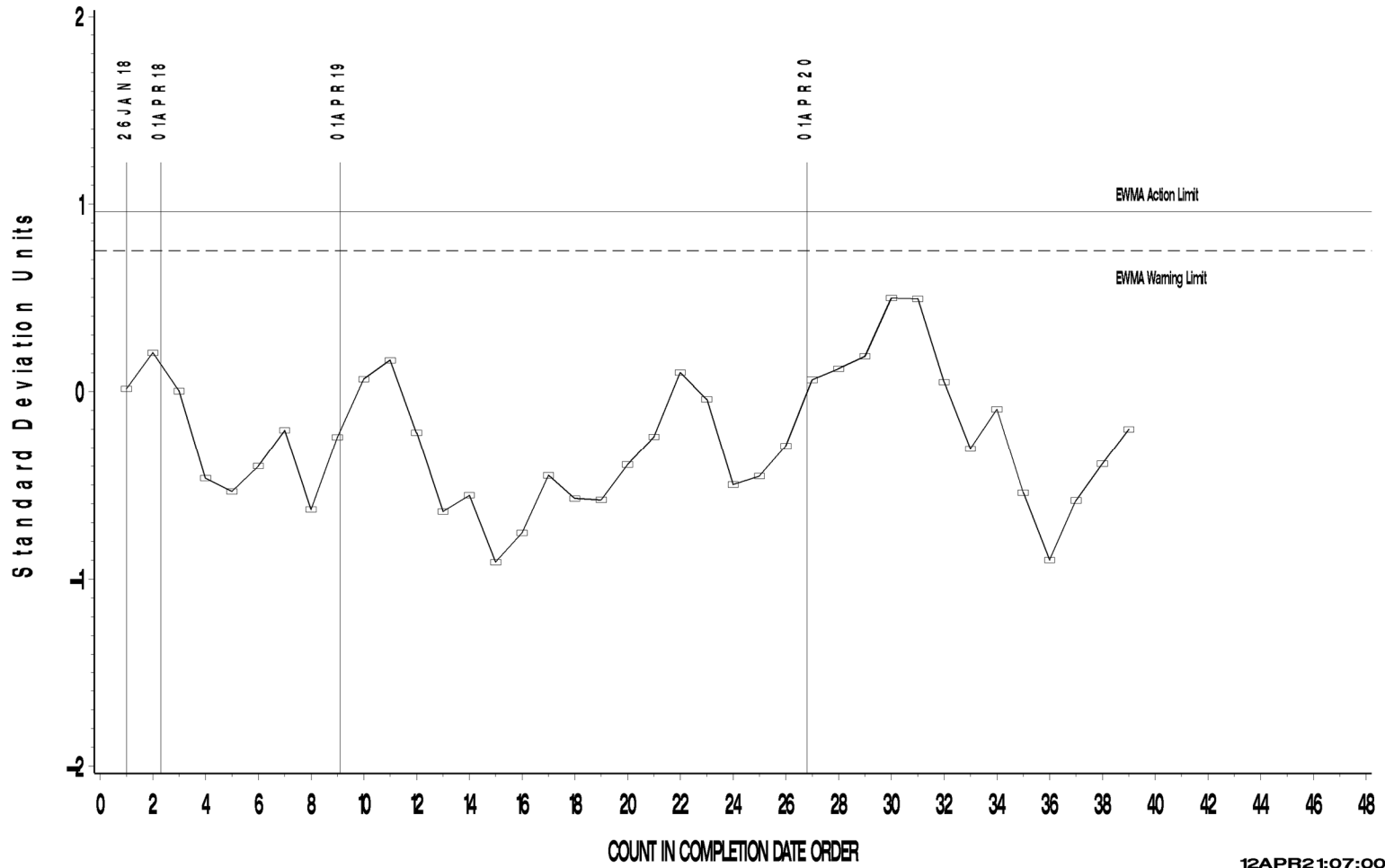


L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



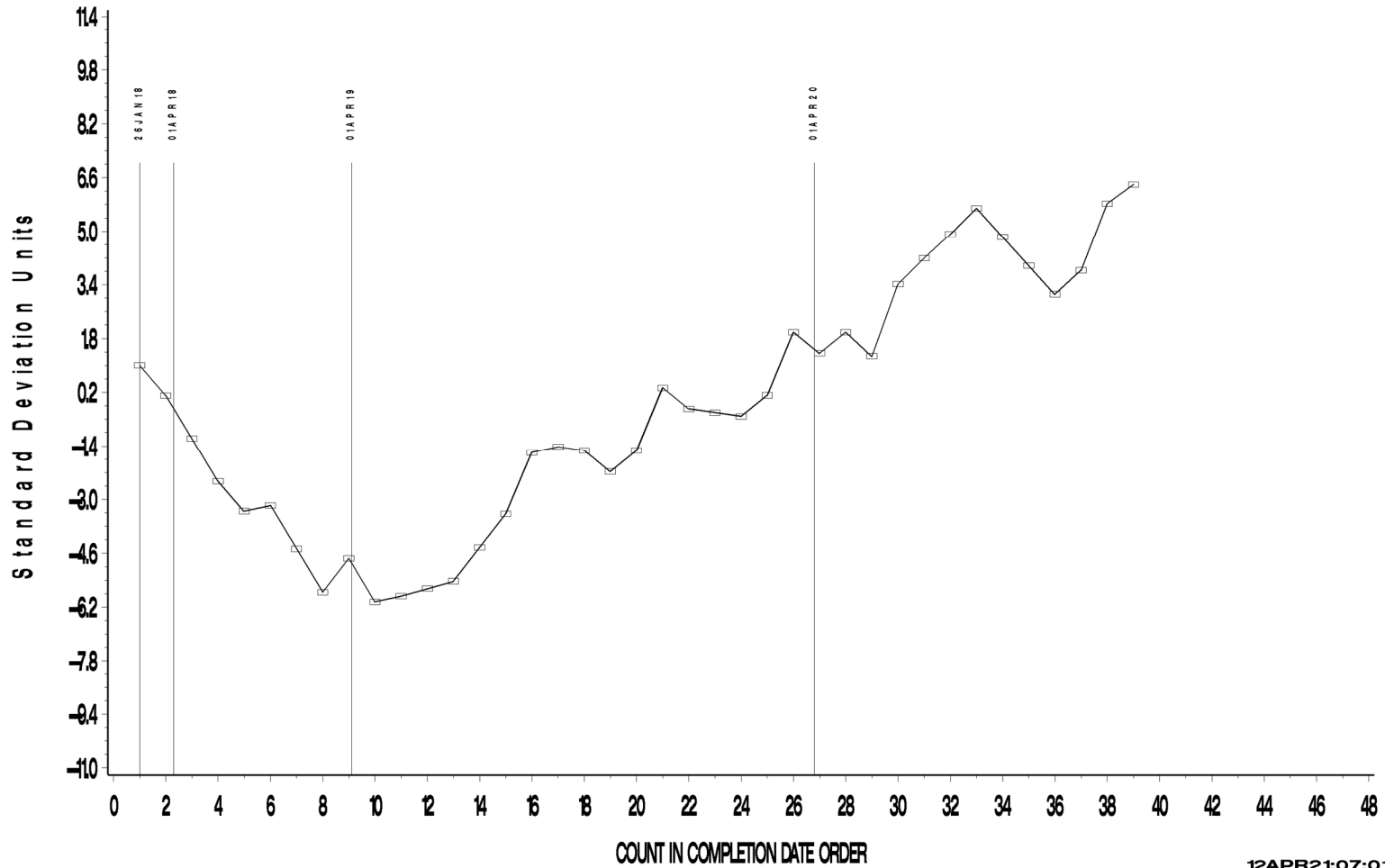
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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis

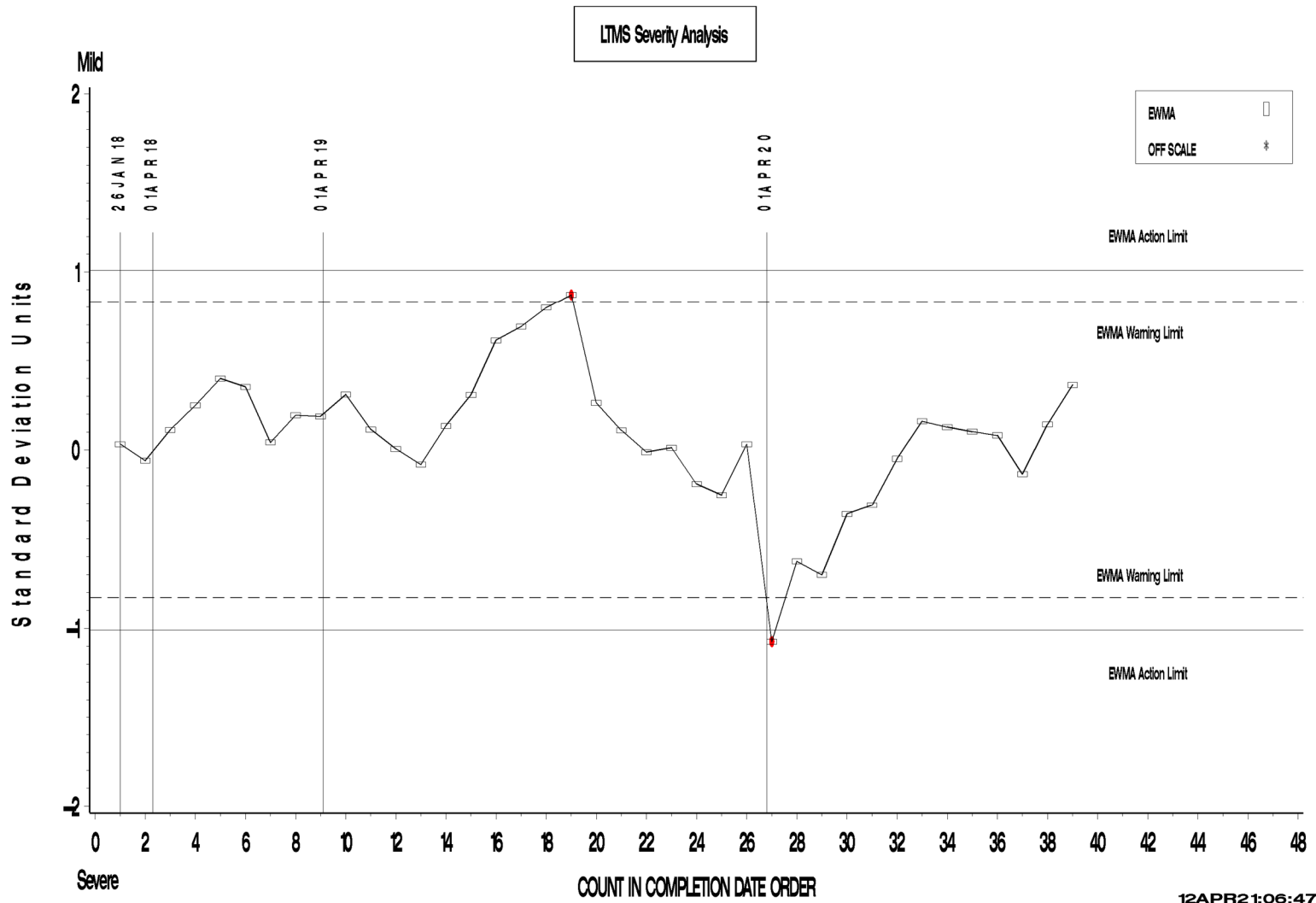


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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

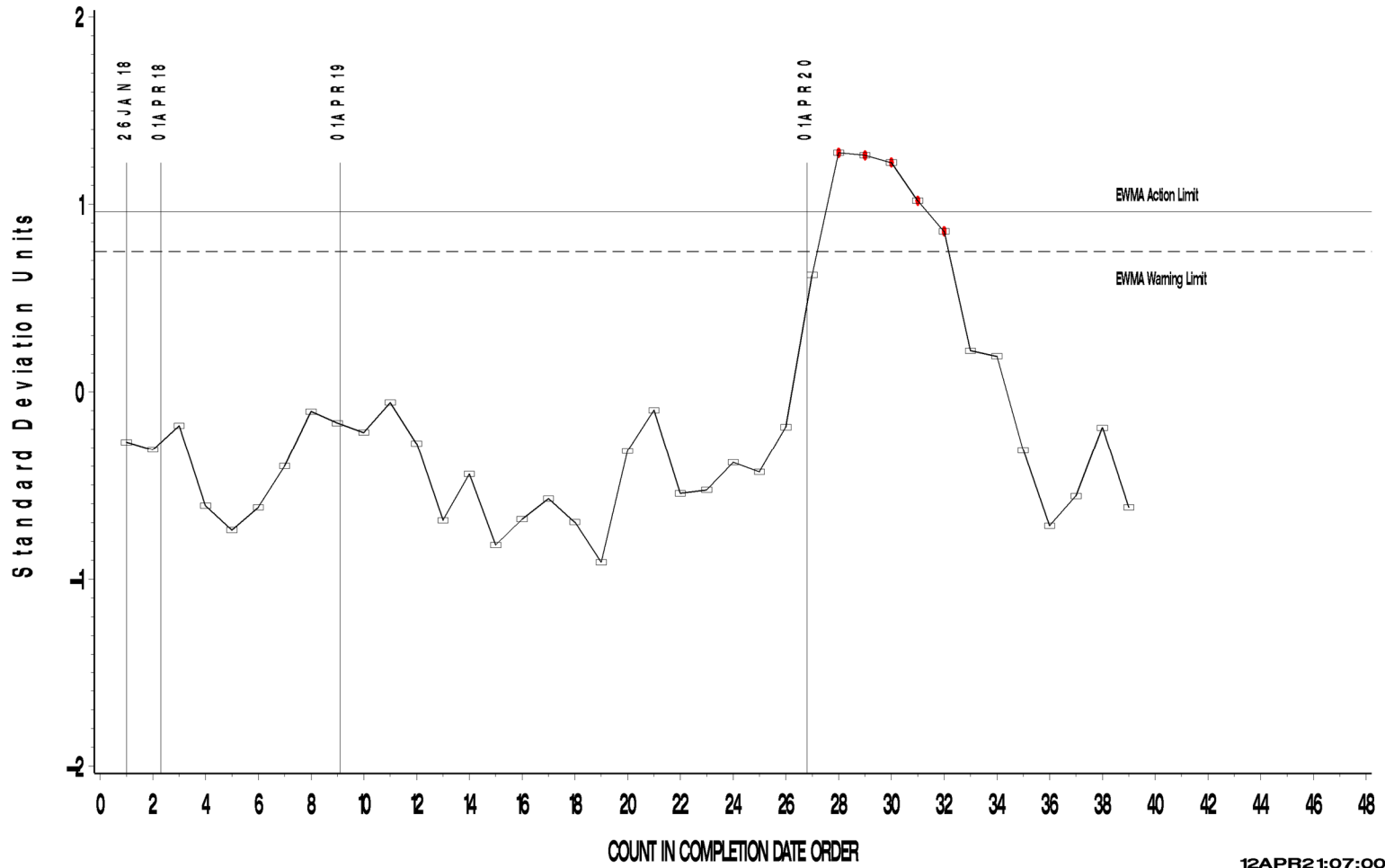


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L-37-1 NONLUBRICATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



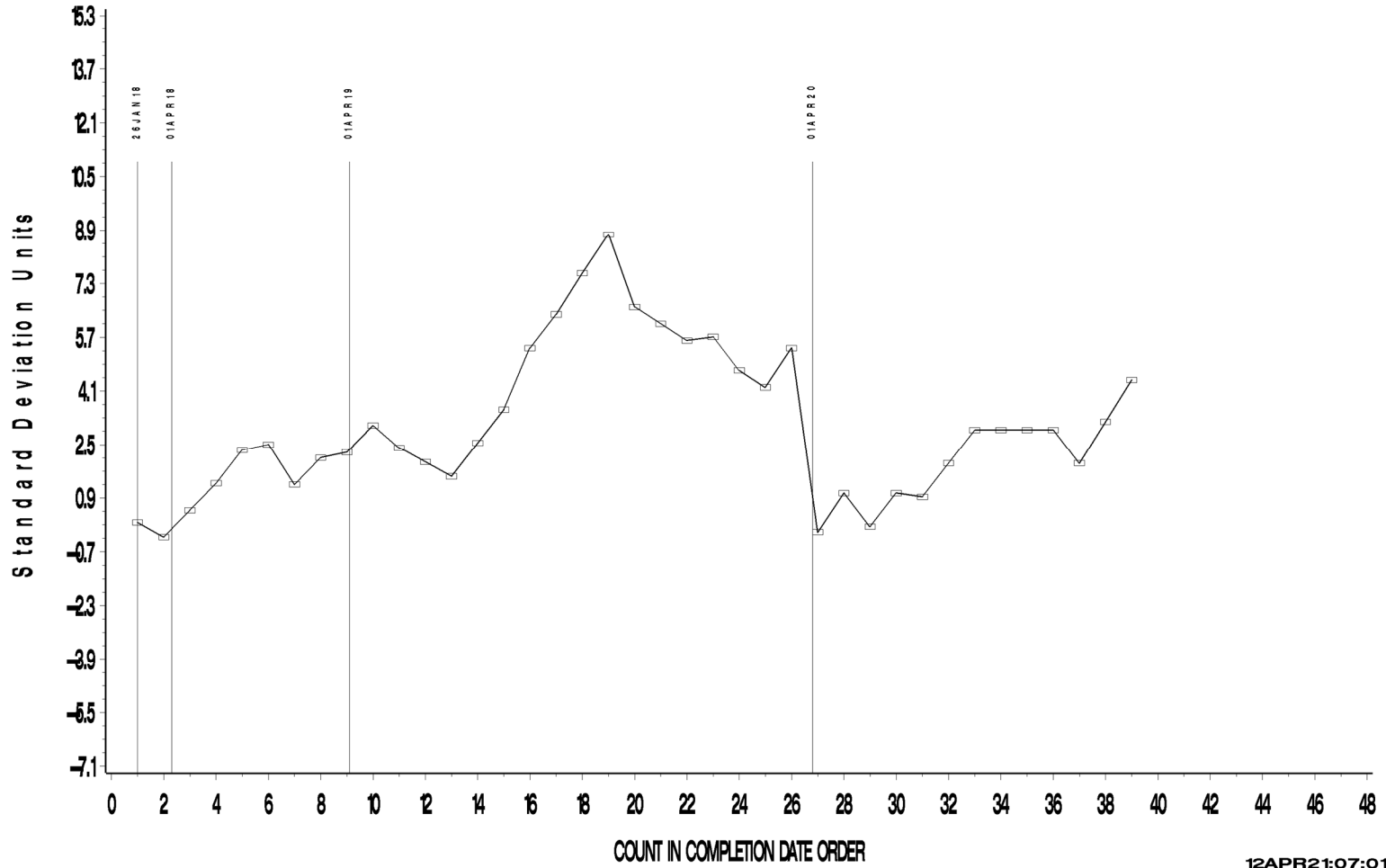
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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis

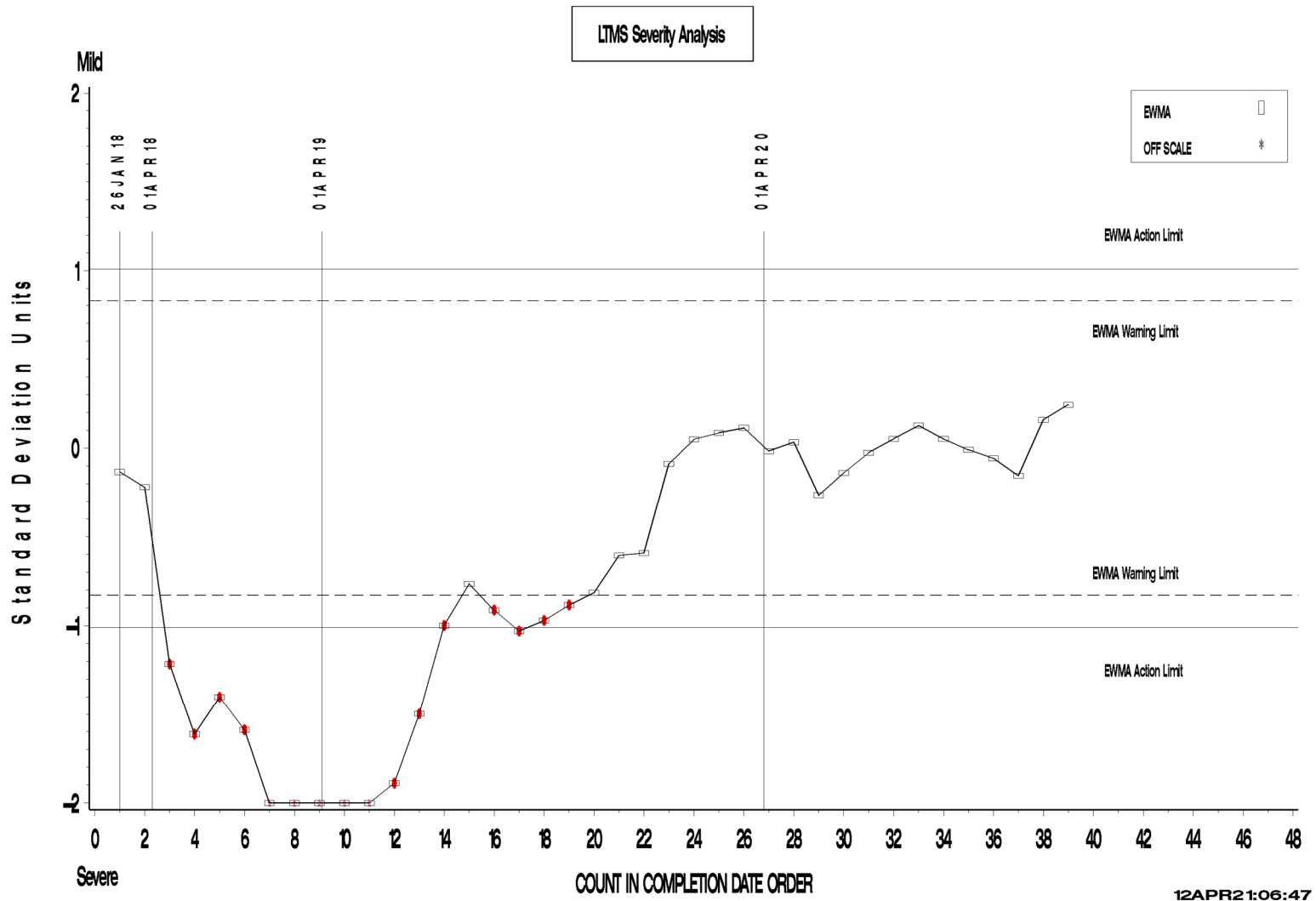


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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

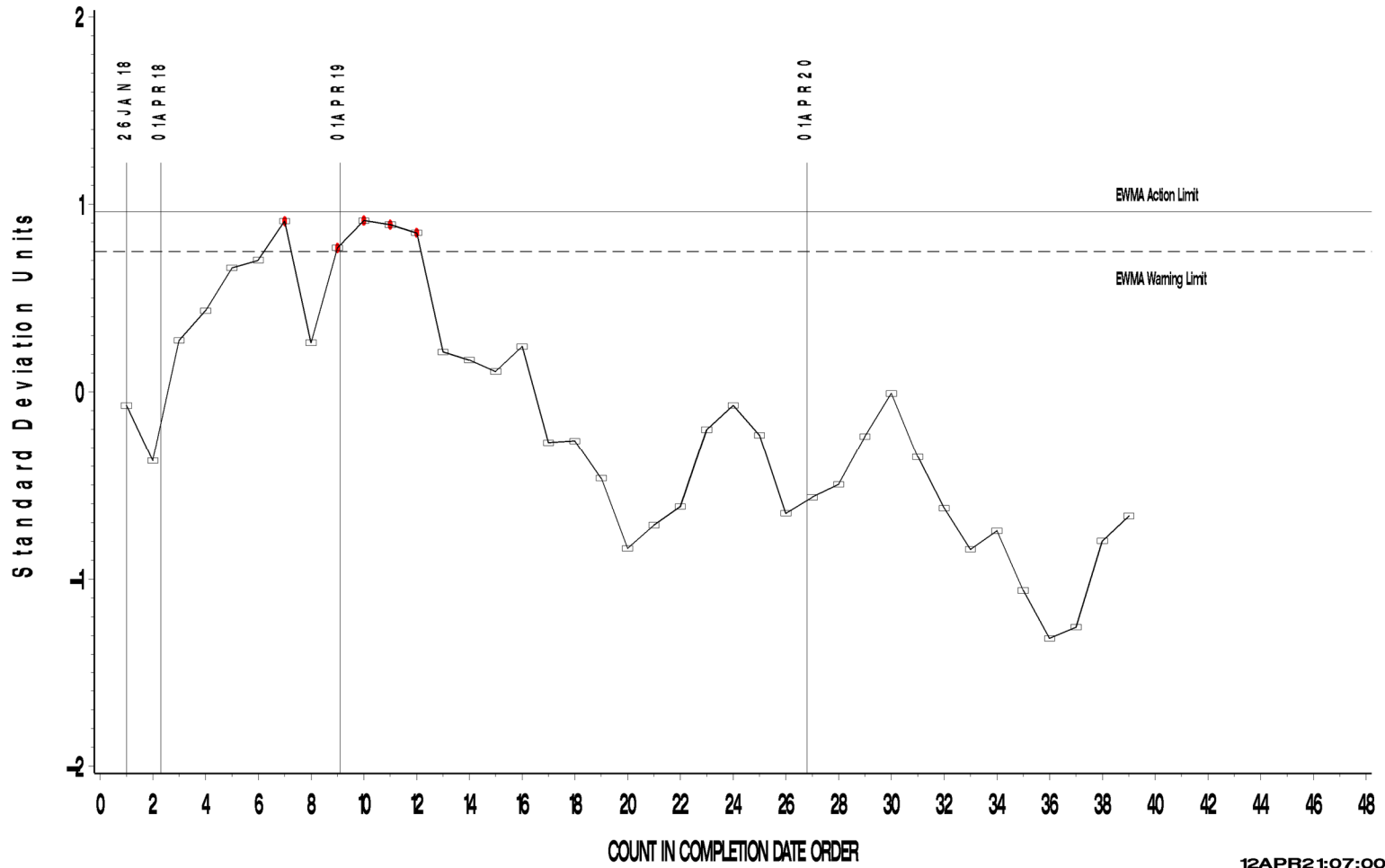


L-37-1 (D8165)

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FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



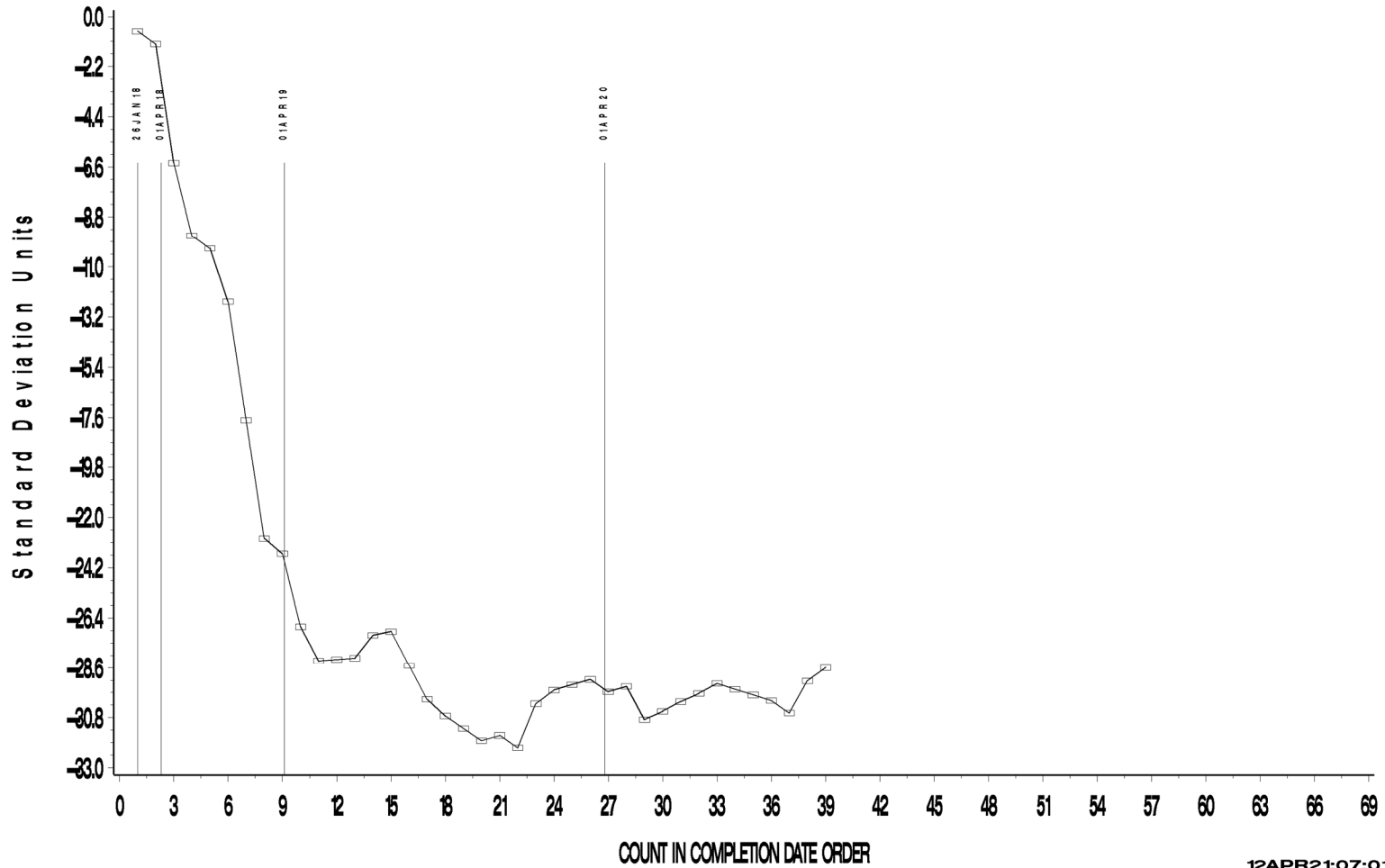
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L-37-1 (D8165)

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FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



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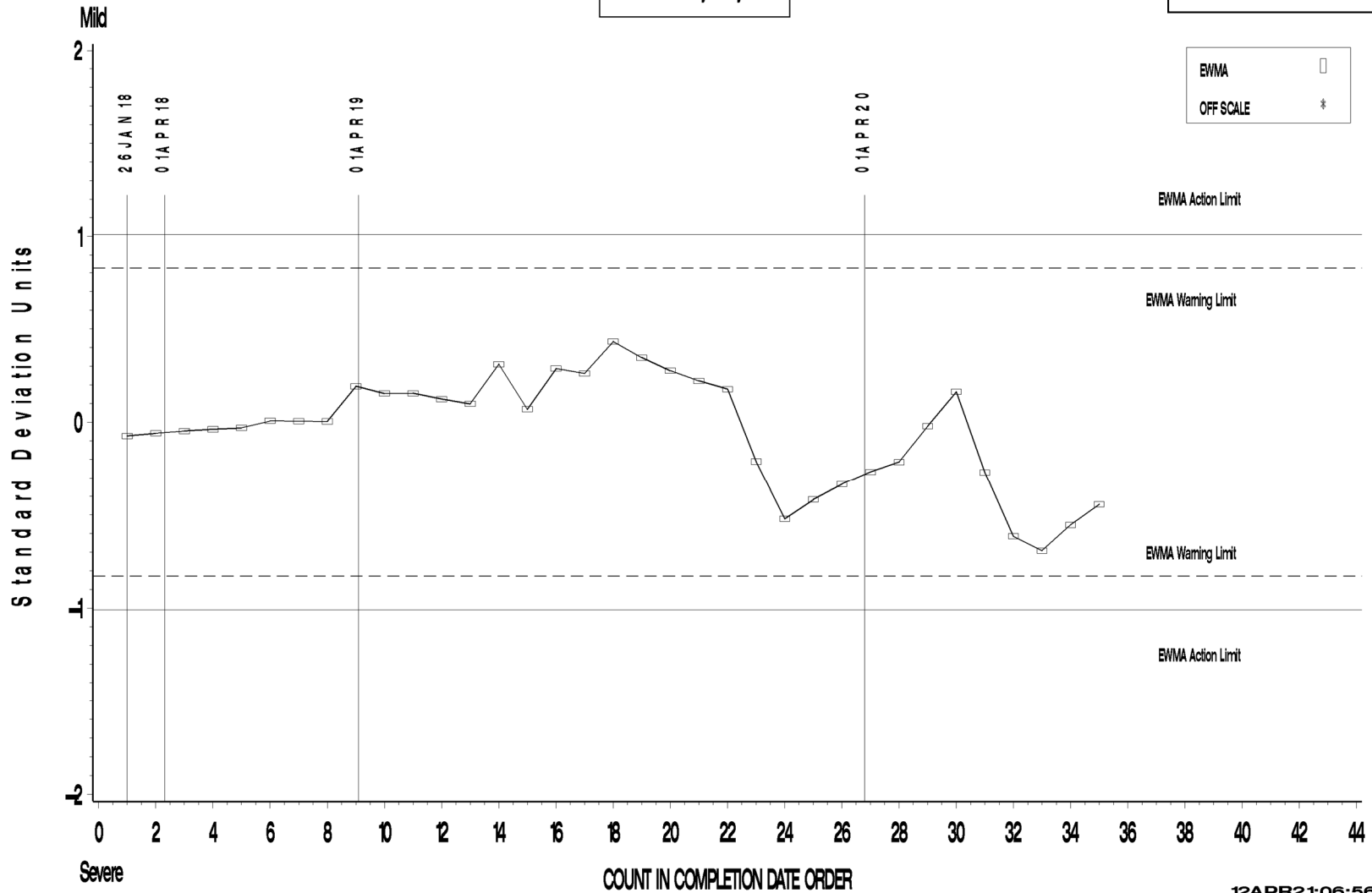
L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Severity Analysis

Results for 155-1 reference oil were not included in this SPIT charts based on the current targets leading to undefined calculations. Two 152-2 results (129856, and 138440) were also omitted.



12APR21:06:56

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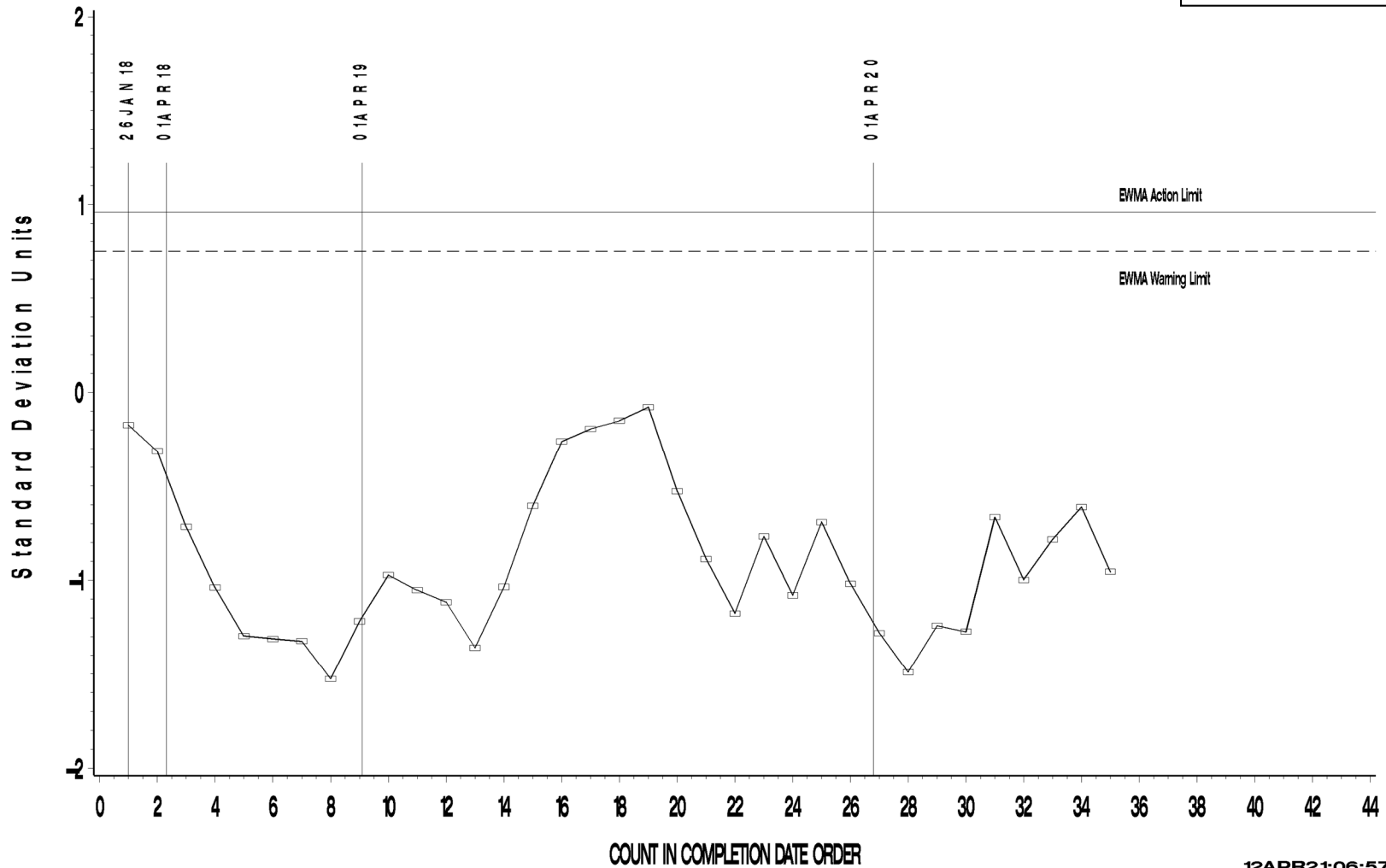
L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

LTMS Precision Analysis

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12APR21:06:57

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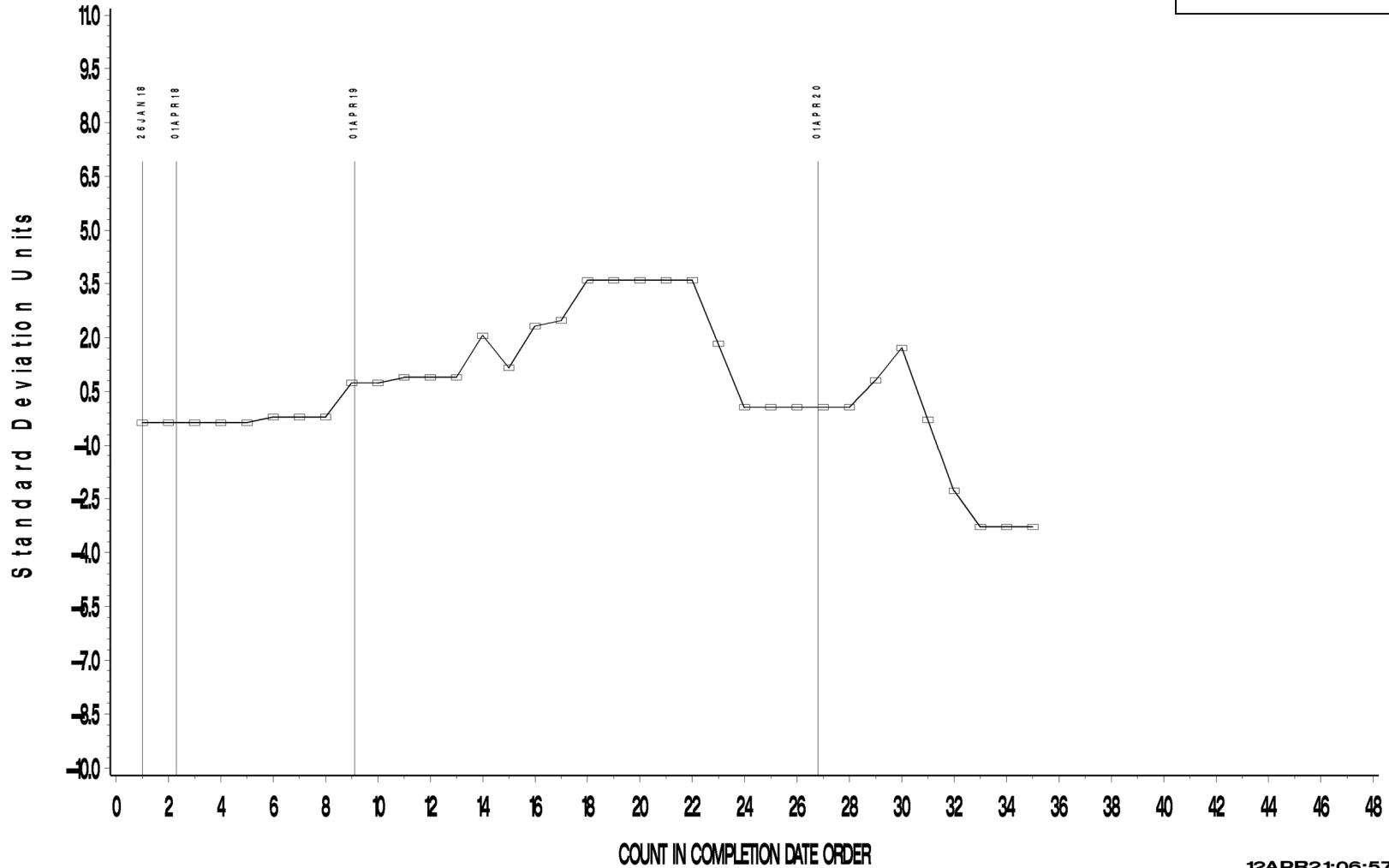
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L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis



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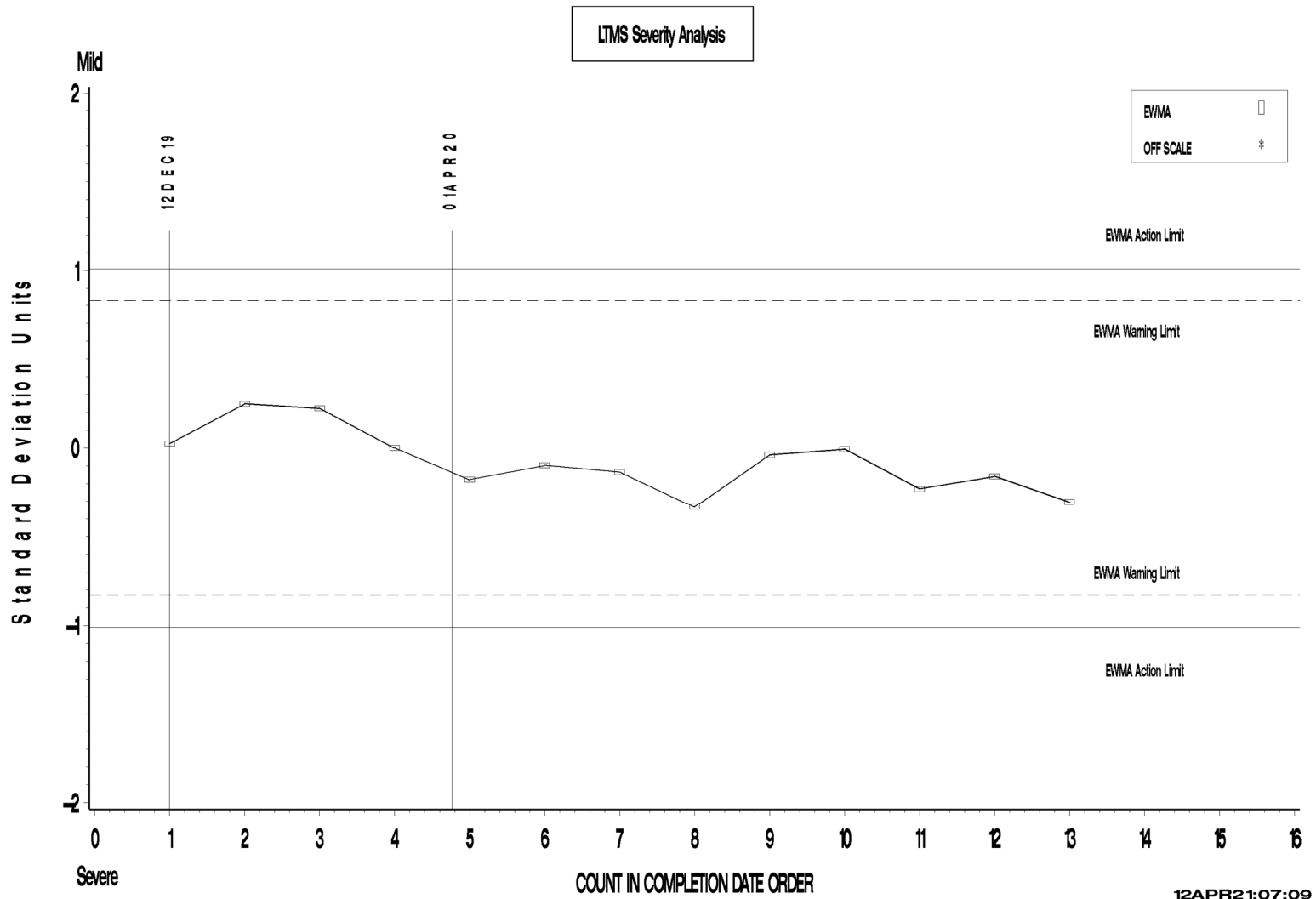


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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

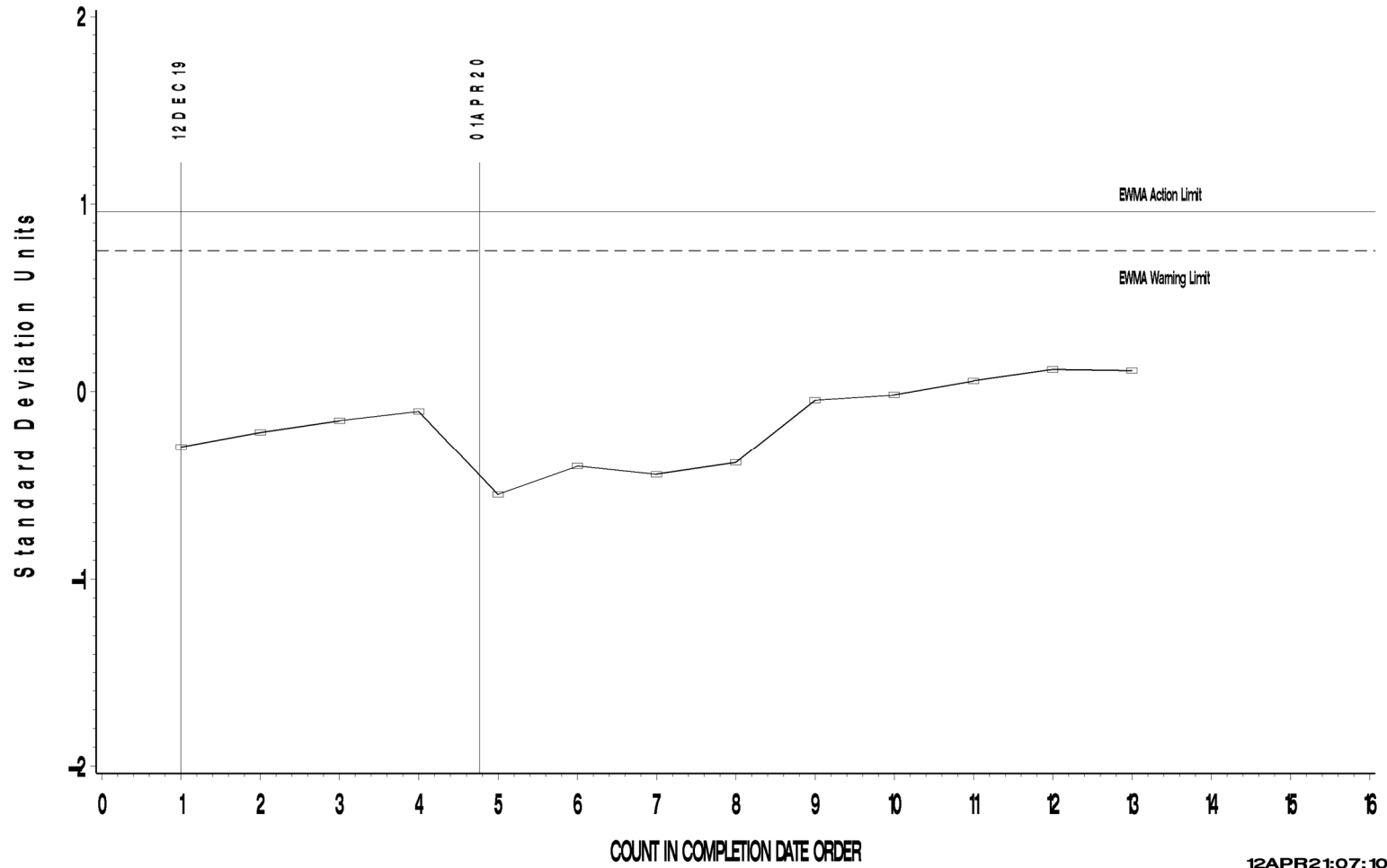


L-37-1 (D8165)

L-37-1 LUBRICATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis



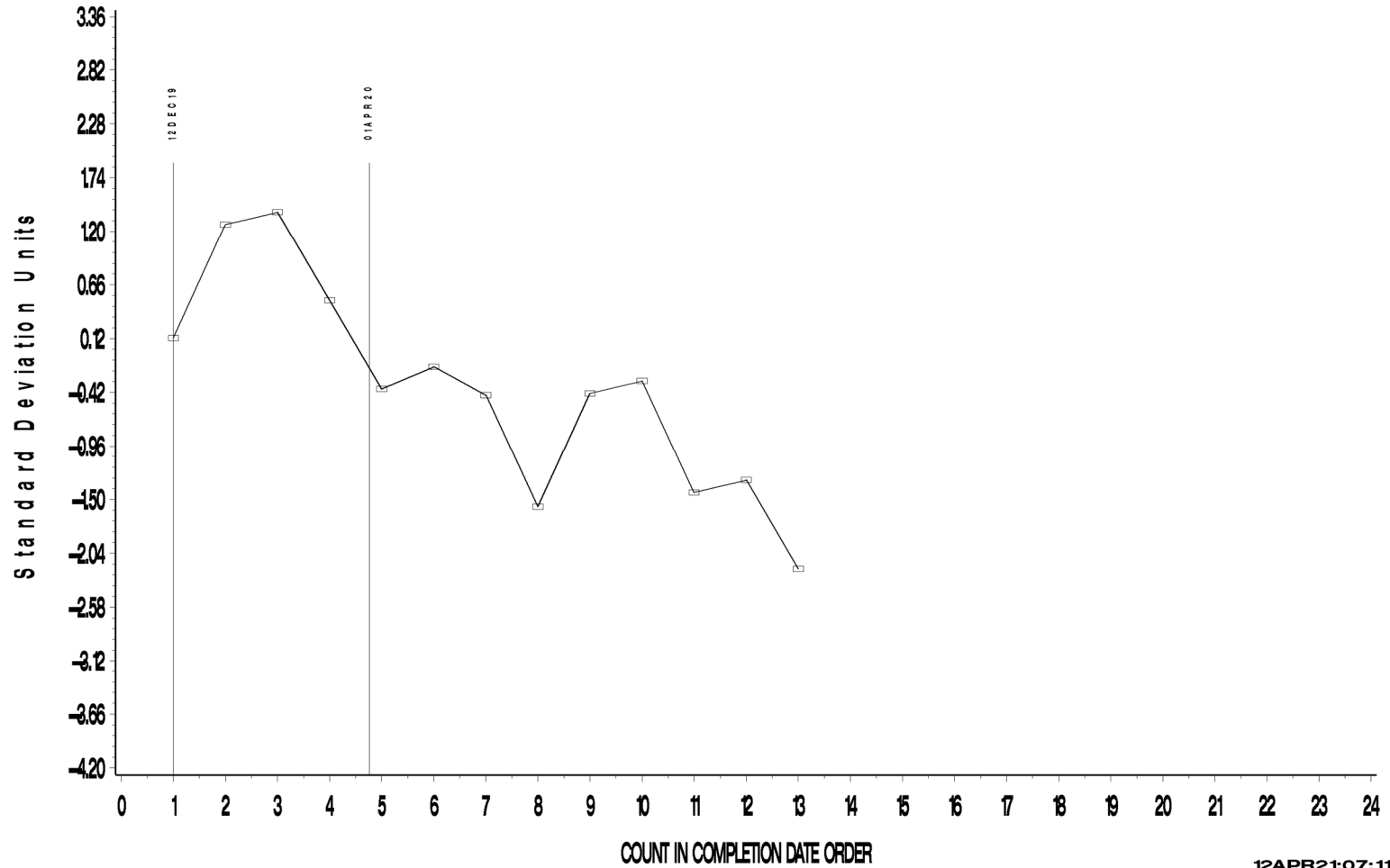
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

CUSUM Severity Analysis

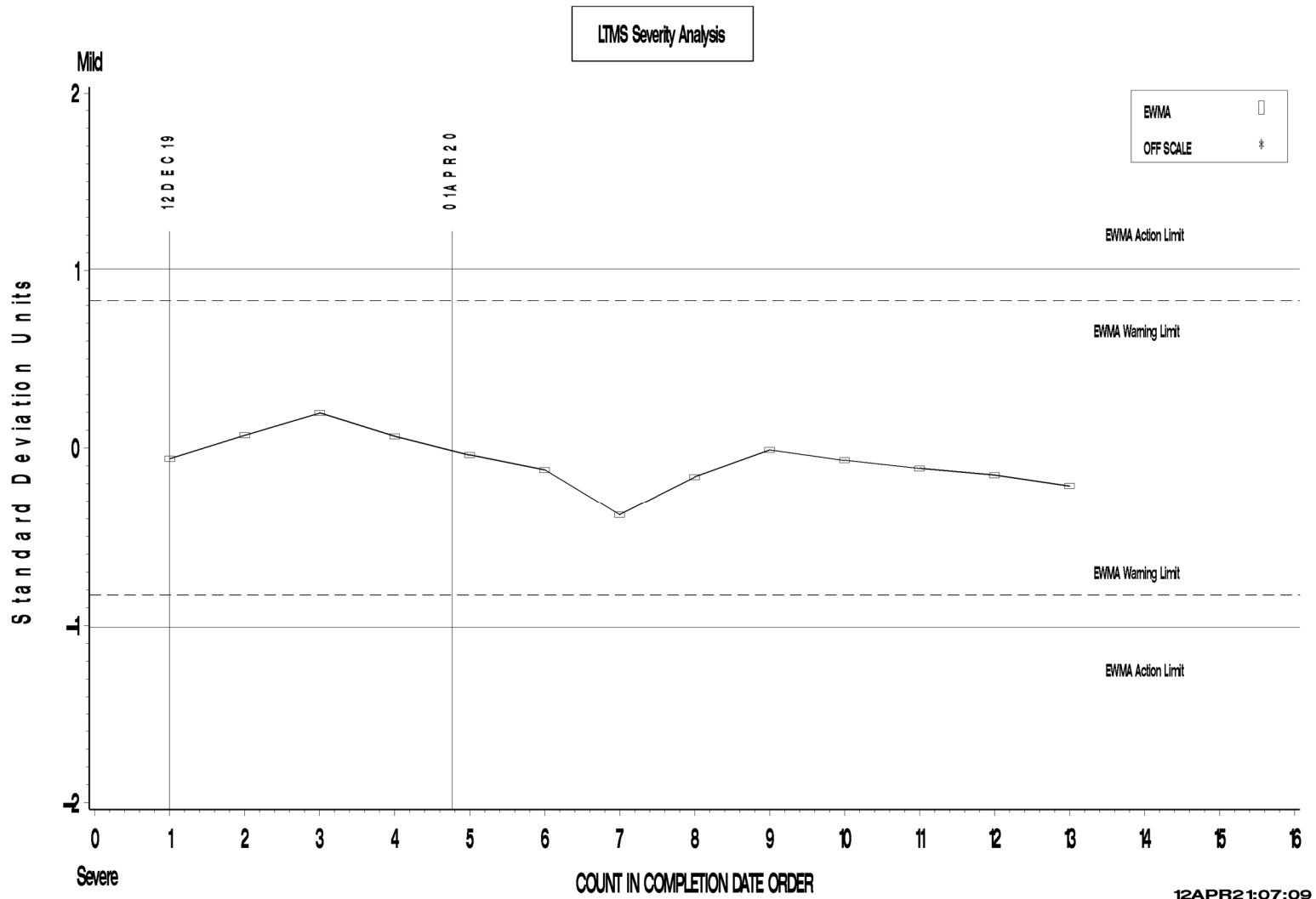


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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

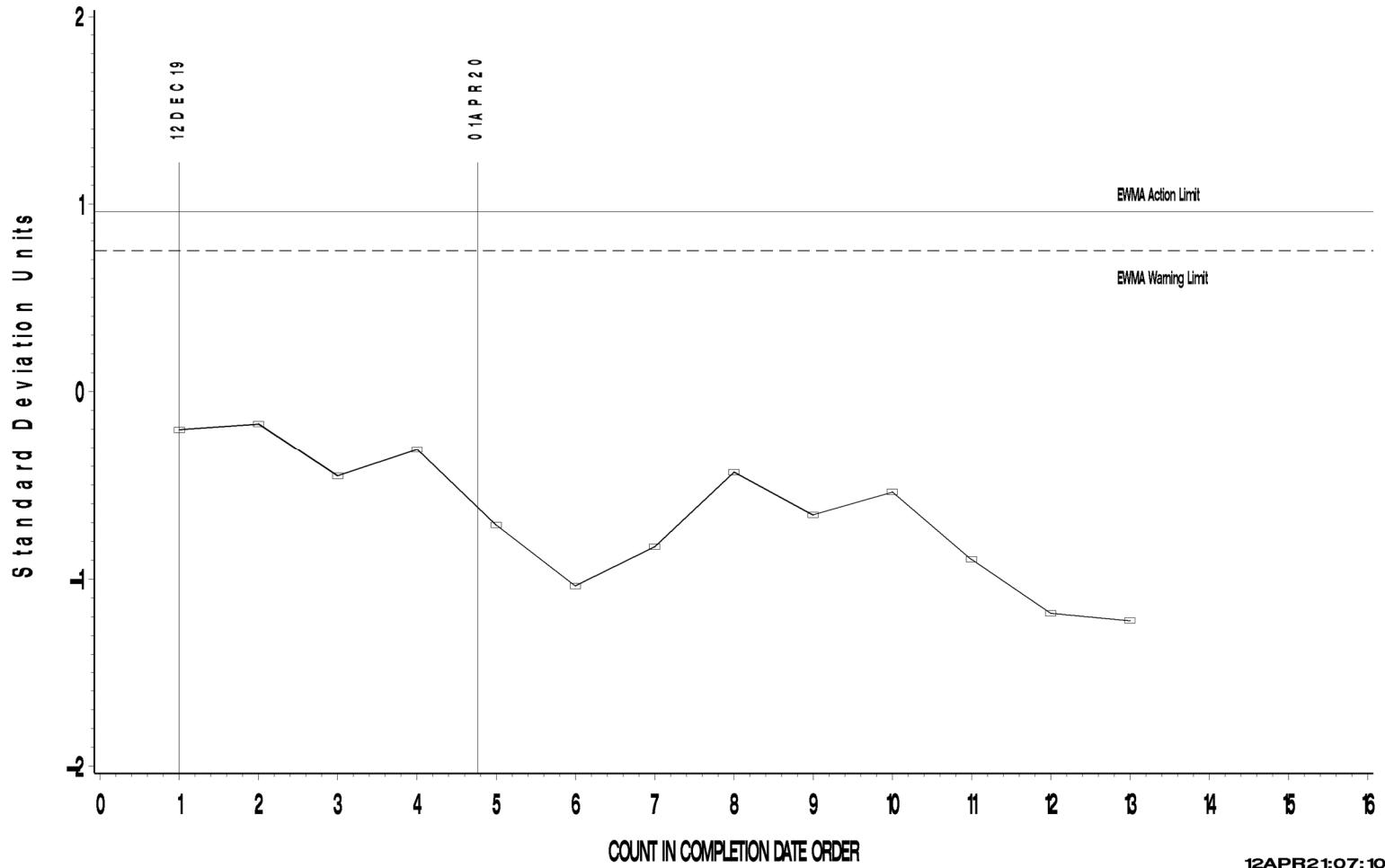


L-37-1 (D8165)

L-37-1 LUBRICATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



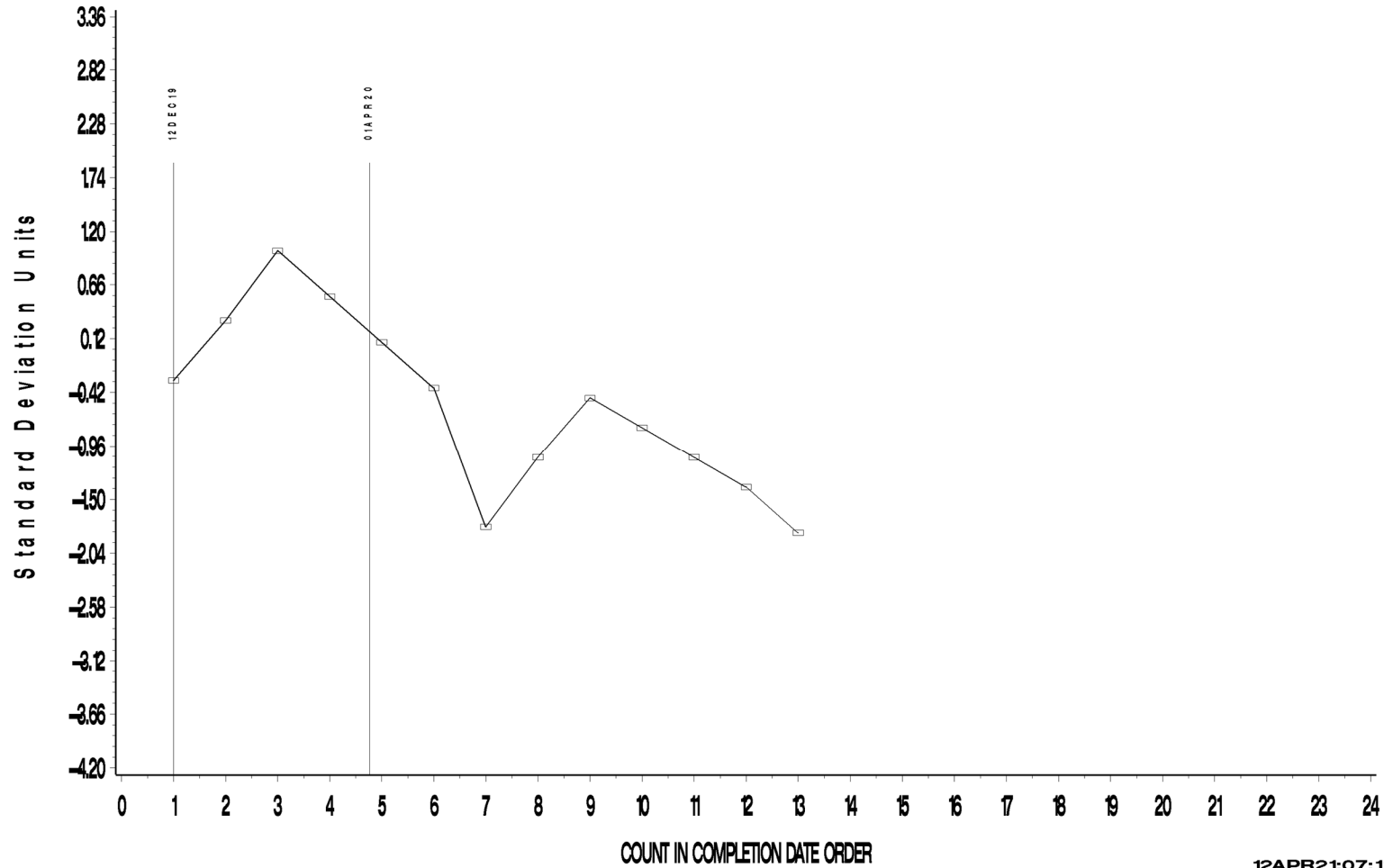
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L-37-1 (D8165)

L-37-1 LUBRICATED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

CUSUM Severity Analysis



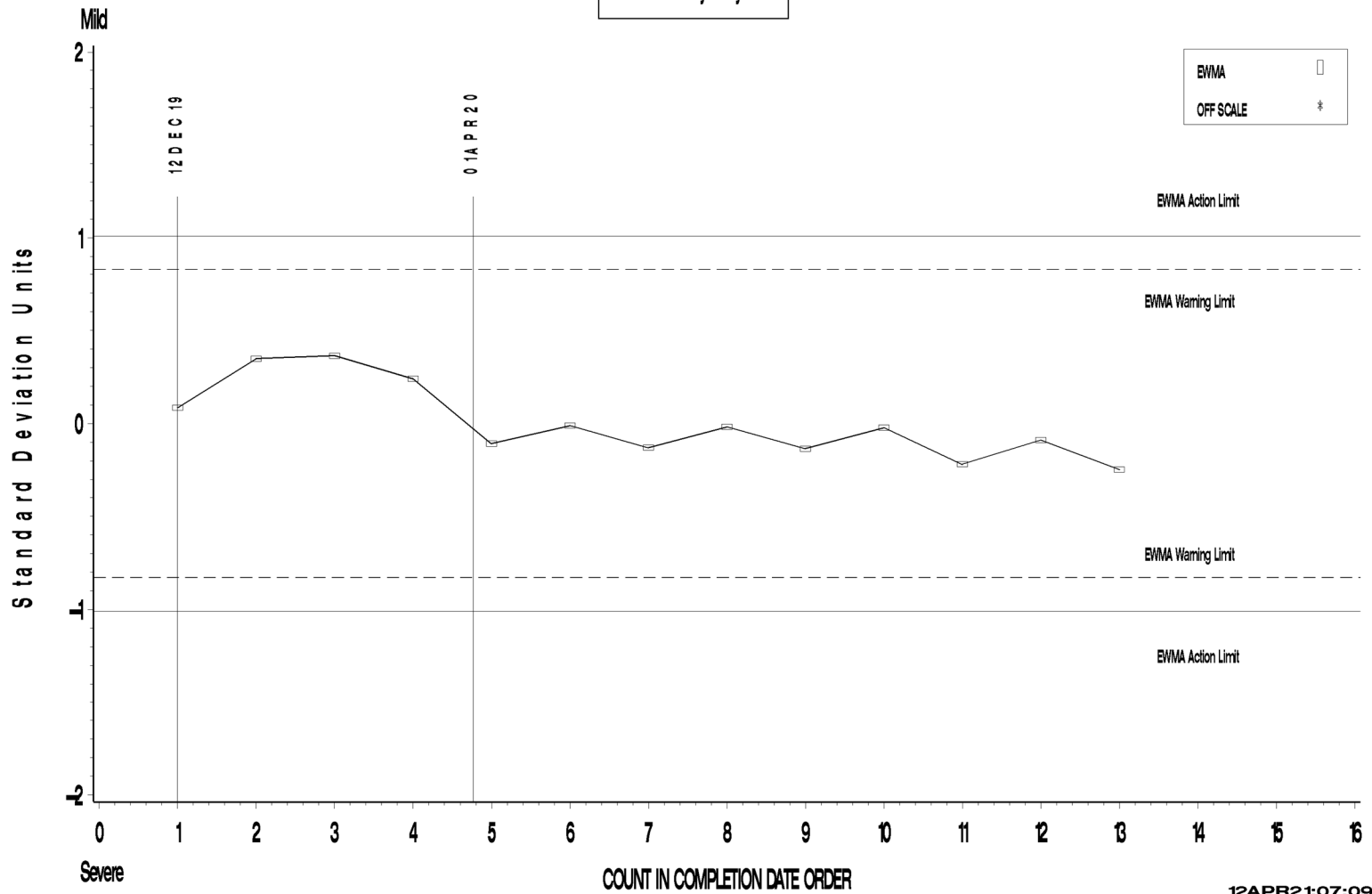
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Severity Analysis



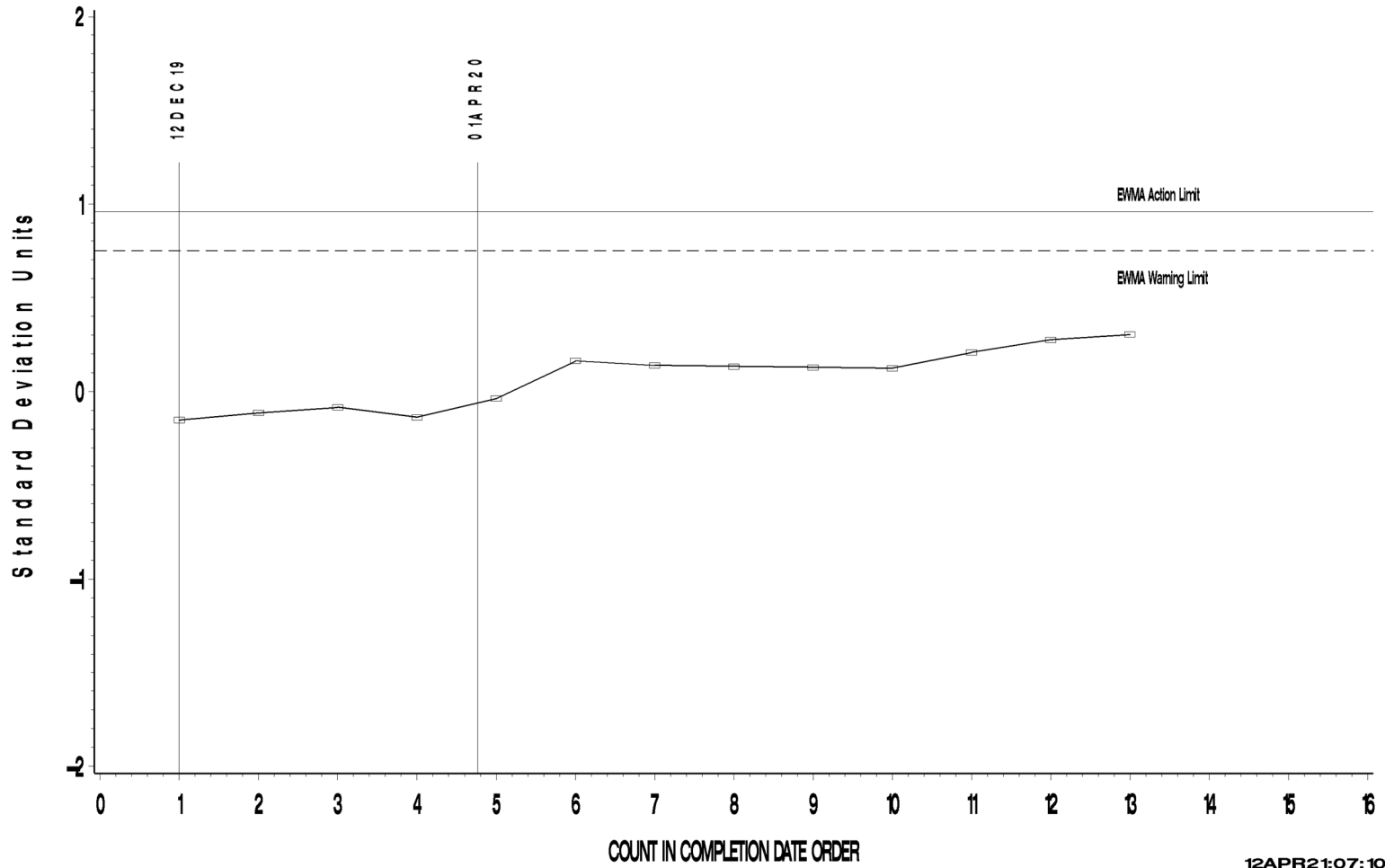
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

LTMS Precision Analysis



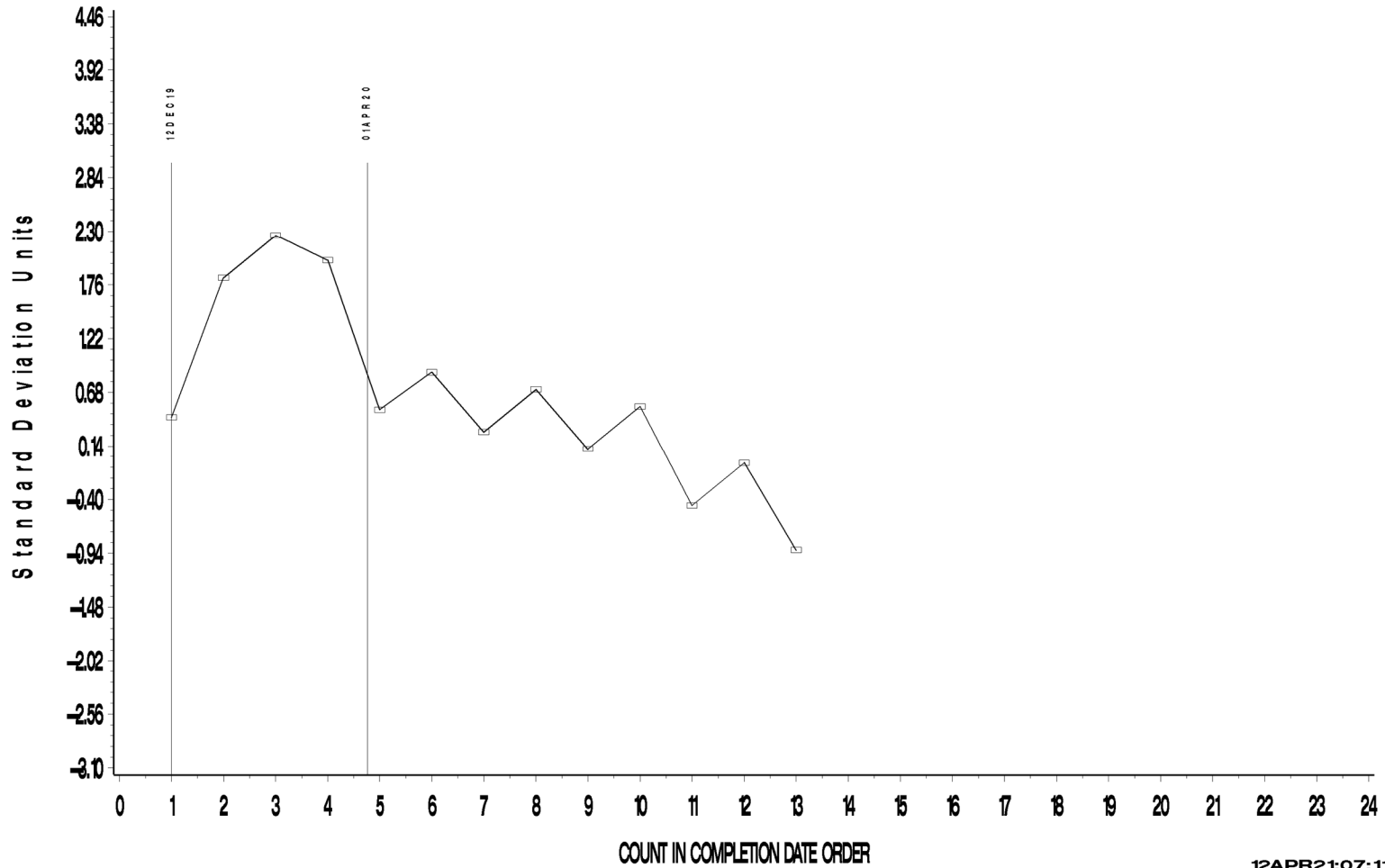
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



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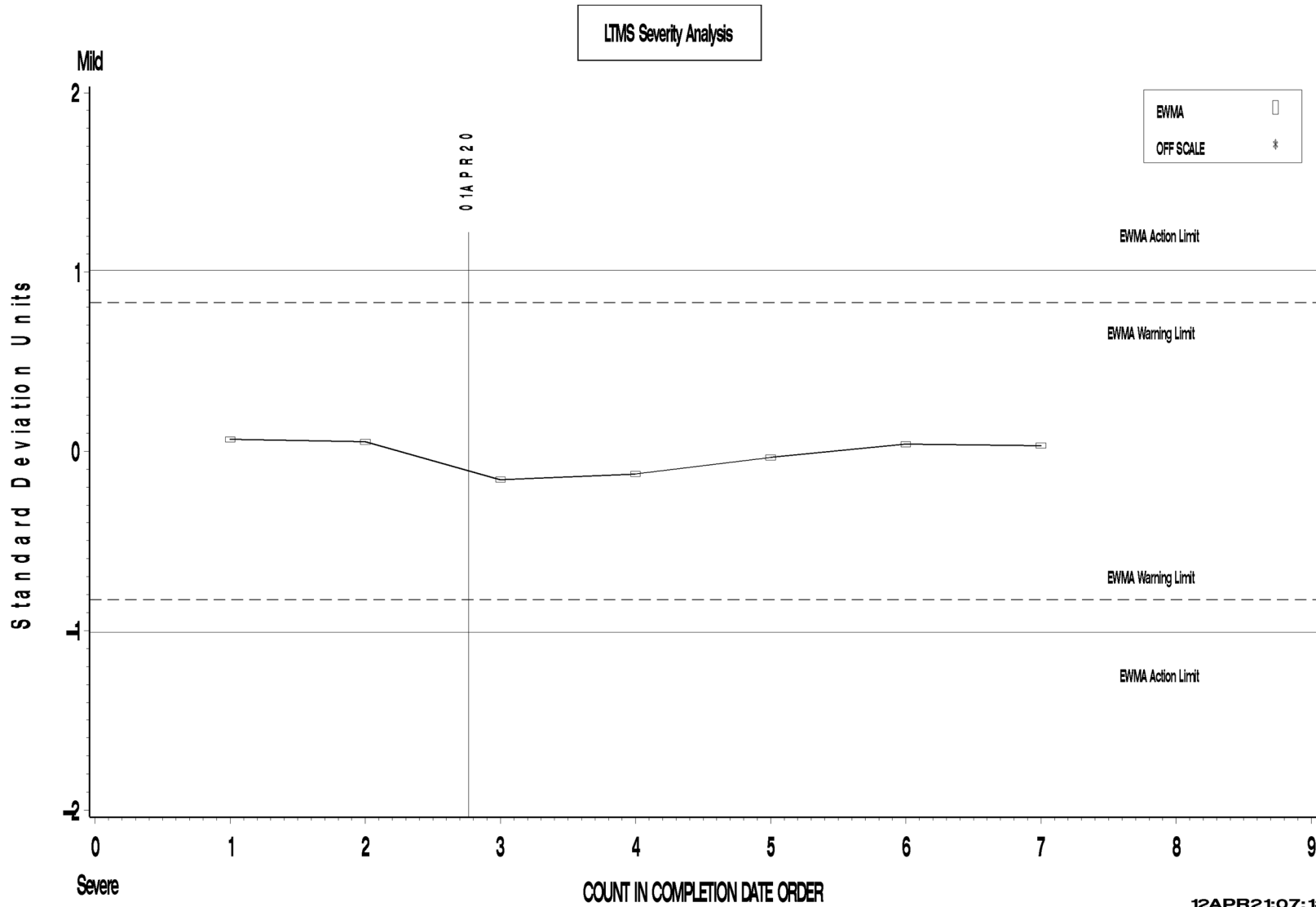


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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING

Results for 155-1 reference oil were not included in this SPIT charts based on the current targets for the oil leading to undefined calculations.



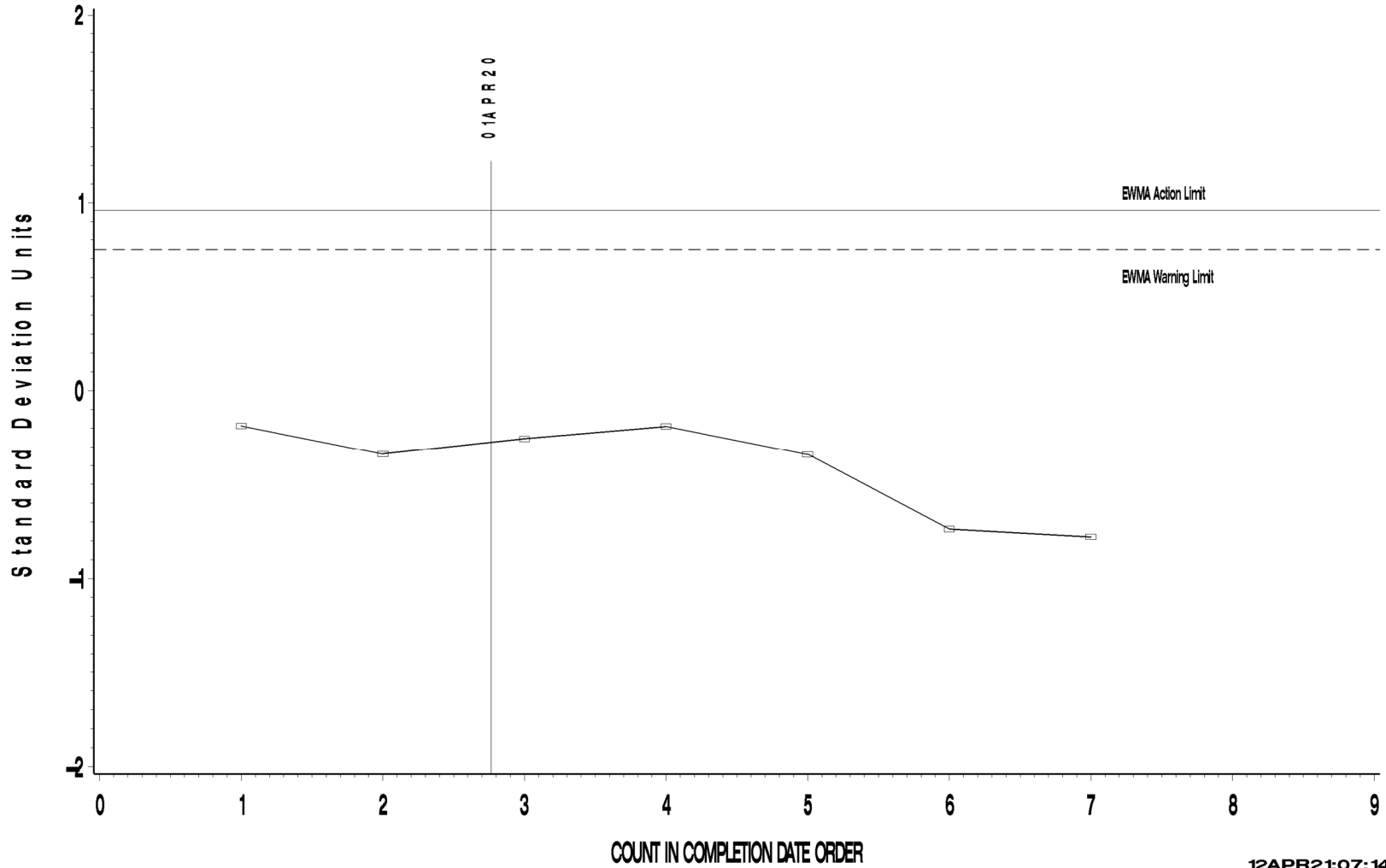
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L-37-1 (D8165)

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FINAL PINION GEAR PITTING/SPALLING

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LTMS Precision Analysis



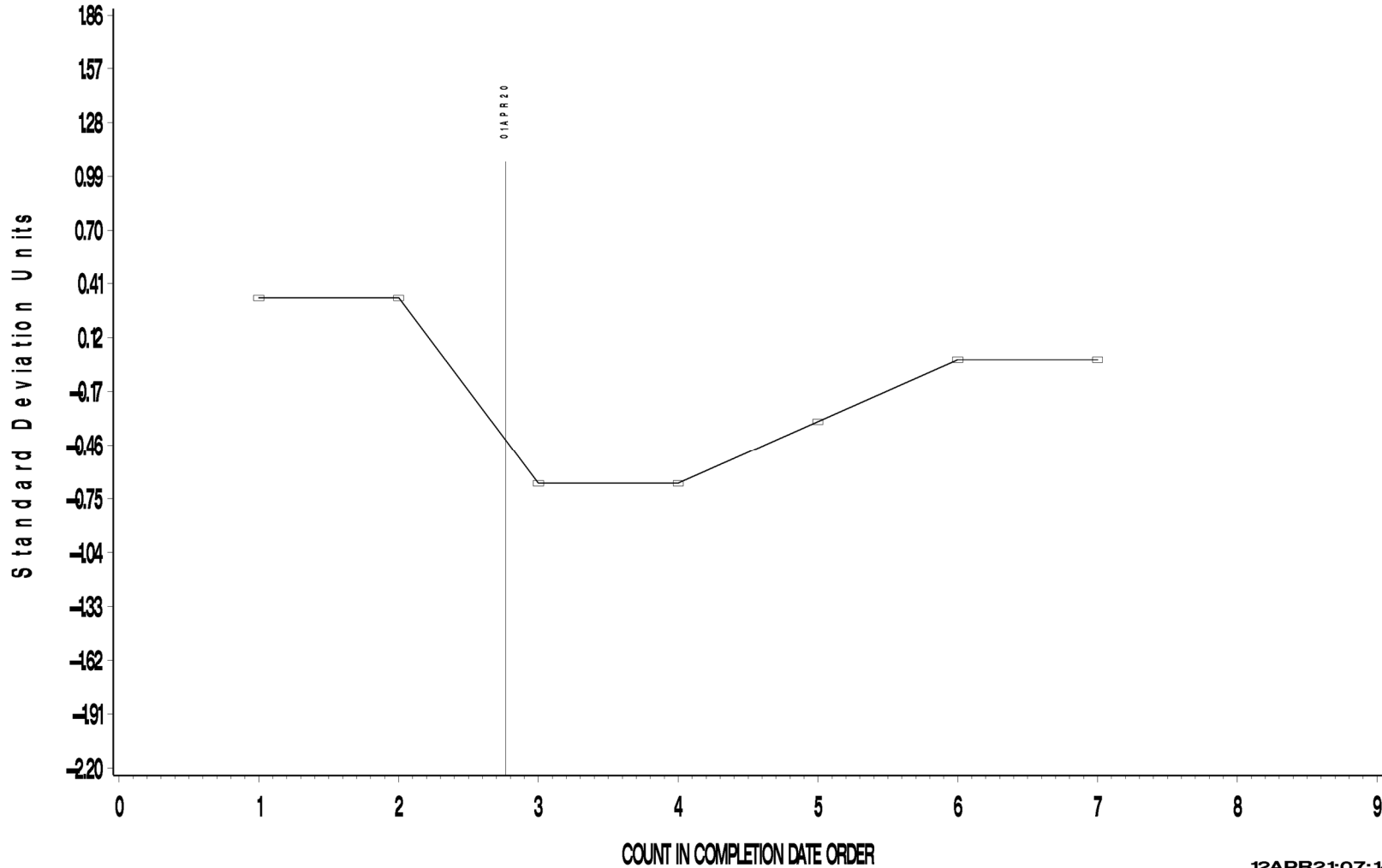
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L-37-1 (D8165)

L-37-1 LUBRITED INDUSTRY OPERATIONALLY VALID DATA
FINAL PINION GEAR PITTING/SPALLING

CUSUM Severity Analysis

Results for 155-1 reference oil were not included in this SPIT charts based on the current targets for the oil leading to undefined calculations.



12APR21:07:14

L-37-1 (D8165)

TIMELINE ADDITIONS

Effective Date	Information Letter	Event
November 12, 2020	20-3	Removal of section X1.1.1 from the test procedure.
November 13, 2020	20-4	Removal of section 4.3 from the test procedure.

L-37-1 (D8165)

LAB VISITS

No lab visits were conducted during this reporting period.

INFORMATION LETTERS

Information letters 20-3, and 20-4 were issued during this period. Both information letters served the purpose of removing information from the test method that is no longer accurate.

L-37-1 (D8165)

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	314	314.5
118	3	156	156.0
134	1	0	0.0
134-1	30	132	132.0
152-2	34	60	60.0
155	5	27	27.5
155-1	26	36	36.8
Total	108	725	726.8

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 38.6 gal) for use in that test.

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