



Test Monitoring Center

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

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

MEMORANDUM: 19-058
DATE: November 26, 2019
TO: Robert Slocum, Chairman, L-37-1 Surveillance Panel
FROM: Dylan Beck *Dylan Beedo*
SUBJECT: L-37-1 Testing from April 1, 2019 through September 30, 2019

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

DJB/djb/mem19-058.djb.doc

cc: Frank Farber
Jeff Clark

L-37 Surveillance Panel

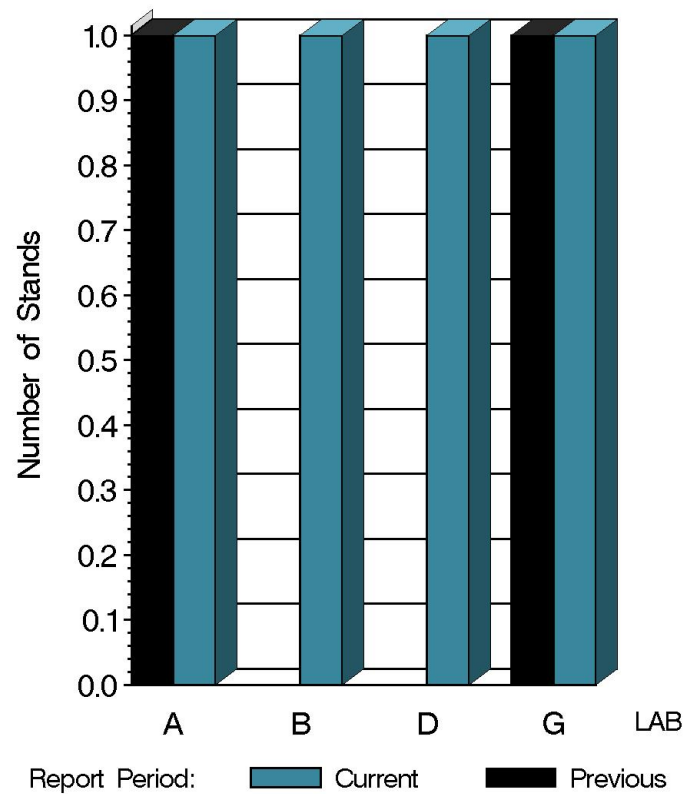
<http://www.astmtmc.cmu.edu/ftp/docs/gear/1371/semiannualreports/1371-10-2019.pdf>

Distribution: email

L-371 (D8165)

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

BY-LAB STAND
DISTRIBUTION



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Test Distribution by Oil and Validity

					Totals	
		134/ 134-1	152-2	155-1	Last Period	This Period
Accepted for calibration	AC	5	3	2	2	10
Rejected (Mild)	OC	1	0	0	0	1
Rejected (Severe)	OC	0	1	1	3	2
Rejected (Precision)	OC	0	0	0	0	0
Aborted run	XC	3	0	1	0	4
Acceptable info run	NI	8	15	6	4	29
Aborted info run	XI	1	1	0	0	2
Not Acceptable info run	MI	1	9	0	1	10
Total		19	29	10	13	58

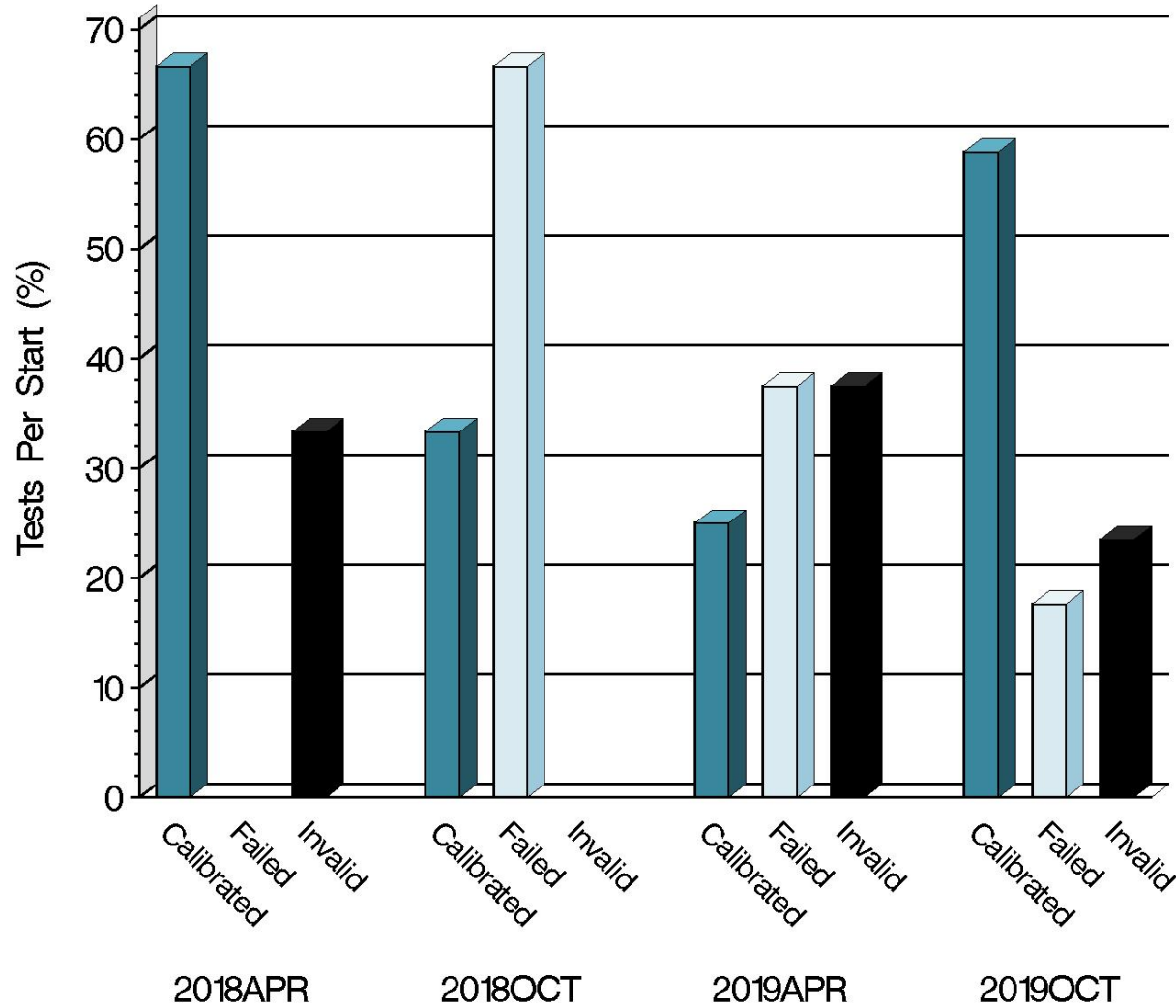
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Calibration Attempt Detail

	Gear Batch	Acceptable	Failed	Total
NONLUBRITED	2153061/2153064	0	1	1
	2153060/2153063	1	0	1
	2124464/2124398	2	0	2
	2115435/2116457	1	0	1
	2122701/2722705	1	0	2
	2722700/2722706	1	0	2
	2116454/2116457	2	0	2
	2124463/2124397	1	2	3
	2722679/2722707	1	0	1
	Total		10	3

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CALIBRATION ATTEMPT SUMMARY



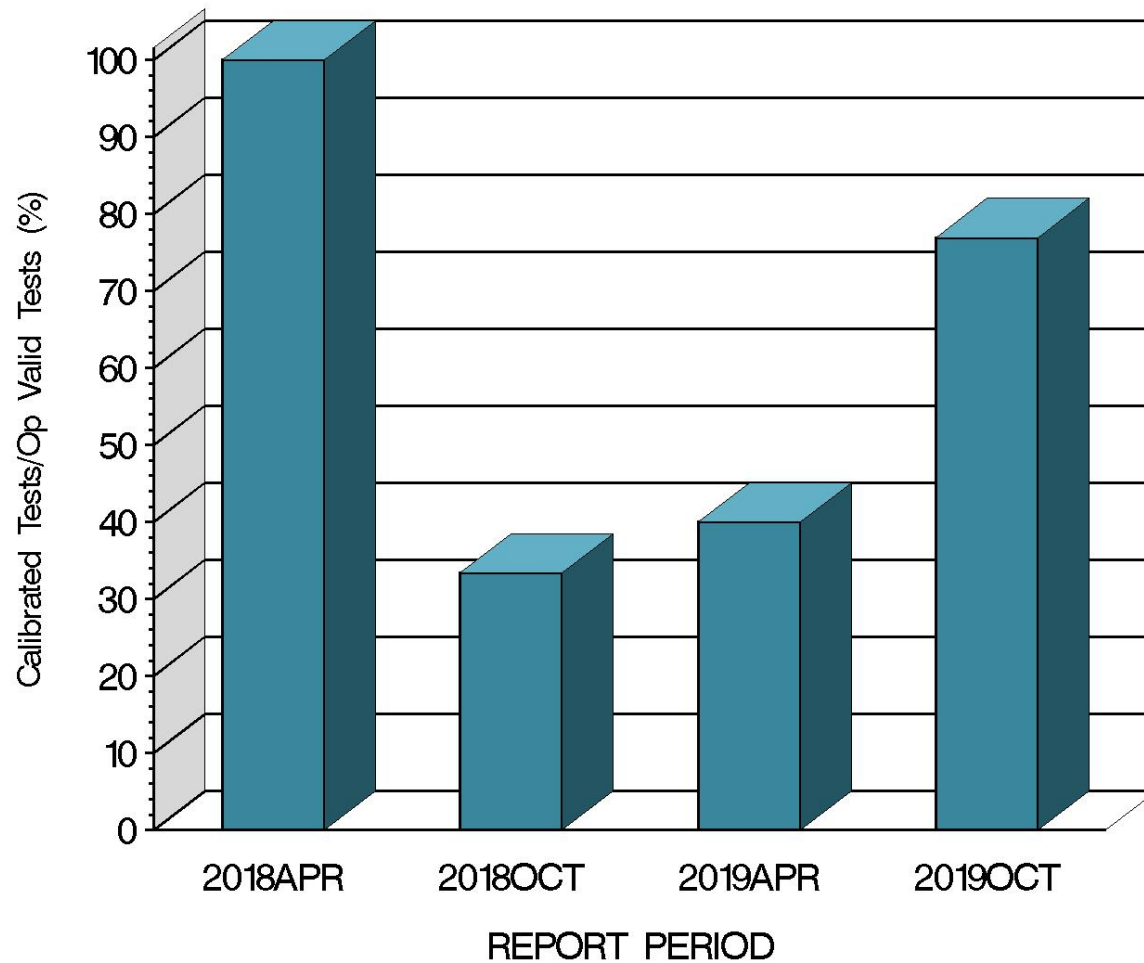
Resolution

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	%
D	High vibration	•				•			6	22	27%
			•					•			
	Multiple shutdowns	•				•					
	Broken ring teeth		•			•					
	Fluid temp not achieved				•	•					
	Data not recorded			•				•			
	Lost	2	2	1	1	4	0	2			
	Starts	4	15	29	10	58	58	58			
	%	50%	13%	3.4%	10%	7%	0%	3%			

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GEAR BATCH SEVERITY

NON-LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
RIDG	2115435/2116457	1	-0.43	.	0.33	0.22
RIPP	2115435/2116457	1	0.06	.	-0.46	-0.26
SPIT	2115435/2116457	1	0.00	.	-11110.81	-9410.86
WEAR	2115435/2116457	1	0.22	.	0.34	0.24
RIDG	2116454/2116457	1	-0.43	.	0.33	0.22
RIPP	2116454/2116457	1	0.06	.	-0.46	-0.26
SPIT	2116454/2116457	1	0.00	.	-11110.81	-9410.86
WEAR	2116454/2116457	1	0.22	.	0.34	0.24
RIDG	2116454/2116458	1	-1.20	.	0.33	0.22
RIPP	2116454/2116458	1	0.18	.	-0.46	-0.26
SPIT	2116454/2116458	1	.	.	-11110.81	-9410.86
WEAR	2116454/2116458	1	0.57	.	0.34	0.24
RIDG	2124463/2124397	2	1.42	0.58926	0.33	0.22
RIPP	2124463/2124397	2	-1.50	0.00000	-0.46	-0.26
SPIT	2124463/2124397	2	0.66	0.70711	-11110.81	-9410.86
WEAR	2124463/2124397	2	1.00	1.17851	0.34	0.24
RIDG	2124464/2124398	2	1.00	0.00000	0.33	0.22
RIPP	2124464/2124398	2	0.58	0.58926	-0.46	-0.26
SPIT	2124464/2124398	2	0.13	1.45143	-11110.81	-9410.86

*Overall Δ/S is high in some instances due to a small N size and small std dev

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GEAR BATCH SEVERITY (Cont.)

NON-LUBRITED HARDWARE						
Parameter	Gear Batch	N	Δ/s	s^A	Overall Δ/s	Overall Shift (in Merits) ^B
WEAR	2124464/2124398	2	1.00	0.00000	0.34	0.24
RIDG	2722679/2722707	1	1.22	.	0.33	0.22
RIPP	2722679/2722707	1	-0.73	.	-0.46	-0.26
SPIT	2722679/2722707	1	1.12	.	-11110.81	-9410.86
WEAR	2722679/2722707	1	-0.11	.	0.34	0.24
RIDG	2722700/2722706	1	1.17	.	0.33	0.22
RIPP	2722700/2722706	1	-0.54	.	-0.46	-0.26
SPIT	2722700/2722706	1	0.00	.	-11110.81	-9410.86
WEAR	2722700/2722706	1	-0.63	.	0.34	0.24
RIDG	2724463/2124397	1	-1.86	.	0.33	0.22
RIPP	2724463/2124397	1	-1.81	.	-0.46	-0.26
SPIT	2724463/2124397	1	-100000	.	-11110.81	-9410.86
WEAR	2724463/2124397	1	-0.89	.	0.34	0.24

^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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LAB SEVERITY

NON-LUBRITED HARDWARE AVERAGE Δ/s						
Gear Batch	Lab	N	RIDG	RIPP	SPIT	WEAR
2115435/2116457	D	1	-0.429	0.063	0.000	0.222
2116454/2116457	D	1	-0.429	0.063	0.000	0.22222
2116454/2116458	D	1	-1.200	0.182	.	0.571
2124463/2124397	G	2	1.417	-1.500	0.660	1.000
2124464/2124398	D	2	1.000	0.583	0.130	1.000
2722679/2722707	G	1	1.222	-0.733	1.120	-0.111
2722700/2722706	A	1	1.167	-0.538	0.000	-0.625
2724463/2124397	G	1	-1.857	-1.813	-100000	-0.889

L-37-1 (D8165)

SUMMARY OF SEVERITY & PRECISION

Severity

Nonlubrited – SPIT is currently exceeding the action limit. RIPP exceeded the severity limits this period but has since returned within limits. RIDG and WEAR remained within the limits this period.

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SUMMARY OF SEVERITY & PRECISION (cont.)

Precision

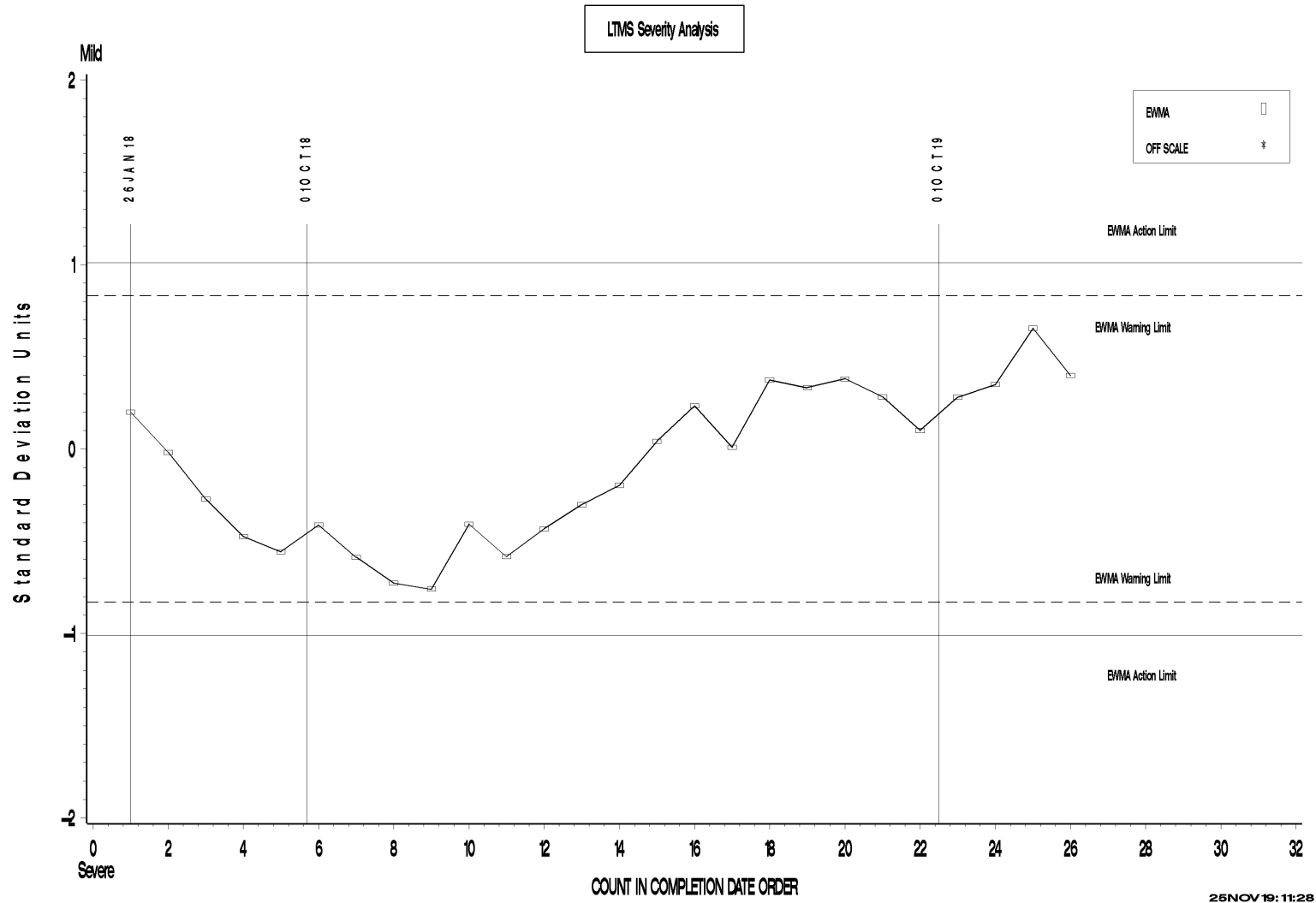
Nonlubrited – SPIT is currently exceeding the precision limit. RIPP, RIDG, and WEAR all remained within the precision limit this period.

Industry control charts follow.

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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

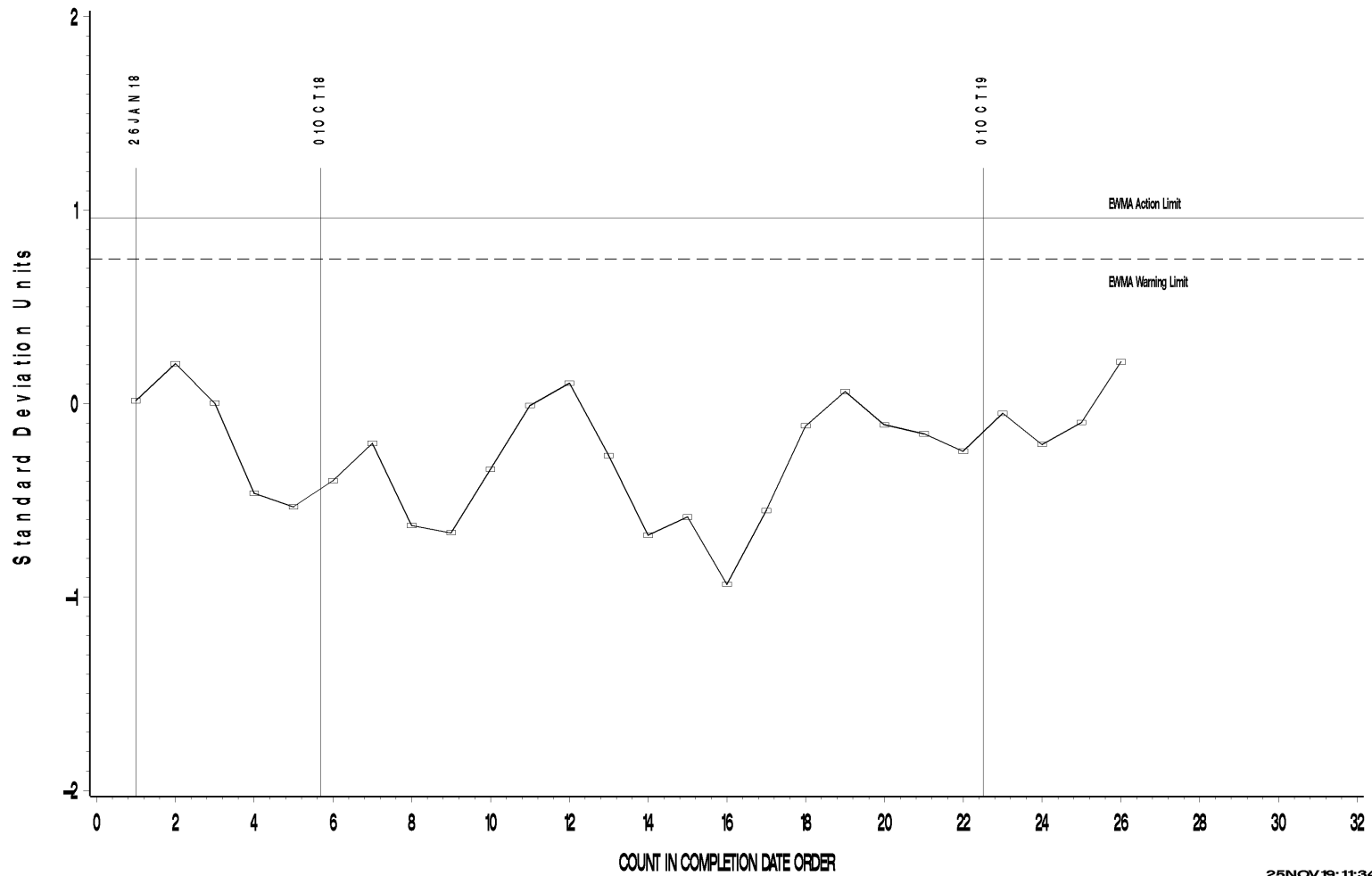


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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

LTMS Precision Analysis

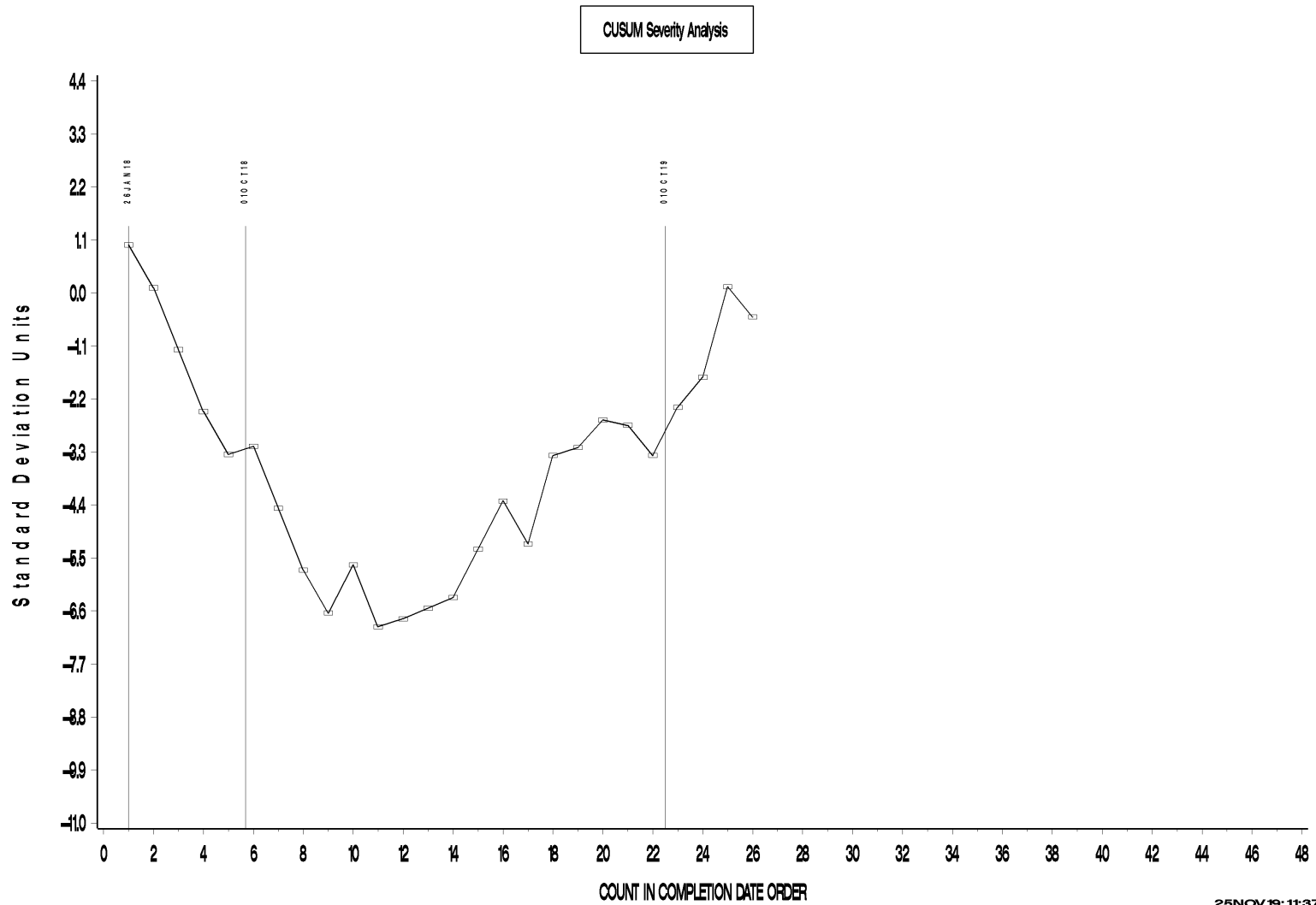


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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR WEAR

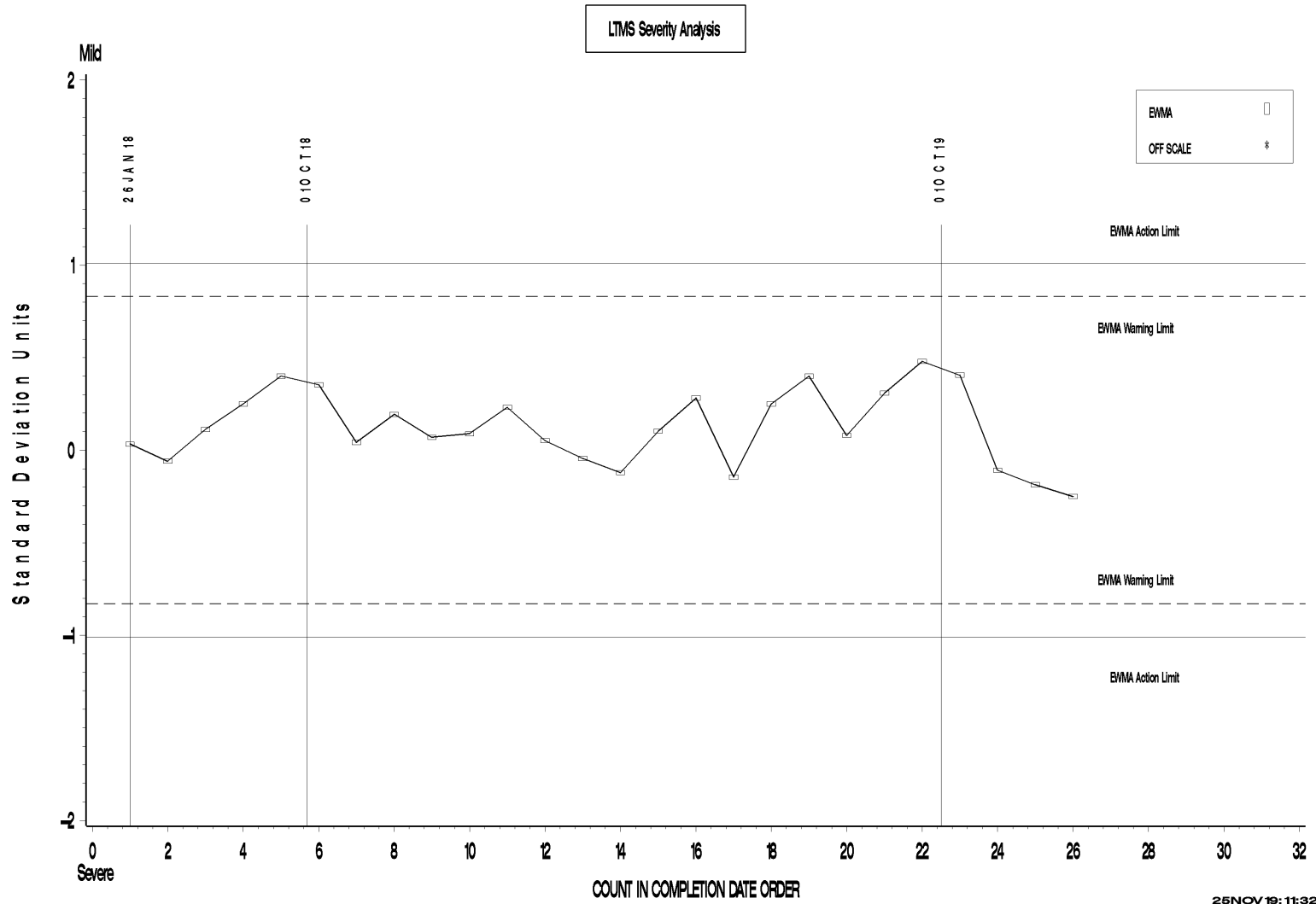


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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

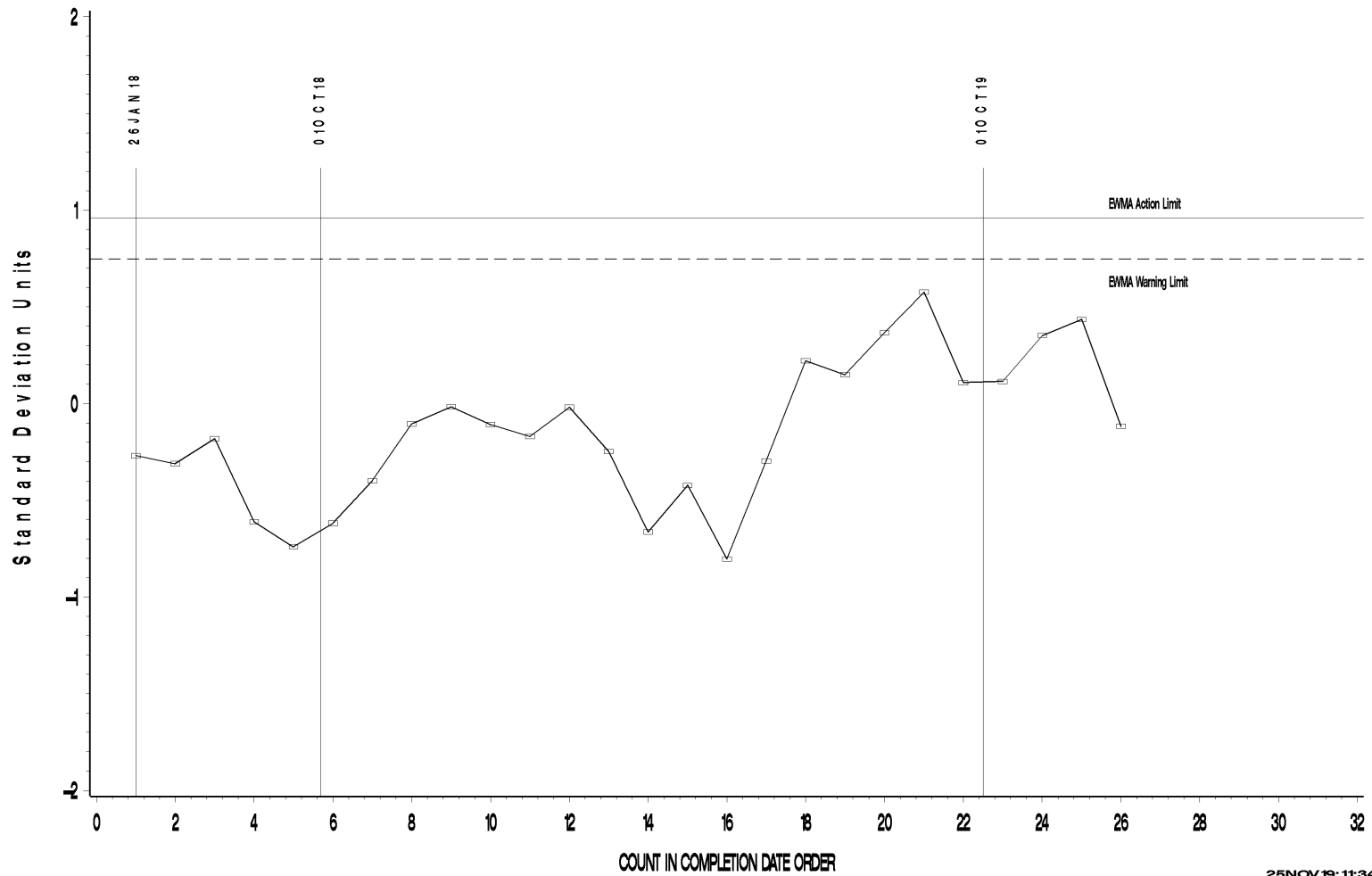


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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

LTMS Precision Analysis



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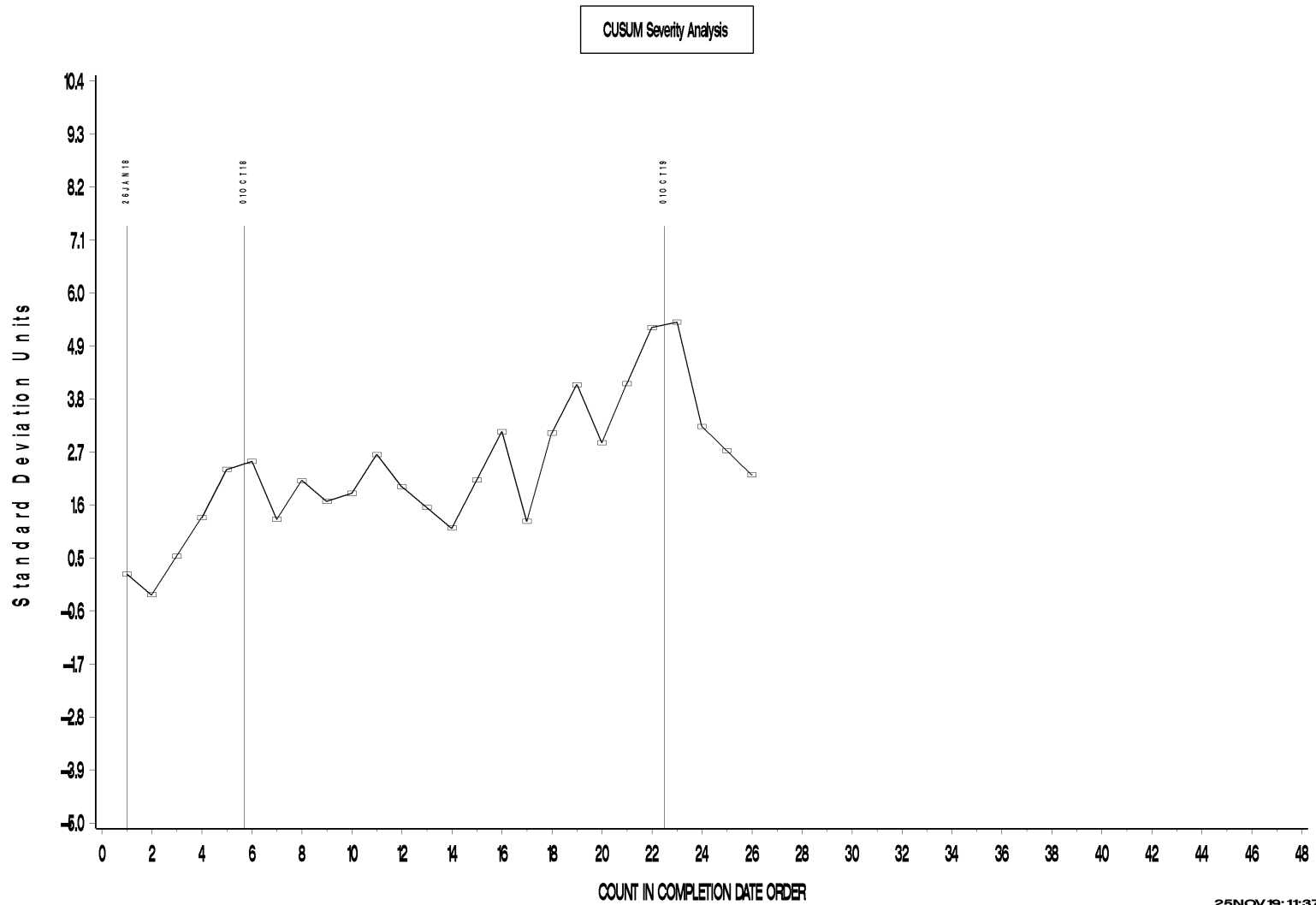


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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIDGING

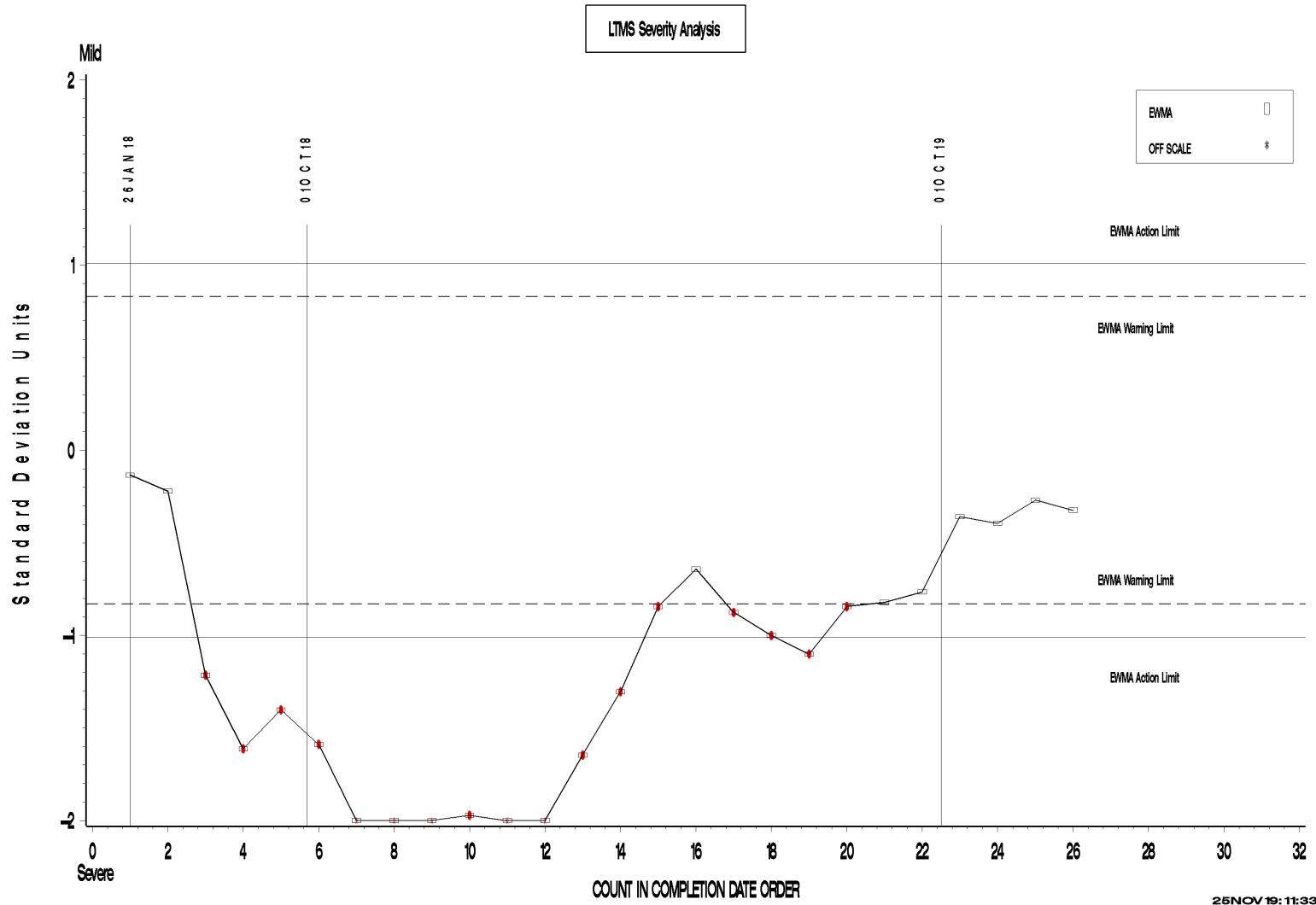


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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPING

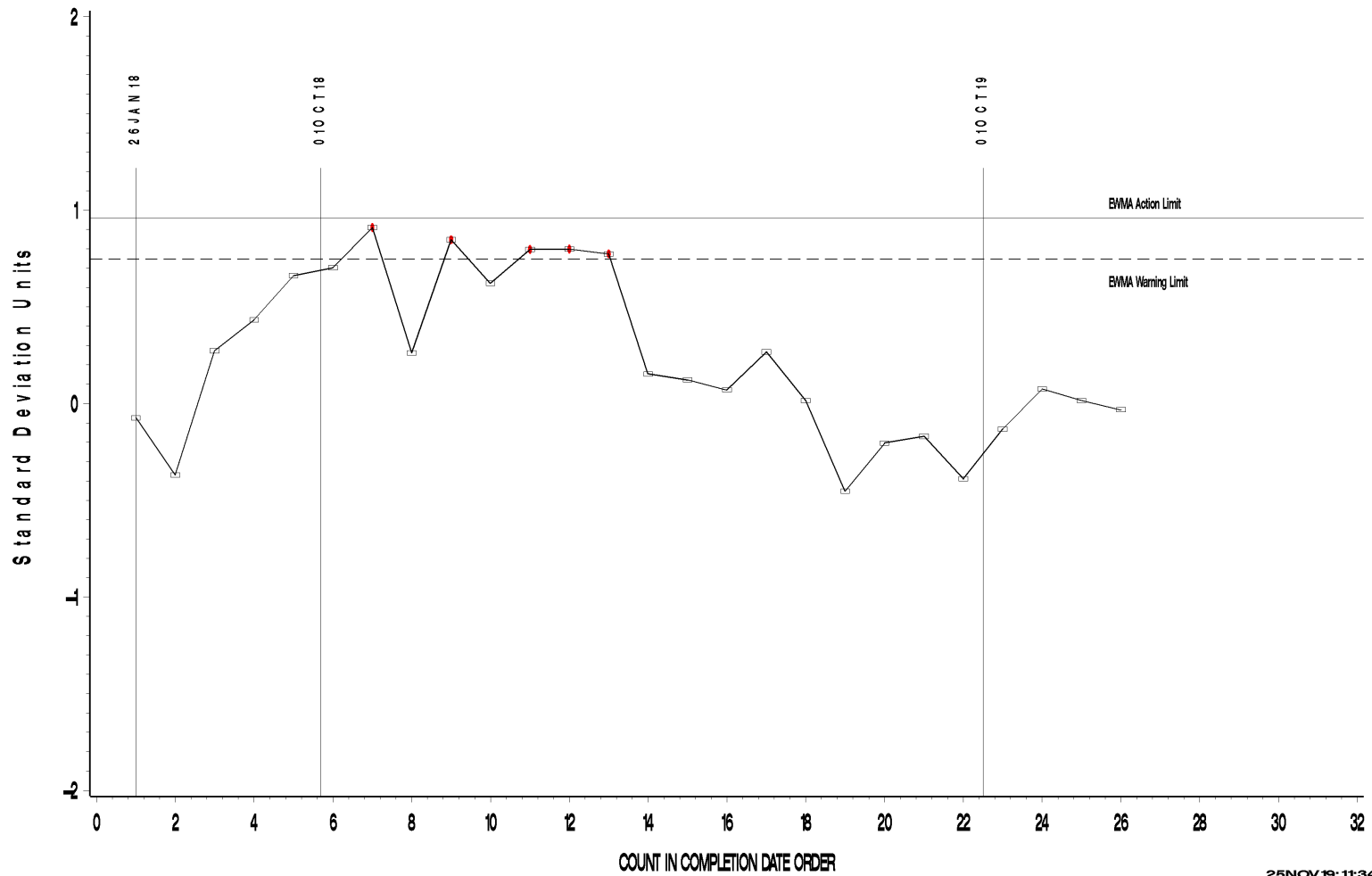


L-37-1 (D8165)

L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIBBLING

LTMS Precision Analysis



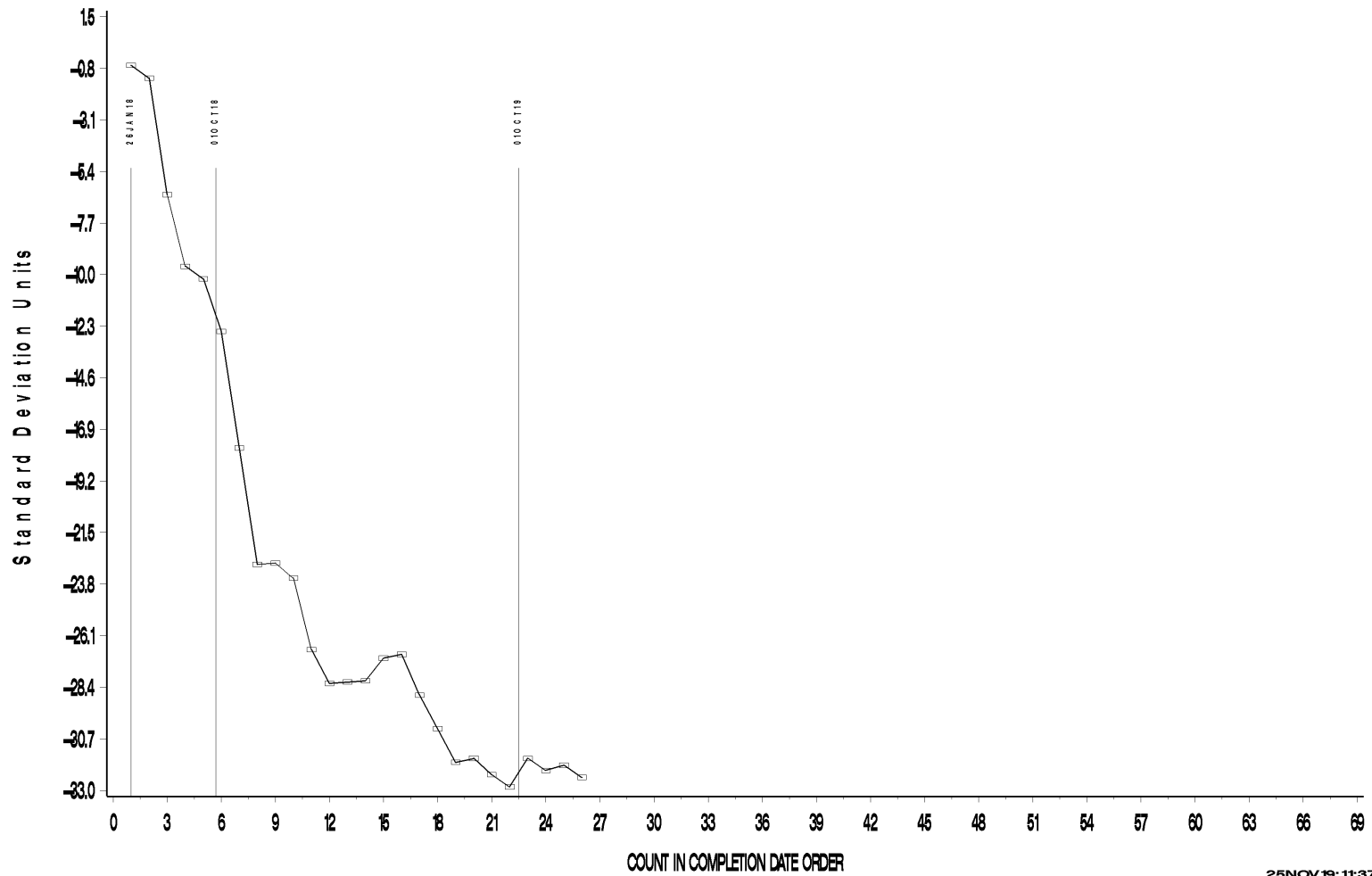
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L-37-1 NONLUBRITED INDUSTRY OPERATIONALLY VALID DATA

FINAL PINION GEAR RIPPLING

CUSUM Severity Analysis



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The current targets for reference oil 155-1 have a SPIT standard deviation of 0. This results in undefined results when performing control chart calculations. Because of this, charts for SPIT cannot be produced.

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TIMELINE ADDITIONS

Effective Date	Information Letter	Event
May, 2 2019	19-2	The Panel agreed that any test conducted on either a reference oil or non-reference oil that exhibits adhesive wear at the end of test shall make the validity of said test non-interpretable.
August 21, 2019	19-3	Info letter 19-3 was issued to revise the changes made with info letter 19-2. After a rating investigation at the July workshop, and surveillance panel discussion, it was decided to revise the requirements of adhesive wear so that test with results too severe to be rated are to be deemed non-interpretable. The term adhesive wear was also found to be inaccurate and has been replaced with undefined distress.

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LAB VISITS

No L-371 lab visit was conducted this period.

INFORMATION LETTERS

Information letters 19-2, and 19-3 were issue this period.

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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	11	342	342.0
118	3	156	156.0
134	0	0	0.0
134-1	21	146	146.0
152-2	10	89	89.0
155	5	27	27.5
155-1	20	70	70.8
Total	70	830	831.3

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 38.6 gal) for use in that test.

TMC stocks of oil 134 have been depleted. The 134-1 reblend has been introduced to testing.