



# Test Monitoring Center

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MEMORANDUM: 04-030  
DATE: April 19, 2004  
TO: Wim Van Dam, Chairman, Mack Surveillance Panel  
FROM: Jeff Clark  
SUBJECT: T-10 / T-10A Calibration Testing for the April 2004 ASTM Report Period

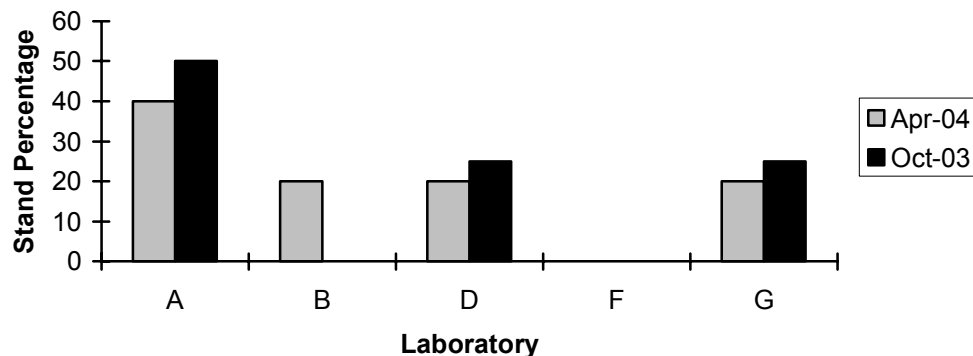
The following is a summary of T-10 reference oil tests completed during the April 2004 ASTM report period, which began on October 1, 2003 and ended on March 31, 2004.

### Lab / Stand Distribution:

	Reporting Data	Calibrated as of 3/31/04
Number of Laboratories	4	4
Number of Stands	5	4

The figure below shows the T-10 laboratory / stand distribution for tests completed the current and previous report periods:

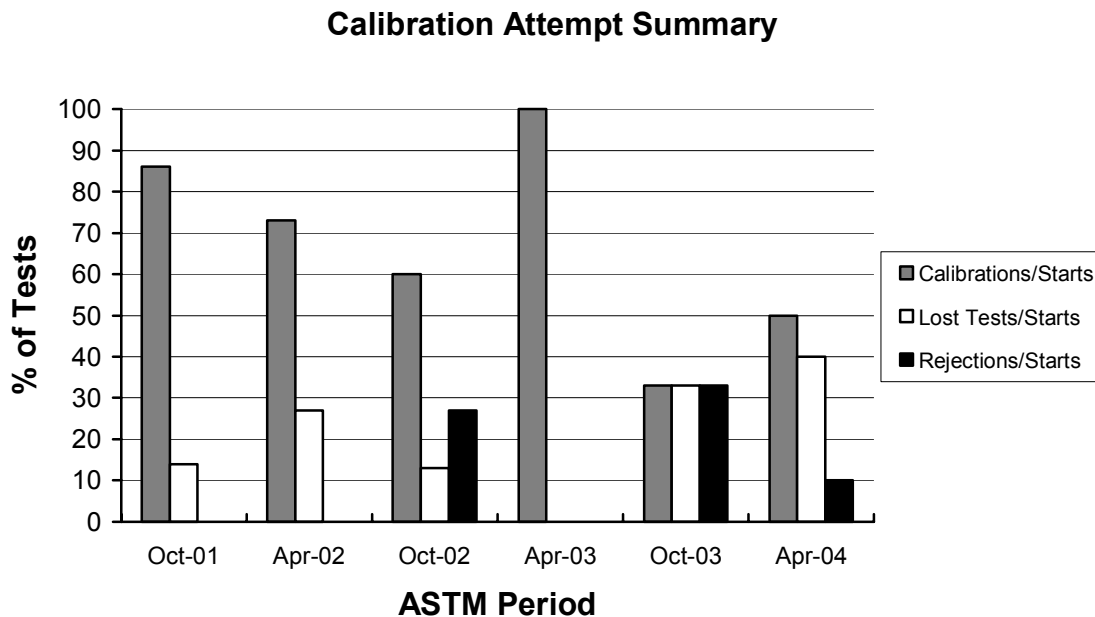
### Laboratory / Stand Distribution



The table below summarizes the status of the reference oil tests reported to the TMC this ASTM report period:

Test Status	TMC Validity Code	Number of T-10 Tests
Acceptable Calibration Test	AC	5
Failed Calibration Test (LTMS Criteria)	OC	1
Operationally Invalid Calibration Test	LC	3
Aborted Calibration Test	XC	1
Total		10

The calibrations per start, lost tests per start and rejections per start rates are summarized in the figure below:



A detailed list of reasons tests failed the acceptance criteria (OC validity) is shown in Table 1. Table 2 lists the operationally invalid tests (LC validity) and Table 3 lists the aborted tests (XC validity).

Severity and Precision:

Figures 1 through 5 (attached) show the current industry EWMA severity, EWMA precision, and cusum charts Delta Pb @ EOT (PB), Cylinder Liner Wear (CLW), Top Ring Weight Loss (TRWL), Oil Consumption (OC), and Delta Pb 250-300 Hours (PB2). Note that both PB and PB2 show industry alarms, however, these are due to the use of experimental conrod bearings on reference tests. Both parameters have been temporarily suspended from LTMS for determining stand calibration. Severity adjustments have been suspended for both parameters as well. The combination of low test activity and the experimental bearing tests makes it difficult to offer any meaningful commentary regarding severity trends for any of the parameters.

Precision, as estimated by the pooled standard deviation, is shown in the following table. Precision estimates are presented on an annual basis. However, any conclusions drawn from a comparison between current and previous estimates are of little value due to the reduced number of degrees of freedom. Please note, that the degrees of freedom (df) equals  $\Sigma(n \text{ observations per oil} - 1)$ .

**T-10 Pooled Precision By Year**

Parameter	2001	2002	2003	2004
df	13	20	3	
PB	0.2660	0.2530	n/a*	
CLW	3.31	4.94	2.78	
TRWL	26.7	17.99	4.58	
OC	6.36	7.02	6.67	
PB2	4.69	3.49	n/a*	

\*Precision estimate not available due to tests being run on experimental conrod bearings.

Reference Oils:

The current reference oil test targets are shown below:

Oil	N	Parameter	Mean (cSt)	S
820-2	20	PB	3.2106	0.2339
		CLW	32.0	4.2
		TRWL	109	18
		OC	52.9	7.2
		PB2	9.0	3.5

Once 30 tests on oil 820-2 have been completed, the TMC will provide a target update for surveillance panel consideration.

Abbreviated Length Test T-10A:

The TMC monitors the T-10A for the determination of laboratory severity adjustments for MRV viscosity. Figure 6 (attached) shows the current industry EWMA severity, EWMA precision, and CUSUM charts for MRV viscosity.

Information Letters:

T-10 Information Letter 03-3, Sequence No. 5 was issued October 28, 2003. This letter dealt with the implementing of an intake manifold pressure specification.

TMC Laboratory Visits:

No TMC laboratory visits were conducted this ASTM period.

Quality Index:

One Quality Index deviation was issued this ASTM report period, for intake manifold and fuel inlet temperatures. For the history of the T-10/T-10A, one QI deviation has been issued.

Additional Information:

The T-10 and T-10A databases, industry timeline, and industry alarm logs can be accessed on the TMC's homepage. If you have any questions on how to access this information, contact the TMC.

JAC/jac/mem04-030.jac.doc

Attachments

c: J.L. Zalar, TMC  
F.M. Farber, TMC  
Mack Surveillance Panel  
<ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/semiannualreports/T10-04-2004.pdf>

Distribution: Email

**Table 1**  
**Summary of Reasons for Rejected Tests**

	No. of Tests
Mild Top Ring Weight Loss	1

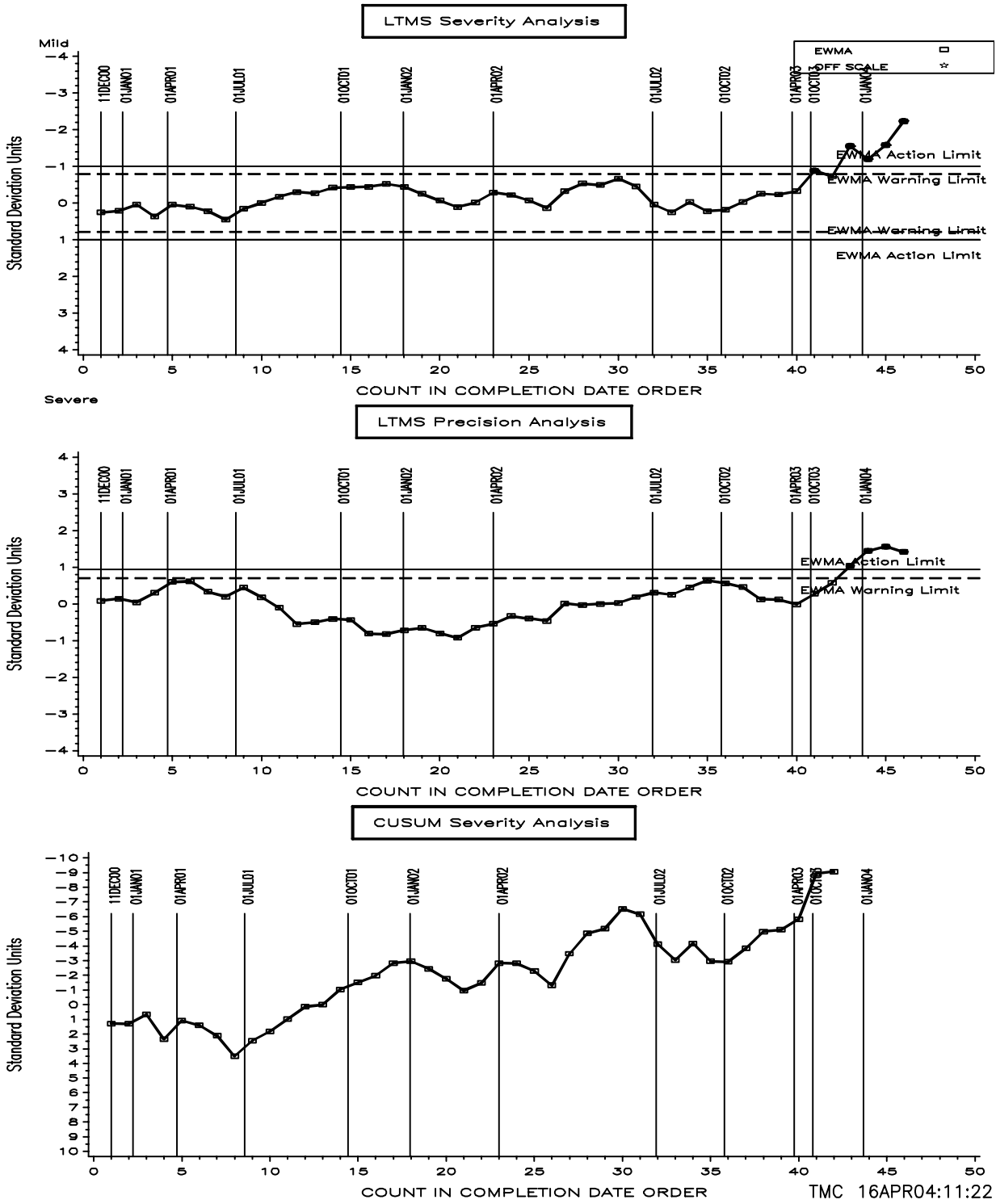
**Table 2**  
**Summary of Reasons for Invalid Tests**

	No. of Tests
Wrong main bearings	1
Intercooler leak	2

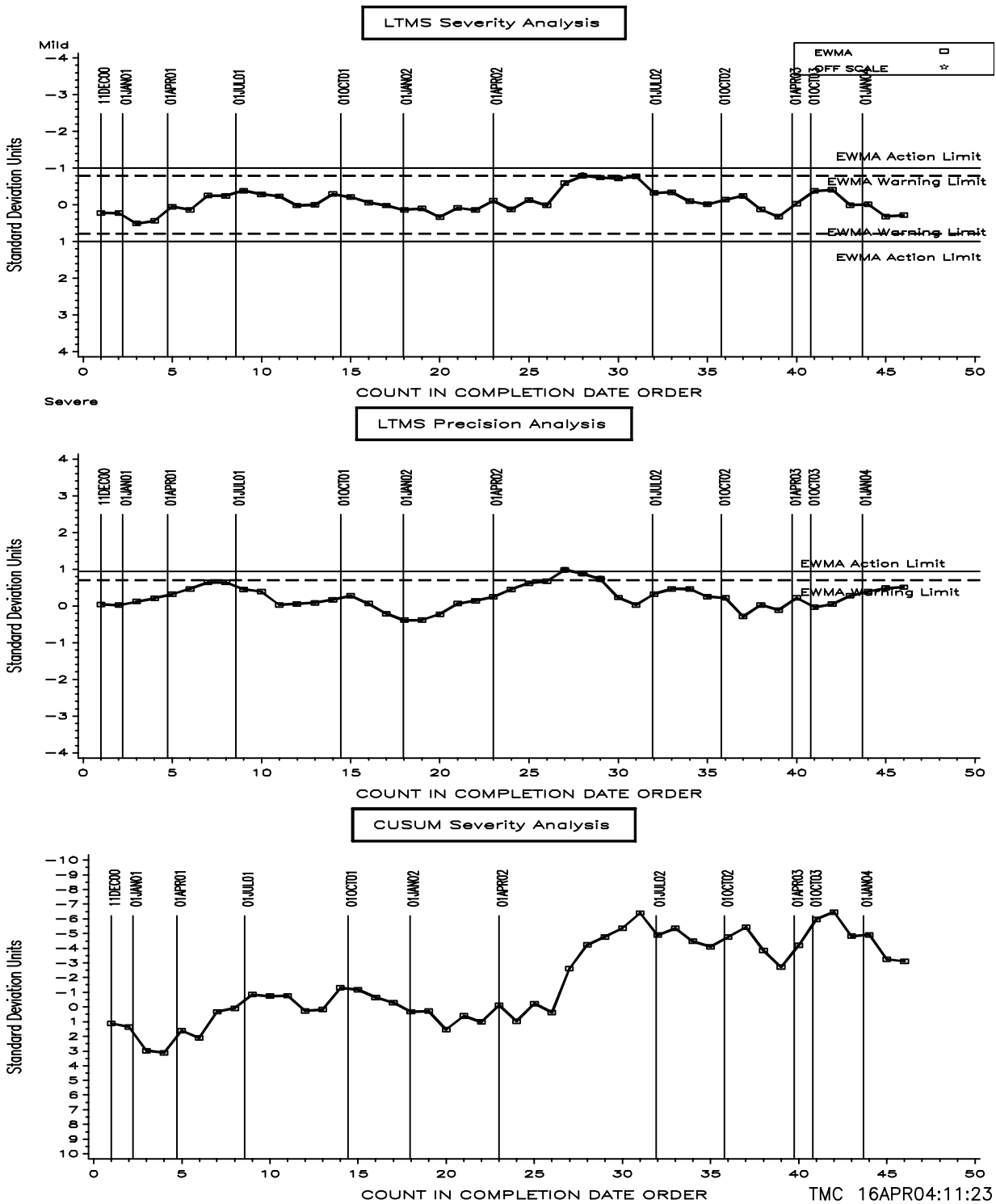
**Table 3**  
**Summary of Reasons for Aborted Tests**

	No. of Tests
Failed fuel injector	1

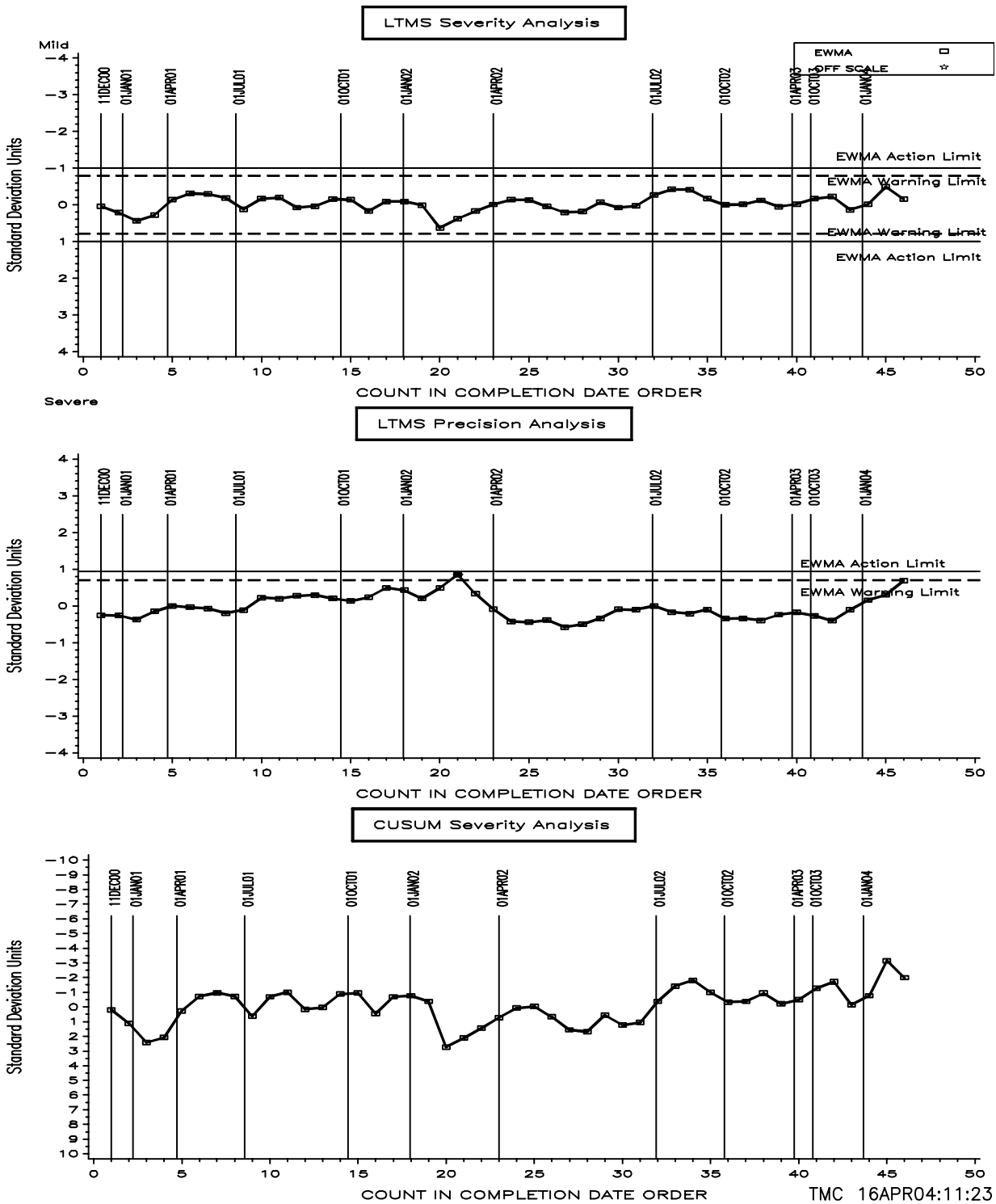
**FIGURE 1**  
T-10 INDUSTRY OPERATIONALLY VALID DATA  
DELTA PB @ EOT



**FIGURE 2**  
T-10 INDUSTRY OPERATIONALLY VALID DATA  
CYLINDER LINER WEAR

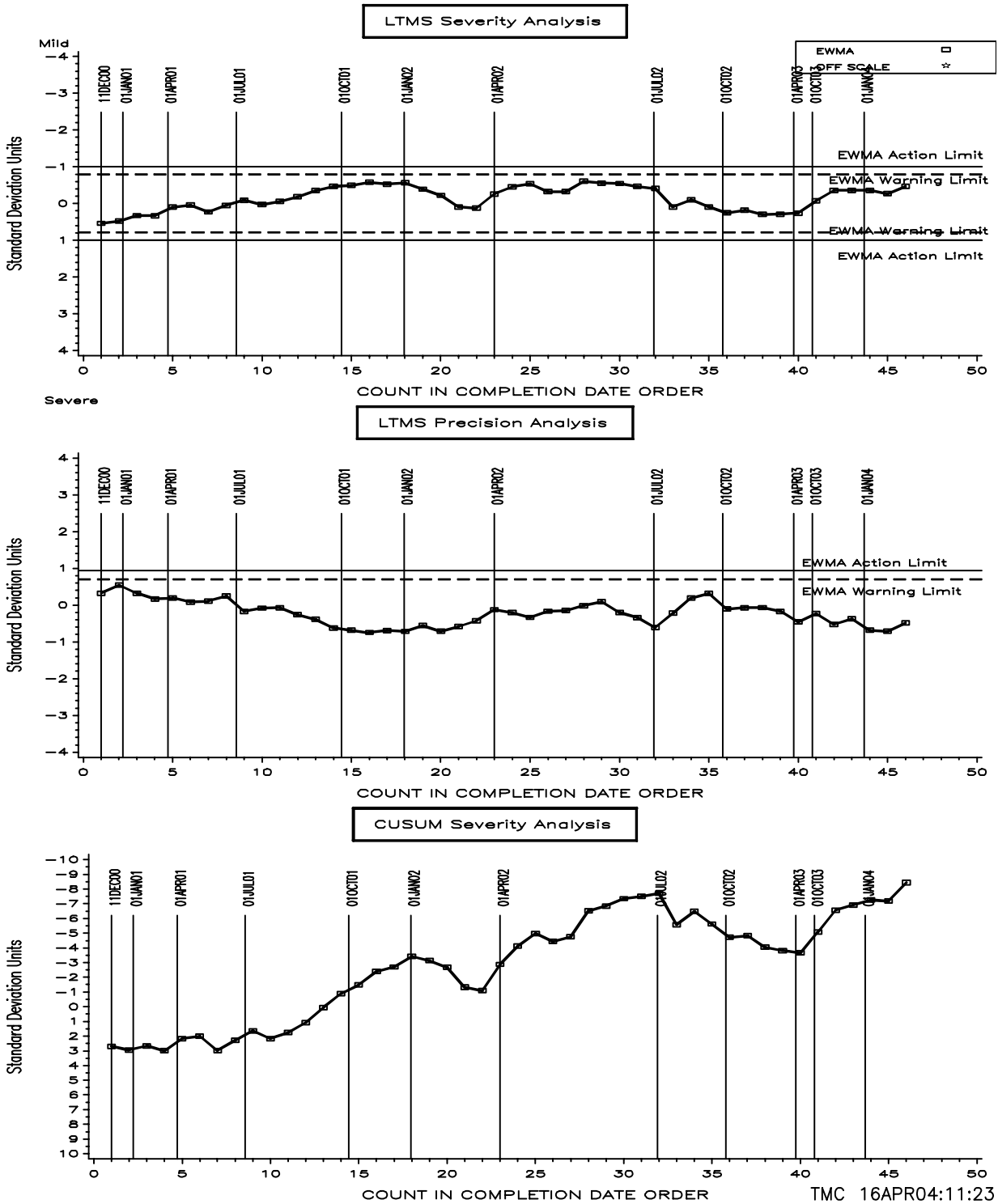


**FIGURE 3**  
T-10 INDUSTRY OPERATIONALLY VALID DATA  
TOP RING WEIGHT LOSS



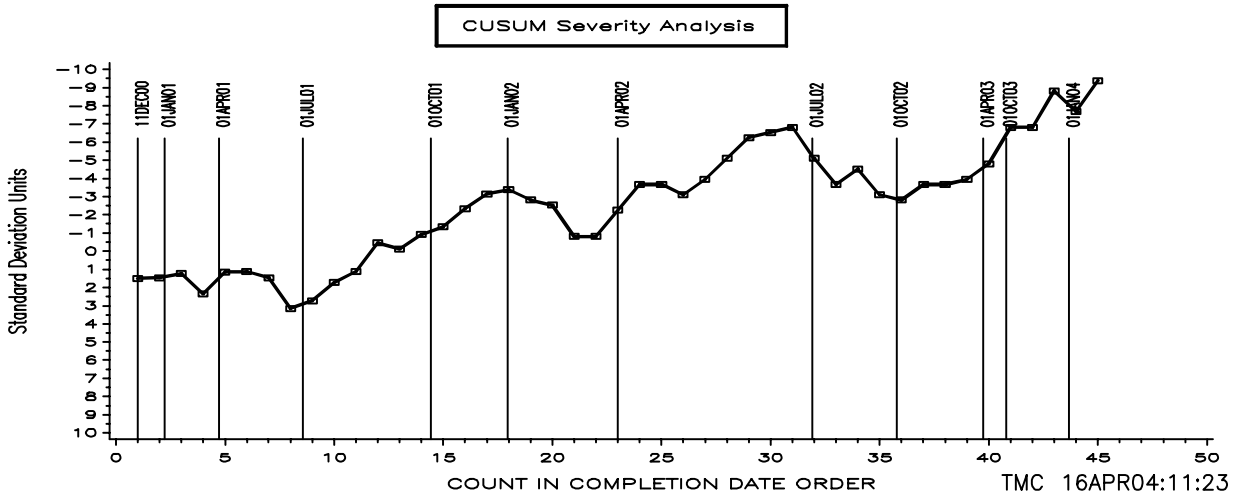
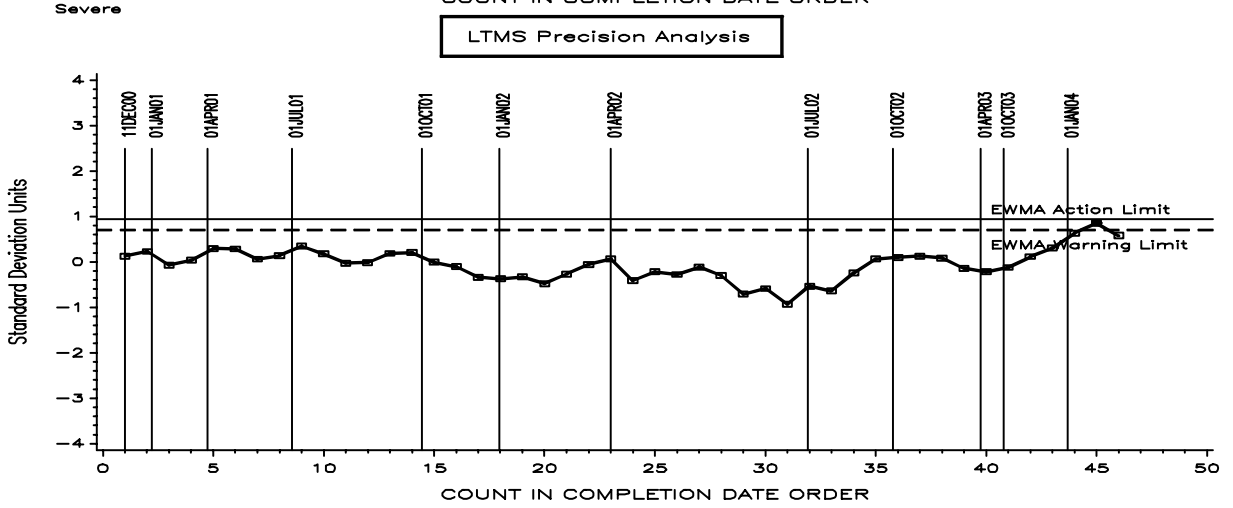
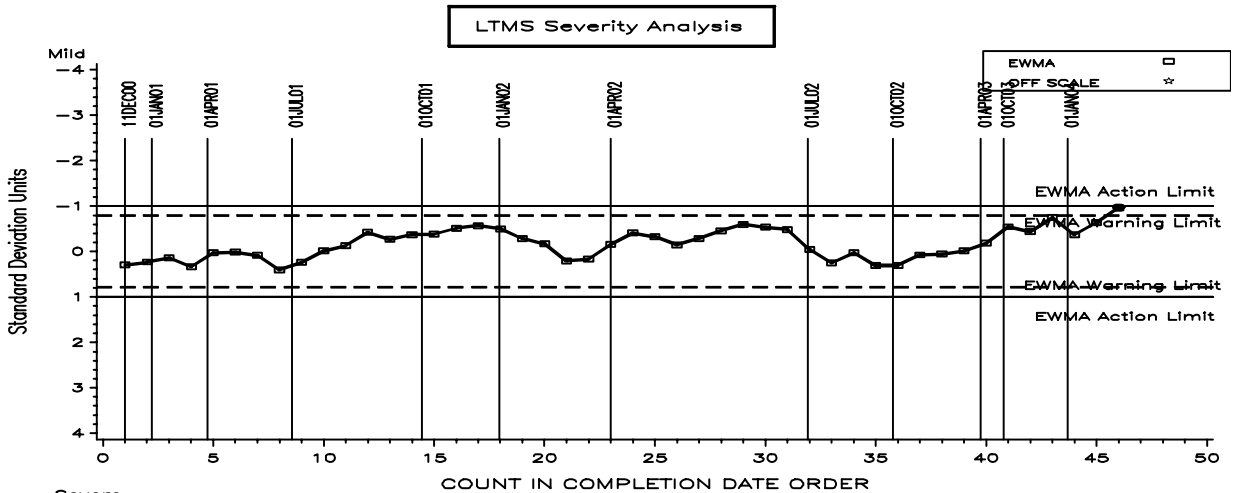


**FIGURE 4**  
T-10 INDUSTRY OPERATIONALLY VALID DATA  
OIL CONSUMPTION



**FIGURE 5**  
T-10 INDUSTRY OPERATIONALLY VALID DATA

DELTA PB 250-300 HOURS



**FIGURE 6**  
T10A INDUSTRY OPERATIONALLY VALID DATA  
MRV VISCOSITY @ 75H

