Test Monitoring Center
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MEMORANDUM: 00-145

DATE: October 17, 2000

TO: Charlie Passut, Chairman, Mack Surveillance Panel

FROM: Jeff Clark

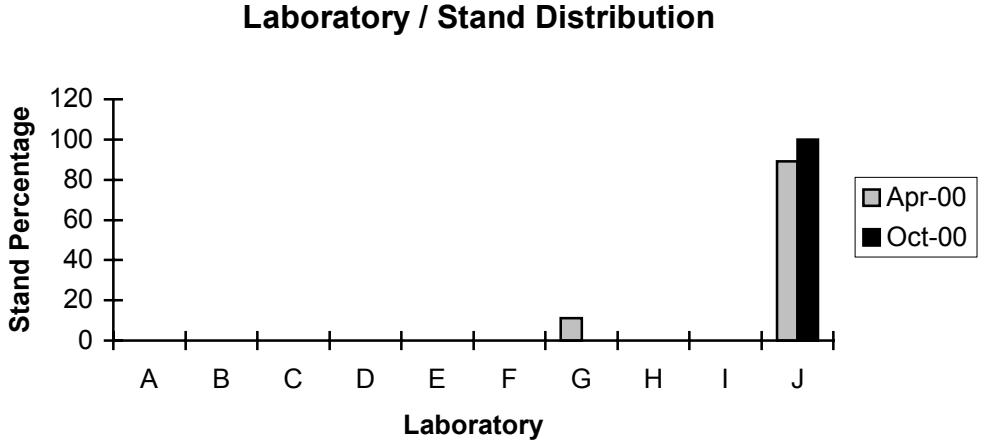
SUBJECT: T-8 / T-8E Calibration Testing for the October 2000 ASTM Report Period

The following is a summary of T-8 / T-8E reference oil tests completed during the October 2000 ASTM report period, which began on April 1, 2000 and ended on September 30, 2000.

Lab / Stand Distribution:

	T-8 / T-8E Reporting Data	T-8 Calibrated as of 9/30/00	T-8E Calibrated as of 9/30/00
Number of Laboratories	1	2	2
Number of Stands	4	6	6

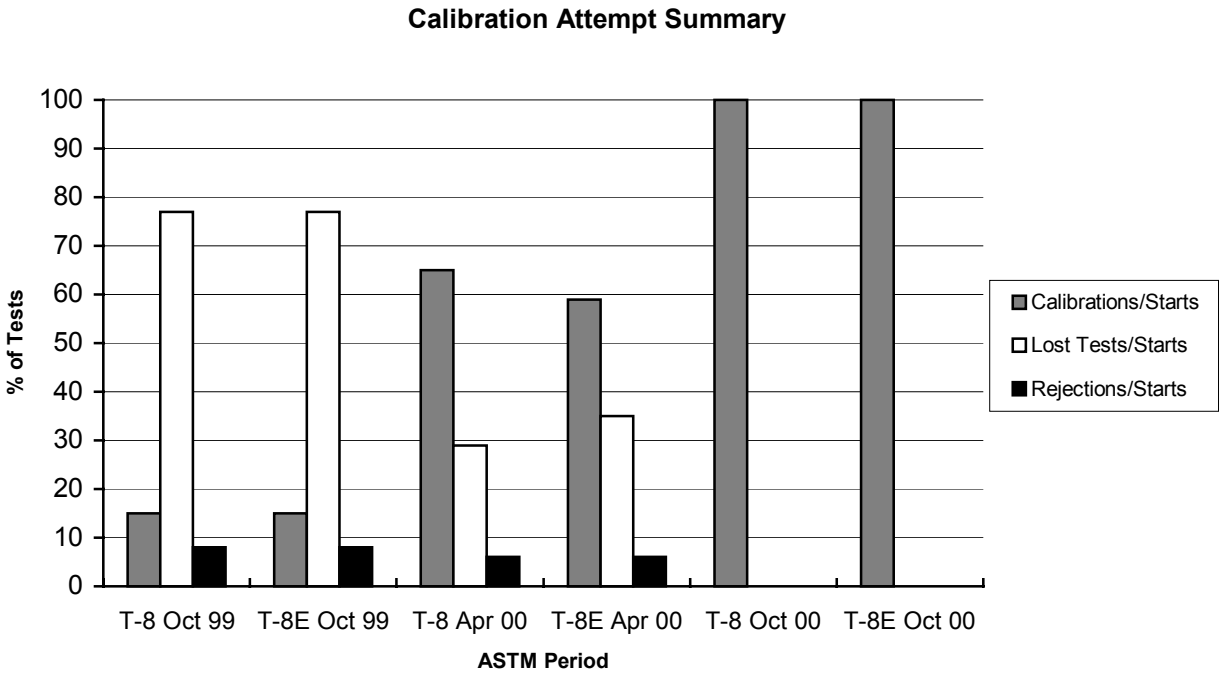
The figure below shows the T-8 / T-8E laboratory / stand distribution for tests completed this report period:



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-8 Tests	Number of T-8E Tests
Operationally and Statistically Acceptable	AC	4	4
Failed LTMS Acceptance Criteria	OC	0	0
Operationally Invalid	LC	0	0
Aborted	XC	0	0
Total		4	4

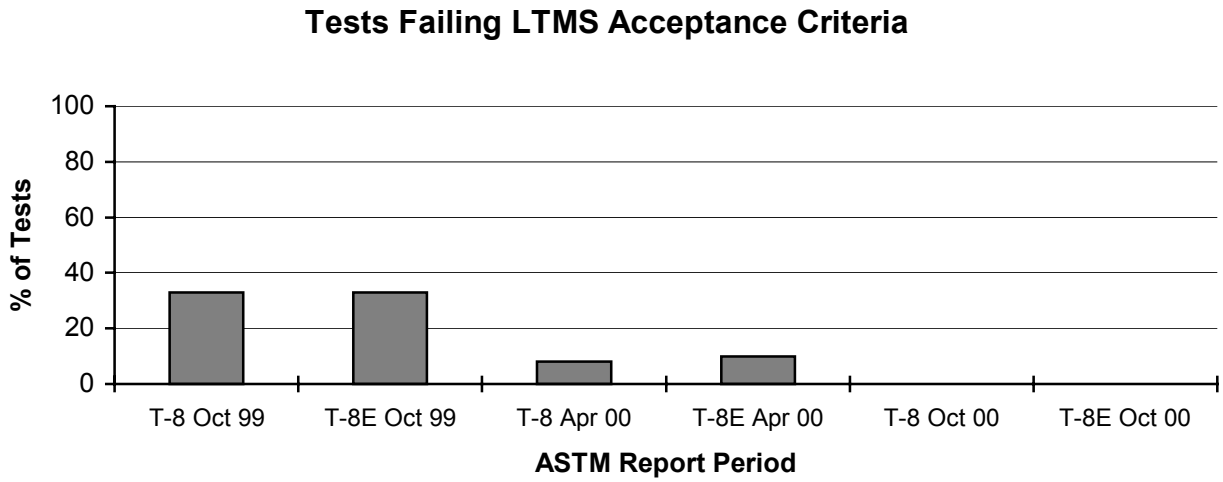
Calibrations per start, lost tests per start and rejections per start rates are summarized in the figure below:



The calibration per start rate is much improved compared to recent periods. The lost test per start and rejection per start rates are lower than historical levels. A detailed list of reasons tests failed the acceptance criteria is shown in Table 1. Table 2 lists the operationally invalid tests and Table 3 lists the aborted tests.

LTMS Acceptance Criteria / Stand Alarms:

The following figure shows the percentage of operationally valid tests that failed the LTMS acceptance criteria (TMC validity code = OC) for recent ASTM report periods:



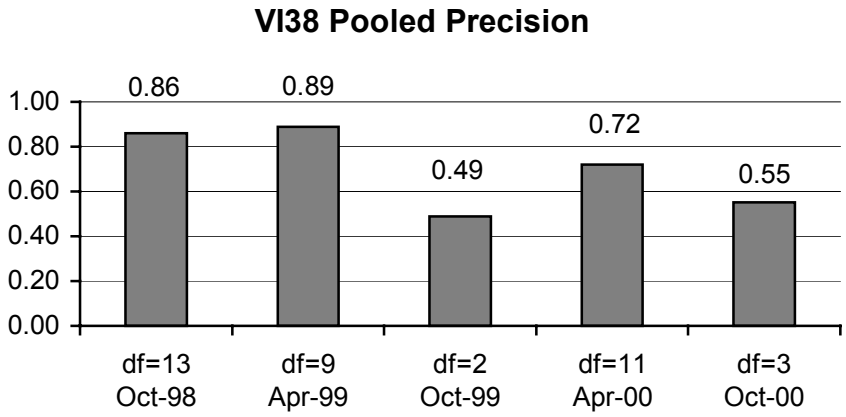
There were no LTMS stand alarms for the current period.

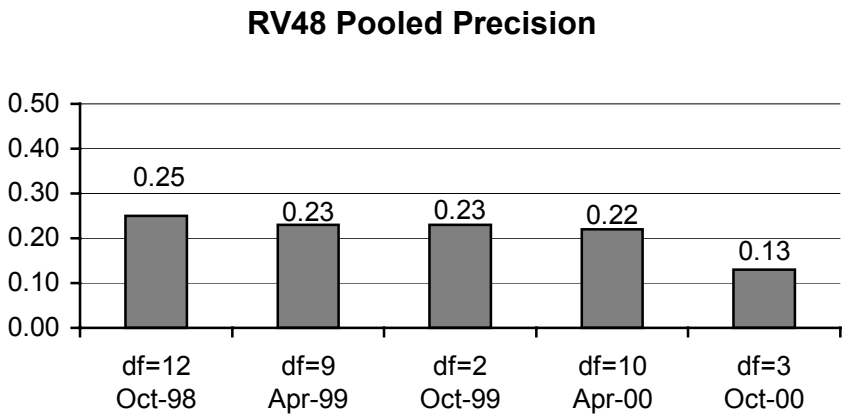
Severity and Precision:

Figure 1 (attached) shows the current industry EWMA severity, EWMA precision, and cusum charts for Viscosity Increase at 3.8% TGA Soot (VI38). VI38 is currently in control. However, for this period, VI38 is trending an average of 0.45 Δ/s mild. This is equivalent to 0.40 cSt. Figure 2 (attached) shows the industry charts for the most recent twenty-five tests. For a history of VI38 industry alarms, refer to the industry alarm log shown in Table 4.

Figure 3 (attached) shows the current industry EWMA severity, EWMA precision, and cusum charts for Relative Viscosity at 4.8% TGA Soot (RV48). RV48 is currently in control. However, for this period, RV48 is trending an average of 0.99 Δ/s mild. This is equivalent to 0.26 relative viscosity units. Figure 4 shows the industry charts for the most recent twenty-five tests. For a history of RV48 industry alarms, refer to the industry alarm log shown in Table 5.

Precision, as estimated by the pooled standard deviation, is shown in the following figures. For comparison purposes, the TMC will continue to report precision by ASTM period.





The October '00 precision estimate for VI38 is comparable to recent ASTM periods. The October '00 precision estimate for RV48 shows improvement compared to recent ASTM periods. However, the small degrees of freedom make it difficult to draw any meaningful conclusions regarding precision. Please note, that the degrees of freedom (df) equals Σ(n observations per oil - 1).

Reference Oils:

The current T-8 / T-8E reference oil test targets are shown below:

Parameter	Oil	n	Mean (cSt)	s
VI38	1004-2	59	4.92	0.93
	1004-3	30	4.57	0.90
RV48	1004-2	24	2.02	0.26
	1004-3	30	2.07	0.26

Information Letters:

No information letters were issued this ASTM period.

TMC Laboratory Visits:

No TMC laboratory visits were conducted this ASTM period.

Additional Information:

Figure 5 is a plot of TGA soot versus test hours for all operationally valid calibration tests on TMC oil 1004-3

Table 6 contains the T-8 / T-8E Timeline which details changes to the test since January 1, 1993.

The T-8 / T-8E database, for operationally valid calibration tests, can be accessed on the TMC's homepage. If you have any questions on how to access this information, contact the TMC.

JAC/jac/mem00-145.jac.doc

Attachments

c: J.L. Zalar, TMC
F.M. Farber, TMC
Mack Surveillance Panel
ftp://tmc.astm.cmri.cmu.edu/docs/diesel/mack/semiannualreports/T8-10-2000.pdf

Table 1
Summary of Reasons for Rejected Tests

	No. of T-8 Tests	No. of T-8E Tests
No rejected tests	-	-

Table 2
Summary of Reasons for Invalid Tests

	No. of T-8 Tests	No. of T-8E Tests
No invalid tests	-	-

Table 3
Summary of Reasons for Aborted Tests

	No. of Tests
No aborted tests	-

FIGURE 1

T–8/T–8E INDUSTRY OPERATIONALLY VALID DATA

VISCOSITY INCREASE AT 3.8% SOOT (CST)

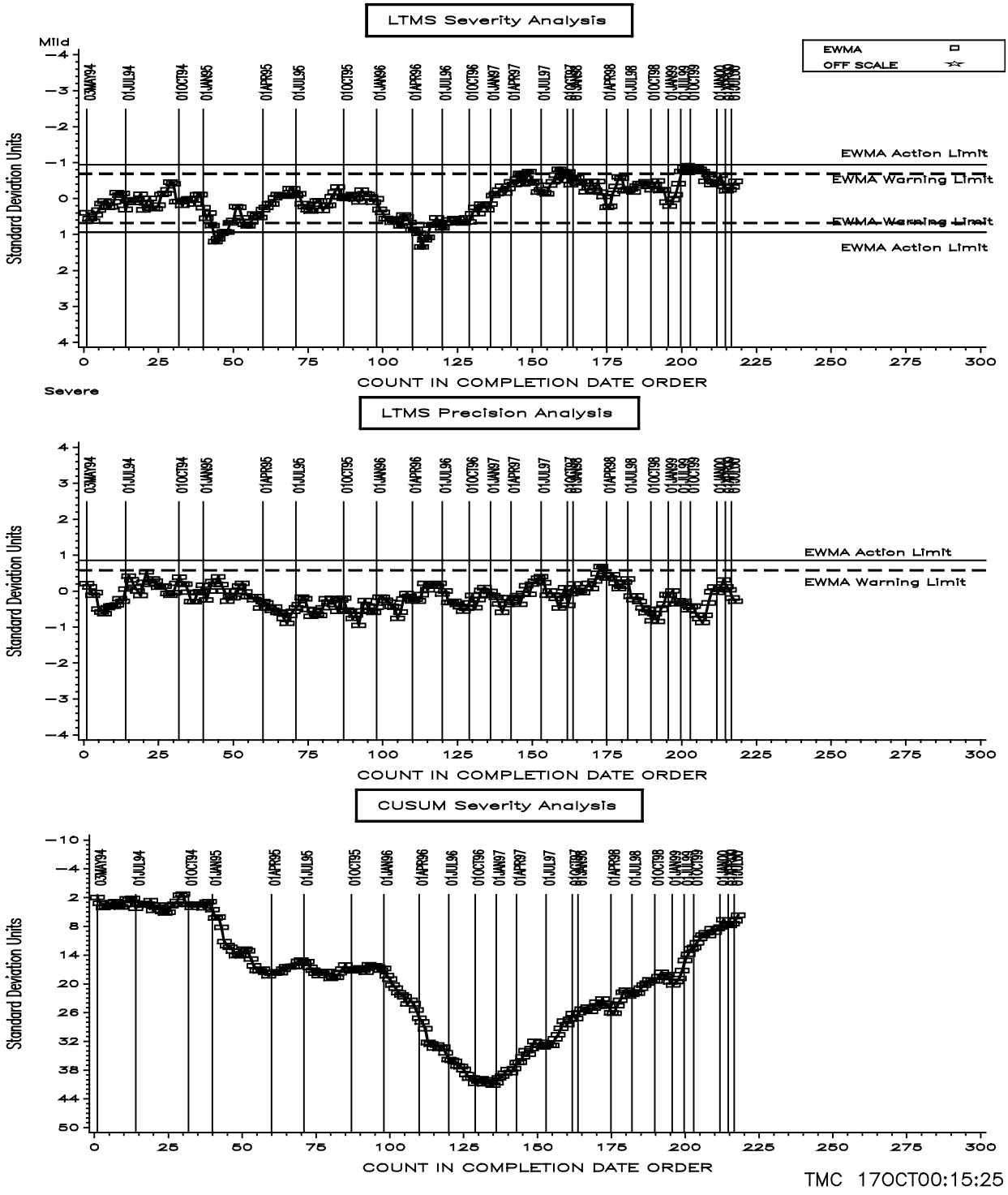


FIGURE 2

T-8/T-8E INDUSTRY OPERATIONALLY VALID DATA

VISCOSITY INCREASE AT 3.8% SOOT (CST)

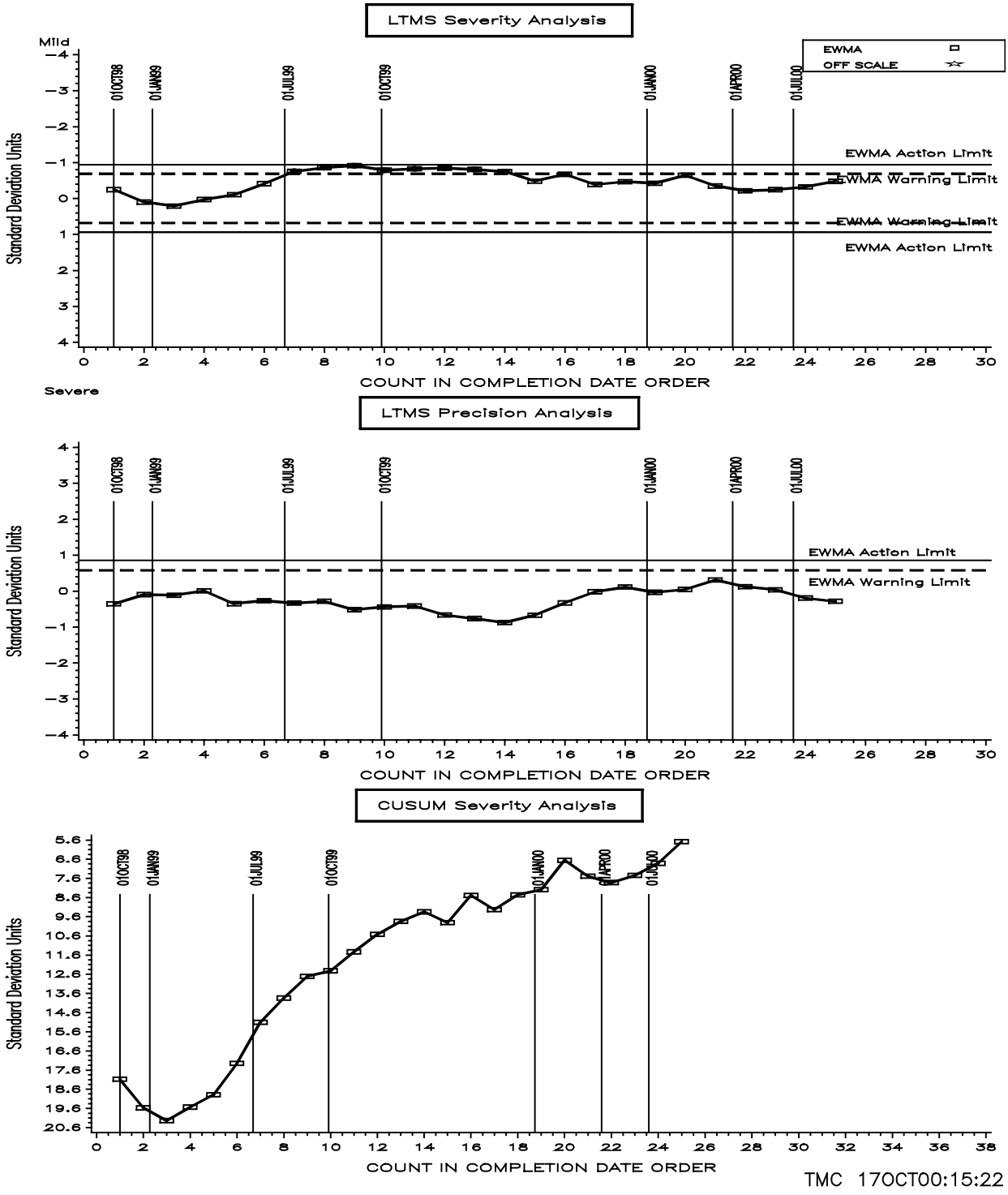


TABLE 4

T-8 / T-8E VISCOSITY INCREASE AT 3.8% SOOT INDUSTRY ALARM LOG

January 21, 1995 to March 14, 1995 (Severity, Severe direction)

Surveillance investigated effects of fuel batches at April and June 1995 meetings. No cause was identified.

February 3, 1996 to October 25, 1996 (Severity, Severe direction)

Surveillance investigated alarms at June and September 1996 meetings. Alarms believed to be caused by the test trending mild on soot. Concerned that existing test targets did not represent true test performance, the Surveillance Panel adopted new targets on September 5, 1996. Alarms cleared on October 25, 1996.

May 6, 1997 to June 4, 1997 (Severity, Mild direction)

Industry mild trend believed to be caused by one laboratory's data.

August 17, 1997 to November 28, 1997 (Severity, Mild direction)

Industry mild trend believed to be caused by one laboratory's data.

March 23, 1998 to March 24, 1998 (Precision)

A one-test excursion occurs. No industry related problem.

September 1, 1999 to November 25, 1999 (Severity, Mild direction)

A series of mild tests triggered an industry warning. No causes were identified and the Surveillance Panel took no action.

Updated 10/24/00

FIGURE 3

T–8/T–8E INDUSTRY OPERATIONALLY VALID DATA

RELATIVE VISCOSITY AT 4.8% SOOT

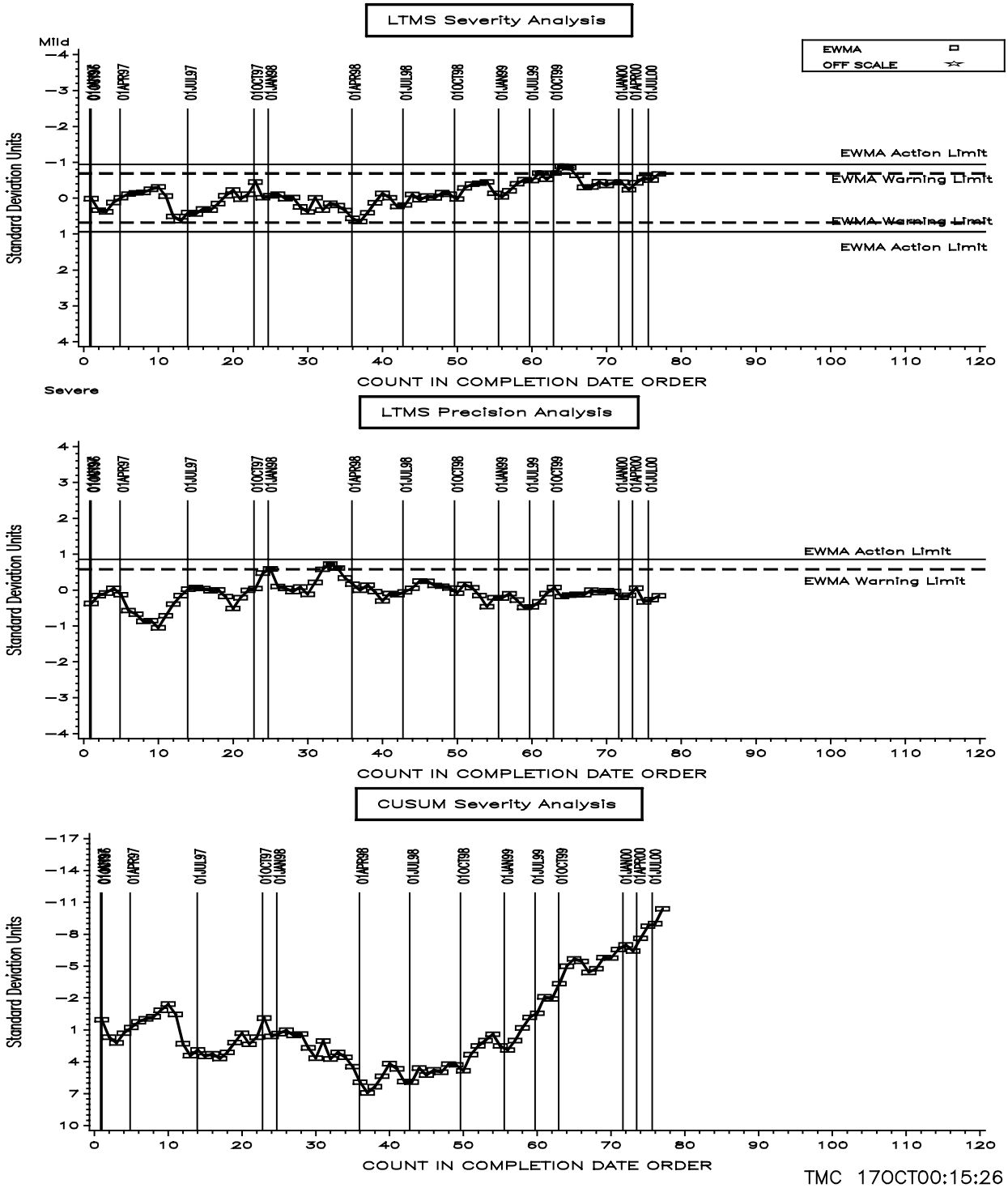


FIGURE 4

T–8/T–8E INDUSTRY OPERATIONALLY VALID DATA

RELATIVE VISCOSITY AT 4.8% SOOT

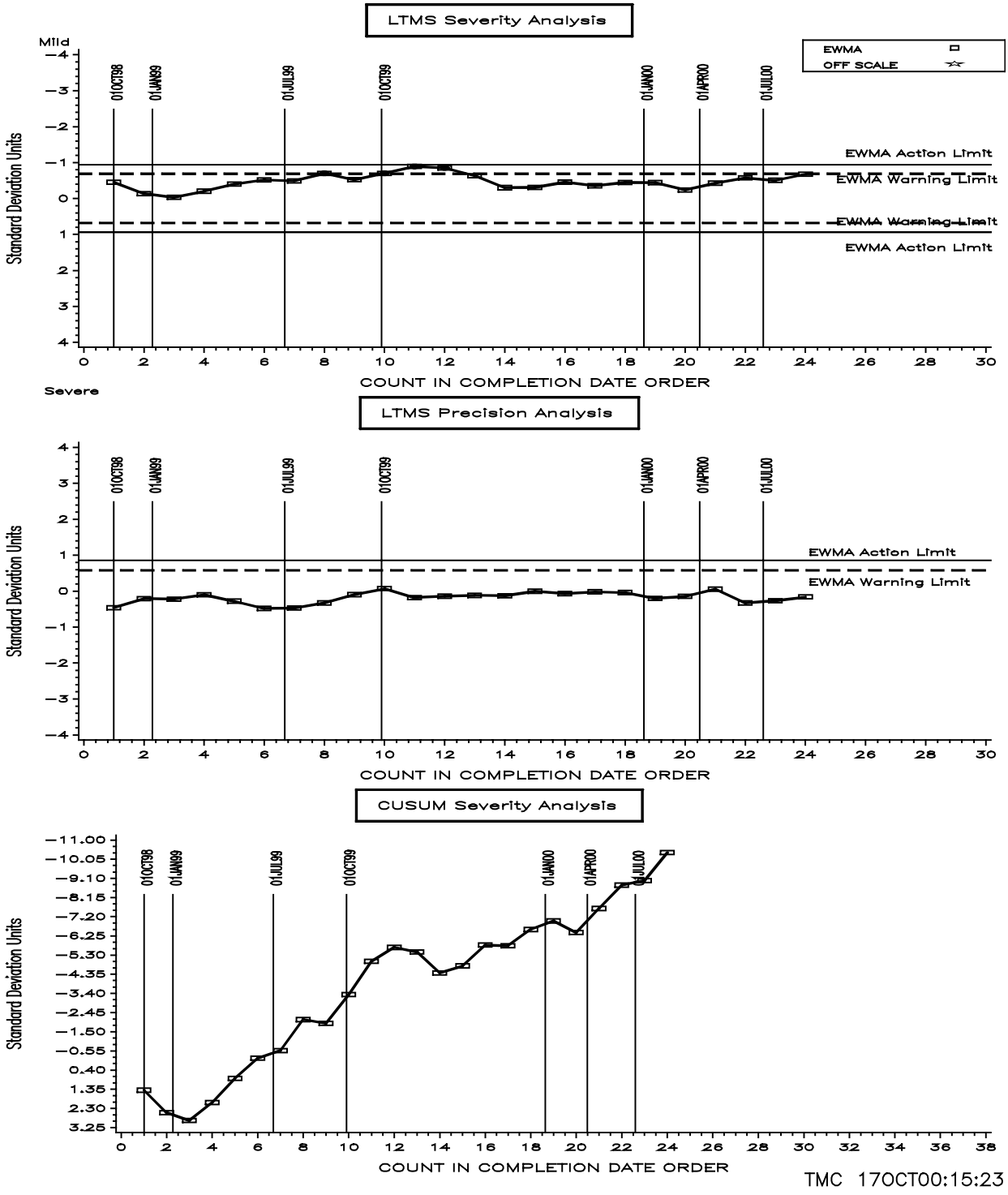


TABLE 5

T-8E RELATIVE VISCOSITY AT 4.8% SOOT INDUSTRY ALARM LOG

February 1, 1998 to February 12, 1998 (Precision)

A one-test excursion occurs. No industry related problem.

March 21, 1998 to March 24, 1998 (Precision)

A two-test excursion occurs. No industry related problem.

September 16, 1999 to October 21, 1999 (Severity, Mild direction)

Four of five tests trigger a warning alarm. No causes were identified and the Surveillance Panel took no action.

Updated 10/24/00

Figure 5
TGA Soot vs. Test Hours
TMC Oil 1004-3

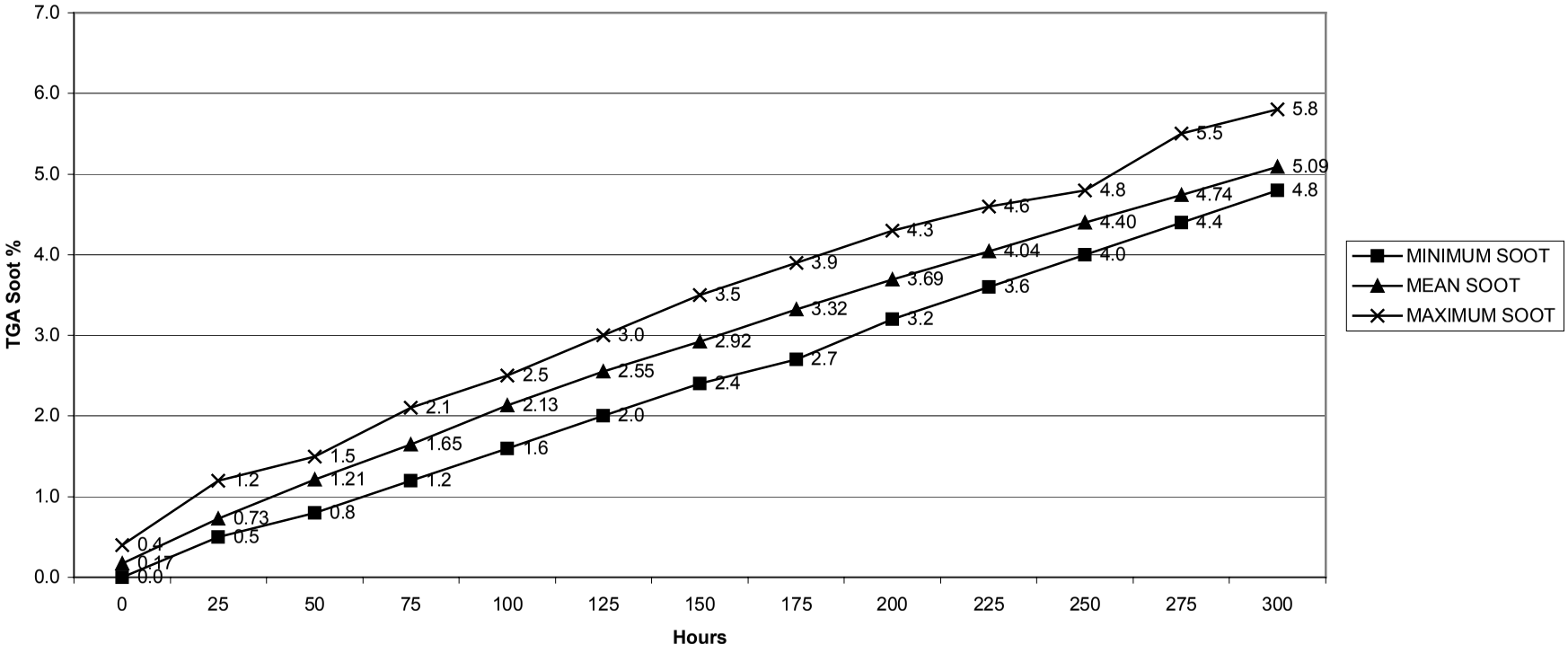


TABLE 6
T-8 / T-8E TIMELINE

Date	Info. Letter	Topic
19940316,	94-1	, End of Test Soot Window set to 4.0% - 4.6% for oil 1004-1
19940401,		, Oil 1004-1 Thirty-test Targets
19940401,	94-1	, Acceptance Bands with Shewhart Severity k=1.75
19940602,	94-1	, Kinematic Viscosity at 100° C Measurement procedure added to test procedure
19940602,	94-1	, Enhanced Detroit Diesel TGA Soot Procedure added to test procedure
19940727,	94-1	, Data Dictionary and Report Form Revisions - Version 19940615
19940811,		, Viscosity measurement both soak window changed to ± 30 seconds
19950101,	95-1	, LTMS used for test acceptance
19950101,	95-1	, Post Test flush oil specified as Bulldog Premium Oil
19950101,	95-1	, Post Test Solvent Wash - oil pan is to be solvent cleaned
19950603,	95-1	, Data Dictionary and Report Form Revisions - Version 19950321
19950614,	95-2	, End of Test Soot Window set to 4.0% - 4.8% for oil 1004-2
19950619,		, Oil 1004-2 Ten-test Targets uses std. dev from 1004-1 of 1.19
19951101,		, Oil 1004-2 Twenty-test Targets uses std. dev. from 1004-1 of 1.19
19960201,		, Oil 1004-2 Thirty-test Targets uses std. dev. from 1004-1 of 1.19
19960628,	96-1	, Correction to Oil Consumption calculation
19960815,	96-1	, Data Dictionary and Report Form Revisions - Version 19960122
19961001,		, Oil 1004-2 Fifty-Nine Test Targets uses std. dev. of 0.93 from oil 1004-2
19970407,	97-1	, Reference test length increased to 300 hours.
19970407,	97-1	, Calibration period increased to 3000 hours.
19971001,	97-1	, Data Dictionary and Report Form Revisions - Version 19970702
19971208,	98-1	, T-8E incorporated into Test Method D 5967
19980303,	98-2	, Oil samples at 25, 75, and 125 h are mandatory for reference oil tests, optional for non-reference oil tests. These samples are not used for calculation of VI38 and RV48.
19980316,	98-1	, Data Dictionary and Report Form Revisions - Version 19980122
19980501,		, Oil 1004-3 Ten-test Targets
19980622,	98-3	, Mack primary and secondary filters specified for fuel system.
19980622,	98-3	, DIN Test Method number changed from D 3945 to D 6278.
19980622,	98-3	, Viscosity measurement procedure revised.
19980803,	98-2	, Data Dictionary and Report Form Revisions - Version 19980624
19980914,		, Oil 1004-3 Twenty-two test Targets
19980928,	98-3	, Data Dictionary and Report Form Revisions - Version 19980818
19981001,	98-4	, Critical parts list redefined, critical parts to be obtained from TEI
19981211,	98-5	, T-8A incorporated into Test Method D 5967
19990129,	98-5	, Data Dictionary and Report Form Revisions - Version 19981027
19990201,		, Oil 1004-3 Thirty test targets