Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206-4489
(412) 365-1000

MEMORANDUM: 04-070

DATE: October 1, 2004

TO: Wim Van Dam, Chairman, Mack Surveillance Panel

FROM: Jeff Clark

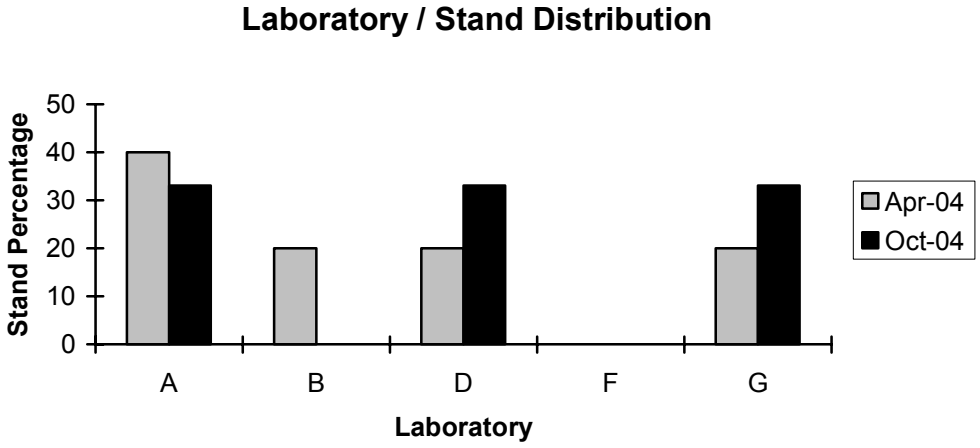
SUBJECT: T-10 / T-10A Calibration Testing for the October 2004 ASTM Report Period

The following is a summary of T-10 reference oil tests completed during the October 2004 ASTM report period, which began on April 1, 2004 and ended on September 30, 2004.

Lab / Stand Distribution:

| | Reporting Data | Calibrated as of 9/30/04 |
|---|---|---|
| Number of Laboratories | 3 | 2 |
| Number of Stands | 3 | 2 |

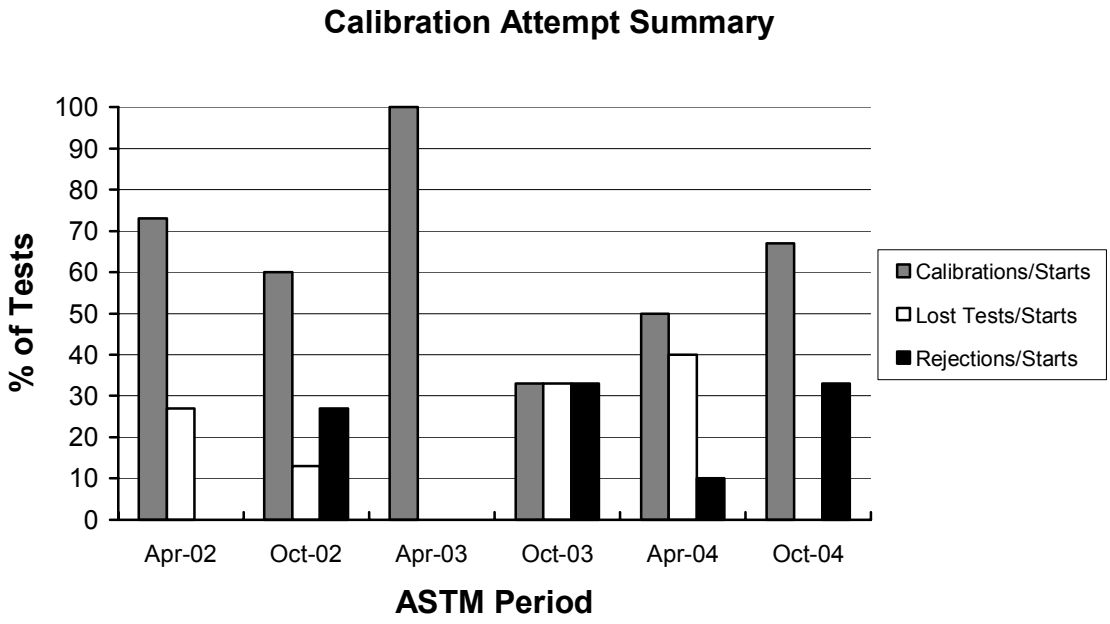
The figure below shows the T-10 laboratory / stand distribution for tests completed the current and previous report periods:



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 | 2 |
| Failed Calibration Test (LTMS Criteria) | OC | 1 |
| Operationally Invalid Calibration Test | LC | 0 |
| Aborted Calibration Test | XC | 0 |
| Total | | 3 |

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). All parameters are currently within control chart limits. Low test activity 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. Precision estimates for 2003 and 2004 are not available. Please note, that the degrees of freedom (df) equals Σ(n observations per oil - 1).

**T-10 Pooled Precision By Year**

| Parameter | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|
| df | 13 | 20 | | |
| PB | 0.2660 | 0.2530 | | |
| CLW | 3.31 | 4.94 | | |
| TRWL | 26.7 | 17.99 | | |
| OC | 6.36 | 7.02 | | |
| PB2 | 4.69 | 3.49 | | |

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.

Hardware:

Connecting rod bearing batch J was approved for use at the September 10, 2004 surveillance panel meeting. These bearings produce milder lead results than batches A through G. As a result, correction equations that are detailed in Information Letter 04-3 are used in conjunction with the batch J bearings. All reference oil tests on the various bearing batches that were not approved have been removed from the industry and laboratories' control charts.

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 04-1, Sequence No. 6 was issued May 19, 2004. This letter incorporates previous T-10 Information Letters 03-1, 03-2, and 03-3 into D 6987.

T-10 Information Letter 04-2, Sequence No. 7 was issued September 17, 2004. This letter added Appendix X1, which provides information regarding ACEA's use of an ultra-low sulfur diesel fuel T-10 (ACEA designation T-10 ULSD).

T-10 Information Letter 04-3, Sequence No. 8 was issued September 20, 2004. This letter introduces the equations used to calculate lead results for connecting rod bearing batch J.

T-10 Information Letter 04-04, Sequence No. 9 was issued September 20, 2004. This letter updated definitions contained in the precision section of the test method.

TMC Laboratory Visits:

No TMC laboratory visits were conducted this ASTM period.

Quality Index:

No Quality Index deviations were issued this ASTM report period. For the history of the T-10 and 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/mem04-070.jac.doc

Attachments

c: J.L. Zalar, TMC
F.M. Farber, TMC
Mack Surveillance Panel
ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/semiannualreports/T10-10-2004.pdf

Distribution: Email

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

| | No. of Tests |
|---|---|
| Severe Top Ring Weight Losss | 1 |

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

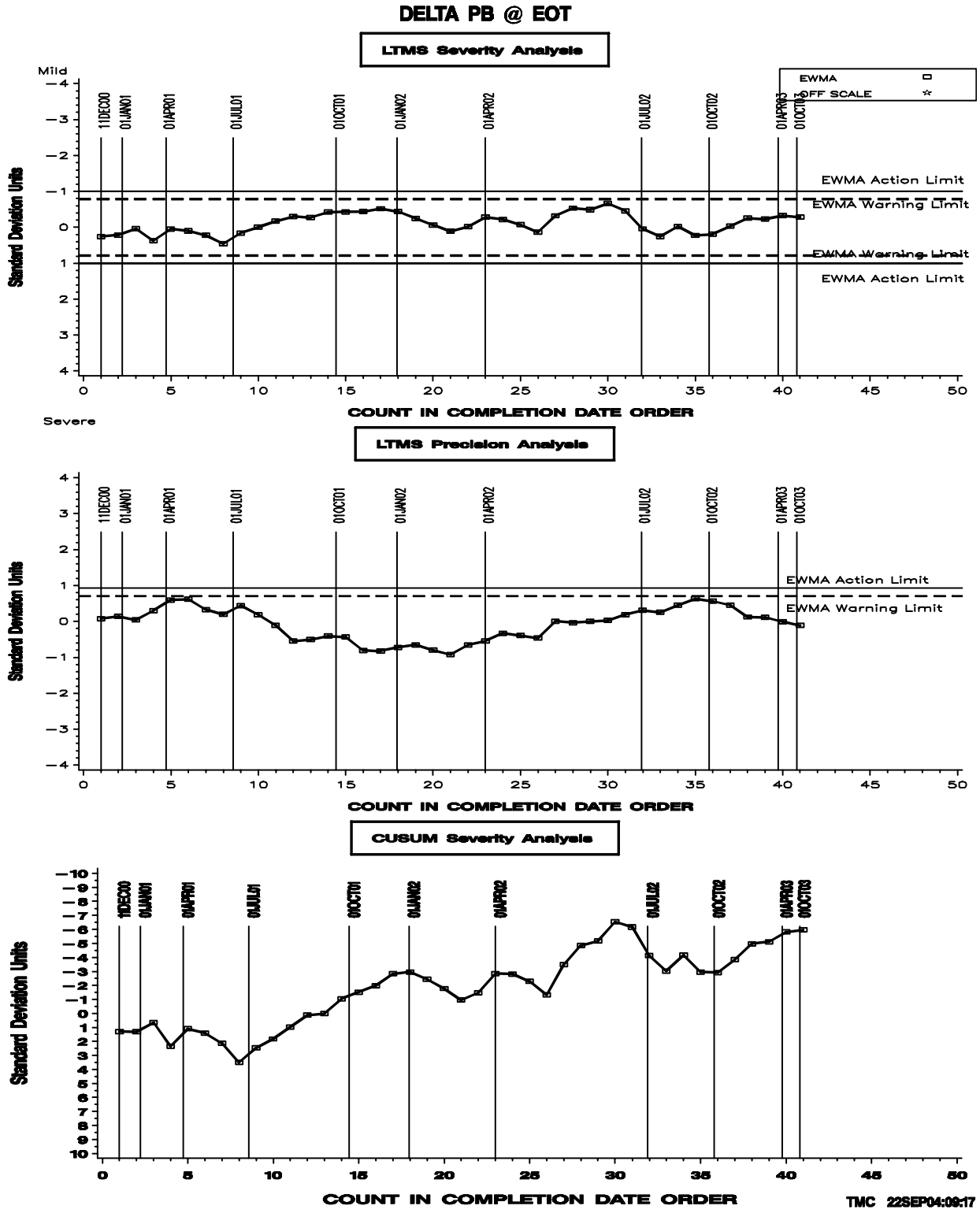
| | No. of Tests |
|---|---|
| No Invalid Tests | - |

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

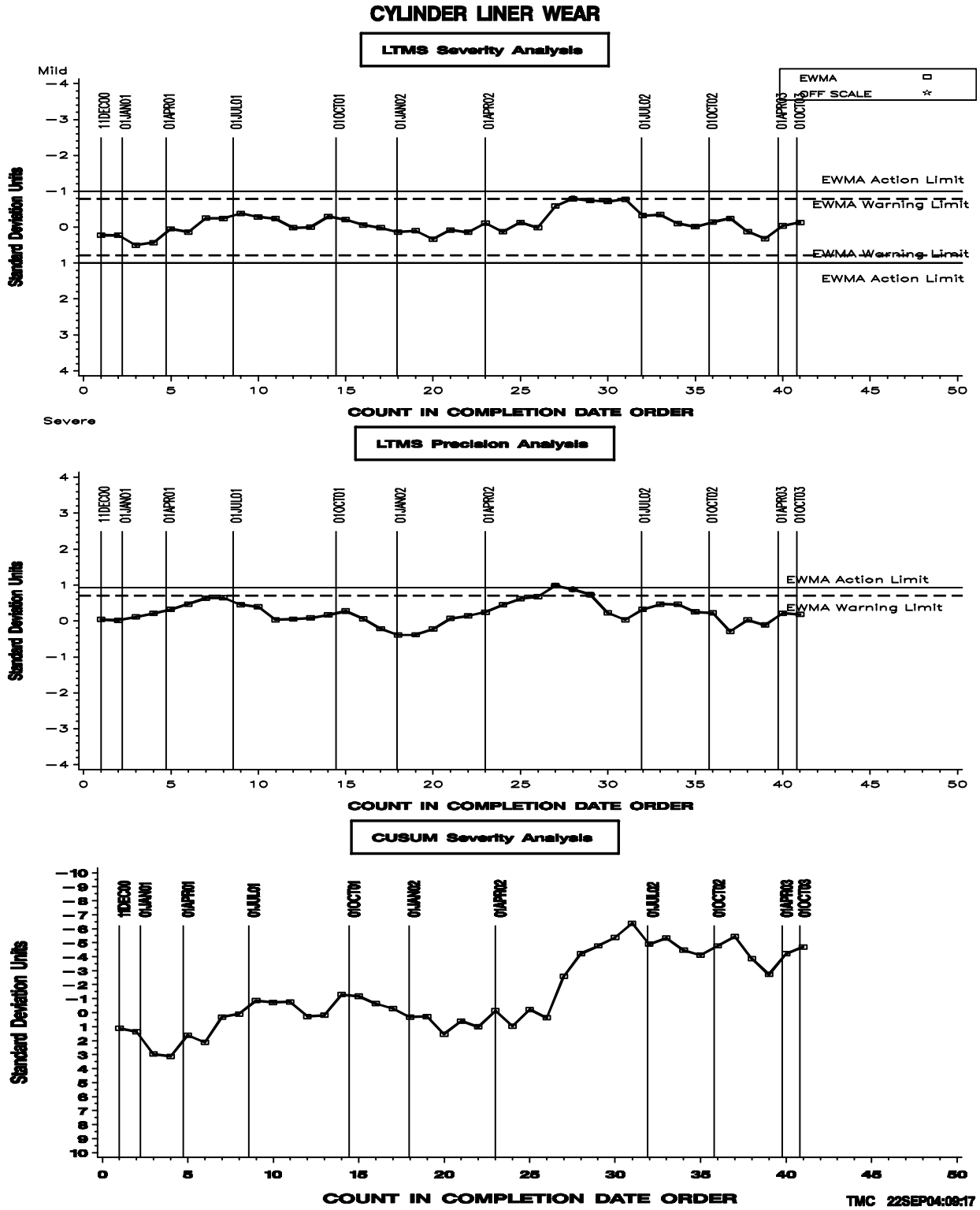
| | No. of Tests |
|---|---|
| No Aborted Tests | - |

# FIGURE 1

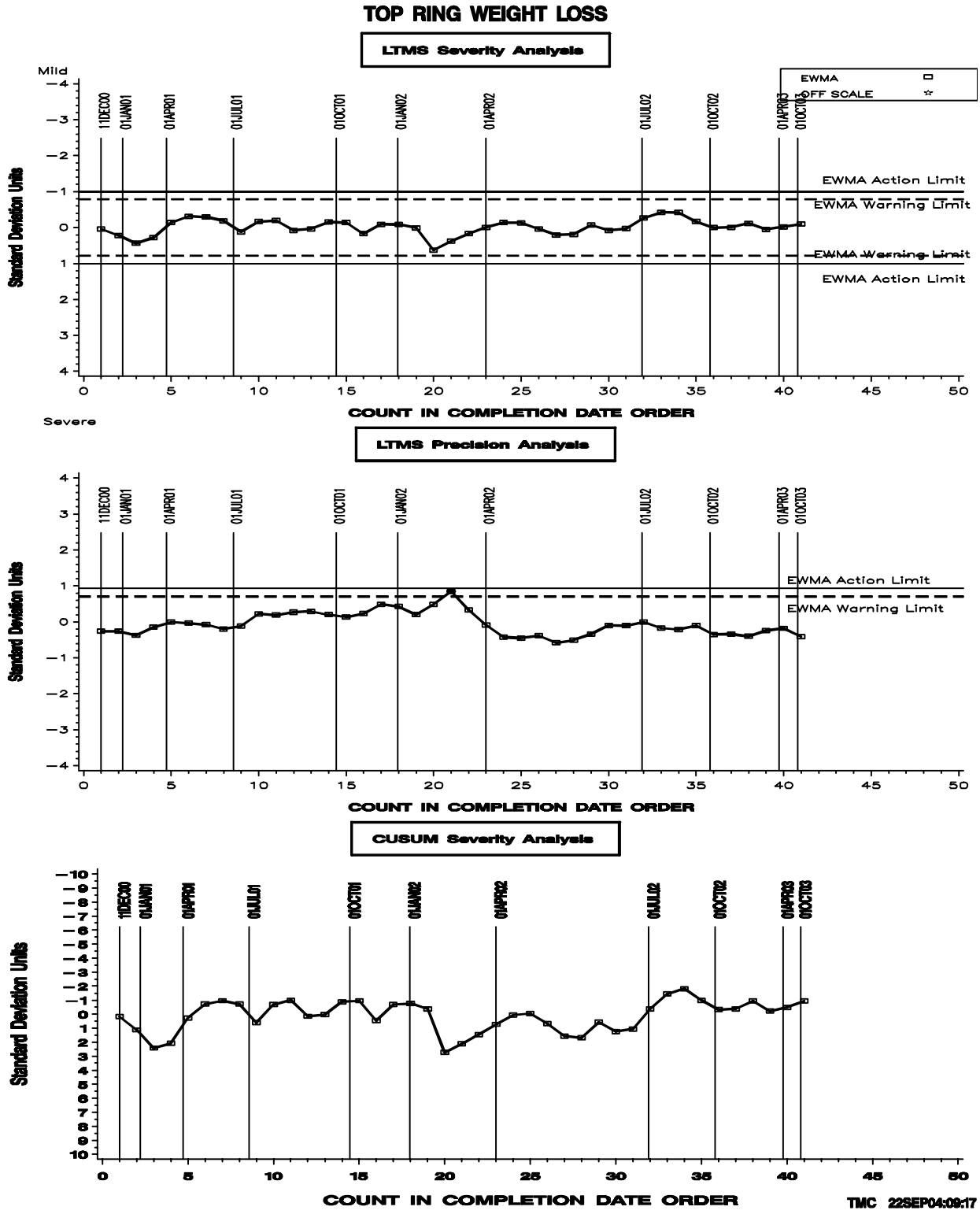
## T−10 INDUSTRY OPERATIONALLY VALID DATA



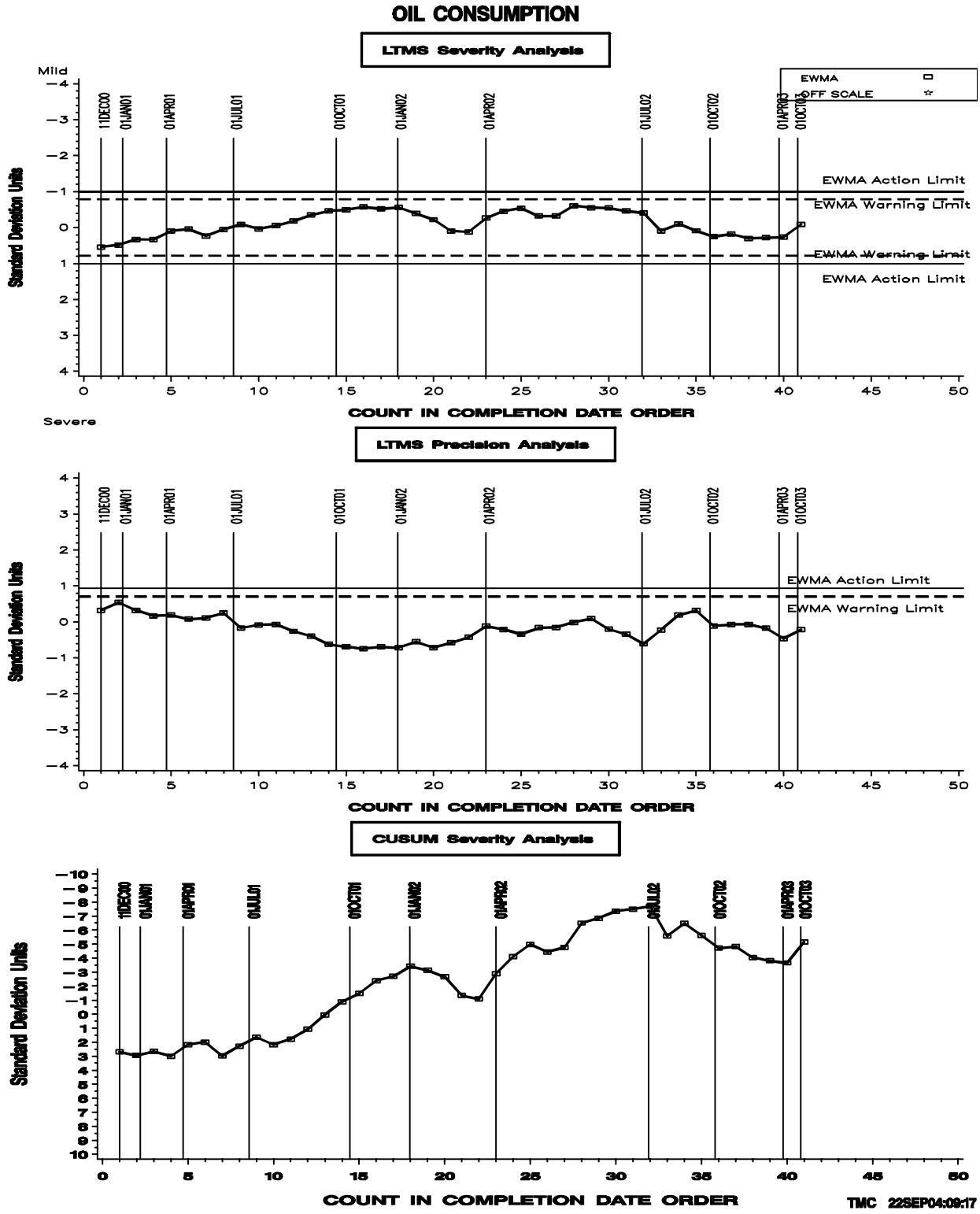
# FIGURE 2
## T−10 INDUSTRY OPERATIONALLY VALID DATA



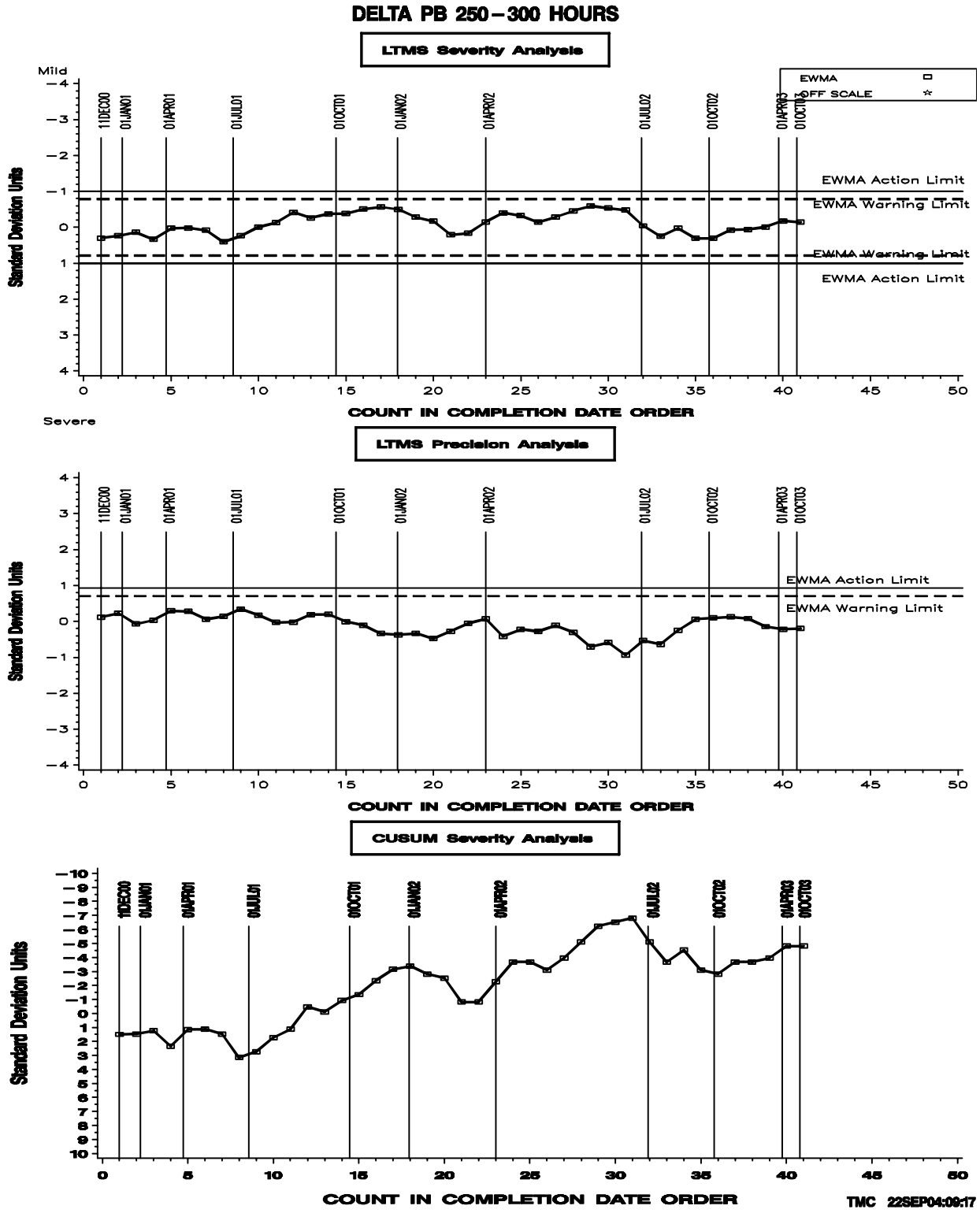
# FIGURE 3
# T−10 INDUSTRY OPERATIONALLY VALID DATA



# FIGURE 4
# T−10 INDUSTRY OPERATIONALLY VALID DATA



# FIGURE 5
# T−10 INDUSTRY OPERATIONALLY VALID DATA



# FIGURE 6
## T10A INDUSTRY OPERATIONALLY VALID DATA