



Test Monitoring Center

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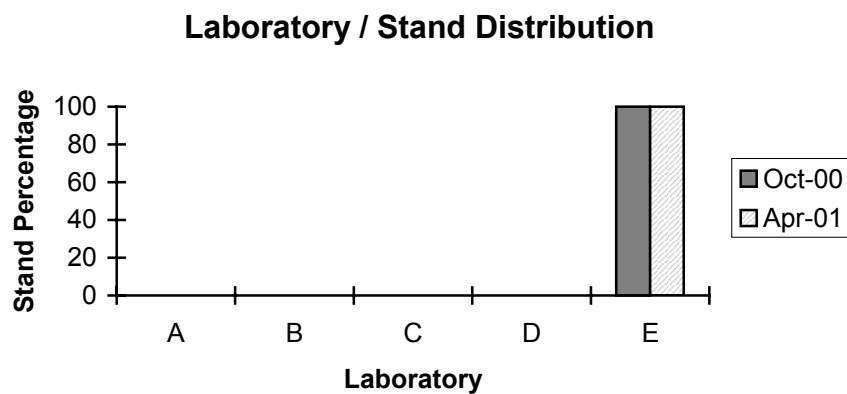
MEMORANDUM: 01-060
DATE: May 29, 2001
TO: Patrick Lai, Chairman, Two-Cycle Diesel Surveillance Panel
FROM: Jeff Clark
SUBJECT: 6V92TA Reference Testing for the April 2001 ASTM Report Period

There were two 6V92TA reference oil tests completed during the April 2001 ASTM period, which began October 1, 2000 and ended March 31, 2001.

Lab / Stand Distribution:

| | Reporting Data | Calibrated as of 3/31/01 |
|------------------------|----------------|--------------------------|
| Number of Laboratories | 1 | 1 |
| Number of Stands | 1 | 1 |

The following chart shows the laboratory / stand distribution:

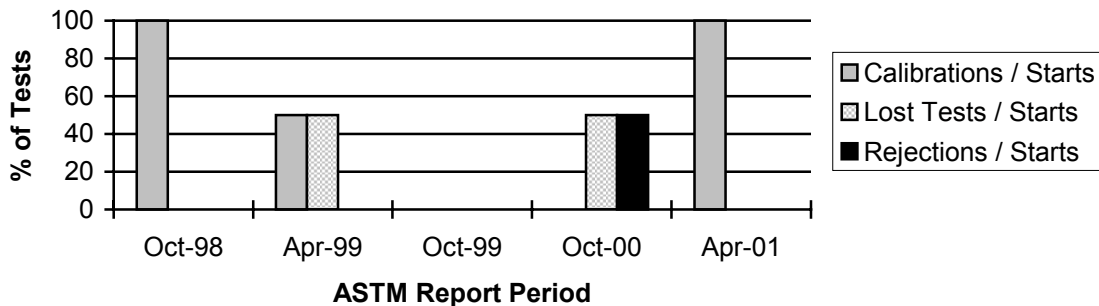


The following summarizes the status of the reference oil tests reported to the TMC:

| Test Description | TMC Validity Code | Number of Tests |
|--|-------------------|-----------------|
| Operationally and Statistically Acceptable | AC | 2 |
| Failed Acceptance Criteria | OC | 0 |
| Operationally Invalid | LC | 0 |
| Aborted | XC | 0 |
| Total | | 2 |

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

Calibration Attempt Summary



Severity and Precision:

Figures 1, 2, and 3 (attached) show the cusum delta/s for Fire Ring Distress, 2nd & 3rd Ring Distress, and Average Liner Distress. For all three parameters, it is apparent that the industry is continuing a mild trend that began in 1994. Low-test activity makes it difficult to quantify the magnitude of, or attribute a cause to, this long-term mild trend.

The TMC has historically provided yearly pooled (across all reference oils) standard deviation as an estimate of test precision. The precision estimates are shown in the following table. Due to low testing frequency, no estimate of precision can be made for any individual year from 1995 through 1997. Instead, 1995 through 1998 are combined into a single estimate. No estimate of precision is available for 1999. The estimate of test precision for 2000 is also shown, however, please note the small number of degrees of freedom. The continued low frequency of testing prevents any meaningful commentary regarding current precision levels. Note, the degrees of freedom (df) equals $\Sigma(\text{no. obs. per oil} - 1)$.

6V92TA Pooled Precision by Year

| Parameter | 1992 df = 5 | 1993 df = 8 | 1994 df = 8 | 1995 – 1998 df = 9 | 2000 df = 2 |
|---|----------------|----------------|----------------|-----------------------|----------------|
| Average Fire Ring Distress | 0.044 | 0.058 | 0.113 | 0.032 | 0.017 |
| 2 nd & 3 rd Ring Distress | 0.018 | 0.036 | 0.033 | 0.028 | 0.029 |
| Liner Distress | 8.69 | 8.22 | 14.91 | 7.68 | 5.40 |

Reference Oils and Hardware:

The table below shows the current reference oil targets.

6V92TA Reference Oil Targets

| Parameter | Oil | N | Mean | s |
|---|------------|----------|-------------|----------|
| Avg. Fire Ring Distress | 861-1 | 14 | 0.297 | 0.080 |
| 2 nd & 3 rd Ring Distress | | | 0.224 | 0.009 |
| Liner Distress | | | 58.2 | 7.7 |
| Avg. Fire Ring Distress | 862 | 24 | 0.155 | 0.031 |
| 2 nd & 3 rd Ring Distress | | | 0.145 | 0.038 |
| Liner Distress | | | 30.3 | 9.0 |
| Avg. Fire Ring Distress | 862-1 | 8 | 0.127 | 0.019 |
| 2 nd & 3 rd Ring Distress | | | 0.117 | 0.033 |
| Liner Distress | | | 23.7 | 7.4 |

TMC Lab Visitations:

No TMC lab visitations were performed during this ASTM period.

Information Letters:

No information letters were issued during this ASTM period.

Additional Information:

Figures 4 through 6 are the industry control charts for the 6V92TA test.

Figure 7 is the 6V92TA Timeline which details changes to the 6V92TA test since 1992.

The 6V92TA database, as well as the current industry cusum and LTMS plots, may be accessed from the TMC home page at www.tmc.astm.cmri.cmu.edu.

JAC/jac/mem01-060.jac.doc

Attachments

c: J.L. Zalar, TMC
 F.M. Farber, TMC
 Two-Cycle Diesel Surveillance Panel
<ftp://tmc.astm.cmri.cmu.edu/docs/diesel/6v92/semiannualreports/6v92-04-2001.pdf>

Figure 1
 6V92 INDUSTRY OPERATIONALLY VALID DATA

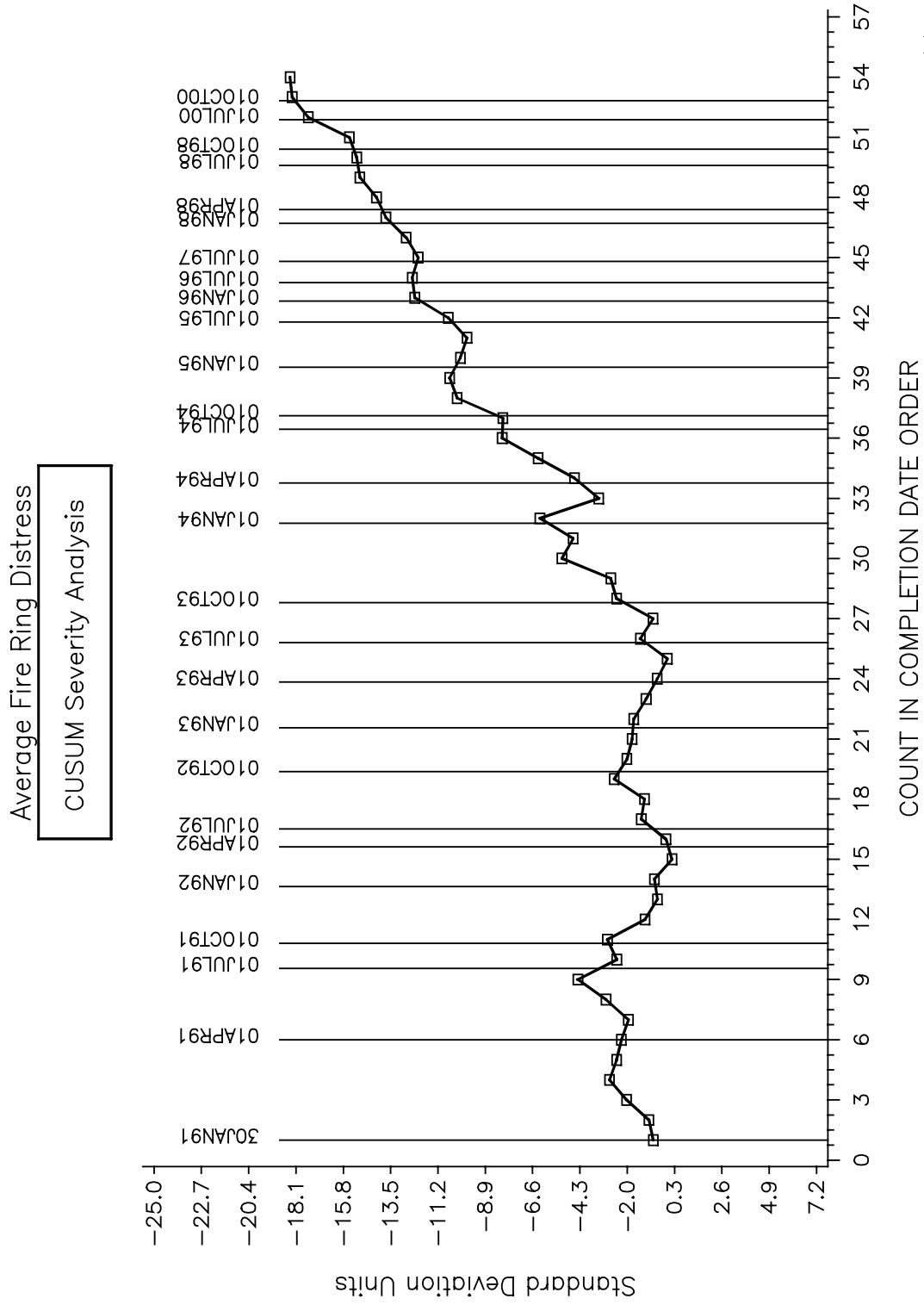


Figure 2
 6V92 INDUSTRY OPERATIONALLY VALID DATA

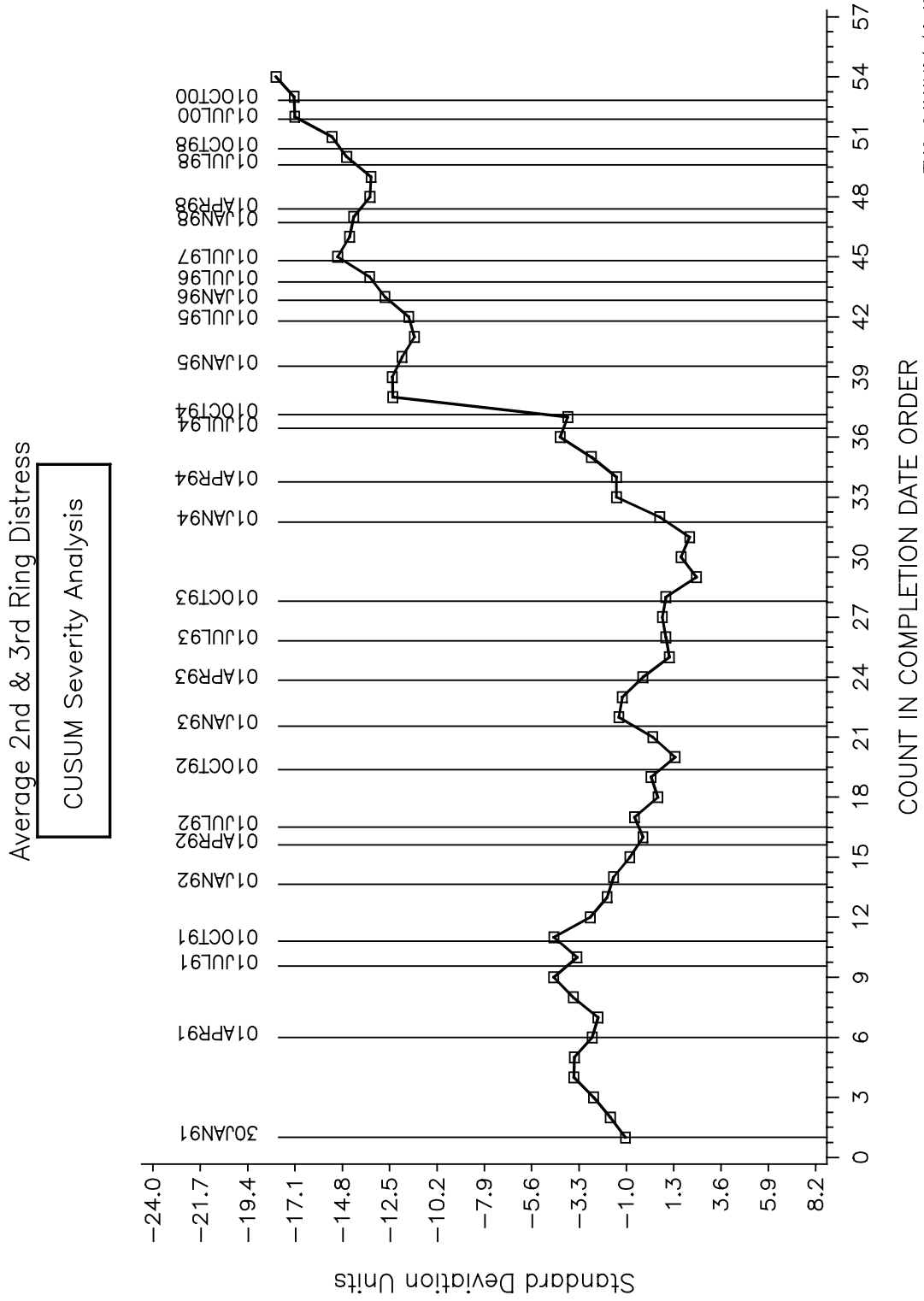


Figure 3
 6V92 INDUSTRY OPERATIONALLY VALID DATA

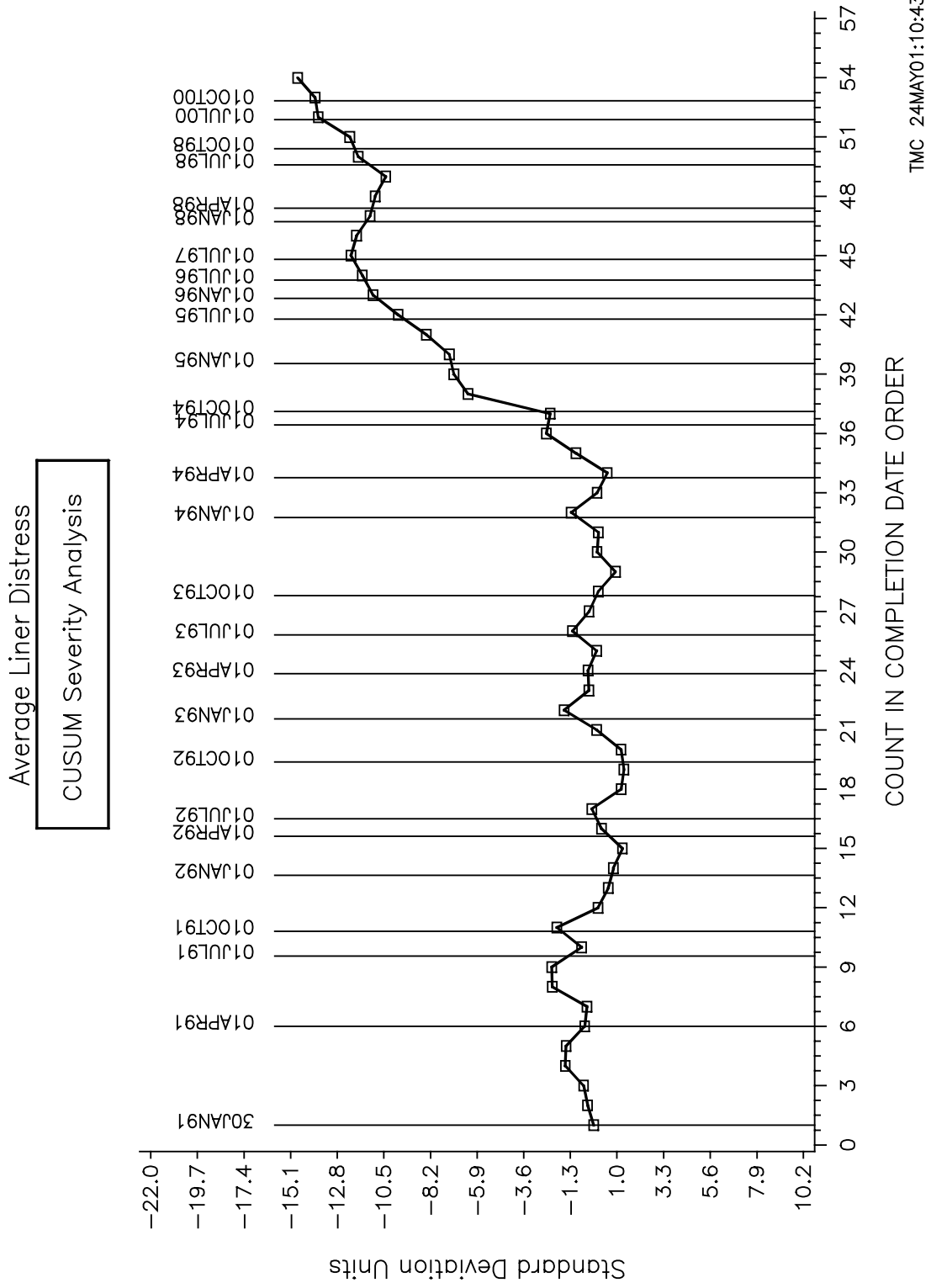


Figure 4
6V92 INDUSTRY OPERATIONALLY VALID DATA

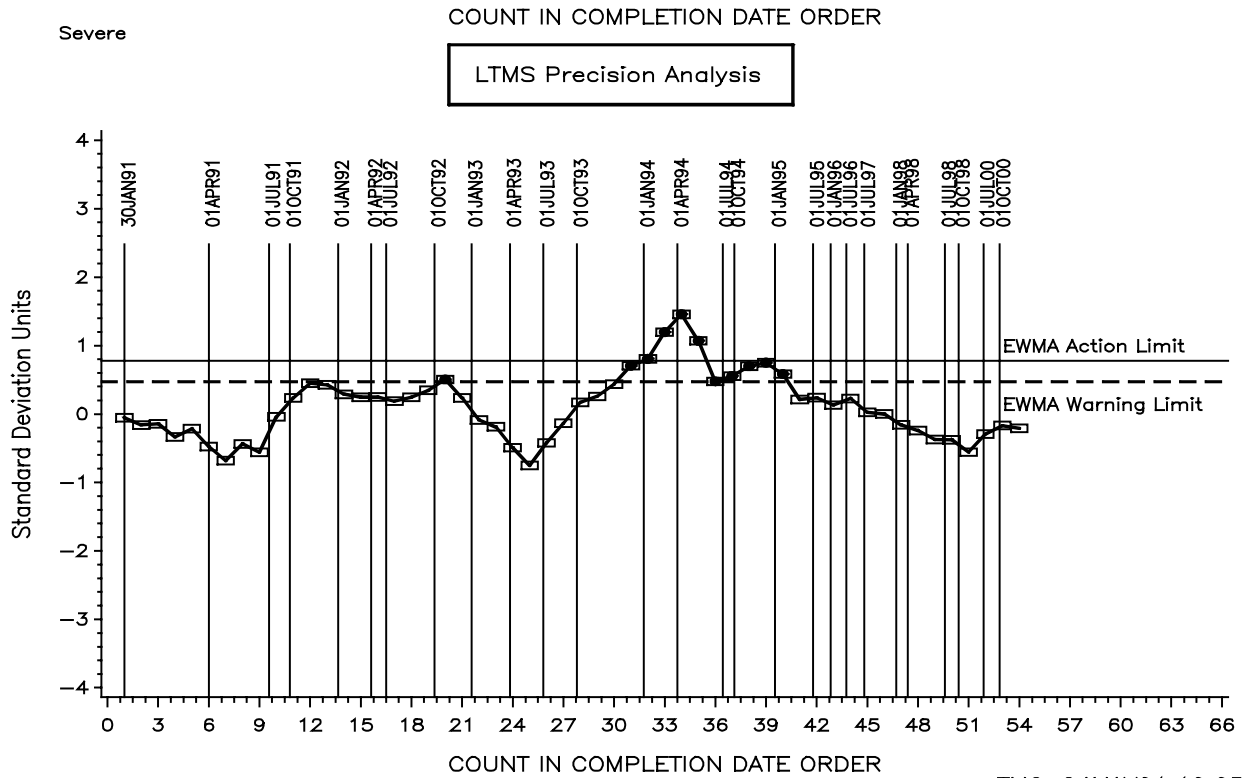
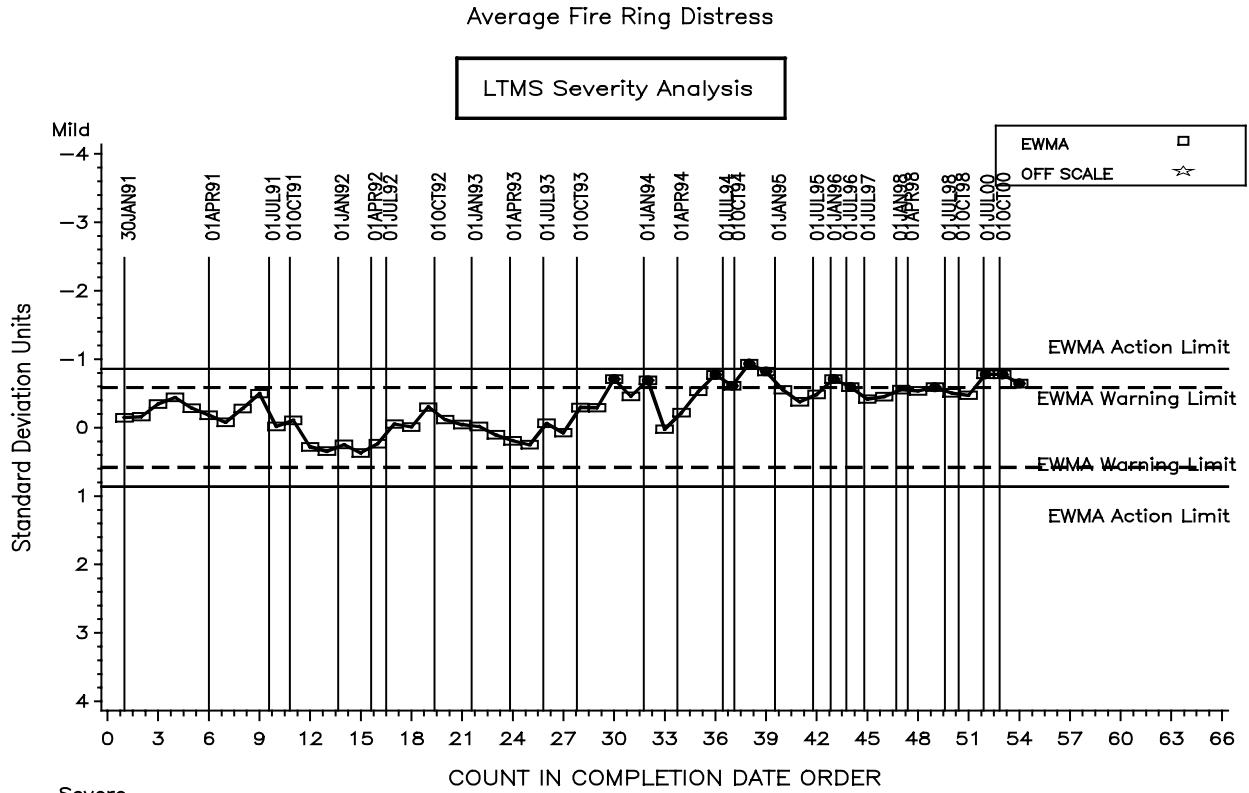


Figure 5
6V92 INDUSTRY OPERATIONALLY VALID DATA

Average 2nd & 3rd Ring Distress

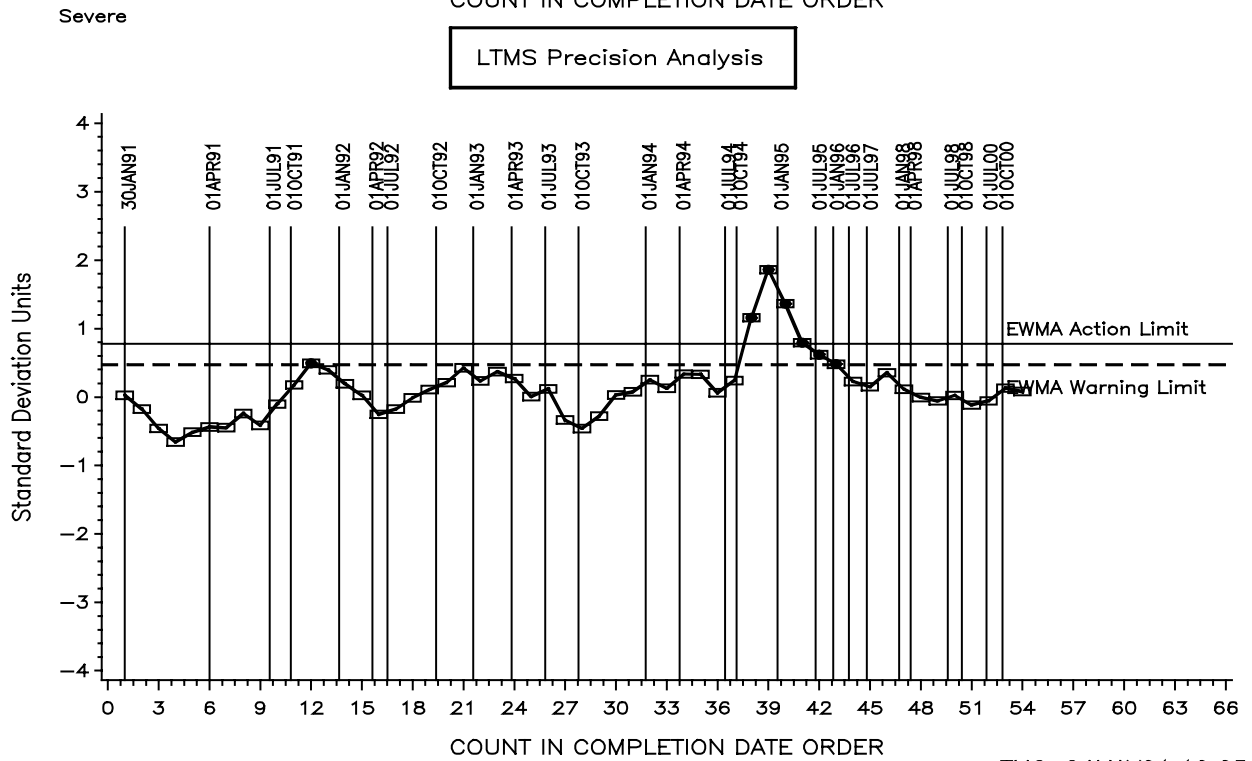
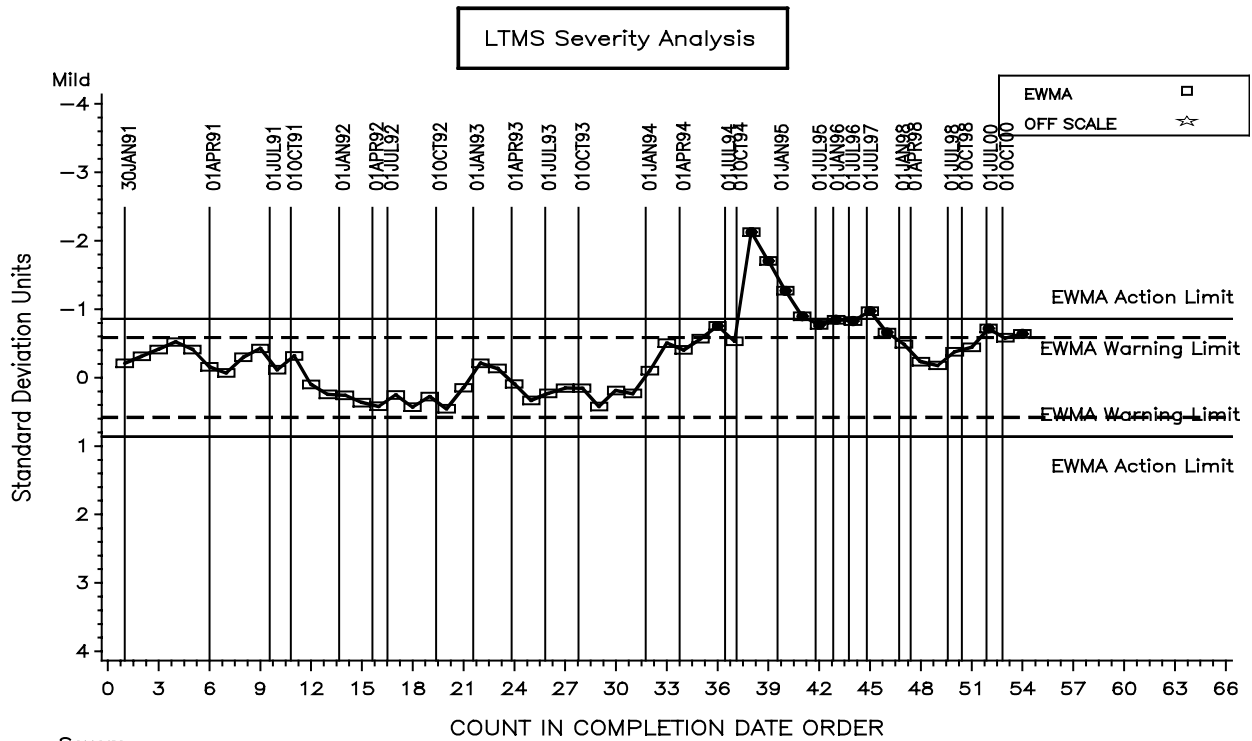


Figure 6
6V92 INDUSTRY OPERATIONALLY VALID DATA

Average Liner Distress

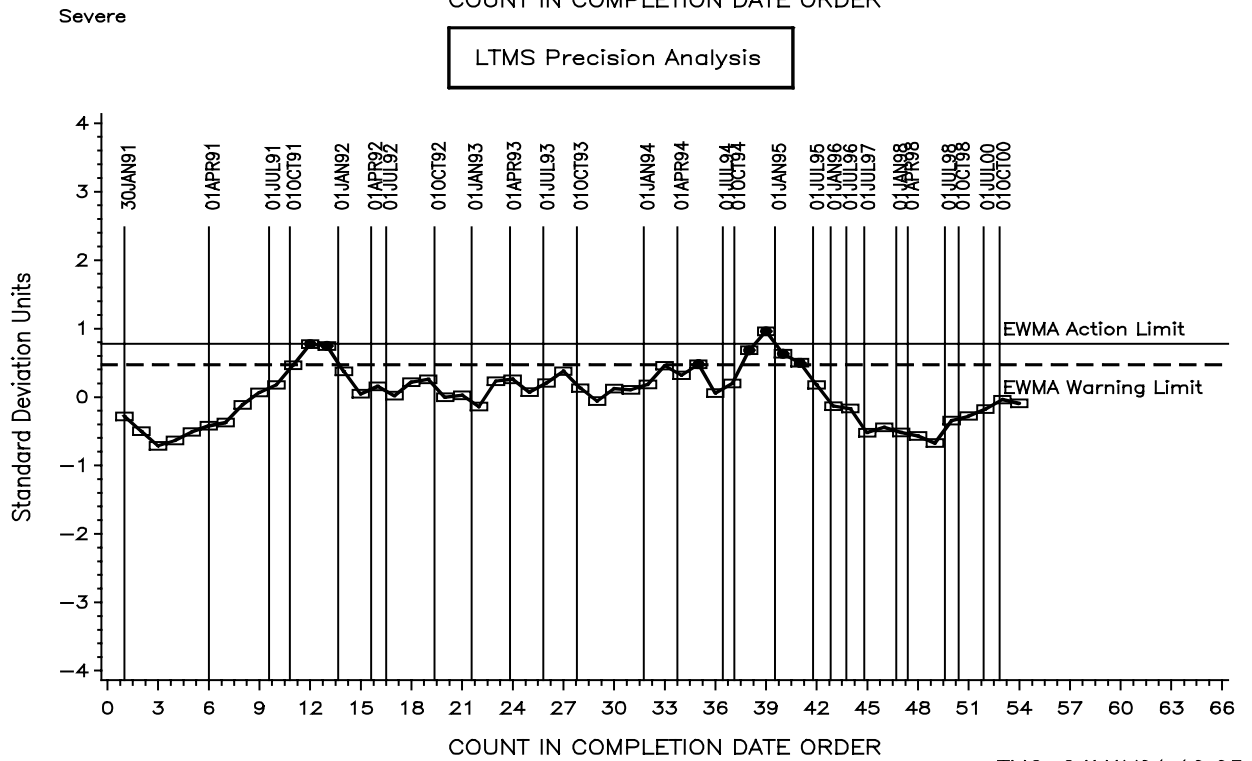
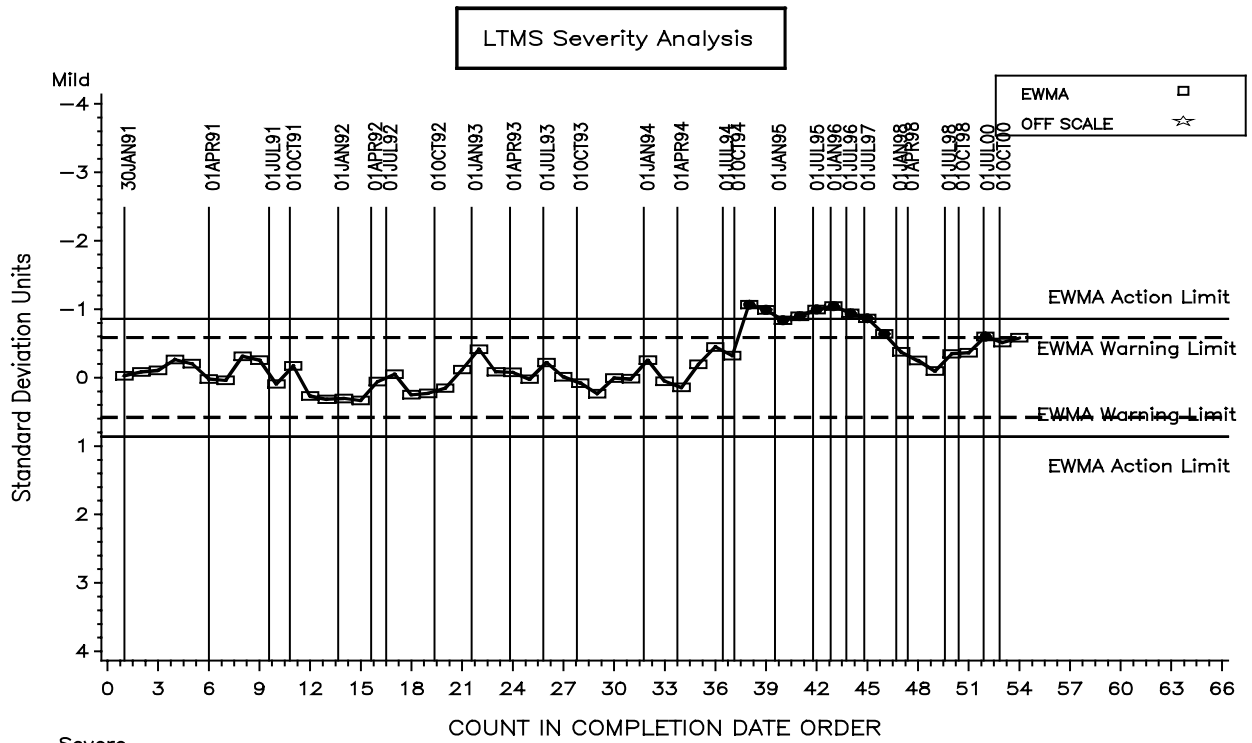


FIGURE 7 6V92TA TIMELINE

| Date | Info. Let. | Topic |
|-----------|------------|--|
| 19920507, | | Test Targets introduced - Oils 861 and 862 |
| 19920617, | | Detroit Diesel specified as single source rebuilt injector supplier |
| 19920903, | | Oil system to be pressurized prior to engine cranking |
| 19920928, | | Oil 861-1 introduced for testing |
| 19921101, | | Test Targets updated |
| 19930401, | | Test Targets updated; Oil 861-1 targets introduced |
| 19930423, | 93-1 | March 1993 Version of Test Procedure Issued |
| 19930701, | | Test Targets updated |
| 19930811, | 93-2 | Data Dictionary and Report Form Revisions |
| 19931102, | 94-1 | Oil Sump and Oil Gallery Temperature limits revised |
| 19940101, | | Test Targets updated |
| 19940119, | 94-1 | Data Dictionary and Report Form Revisions - Version 19940119 |
| 19940322, | | EF-411 to be used as build-up oil |
| 19940701, | | Test Targets updated |
| 19941129, | | Special slipper bushings introduced |
| 19941129, | | Fire Rings with improved face lapping process introduced |
| 19950101, | | Test Targets updated; Acceptance bands calculated using Shewhart severity $k = 1.80$ |
| 19950701, | | Test Targets updated |
| 19950921, | | Only Oil 862-1 to be assigned for testing; Oils 862 and 861-1 temporarily suspended from testing |
| 19960101, | | Test Targets updated |
| 19960202, | | Oil 862-1 introduced for testing |
| 19960430, | | Build-up oil changed to a 50 weight oil to be supplied by Imperial Oil |
| 19960430, | | Uniform ramping procedures adopted |
| 19960430, | | Coolant system pressure specified to be a minimum 50 kPa |
| 19960701, | | Test Targets updated |
| 19970101, | | Test Targets updated |
| 19970701, | | Test Targets updated |
| 19980101, | | Test Targets updated |
| 19980610, | 98-1 | Oil filter part number changed to 23518524 |
| 19980610, | 98-1 | New stand may calibrate with two tests on the same reference oil |
| 19980701, | | Test Targets updated |
| 19990101, | | Test Targets updated |
| 19990301, | 99-1 | Report forms and data dictionary version 19981208 |
| 19990701, | 99-2 | Report forms and data dictionary version 19990414 |
| 19990701, | | Test Targets updated |
| 20010101, | | Test Targets updated |