A Program of ASTM International

Test Monitoring Center

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

Memorandum: 10-007

Date: April 19, 2010

To: Charlie Leverett, Chairman, Sequence VI Surveillance Panel

From: Richard E. Grundza

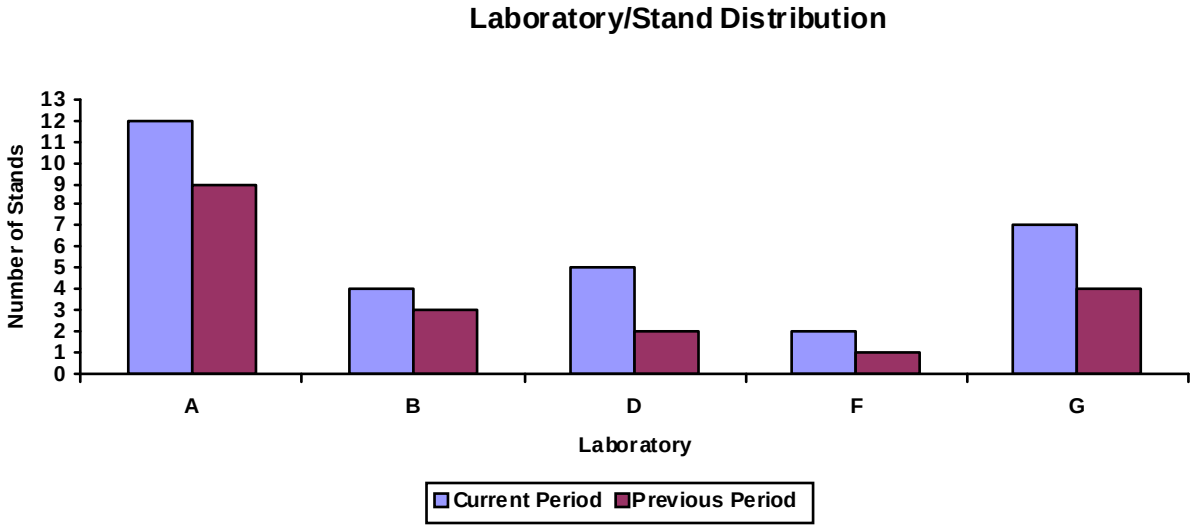
Subject: Sequence VID Semiannual Report: October 1, 2009 through March 31, 2010

The following is a summary of Sequence VID reference tests that were reported to the Test Monitoring Center during the period October 1, 2009 through March 31, 2010.

Lab/Stand Distribution

	Reporting Data	Calibrated as of March 31, 2010
Number of Laboratories:	5	5
Number of Test Stand/Engines:	30	19

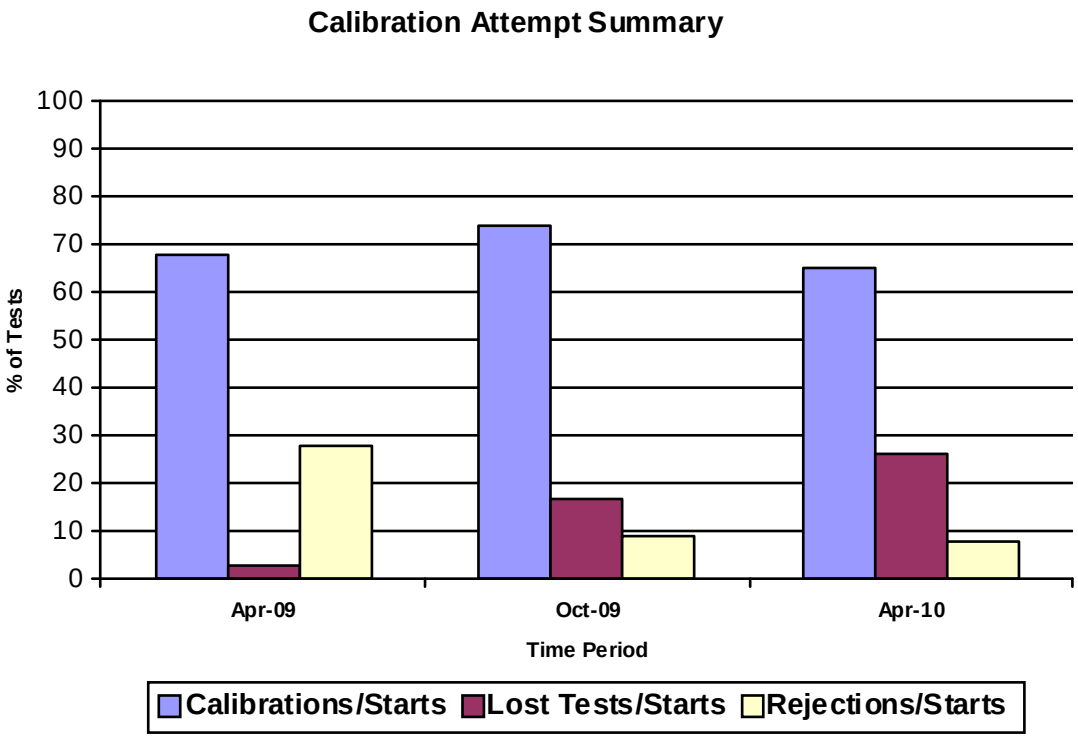
The following chart shows the laboratory/stand distribution:



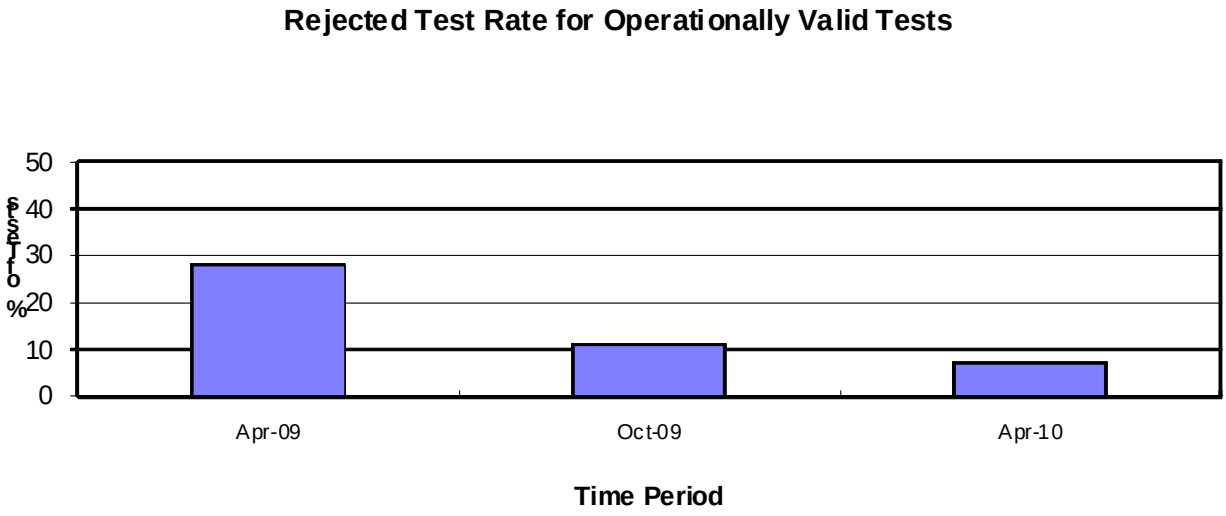
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	66
Operationally Valid, Statistically Unacceptable	OC	5
Operationally Invalid, Laboratory Judgment	LC	9
Aborted Calibration Attempt	XC	5
Engine Abandoned	MC	16
Total		101

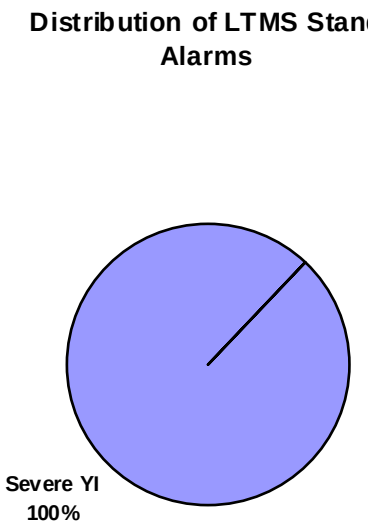
Calibrations per start, lost tests per start and rejection per start rates are summarized below:

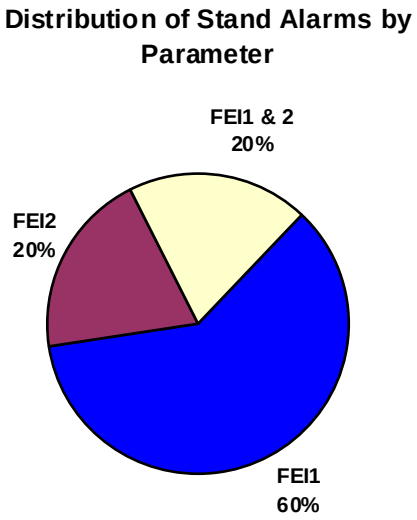


The calibration per start rate has decreased since last period. The lost test per start rate has increased since last period. The rejected test per start rate has decreased this period. The increase in lost tests is primarily due to the high number of engines that were abandoned.



Five tests failed acceptance criteria. The following charts summarize the reasons and breakdown by parameter for the failed tests:





Of the five tests, three failed for FEI1 in the severe direction, one failed FEI2 in the severe direction and one test failed both parameters in the severe direction.

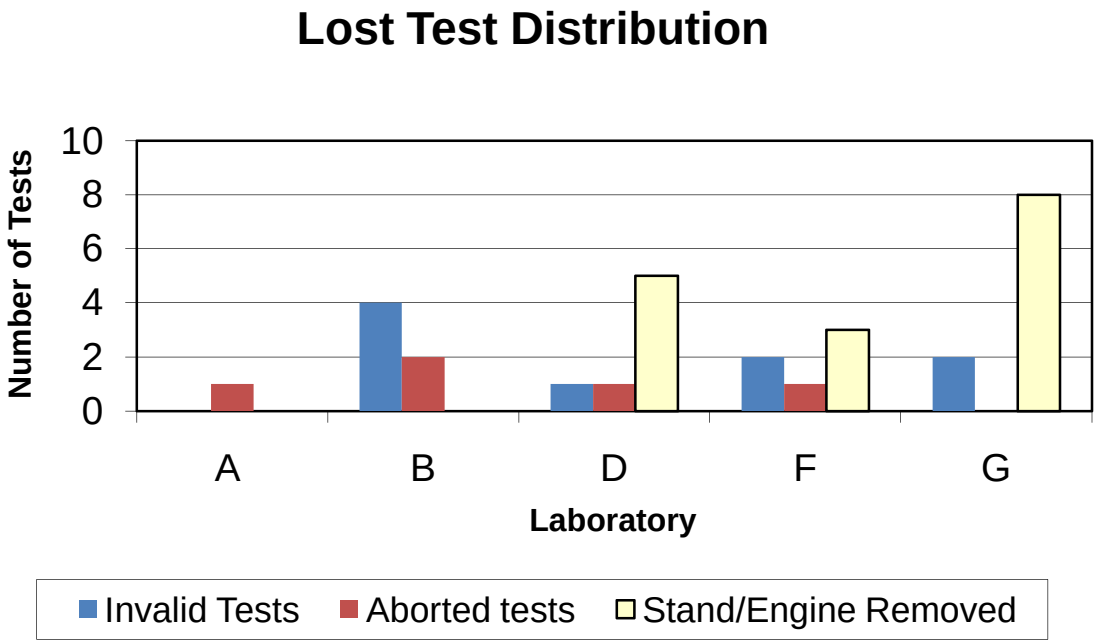
There was one LTMS Deviation written this period. This deviation allowed calibration of a new stand/engine combination where multiple invalid tests were noted, without additional tests being conducted.

Lost Test Summary

Fourteen tests were lost this period. The reasons for the lost tests are tabulated below:

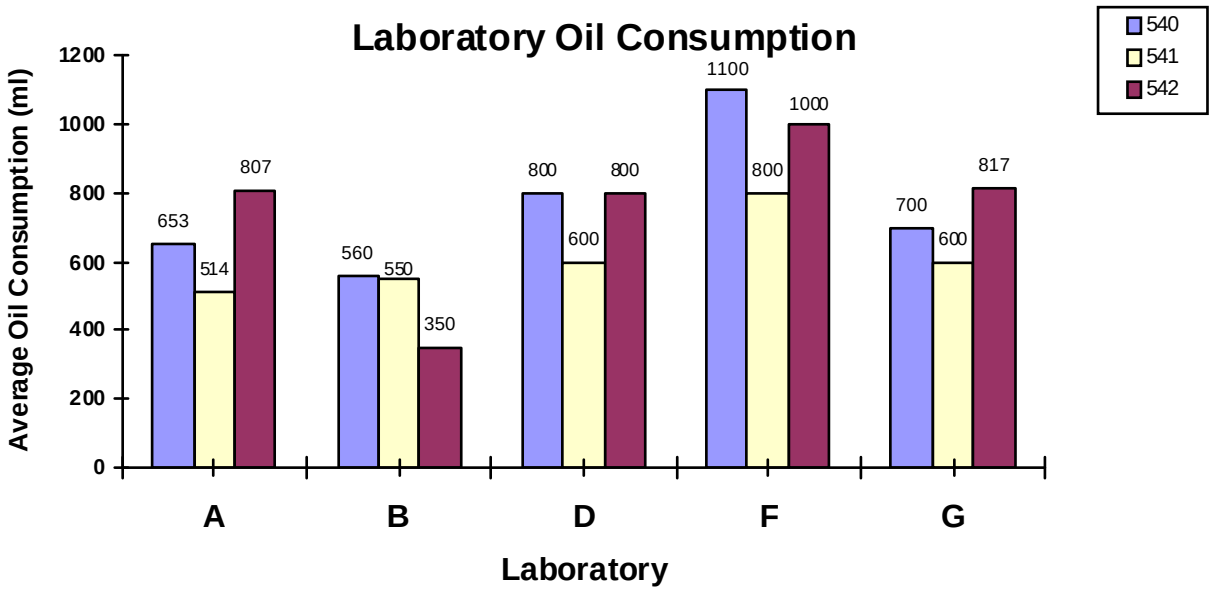
Reasons for Lost Test(s)	Number
Excessive Shutdowns	1
Flushed the Wrong Oil into the Engine	1
Speed Sensor Problems	4
Fuel Flow High Error During BL After	1
Fuel Flow Meter Malfunction	1
Load Cell Shift	1
Fuel Flow Calibration Shift	2
Timing Shift	1
Exhaust Backpressure Control	1
Throttle Control	1

Aborts and operationally invalid tests, reported by laboratory, are summarized in the following chart:



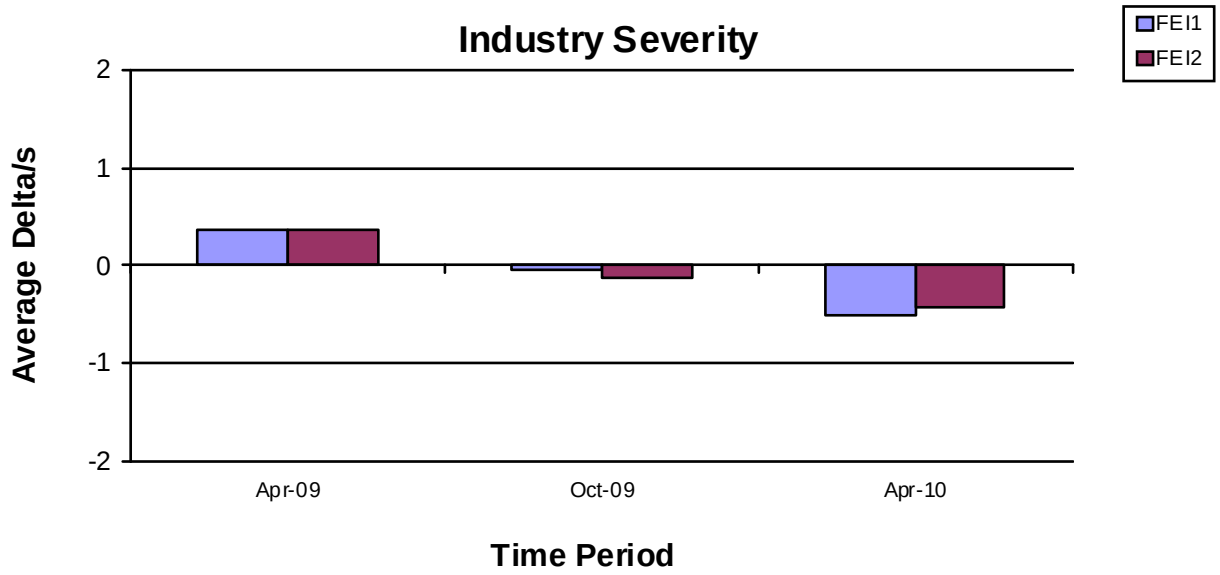
Tests listed as engine abandoned were calibration attempts on engines which did not calibrate and were removed from the LTMS without ever having been calibrated. A total of sixteen results from three labs, representing five engines were removed this period.

The average oil consumption values by oil and laboratory are depicted graphically below

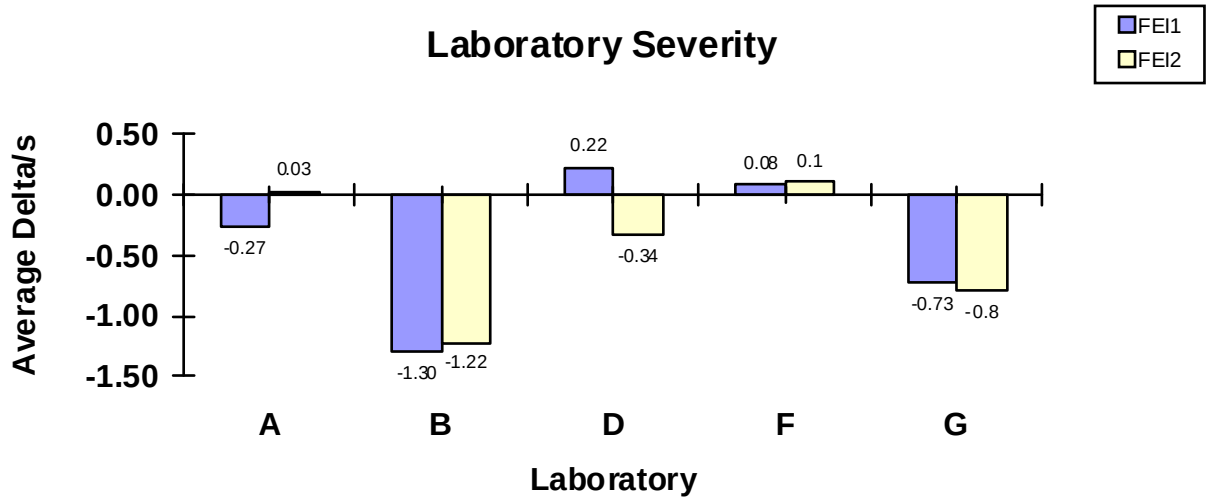


Severity and Precision Analysis

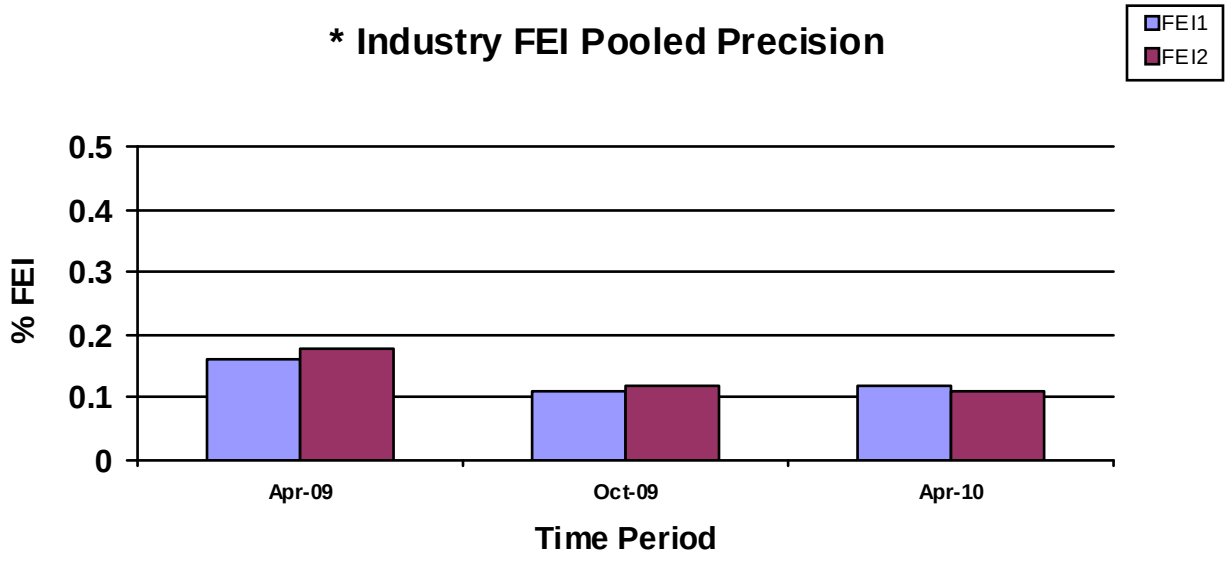
The industry mean Δ/s for FEI1 and FEI2, for this report period is -0.52 and -0.42, respectively. Both FEI1 and FEI2 trended severe for the period.



Shown below is a summary of the average FEI Δ/s for all laboratories reporting data this report period.



Precision estimates for FEI1 and FEI2 are 0.12 and 0.11. Precision for FEI1 and FEI2 has changed little when compared to the previous period.



*Precision estimates are calculated by pooling oil and stand/engine combination.

FEI1

Figure 1 shows the industry control charts. Severity began the period in control and ended the period in control, with an extended severity alarm event in between. Precision was in control for the period. The summation delta/s plot shows industry severity trending severe for most of the period, with the last eight tests beginning to show a mild trend. It should be noted that the event does not have a single lab or test as the root cause of the shift as all stand/engines reporting data during this period tended to be severe.

FEI2

Figure 2 shows the industry control charts. Severity began the period in control, but experienced two periods of warning and action alarms, before ending the period in control. Precision chart was in control for the period. The summation delta/s plot shows industry trending severe for most of the period, but begins to trend mild with the last eleven results reported in the period.

Lab Visits

Two lab visits were conducted this period. During both visits, discrepancies were noted regarding the fuel to fuel flow meter thermocouple placement.

Information Letters

Information Letters 09-2 and 10-1 were issued this period. The subject of these information letters can be found in the Industry Timeline, Figure 3.

Reference Oils

Oil	TMC Inventory, in gallons	TMC Inventory, in tests (5 gal/test)	Laboratory Inventory, in tests	Estimated life
540	665	133	8	2+ years
541	216	43	6	2+ years
542	730	146	8	2+ years

REG/reg

Attachments

c: F. M. Farber, TMC
J. A. Clark, TMC
Sequence VID Surveillance Panel
ftp://astmtmc.cmu.edu/docs/gas/sequenceiv/semiannualreports/VID-04-2010.pdf

Distribution: Electronic Mail

List of Figures

- Figure 1 graphically presents the Industry control charts for FEI1 and also the CUSUM delta/s plot (by count in completion date order) of FEI1 for operationally valid tests.

- Figure 2 graphically presents Industry control charts for FEI2 and also the CUSUM delta/s plot (by count in completion date order) of FEI2 for operationally valid tests.

- Figure 3 is the Sequence VID Timeline, created to track changes in test hardware and operations.

Figure 1

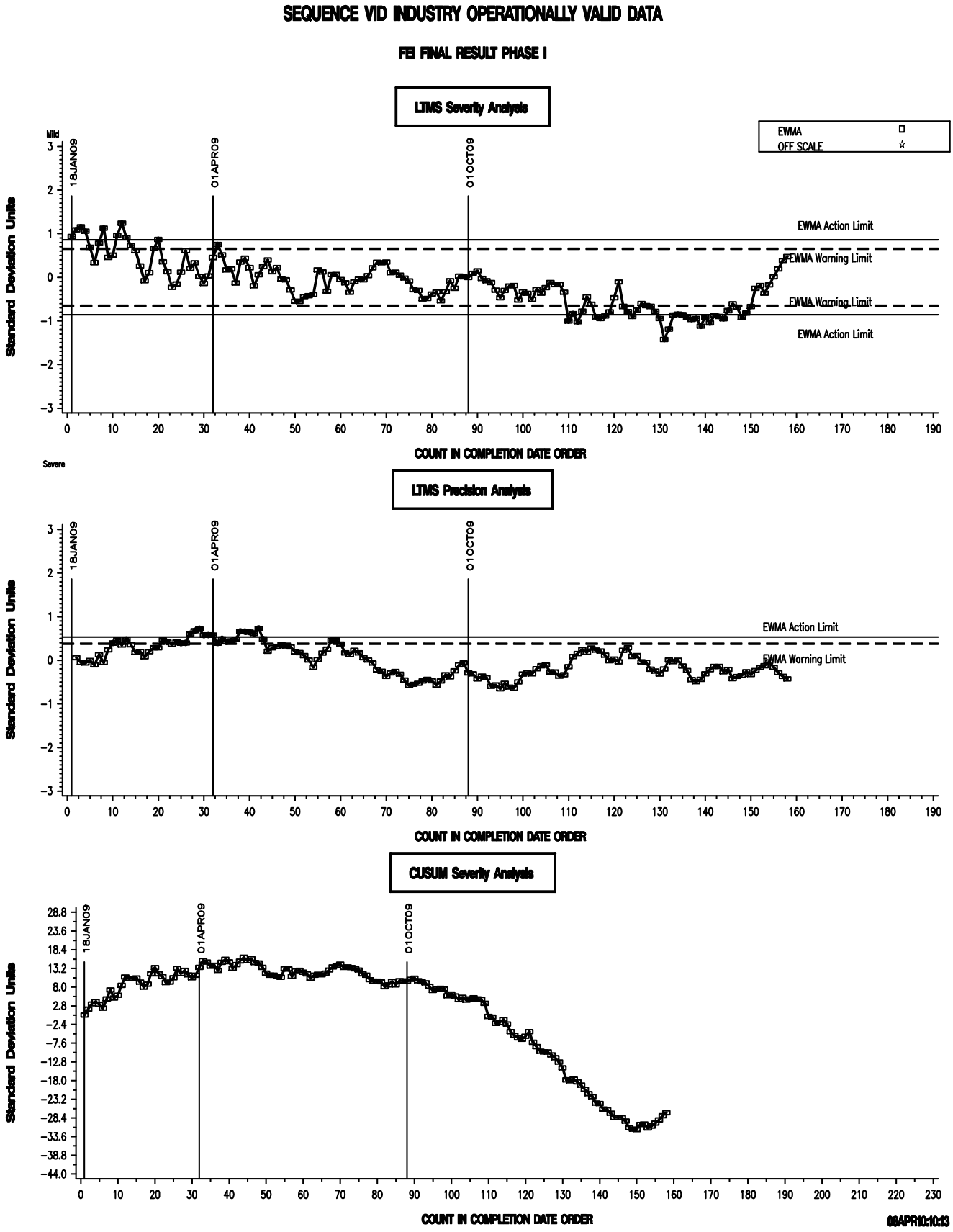

SEQUENCE VID INDUSTRY OPERATIONALLY VALID DATA
FEI FINAL RESULT PHASE I
LTMS Severity Analysis
EWMA
OFF SCALE
Mild
18JAN09
01APR09
01OCT09
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
CUSUM Severity Analysis
08APR10:10:13

Figure 2

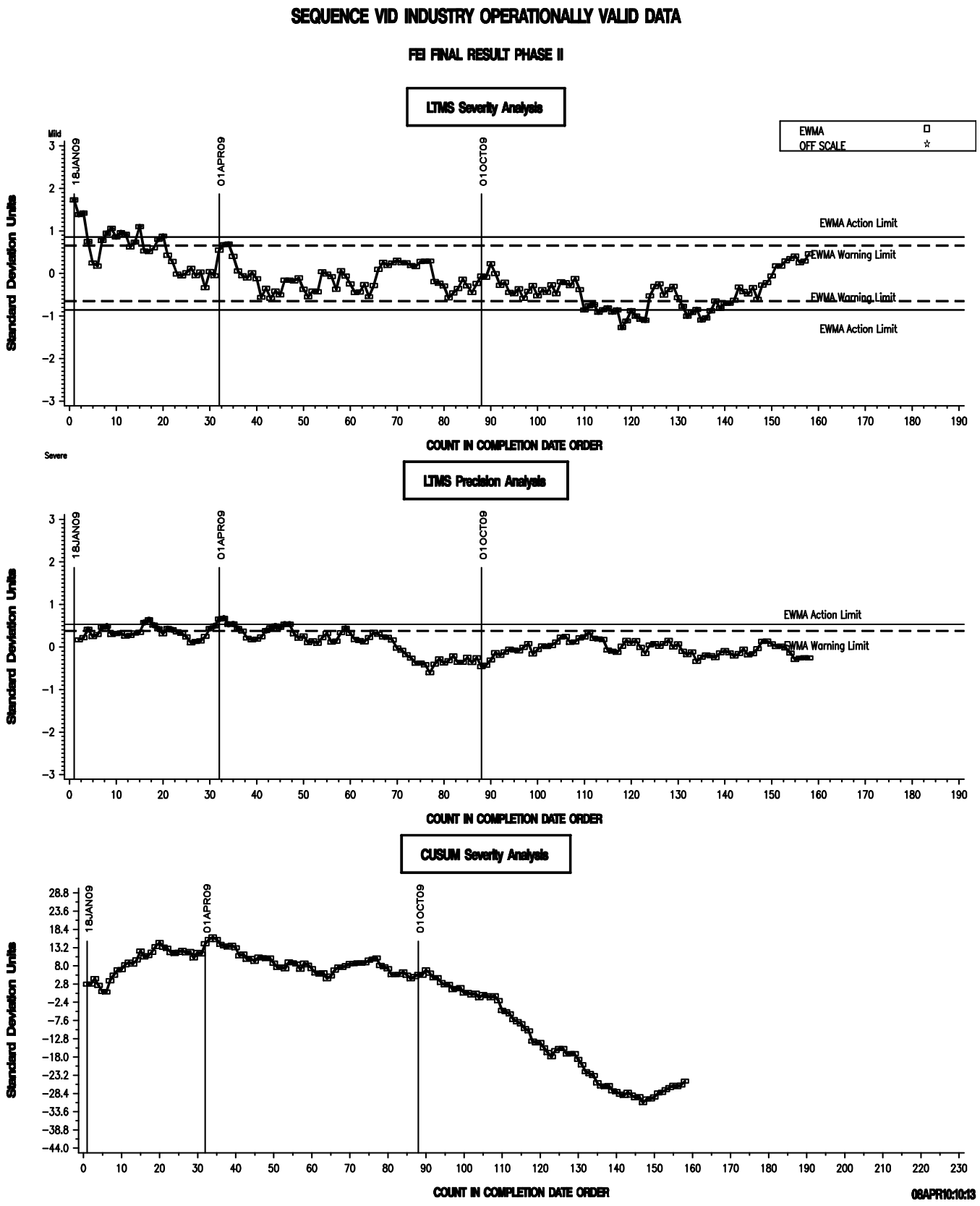

SEQUENCE VID INDUSTRY OPERATIONALLY VALID DATA
FEI FINAL RESULT PHASE II
LTMS Severity Analysis
Mild
EWMA
OFF SCALE
18JAN09
01APR09
01OCT09
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
CUSUM Severity Analysis
03APR10:10:13

Figure 3 - Sequence VID Timeline		
Date	**Topic**	**Information Letter**
20090112	START OF MATRIX TESTING	
20090412	COMPLETION OF MATRIX TESTING	
20090422	SURVEILLANCE PANEL RECOMMENDS TEST ACCEPTABLE TO CLASSIFICATION PANEL, REFERENCE OIL TARGETS ACCEPTED.	
20090513	SEQUENCE VID TEST LTMS ESTABLISHED BY SURVEILLANCE PANEL	
20090527	REVISED STAND ENGINE CALIBRATION REQUIREMENTS	09-1
20090527	ADDED ENGINE HOUR ADJUSTMENT	09-1
20090527	ADDED PRECISION STATEMENT TO TEST PROCEDURE	09-1
20090603	CALIBRATION STATUS GRANTED TO STAND/ENGINE COMBINATIONS	
20091203	UPDATED STANDARD DEVIATIONS FOR CHARTING AND SA'S	
20091214	ADJUSTED CALIBRATION PERIODS	09-2
20091214	CORRECTED/REVISED VALVE IDENTIFICATION	09-2
20091214	ADDRESSED HOW TO DOCUMENT FUEL BATCH WHEN MORE THAN ONE BATCH IS IN THE TANK USED FOR TESTING	09-2
20100119	INCREASE ALLOWABLE DOWNTIME TO 18 HOURS	10-1