A Program of ASTM International

Test Monitoring Center

Carnegie Mellon University
6555 Penn Avenue, Pittsburgh, PA 15206, USA

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

Memorandum: 11-045

Date: October 26, 2011

To: Charlie Leverett, Chairman, Sequence VI Surveillance Panel

From: Richard E. Grundza

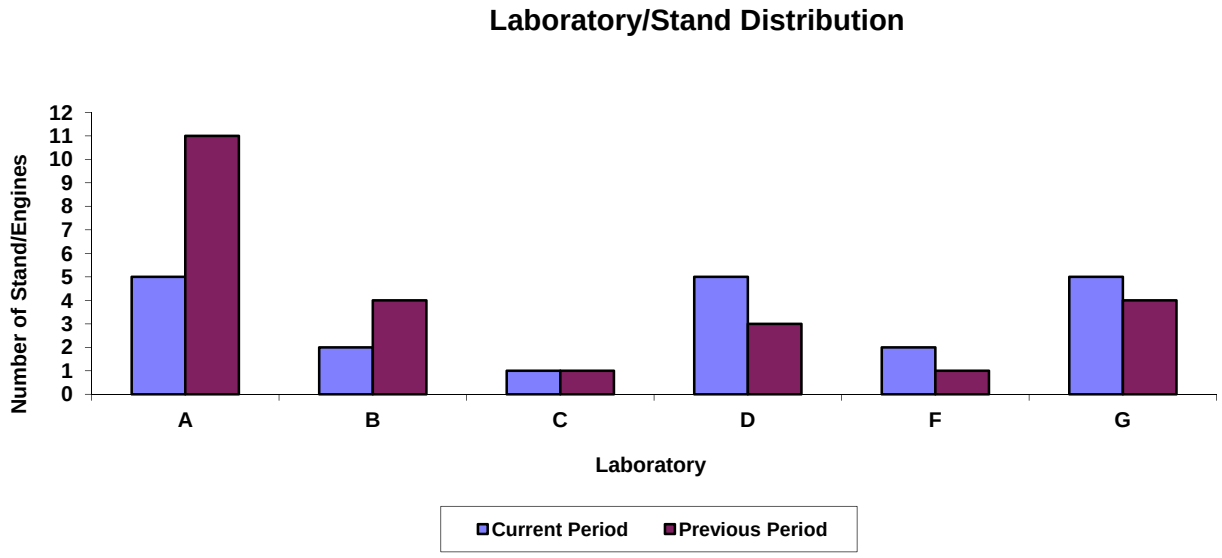
Subject: Sequence VID Semiannual Report: April 1, 2011 through September 30, 2011

The following is a summary of Sequence VID reference tests that were reported to the Test Monitoring Center during the period April 1, 2011 through September 30, 2011.

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2011
Number of Laboratories:	6	5
Number of Test Stand/Engines:	20	10

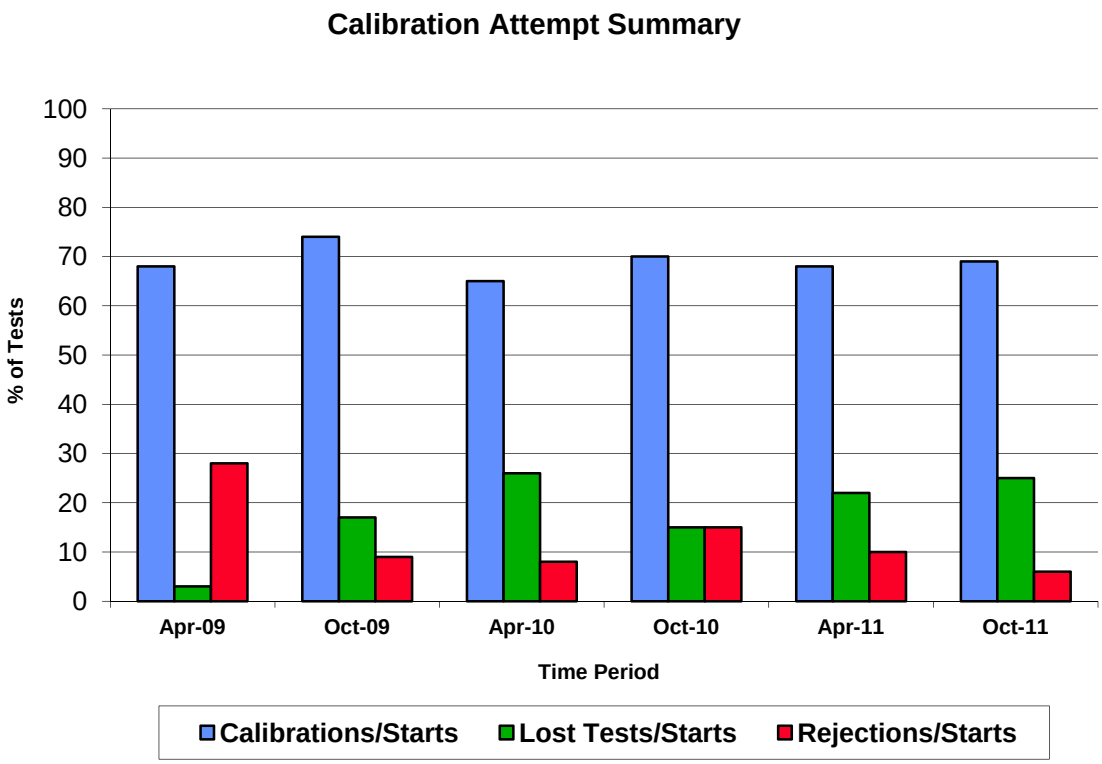
The following chart shows the laboratory/stand distribution:



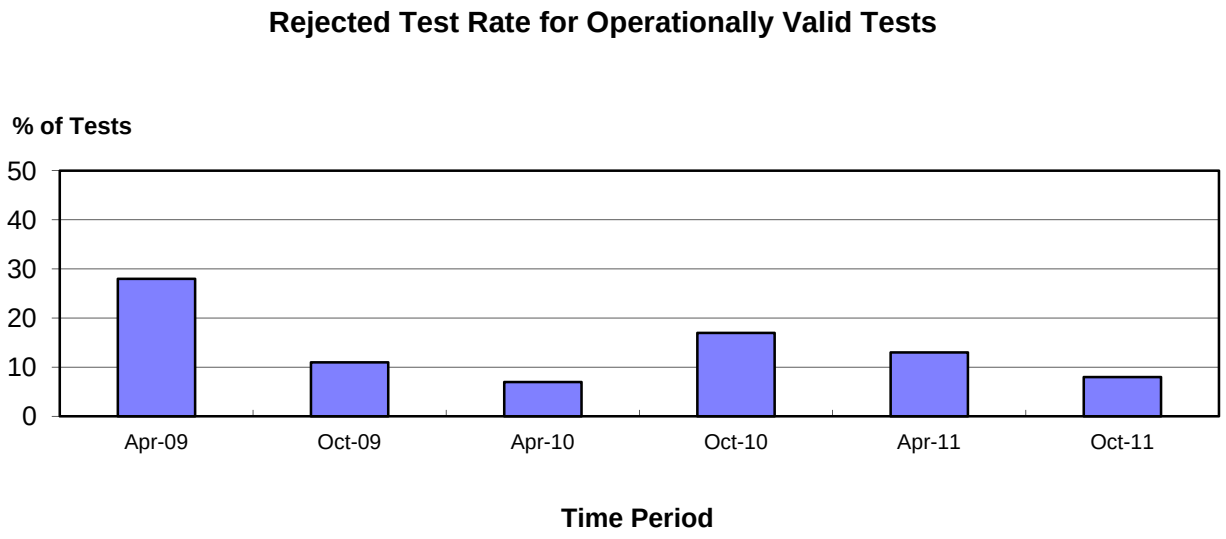
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	36
Operationally Valid, Statistically Unacceptable	OC	3
Operationally Invalid, Laboratory Judgment	LC	2
Aborted Calibration Attempt	XC	2
Engine Abandoned	MC	9
Stand Shakedown	NC	1
Total		53

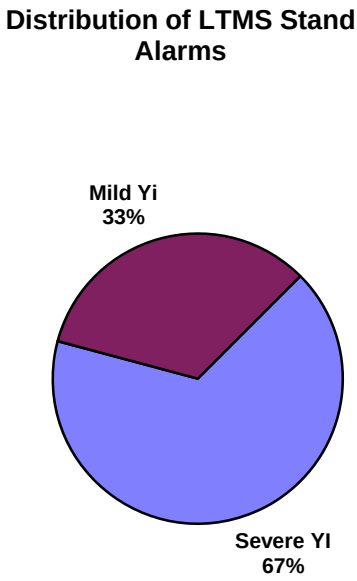
Calibrations per start, lost tests per start and rejection per start rates are summarized below:

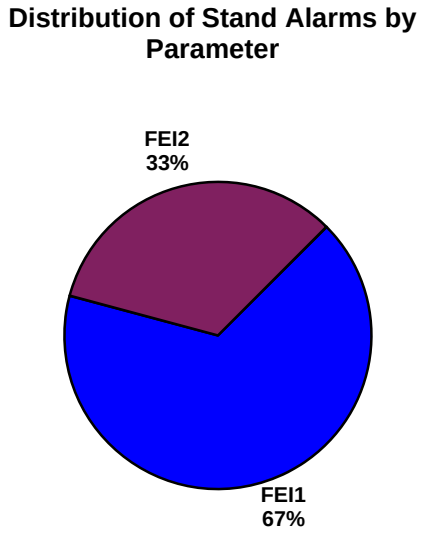


The calibration per start rate has improved slightly since last period. The lost test per start rate has increased since last period. The rejected test per start rate has decreased this period.



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





Of the three failing tests, one failed for FEI1 in the severe direction, one test failed for FEI1 in the mild direction and one failed for FEI2 in the severe direction.

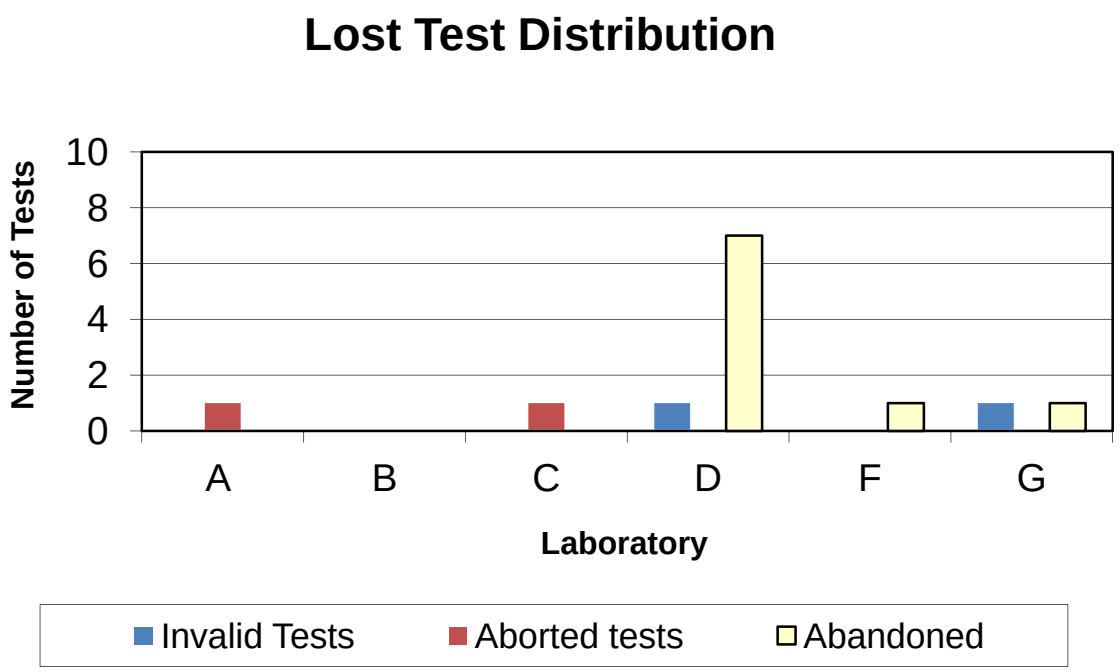
There were no LTMS Deviations written this period. There has been one deviation written to date.

Lost Test Summary

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

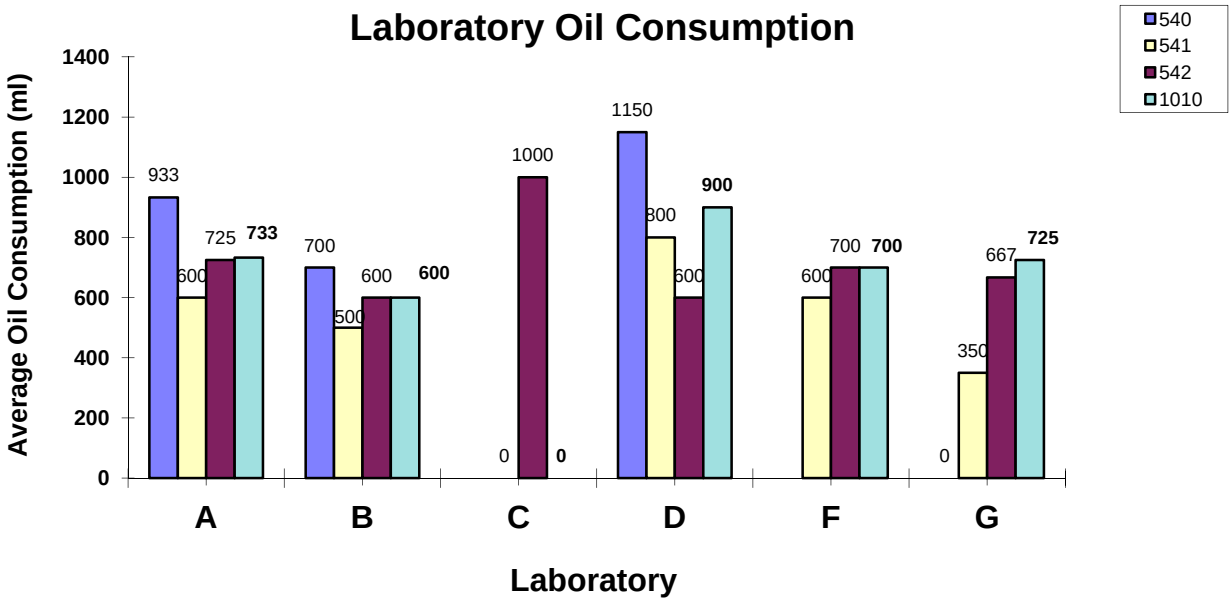
Reasons for Lost Test(s)	Number
Load Cell Calibration Shift	1
Lost Test Time During Test Oil Phase 2, Stage 4 - 6	1
Data Loss, due to Computer Failure	1
Flushing Error, Lost Reference Oil	1
Abandon Engine	9

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



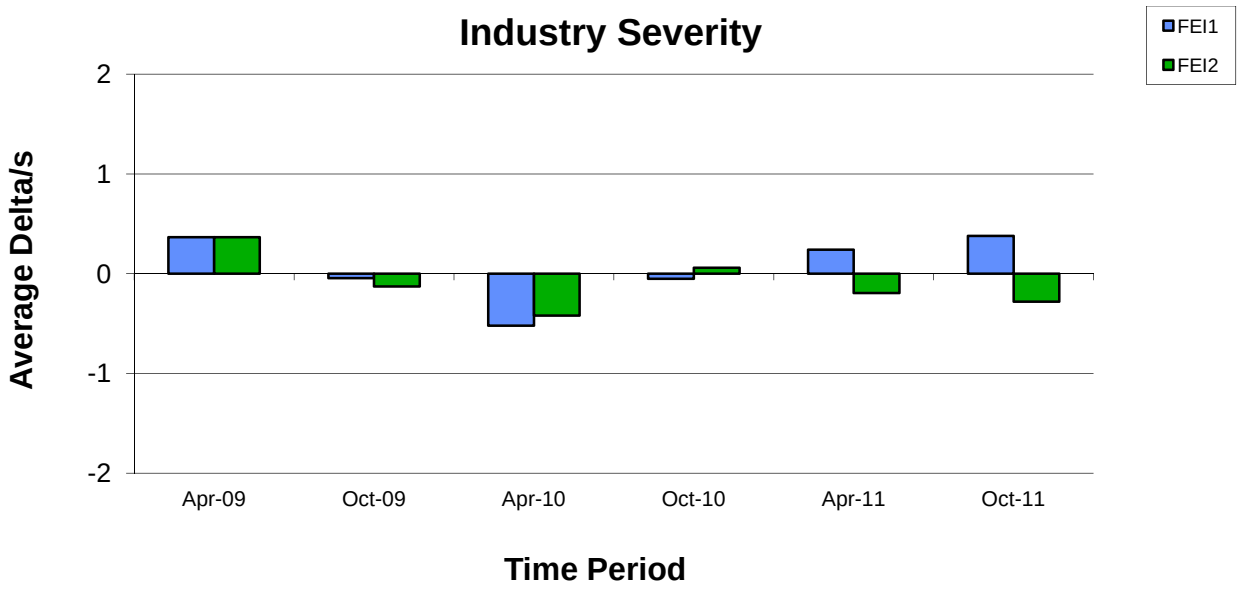
Tests listed as engine abandoned were calibration attempts on engines which did not calibrate and were removed from the LTMS without ever having been calibrated. A total of nine results from three labs, representing four engines were removed this period.

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

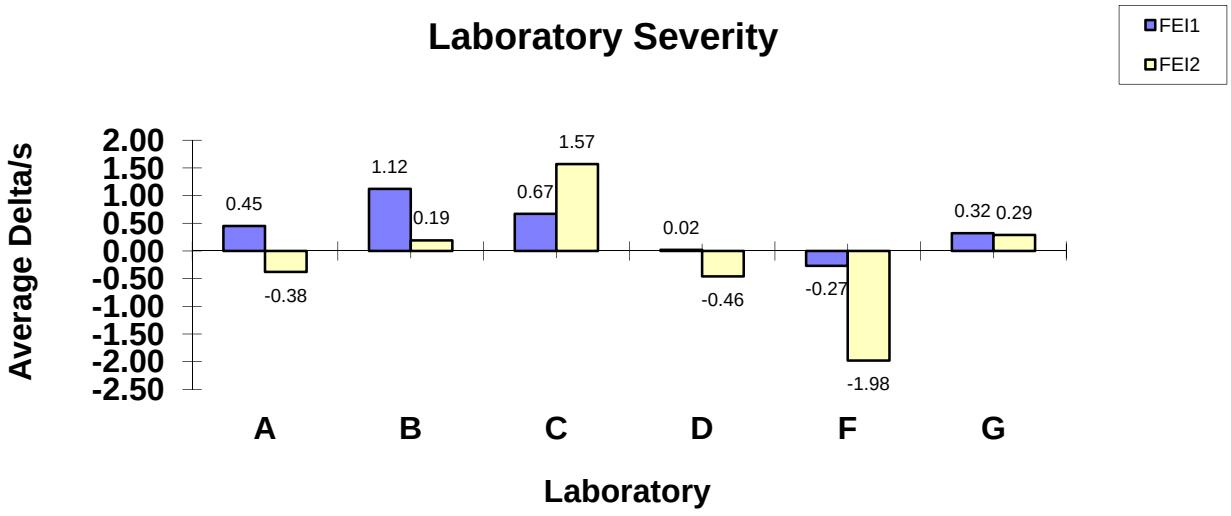


Severity and Precision Analysis

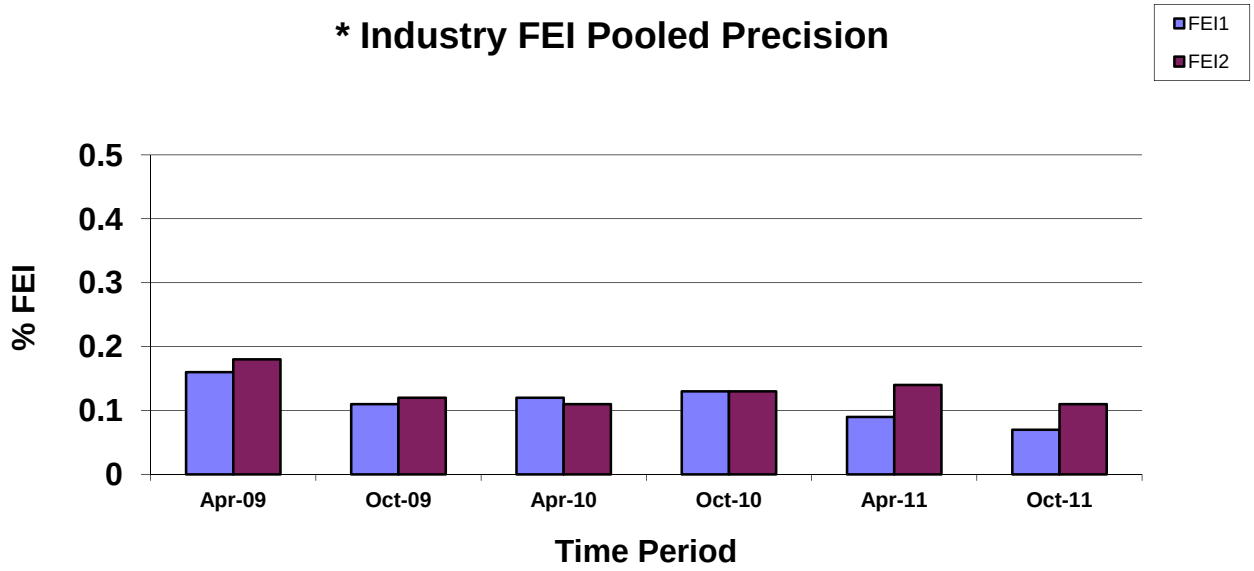
The industry mean Δ/s for FEI1 and FEI2, for this report period is 0.38 and -0.28, respectively. FEI1 was mild, while FEI2 was severe this report period.



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 0.07 and 0.11. Precision for both FEI1 and FEI2 precision has improved 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. With the exception of three mild warning alarms, severity was in control during the report period. With the exception of a warning alarm at the beginning of the period and one additional warning alarm near the end of the period, the precision chart was in control. The summation delta/s plot, with an average delta/s of 0.38, shows industry trending mild for the period.

FEI2

Figure 2 shows the industry control charts. With the exception of a severe action alarm, severity was in control for the period. The precision chart began the period with in warning alarm and, with the exception of two warning alarms near the end of the period, was in control for the remainder of the period. The summation delta/s plot, with an average delta/s of -0.28, shows industry trending severe for the period.

Lab Visits

Three lab visits were conducted this period. No significant discrepancies were noted during these visits.

Information Letters

Two information letters were issued this period. The subject of these letters is given in the Industry Timeline (Figure 3).

Reference Oils

Oil	Original Blend, in gallons	TMC Inventory, in gallons	Quantity Used past six months	TMC Inventory, in tests	Laboratory Inventory, in tests	Estimated life
540	1100	489	25	97	12	3+ years
541	550	40	15	8	10	1 year
541-1	550	540	10	0	2	3+ years
542	1100	444	30	88	10	3+ years
1010	1100	767	73	153	12	3+ years[1]

[1] Multiple test area reference oil; total TMC inventory shown.

A reblend of oil 541 has been obtained, designated 541-1 and is being shipped to laboratories for introduction.

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-10-2011.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

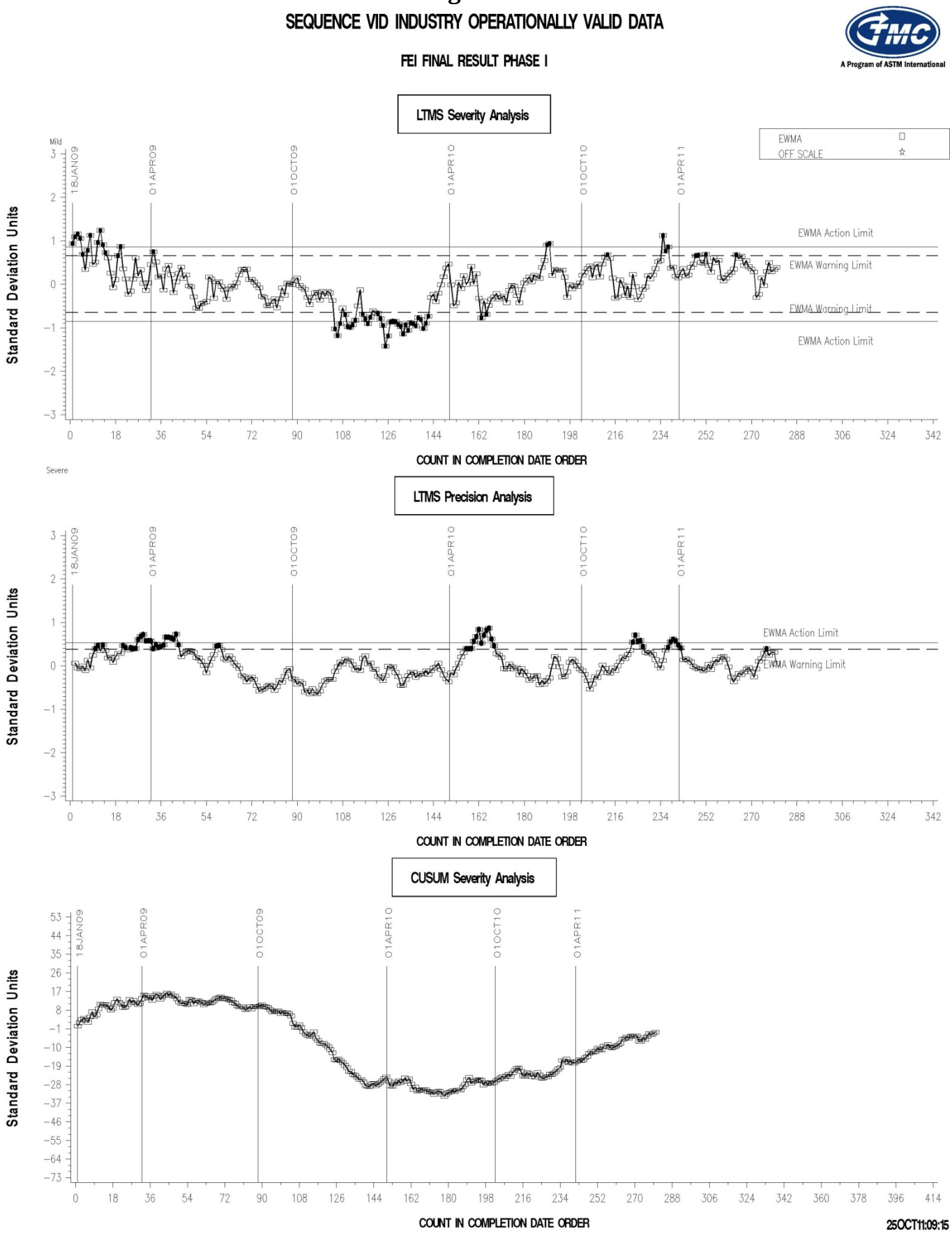
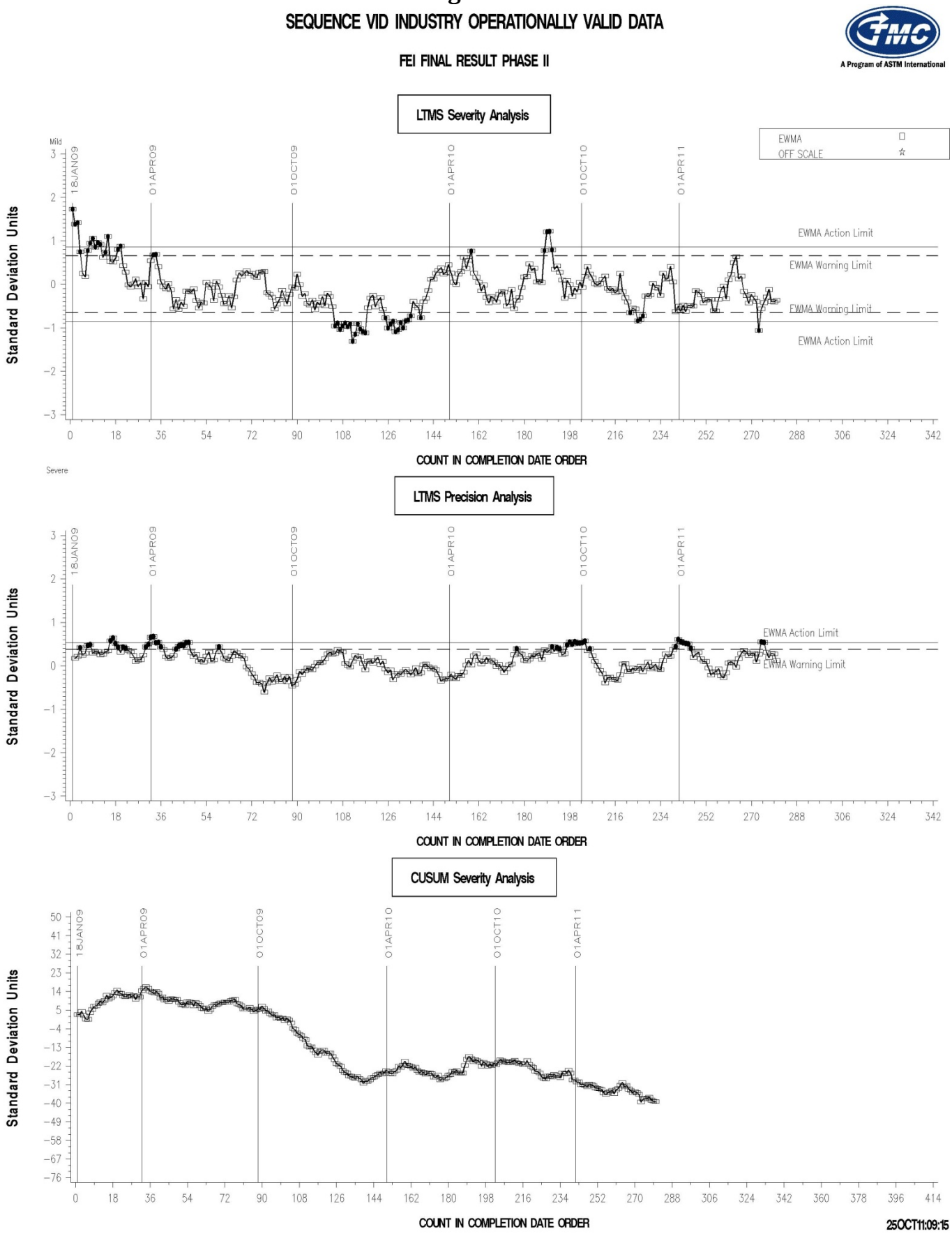

SEQUENCE VID INDUSTRY OPERATIONALLY VALID DATA
FEI FINAL RESULT PHASE I
A Program of ASTM International
LTMS Severity Analysis
Mild
EWMA
OFF SCALE
18JAN09
01APR09
01OCT09
01APR10
01OCT10
01APR11
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
25OCT11:09:15

Figure 2


SEQUENCE VID INDUSTRY OPERATIONALLY VALID DATA
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CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
25OCT11:09:15

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
20100521	CHANGE IN COOLANT FLOW PRESSURE TRANSDUCER	10-2
20100521	ALLOW USE OF SMALL (<35 L/s) FANS TO COOL KNOCK AND O_2 SENSORS	10-2
20100521	ADD MANIFOLD ABSOLUTE PRESSURE (MAP) to BREAK IN TRACES	10-2
20100521	UPDATED LOAD CELL SUPPLIER INFO In APPENDIX X1	10-2
20100720	ADJUSTED CALIBRATION PERIODS	10-3
20100720	CORRECTED/REVISED VALVE IDENTIFICATION FOR SOLENOID VALVES IN OIL SYSTEM	10-3
20100818	REVISED LOCATION OF FUEL TO FUEL RAIL THERMOCOUPLE	10-4
20100818	ADDED TEMPERATURE DRIFT SPEC FOR LOAD CELL POWER SUPPLY	10-4
20100818	CORRECTED AMOUNT OF BL OIL USED FOR A TYPICAL TEST	10-4
20101201	INITIAL TARGETS FOR REFERENCE OIL 1010 (N=5)	
20110512	CORRECTED SIZES FOR VALVES FCV150 C, D, E & F	11-1
20110512	MODIFIED DRAWING FOR CAM POSITIONER	11-1
20110512	ADDED PROCEDURE FOR INSTALLING NON PHASED CAM GEARS	11-1
20110512	DELETED REQUIREMENT TO SEND HARDCOPIES OF TEST REPORTS TO THE TMC	11-1
20110926	CLARIFICATION TO INSTRUMENTATION CALIBRATION REQUIREMENTS	11-2