

November 29, 2005

Reply to: Fred Gerhart
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UNCONFIRMED MINUTES from the SEQUENCE VIB SURVEILLANCE PANEL

**Held in San Antonio, Texas
November 10, 2005**

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Chairman Leverett started the meeting at 8:53 am with 13 members and 7 guests present. The agenda was accepted and is included as **Attachment 1**

Membership changes

Larry Hamilton is voting member for Lubrizol for this meeting only.

Bill Buscher III is Motion and Action items recorder for this meeting. The motion and action items are included as **Attachment 2**.

May 2005 minutes were not available at this time.

TMC semiannual report for the reporting period of April 1, 2005 through September 30, 2005 was accepted as posted on TMC web site and is included in these minutes as **Attachment 3**.

Old Business

Discussion on precision – Chairman Leverett had requested ideals from the surveillance panel before the meeting and did not receive any input. Charlie presented some reference oil history from earlier TMC memos. It looks like test precision has improved with respect to reference oil performance. **Attachment 4** contains the reference data reviewed. Candidate precision from RSI was then compared for the Sequence VI, VIA, and VIB. GF-4 pass rates for the VIB for 0W20 / 5W20 are not very good. Is there a difference in the way precision is calculated between reference data and candidate data? The small sample size for candidates - usually 2 to 3 - results in a precision calculation for candidate oil that is much higher as compared to precision calculations for reference oil results. Another difference is that reference oil precision is calculated using non-severity

adjusted data. RSI data presented is included as **Attachment 5**. During the precision discussion, a side discussion broke out about engine sources for the replacement test. Most would like to have engines for the replacement test built by the laboratories instead of using a black box engine from a test equipment provider. Charlie Leverett requested consent from the panel to report to B that the Surveillance Panel has agreed by unanimous consent, that there is no action to be taken or plan available at this time to improve the precision of the VIB test.

Discussion on engines needed for remainder of VIB (2009?) – Camshafts are in very short supply and the replacement camshaft will not work for this application. Ford is working on a special production run to supply the remaining engines. There are 36 engines in the industry with 14 of the 36 available from AER. This engine supply will last two years.

New Business

Sid's request of funding for research activity in all test types – Sid Clark was unable to present this due to an emergency requiring his immediate return to Detroit. This same request was presented at the Sequence III meeting. Charlie presented a brief review of Sid's request. The VIB chair will make a request to Sub-B chair to work with TMB to develop a source of funding (i.e. test surcharge) for Light-Duty O&H research activities (i.e. evaluating severity issues, hardware, fuel, etc.).

Review of Scope and Objectives

See **Attachment 6**.

Next meeting will be at the call of the chairman.

Meeting adjourned at 9:55 AM.

Sequence VIB Surveillance Panel Agenda

SwRI in Building 209, Conference Room 103.

November 10, 2005 (Thursday)

9:00-12:00 noon

1. Call to Order by Chairman – Charlie Leverett
2. Secretary Items - Fred Gerhart
 - a. Approval of minutes (*May 2005*)
 - b. Motion and Action Items Recorder
 - c. Membership Changes
 - d. Attendance Sign-in
3. TMC Report– Rich Grundza

Please note due to the limited time this report will not be reviewed in detail, please do this prior to the meeting and have question prepared in advance
4. Old Business
 - a. Discussion on Precision
 - * Is there anything that we can do at this point to improve precision?
 - * Is anyone willing to fund this project/work?
 - b. Discussion on engines needed for remainder of VIB (2009?)

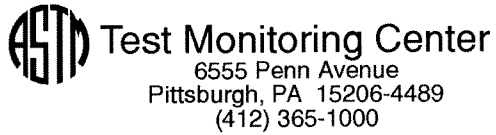
As previously reported, camshafts are no longer in production, the replacement part will not work for our application, AER currently has 12 each right and left cams and is working with Ford on a special production run for the remaining engines. In my last communication with AER it was mentioned that it is not likely the current cams will be reproduced. Labs such continue to keep used heads, cams and coil brackets.
5. New Business
 - * Sid's Request of Funding for research activity in all test types.
6. Review Scope and Objectives
7. Next Meeting – At the call of the chairman
9. Adjournment

Sequence VIB Surveillance Panel
May 18, 2005
12:30PM – 1:30PM
Shadowbrook Inn
Tunkhannock, PA

Motions and Action Items

As Recorded at the Meeting by Bill Buscher

1. Motion – Approval of Minutes for 09/15/04. Approved without changes.
Charlie Leverett / Ben Weber / Passed unanimously
2. Action Item – Laboratories to report their updated engine needs to the TMC by 06/01/05. From this survey the timing for the next engine build will be determined.
3. Motion – Approve the concept that the severity adjustments and the test precision calculation should use the same standard deviations.
Charlie Leverett / Dave Glaenzer / Passed unanimously
4. Action Item – Frank Farber to distribute the TGC test precision calculation proposal to the Surveillance Panel members for agreement on oil selection for each parameter.



MEMORANDUM: 05-071

DATE: October 13, 2005

TO: Charlie Leverett, Chairman, Sequence VIB Surveillance Panel

FROM: Richard Grundza *RG*

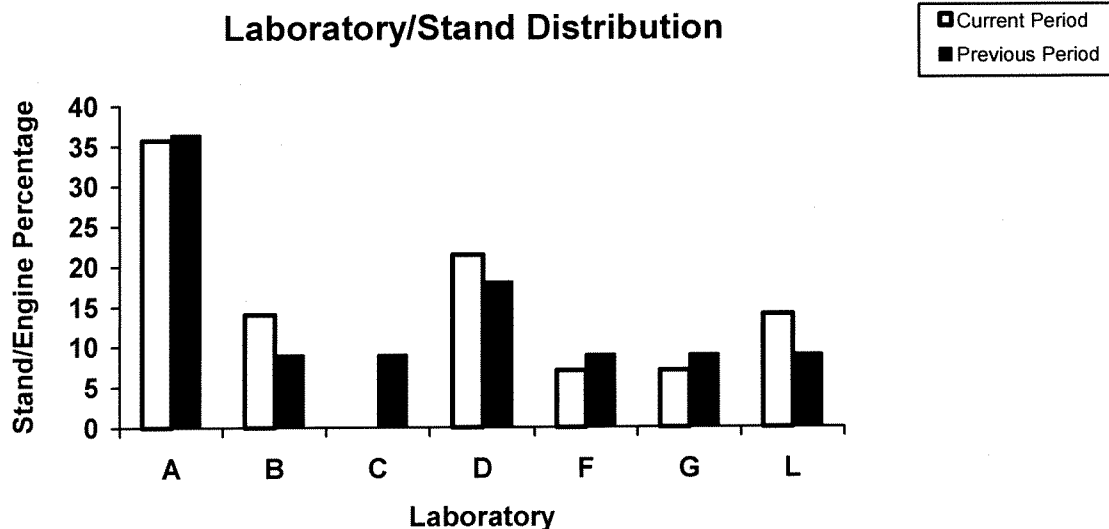
SUBJECT: Sequence VIB Test Results from April 1, 2005 through September 30, 2005

The following is a summary of Sequence VIB reference tests that were reported to the Test Monitoring Center during the period April 1, 2005 through September 30, 2005.

Lab and Stand Summary

	Reported Data During Period	Calibrated as of 09/30/2005
Laboratories	6	5
Stand/Engine Combinations	14	7

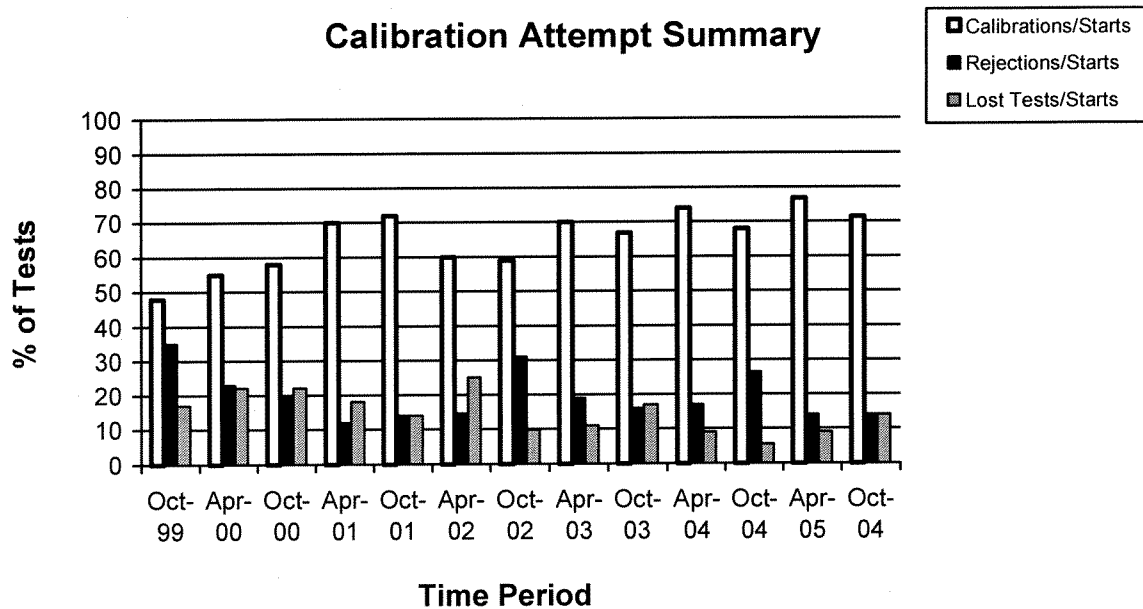
The following chart shows the laboratory stand/engine distribution for data reported during this report period:



The following summarizes the status of the reference oil tests reported to the TMC this report period.

	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	25
Failed Acceptance Criteria	OC	2
Failed Acceptance Criteria (Not in Charts)	OC	3
Operationally Invalid (Laboratory Judgement)	LC	2
Aborted	XC	3
Total		35

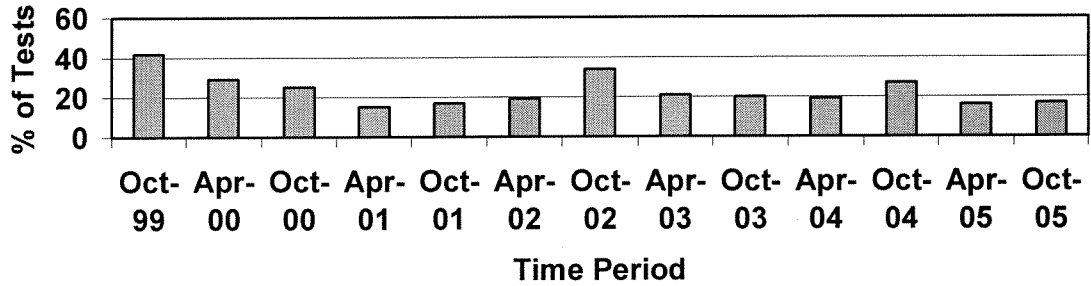
Attempted calibration tests are depicted graphically below by report period:



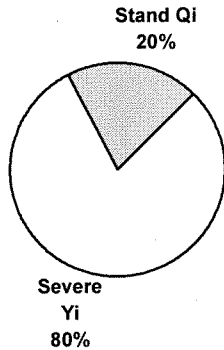
The calibration per start rate has decreased with respect to the previous period. The rejected per start rate has not changed, while the lost test per start rate has increased, when compared to the previous report period.

The percentage of tests failing the acceptance criteria for operationally valid tests has increased when compared to the previous period. The percentages are depicted graphically below.

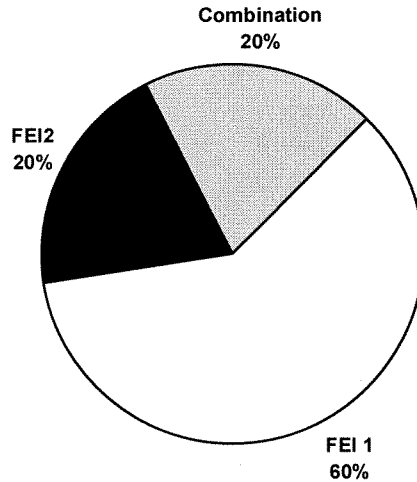
Rejected Operationally Valid Tests



Distribution of LTMS Stand Alarms

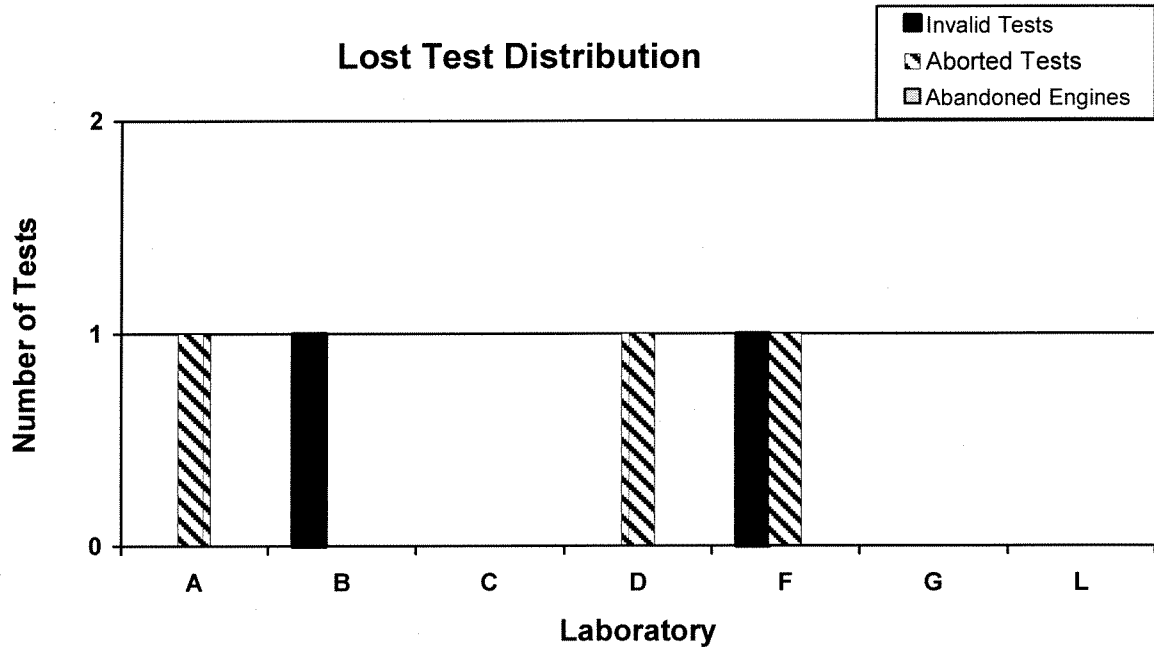


Distribution of Stand Alarms by Parameter

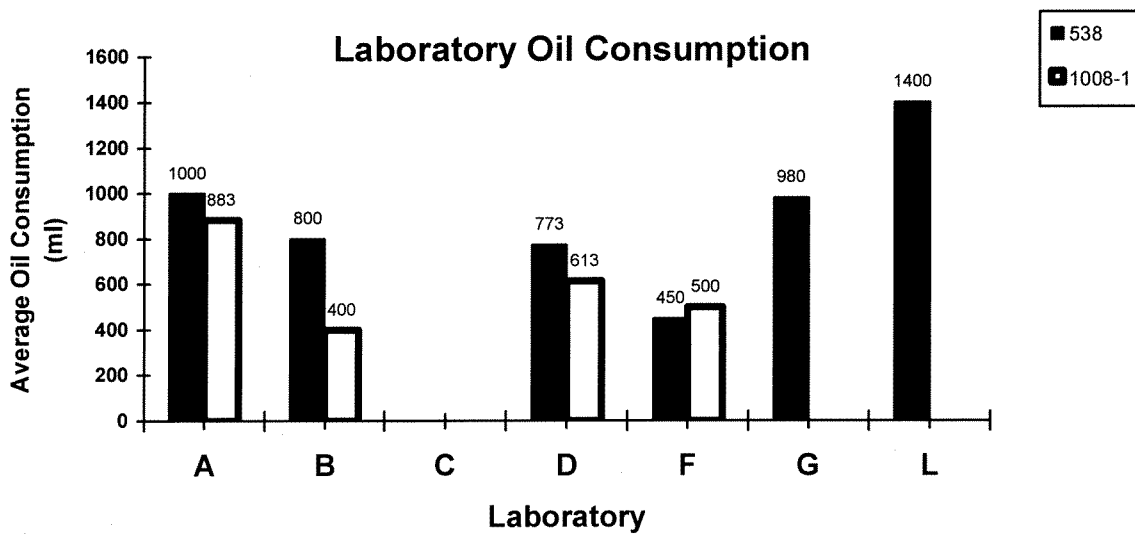


There were four tests rejected for FEI Shewhart (Yi) severe and one test rejected for EWMA precision alarm (Qi). Of the three tests that were run for calibration and were not charted, two were severe on FEI1 and one was severe for both FEI1 and FEI2. The not-charted failing tests were the first tests on new stand/engines that failed Shewhart limits and are not charted so as not to unduly influence the severity adjustment calculation. There has not been an LTMS deviation written for Sequence VIB to date.

The laboratory distribution of lost tests is shown below. A detailed list of reasons for tests declared operationally invalid, aborted or lost due to abandoned engines is shown in Table 2 (See Attachment).

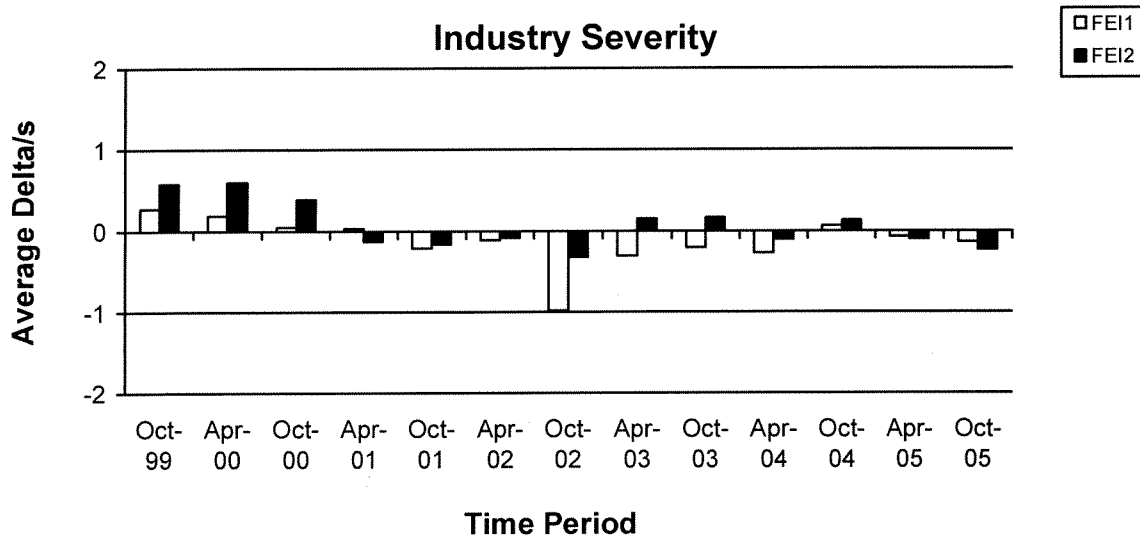


The average oil consumption by oil and laboratory are depicted graphically below

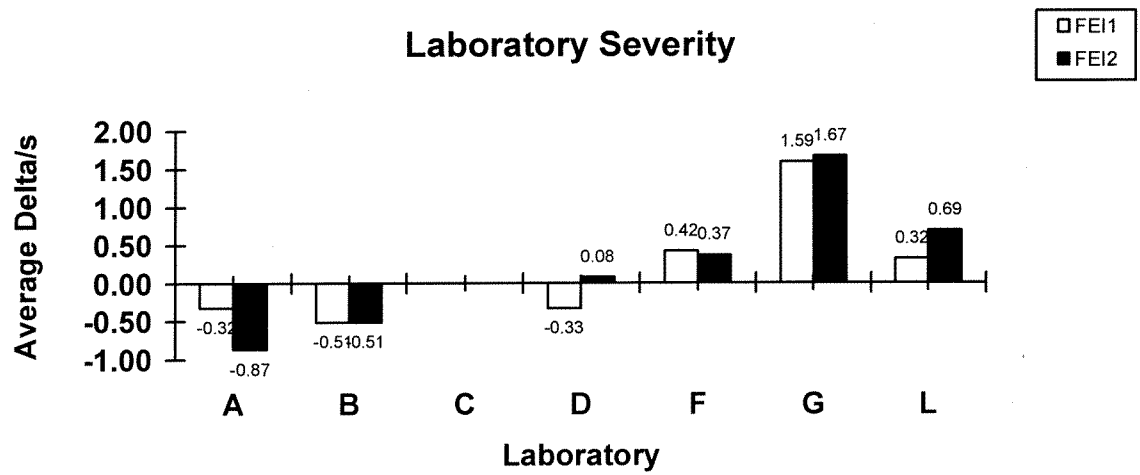


TEST SEVERITY AND PRECISION

The industry mean Δ 's for FEI1 and FEI2, for this report period are -0.14 and -0.23 severe, respectively.

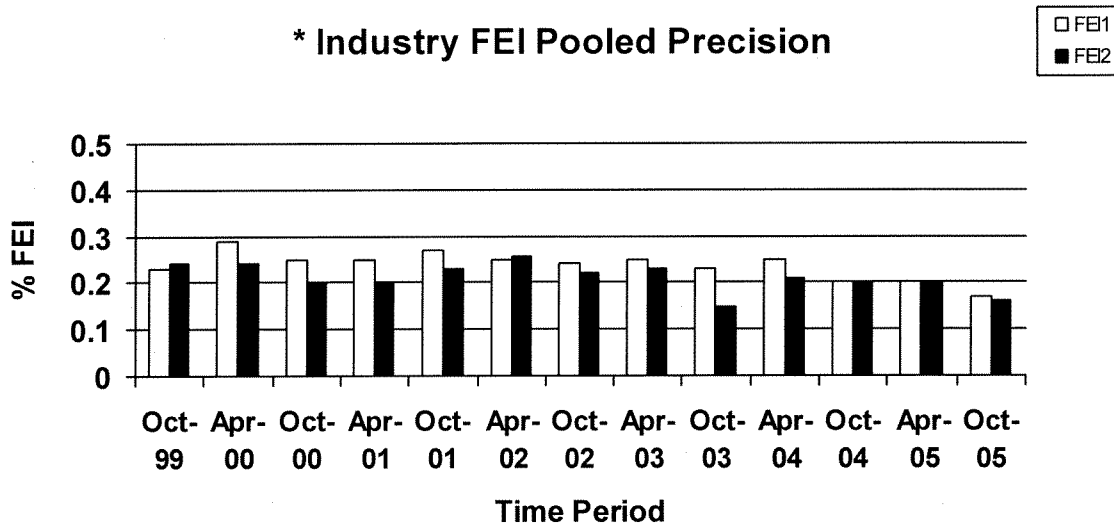


Shown below is a summary of the average FEI Δ 's for all laboratories reporting data this report period.



The industry precision estimates for FEI1 and FEI2 for this report period are 0.17 and 0.16 (pooled s), respectively. Precision for both FEI1 and FEI2 has improved slightly when compared to the previous period and compared well with historical estimates.

*** Industry FEI Pooled Precision**



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

INDUSTRY CONTROL CHARTS

FEI1

With the exception of a warning alarm occurring at the second test in the period, Figure 1 (last 75 test results) shows FEI1 severity in control the entire period. FEI1 precision triggered one warning alarm five tests into the period, but has remained in control for the rest of the period. Figure 2 shows the entire industry chart.

FEI2

As with FEI1, Figure 3 (the last 75 test results) shows severity triggered a warning alarm, but was in control for the remainder of the period. Precision was in control for the entire period. Figure 4 shows the entire industry chart.

REFERENCE OILS

The following table quantifies reference oils by the number of tests remaining at the TMC and each laboratory. Sequence VIB reference oils are shipped in quantities of 5 gallons per test.

LAB	538	539	1006	1007	1008	1008-1
A	2	1	0	7	0	2
B	3	1	0	2	0	3
C	1	1	0	2	0	2
D	2	0	0	0	0	0
F	1	1	0	3	0	1
G	3	2	0	1	0	3
L	1	1	0	5	0	2
TMC	69	182	0	*	**	***

* 441 gallons (Multiple test area usage)

** 29 Gallons (Multiple test area usage)

*** 1497 Gallons (Multiple test area usage)

LAB VISITS

Five lab visits were conducted during this report period. Any discrepancies noted during these visits have been identified to the laboratory and the appropriate corrective actions taken have been documented.

INFORMATION LETTERS

Information Letter 05-1 was issued July 19, 2005. This information letter revised Test Method D 6837 to allow use of throttle body, part number F3PZ-9E926NA.

SUMMARY

Severity for FEI1 was severe this report period.

Severity for FEI2 trended severe for this report period.

FEI1 and FEI2 precision has improved slightly when compared to the last report period.

The percentage of calibrations per starts has decreased this report period.

The percentage of lost tests per starts has increased this report period.

The percentage of statistically rejected tests per starts has not changed this report period.

The percentage of operationally valid tests rejected statistically has not changed this report period.

REG/reg

Attachments

c: Sequence VIB Surveillance Panel

Sequence VIB Test Engineers

<ftp://ftp.asmtmc.cmu.edu/docs/gas/sequencevi/semiannualreports/vib-10-2005.pdf>

Sequence VIB Semiannual Report
List of Attachments

- Table 1 is a historic statistical summary for reference oils through September 30, 2005.
- Table 1A is a statistical summary for reference oils for the current report period.
- Table 2 is a summary of lost tests due to operationally invalid, aborted, abandoned engines or lost due to BC shift exceeding the test limits.
- Table 3 is the Sequence VIB Timeline.
- Figure 1 graphically present the Industry control charts for FEI1 for the last 75 test results.
- Figure 2 graphically present the Industry control charts for FEI1.
- Figure 3 graphically present the Industry control charts for FEI2 for the last 75 test results.
- Figure 4 graphically present the Industry control charts for FEI2.

TABLE 1

SEQUENCE VIB
 OPERATIONALLY VALID DATA SET
 DATA PRIOR TO 10/01/05

OIL CODE 1006				
N	TEST PARAMETER	MEAN	s	REPORTED RANGE
236	FEI1	1.40	0.29	0.61 - 2.50
236	FEI2	0.52	0.27	-.36 - 1.23
OIL CODE 1007				
N	TEST PARAMETER	MEAN	s	REPORTED RANGE
92	FEI1	0.75	0.30	0.24 - 2.11
92	FEI2	0.45	0.27	-.55 - 1.25
OIL CODE 1008				
N	TEST PARAMETER	MEAN	s	REPORTED RANGE
245	FEI1	1.82	0.24	1.18 - 2.47
245	FEI2	1.24	0.21	0.58 - 1.74
OIL CODE 1008-1				
N	TEST PARAMETER	MEAN	s	REPORTED RANGE
179	FEI1	1.89	0.25	1.24 - 2.55
179	FEI2	1.26	0.23	0.48 - 1.95
OIL CODE 538				
N	TEST PARAMETER	MEAN	s	REPORTED RANGE
211	FEI1	1.86	0.32	0.86 - 2.67
211	FEI2	1.57	0.25	0.68 - 2.32

963 TOTAL

TABLE 1A

SEQUENCE VIB
 OPERATIONALLY VALID DATA SET
 DATA FROM 04/01/05 THRU 09/30/05

OIL CODE 1008-1				
N	TEST PARAMETER	MEAN	s	REPORTED RANGE
13	FEI1	1.86	0.18	1.40 - 2.09
13	FEI2	1.20	0.10	1.04 - 1.40

OIL CODE 538				
N	TEST PARAMETER	MEAN	s	REPORTED RANGE
17	FEI1	1.79	0.33	0.86 - 2.24
17	FEI2	1.48	0.32	0.68 - 1.90

30 TOTAL

Table 2

Lost Tests Summary

Tests declared operationally invalid, aborted or lost due to abandoned engines are summarized below by laboratory, reason, number of lost tests, and percent of lost tests:

LAB	REASON	Tests Lost	% of Tests Lost
A	Dyno failure	1	20%
B	High oil consumption	1	20%
D	Power failure	1	20%
F	AFR sensor failure	1	20%
F	Coolant pump failure	1	20%

Sequence VIB Timeline

Date	Item Changed	Information Letter
19990809	Reference oil 1006 targets updated	
19990809	Reference oil 1007 targets updated	
19990809	Reference oil 1008 targets updated	
19990924	Calibration requirements	99-1
19990924	Alternative Cooling system	99-1
19990924	Fuel injection flow procedure	99-1
19990924	Requirement for use of maintenance log	99-1
19990924	Coolant flow measurement device calibration revision	99-1
19990924	Preparation procedure for oil charge	99-1
19990924	Recording compression pressures	99-1
19990924	Ignition timing checks	99-1
19990924	Valve stem seal replacements	99-1
19990924	Alternative Racor oil filter (LFS-62) use approved	99-1
19990924	Engine serial number added to report	99-1
19991015	Invalid test BC shift limits of -0.5 to 0.8% added	99-2
19991015	Tests terminated due to an FEI result are not permitted	99-2
19991015	Section 11.5.17.3 deleted – Manual data logging no longer required	99-2
19991015	Exhaust back pressure calibration prior to calibration test added	99-2
19991015	Instrumentation calibration requirements	99-2
19991015	Use of Eaton 37KW (50hp) dry gap dynamometer approved	99-2
19991015	New flush oil (BCFHD) and flush oil procedure	99-2
19991015	Micro motion model CMF010 mass flow meter approved	99-2
19991015	Kinematic viscosity measurements on new reference oils permitted	99-2
19991015	Report form editorial change for LABVALID made	99-2
19990924	Valve stem seal revised part number	99-3
20000207	Oil sight glass calibration	00-1
20000207	Revised Figure A2.22 – Oil Level Marker Ruler	00-1
20000207	Revised flush effectiveness procedure	00-1
20000207	Coolant flush procedure	00-1
20000207	Oil consumption validity interpretation	00-1
20000207	Load cell temperature specification	00-1
20000410	Valve Spring Replacement	00-2
20000524	Eliminate Baseline Shift Criteria	00-3
20000601	Maximum Allowable Oil Consumption Test Limit	00-3
20000601	Oil Sample Location Defined	00-3
20000601	Revised Blow-by and Crankcase Ventilation System	00-3
20000807	Fuel Injector Calibration Flow Rate Specification Added	00-3
20000807	Dynamometer Replacement During a test is not permitted	00-3
20000807	Engine Break-in Stand Requirements	00-3
20000807	Removal of Ford Wiring Harness Diagram	00-3
20000807	Addition of Alternative Injector Wiring Harness Part Numbers	00-3
20000807	Addition of Alternative HEGO Sensor Part Numbers	00-3
20000807	Addition of Alternative Throttle Body Adapter Part Number	00-3
20000807	Visteon EEC Control Module	00-3
20000901	Barometric Pressure added to report packet as record only	00-3

Sequence VIB Timeline

Date	Item Changed	Information Letter
20000801	A Task Force Was Appointed by the VIB Surveillance Panel to Address Lab To Lab Differences with Oil Consumption and FEI Severity. Information Letter 00-4 was a result of the Lab Visit Discrepancies.	
20000915	Increase Oil Charge to 6.0 Liters	00-4
20000915	Revise Oil Level/Sight Glass Calibration Procedure	00-4
20000915	Oil Pan Oil Level Requirement	00-4
20001116	Reduced Calibration Frequency	01-1
20001117	Validity Interpretation During BSFC Measurement Cycle	01-1
20001117	Reporting Stage Restarts or Any Test Time Deviations	01-1
20001117	Alternate HEGO Sensor Part Number	01-1
20001117	Revisions to New Engine Cyclic Break-in	01-1
20010301	Revisions to Test Length Calculation and Reporting Format	01-1
20010301	Additional Oil Analysis Requirements	01-1
20010822	Allowed Timing Chain Tensioner with Subsequent Reference Oil Test	01-2
20010822	Defined Maximum Total Test Length as 150 h	01-2
20010822	Defined Off Test Time and Allows No More Than 2 h of Off Time During Phase I and II Aging	01-2
20010822	Added Reference to Ford 543 Engine Assembly Manual	01-2
20010822	Refined Oil Analysis Procedure for HTHS, CCS Viscosity, Friction Coefficient by HFRR, Fuel Dilution and Infrared for Oxidation & Nitration	01-2
20010822	Correction of Company Suppliers in X1.3 and X1.19	01-2
20011005	Pressurization of Engine Coolant System to 69±13.8 kPa	01-3
20011005	Deleted Requirement to Measure Blowby	01-3
20011005	Revised Load Cell Temperature Delta for 3°C to 6°C in 6.4.2.3	01-3
20011005	Corrected Fuel Supplier Name and Address in Section 7.2 and Footnote 15	01-3
20011129	Added Provisions for VIBSJ Test	01-4
20011207	Revised AFR limits from 14.25:1 - 15.25:1 to 14.00:1 – 15.00:1	01-5
20020405	Allowed Replacement of Timing Chain as Part of Tensioner Assembly	02-1
20020405	Revised Procedure to Require Viscosity Measurements for Both Reference and Non Reference Oils	02-1
20020712	Reference oil 538 targets updated (n=20)	
20021016	Reference oil 538 targets updated (n=30)	
20021114	Reference oil 1008-1 initial targets generated (n=10)	
20030327	Updated Test Method D6837 to incorporate info letter 02-1 and remove remedial statements	03-1
20030521	Reference oil 1008-1 initial targets generated (n=20)	
20030618	Dropped requirements to monitor HTHS, CCS, FC by HFRR and INI and INO	03-2
20030703	Reference oil 1008-1 initial targets generated (n=30)	
20040101	Added reference to fuel spec, replaced Aliphatic Naphtha with Type II Class C solvent	03-3
20040130	Added addition micromotion transducers to test method, revised calibration requirements for oil heat exchanger thermocouple and made editorial changes relating to precision statements.	04-1
20040802	Added MotorCraft AGSF32FM to test method	04-2

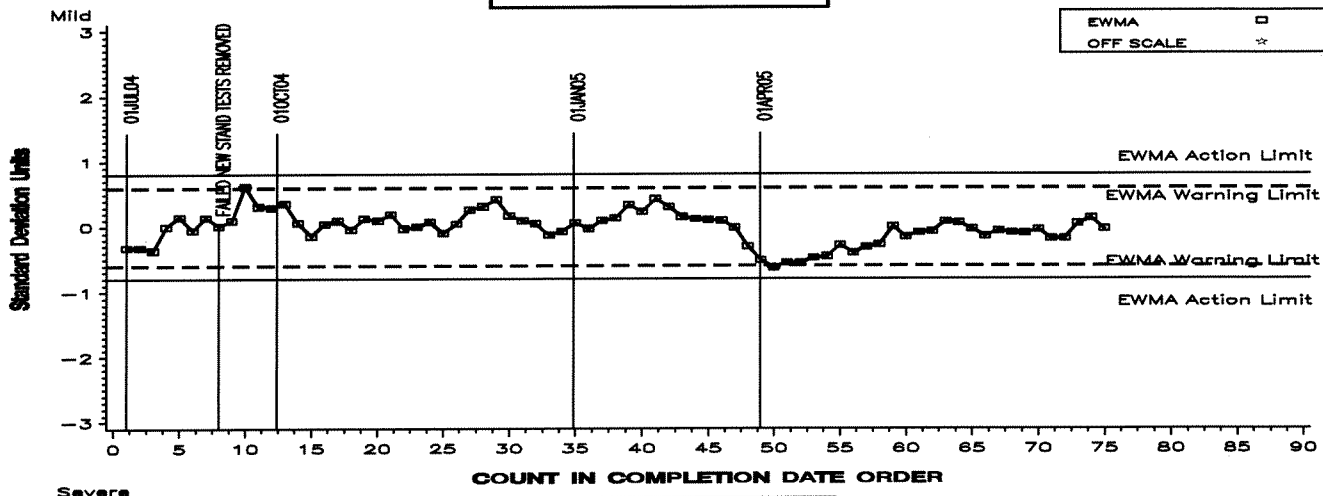
Sequence VIB Timeline

Date	Item Changed	Information Letter
20040802	Added rear crankshaft seal to parts allowed to be replaced on engine	04-2
20040802	Made editorial changes to precision statement	04-2
20040921	Changed Z_0 calculation to be the average of first shewhart acceptable through and including second acceptable reference test to initialize stand charts. Also excluded any unacceptable shewhart results, prior to the first acceptable result on a new stand/engine from control charts.	
20041001	Revised stand/engine calibration requirements to include engine test hours	04-3
20041001	Change calibration frequency for fuel flow, speed, AFR and EBP to prior to a reference sequence.	04-3
20041001	Decreased calibration frequency for coolant flow, thermocouple & temperature measurement systems and other instrumentation to every six months	04-3
20041115	Added provisions for external coolant flush cart	04-4
20041214	Clarified Requirement for solvent meeting ASTM D235, Type II, Class C to meet Type II, Class C requirements for Aromatic content, Color and Flash point only.	04-5
20050719	Added Throttle body F3PZ-9E926NA to test method	05-1

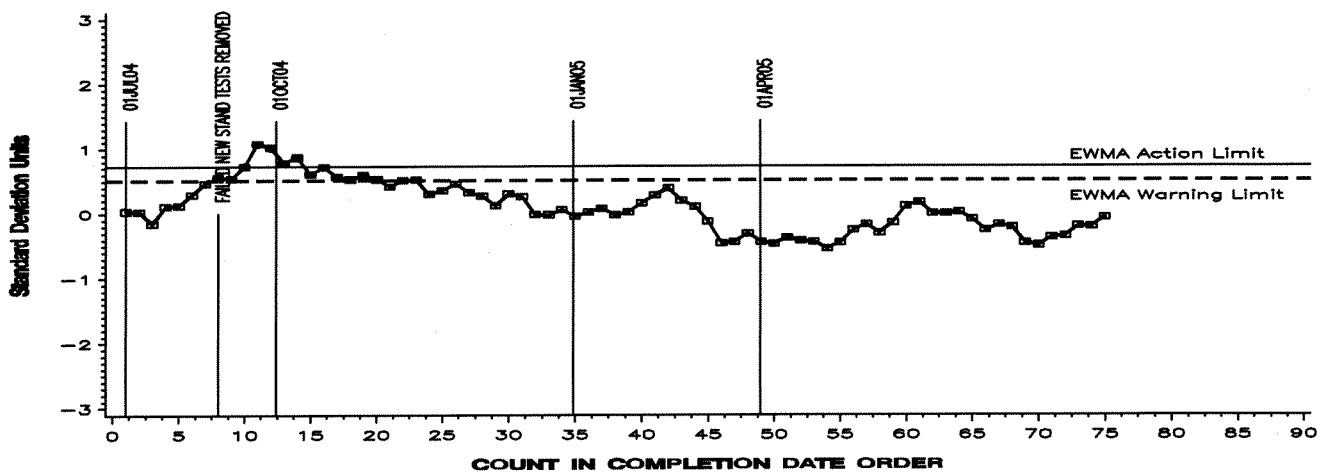
SEQUENCE VIB INDUSTRY OPERATIONALLY VALID DATA

Last 75 Tests Only
FEI FINAL RESULT PHASE I (%)

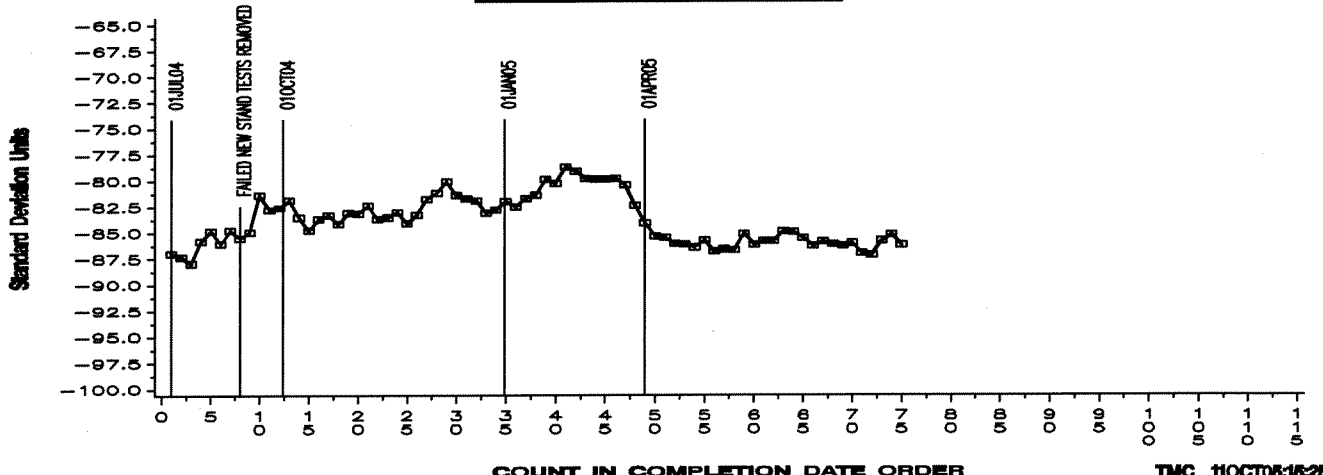
LTMS Severity Analysis



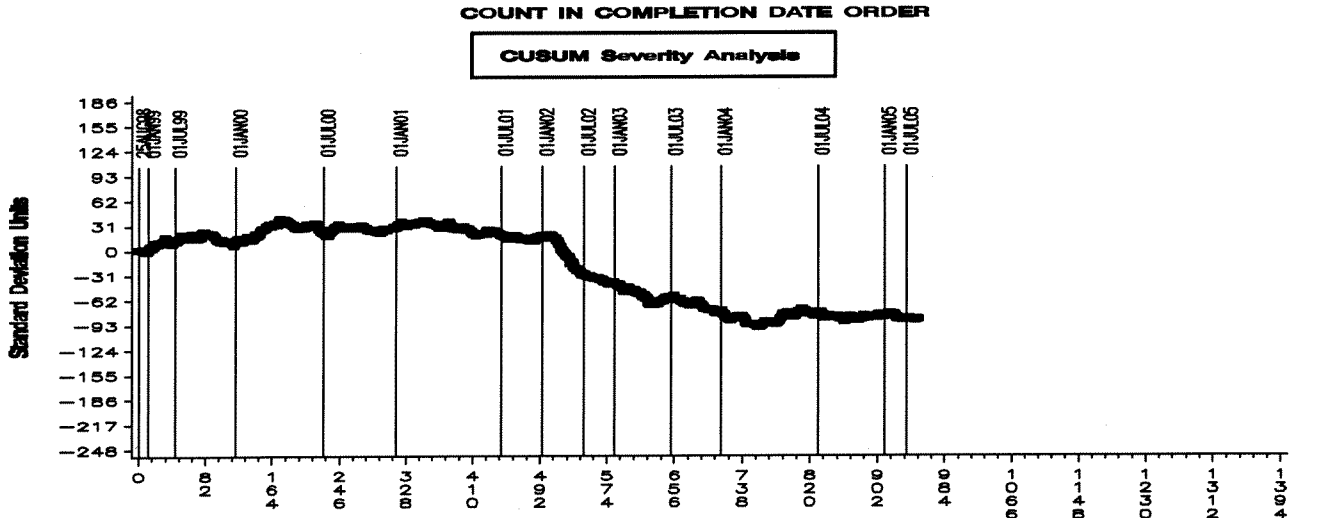
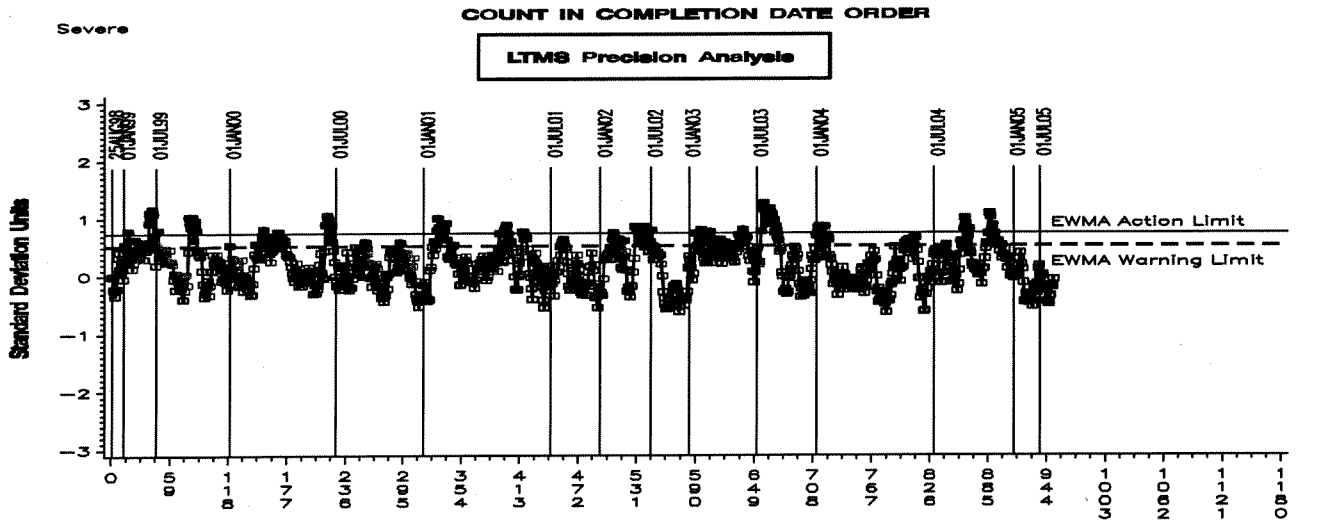
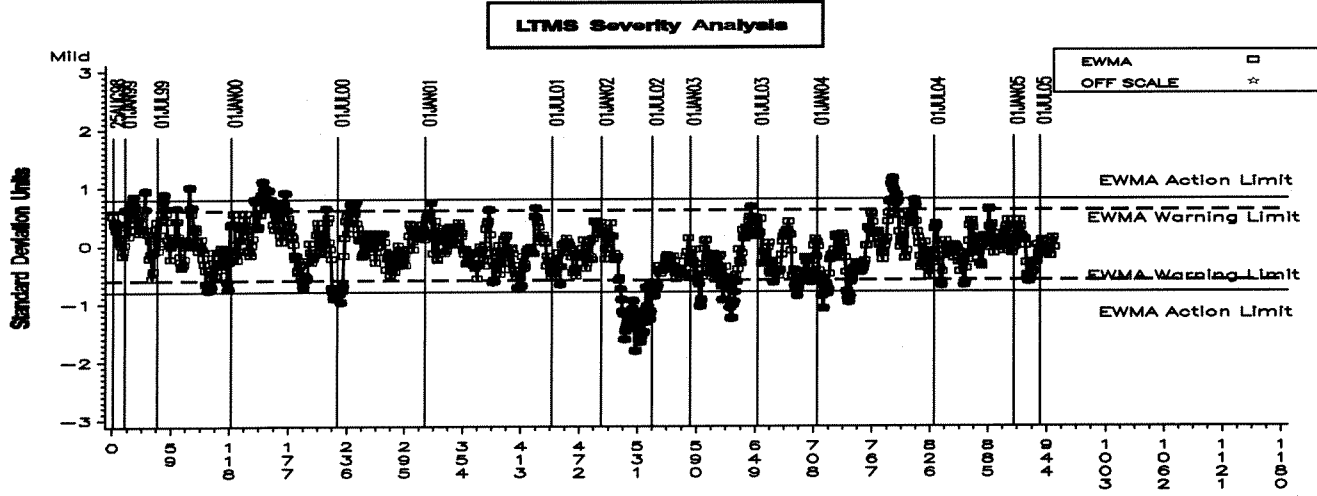
LTMS Precision Analysis



CUSUM Severity Analysis



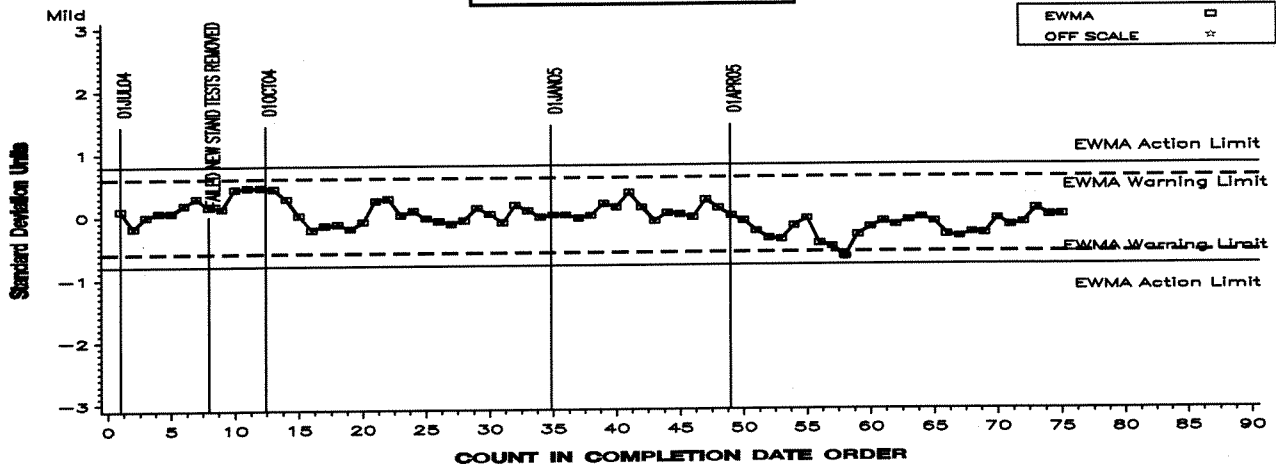
FEI FINAL RESULT PHASE I (%)



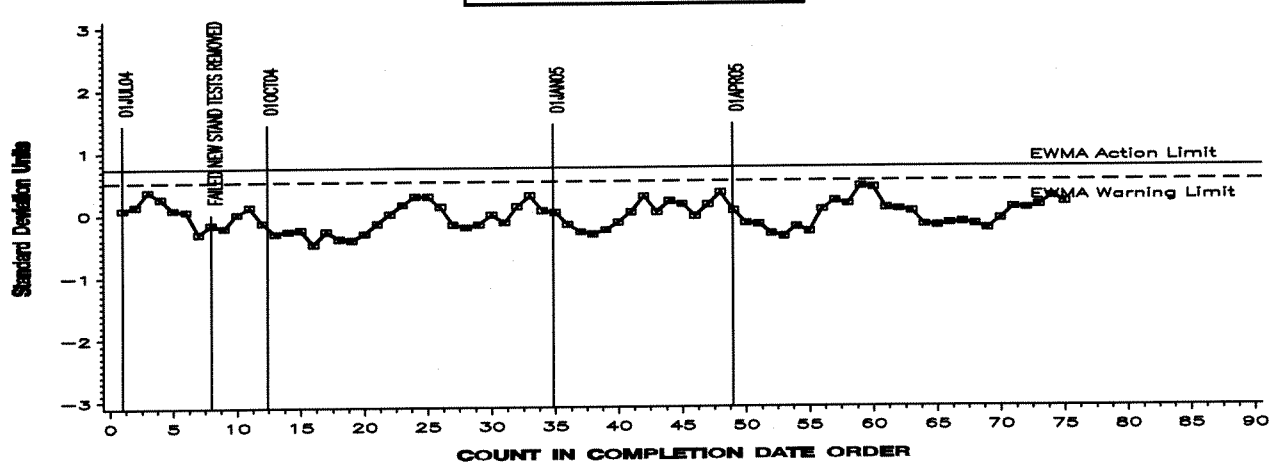
SEQUENCE VIB INDUSTRY OPERATIONALLY VALID DATA

Last 75 Tests Only
FEI FINAL RESULT PHASE II (%)

LTMS Severity Analysis



LTMS Precision Analysis



CUSUM Severity Analysis

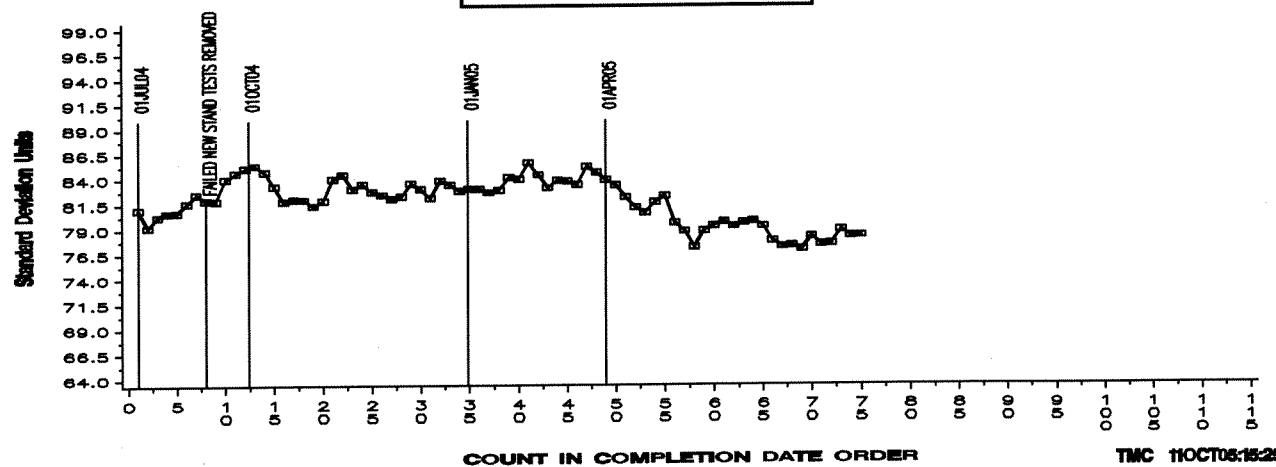
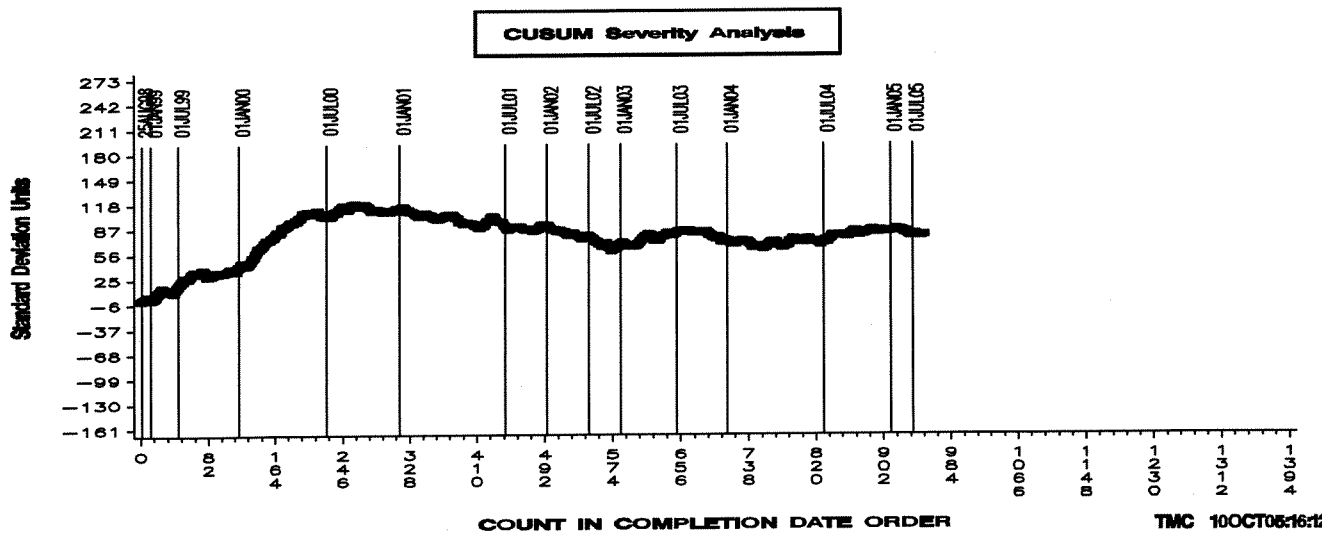
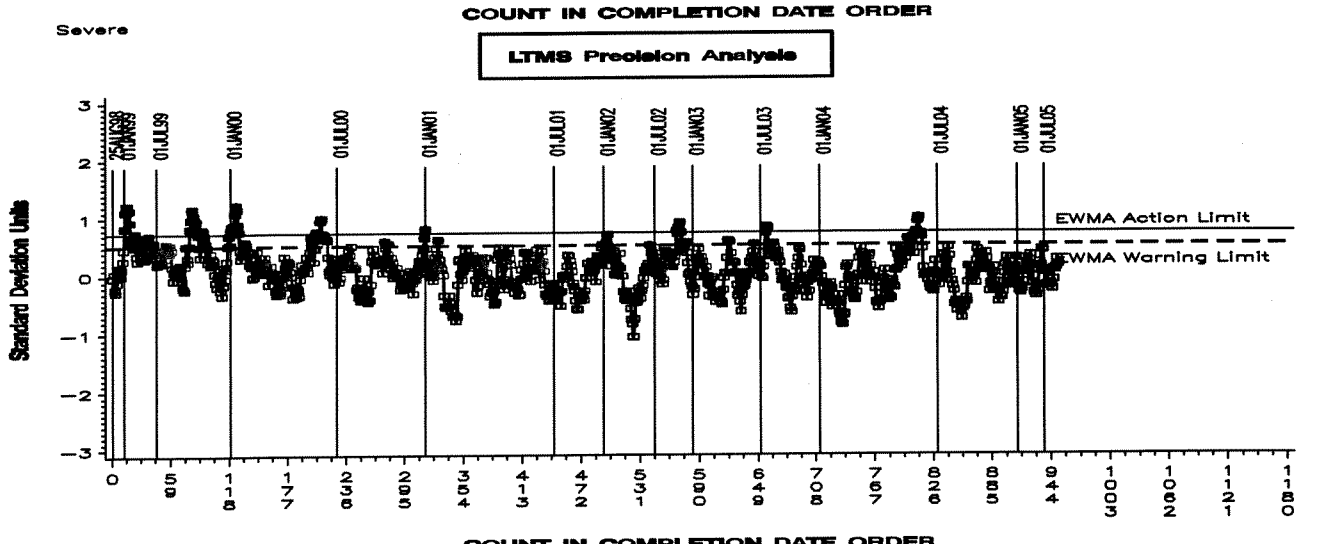
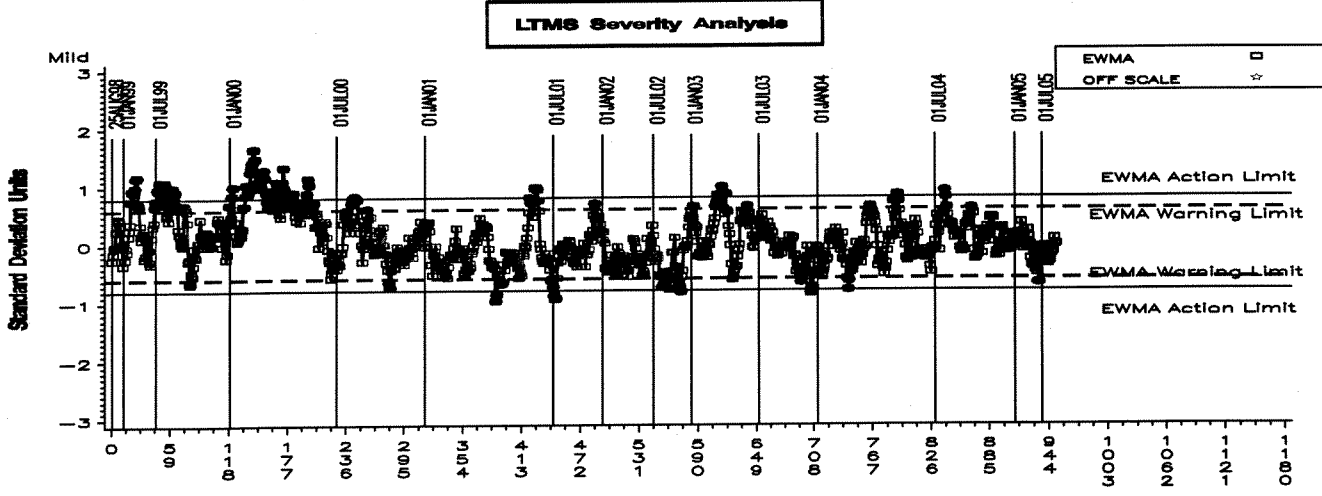
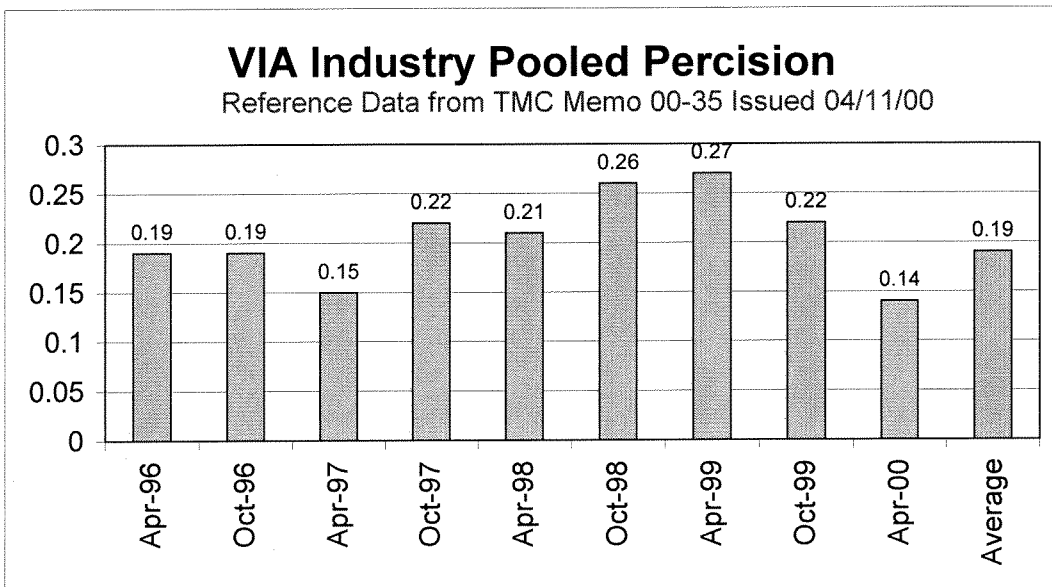
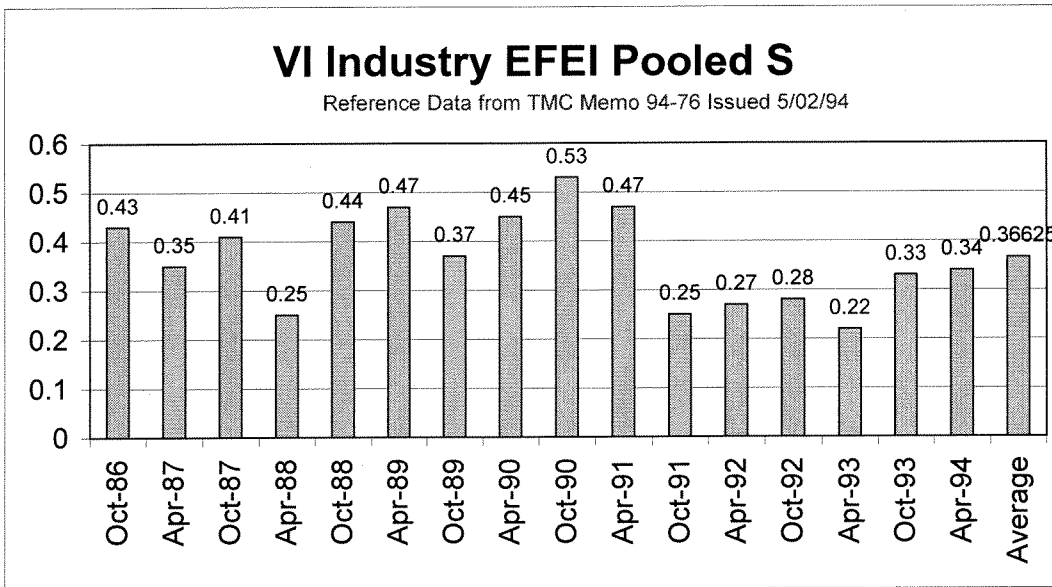
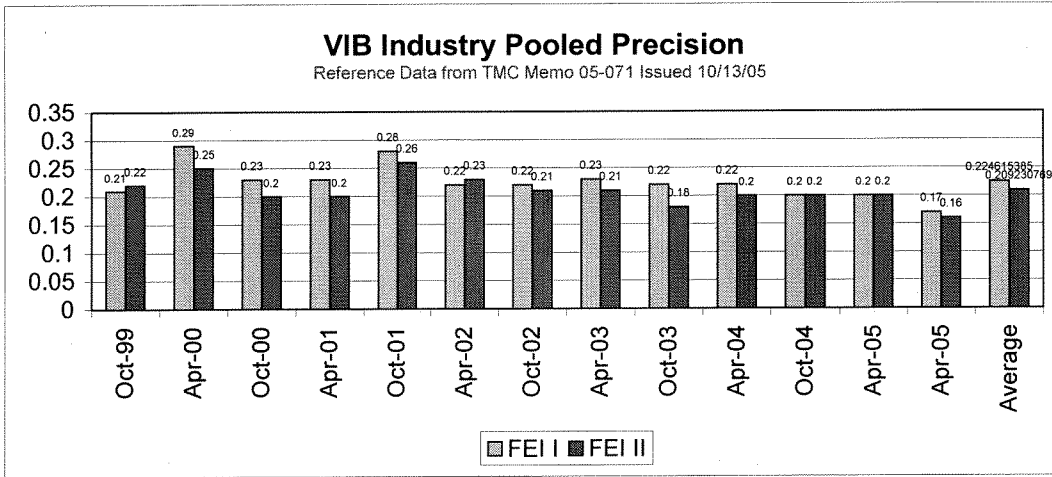


Figure 4

SEQUENCE VIB INDUSTRY OPERATIONALLY VALID DATA

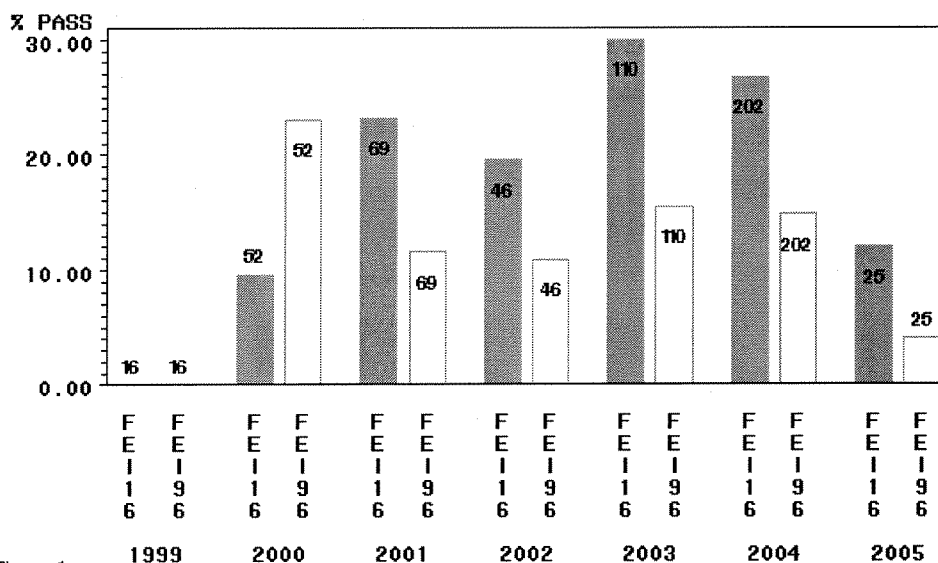
FEI FINAL RESULT PHASE II (%)



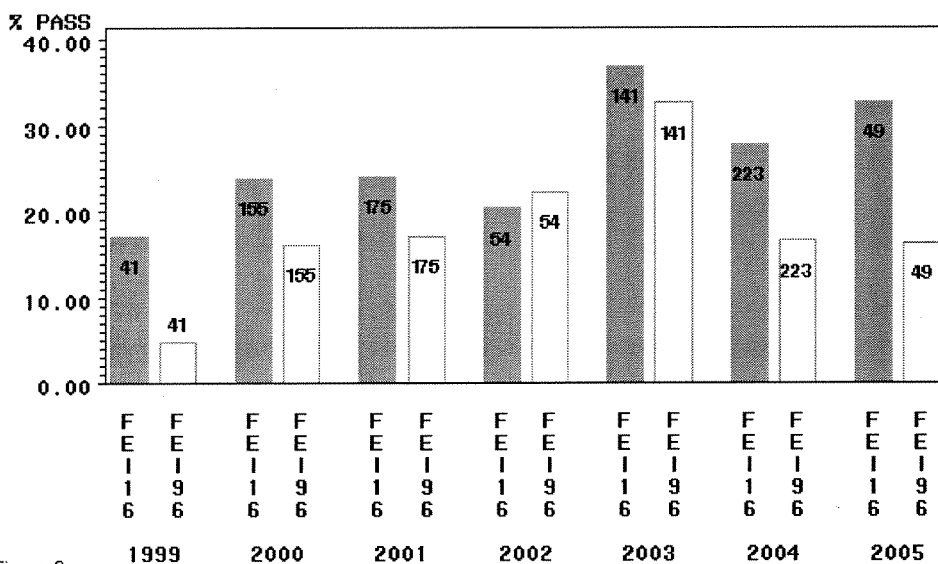




Sequence VIB GF-4, % Pass Rates
Stopped tests considered as FAILING result
visgrade=0W20/5W20



Sequence VIB GF-4, % Pass Rates
Stopped tests considered as FAILING result
visgrade=0W30/5W30





Sequence VIB GF-4, % Pass Rates
Stopped tests considered as FAILING result
visgrade=OTHERS

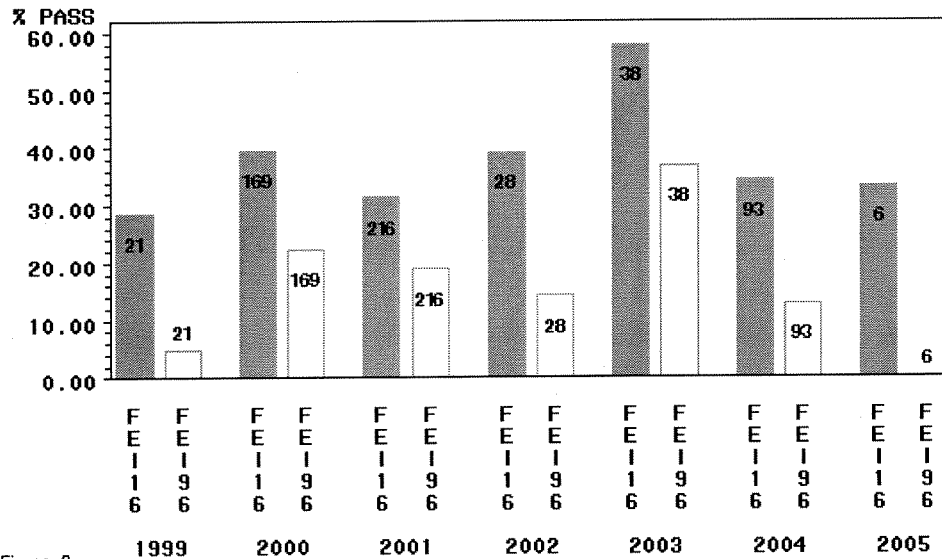
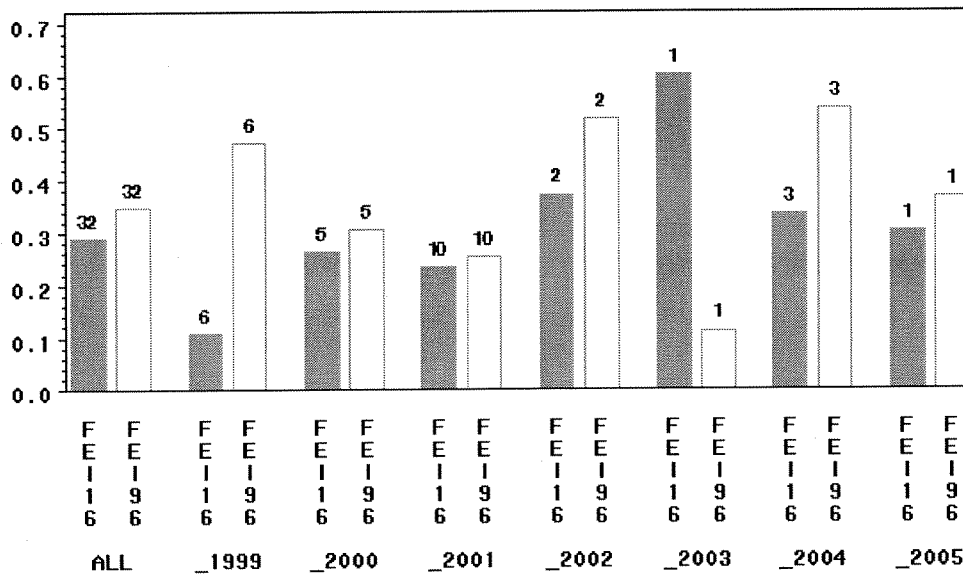


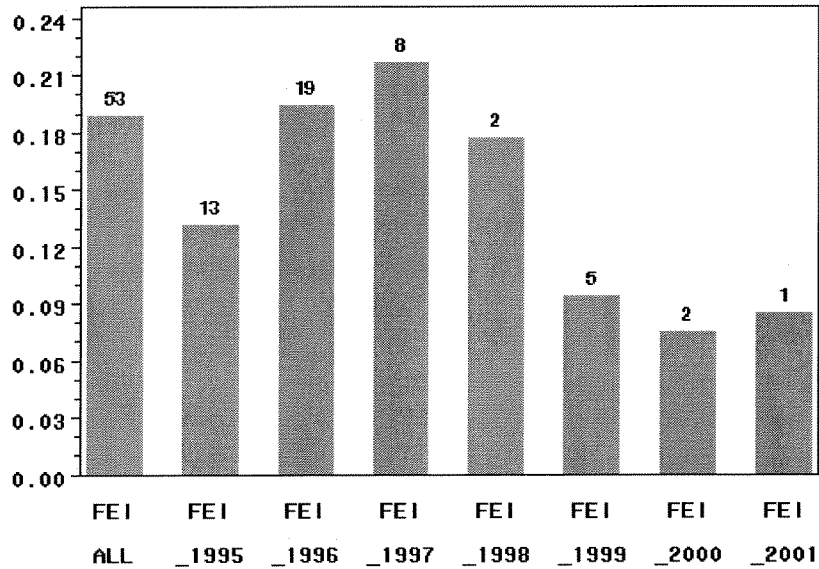
Figure 3

VIB Precision for Repeat Tests on an Oil
Operationally Valid and Completed Tests



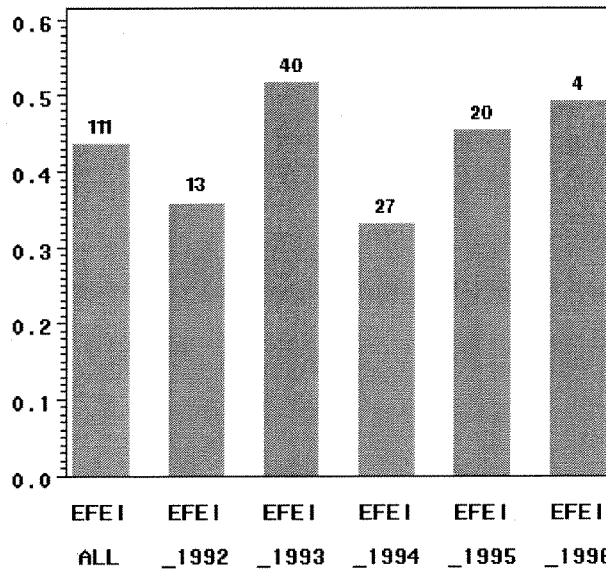
Precision is pooled standard deviation across oils in FEI units.
THE NUMBER ABOVE EACH BAR IS THE NUMBER OF OILS WITH REPEAT TESTS

VIA Precision for Repeat Tests on an Oil
 Operationally Valid and Completed Tests



Precision is pooled standard deviation across oils in FEI units.
 THE NUMBER ABOVE EACH BAR IS THE NUMBER OF OILS WITH REPEAT TESTS

VI Precision for Repeat Tests on an Oil
 Operationally Valid and Completed Tests



Precision is pooled standard deviation across oils in EFEI units.
 THE NUMBER ABOVE EACH BAR IS THE NUMBER OF OILS WITH REPEAT TESTS

ASTM Sequence VIB Surveillance Panel Scope and Objectives

Scope:

The Sequence VIB Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence VIB test documented in ASTM Standard D6837. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least every six months by the panel or its individual members. Improvements in test operation test monitoring and test validation will be accomplished through continual communication with the Test Sponsor, ASTM Test Monitoring Center, Central Parts Distributor, ASTM B.O1, and the Passenger Car Engine Oil Classification Panel. Actions to improve the process will be recommended when deemed appropriate based on input from the aforementioned. It is intended that this process will provide the best possible test procedure for evaluating automotive lubricant performance with respect to the lubricant's ability to provide fuel economy benefits.

Objectives

Target Date

Define new hardware for future VIB testing (After current supply is exhausted) Done 05/03

Review and determine if anything can be done to improve VIB test precision.

Recommendations from this task force shall be forwarded to

the SP within 6 months for their review Done 11/05

Oversee the development of the VID test for GF-5 On-going