May 31, 2001

Reply to: Fred Gerhart
Southwest Research Institute
6220 Culebra Road
P.O. Drawer 28510
San Antonio, Texas 78228-0510

Phone: (210) 522-3842
Fax: (210) 684-7523

UNCONFIRMED MINUTES from the SEQUENCE VIB SURVEILLANCE PANEL

Held in San Antonio, Texas
May 24, 2001

Welcome

Acting chairman Charlie Leverett called the meeting to order. The agenda was accepted and is included as Attachment 1.

Chairman's Comments

The permanent chairmanship of the VIB Surveillance Panel will be established by the next meeting. Daryl Baumgardner has re-entered the industry and sends his regards.

Secretary Items

- Selection of Secretary - Fred Gerhart of SwRI has volunteered to serve as the permanent secretary for the Sequence VIB Surveillance Panel.
- Action Items and Motion recorder - Ben Weber of SwRI has volunteered to serve as the permanent action items and motion recorder for the Sequence VIB Surveillance Panel. The action items and motions are included as Attachment 2.
- Approval of minutes from the previous meeting - November 2000 minutes have not been distributed. Approval will be delayed until the next meeting.
- Hand Count of Voting Members - 13 voting members were present. Attendance list was distributed and is included as Attachment 3.

Action item - separate members from non-members on membership list.

Review of Action Items from November 2000 meeting:

- AER is authorized to purchase oil pumps to complete builds. Flow the pumps to ensure they are in specification. Reject parts if required. Track these pumps separately in the builds. AER representative was not present at the time of discussion. Charlie Leverett gave a brief update stating this was done. *Completed*
- AER is asked to plan for 130 engine builds. *In process*
- ~~The next AER engine build is scheduled for 12/9/00.~~ *Completed*
- The TMC Engineer, the Surveillance Panel Chairman, and the O&H Chairman are charged with determining a recommendation for maximum allowable "off test" run time on the candidate oil. *On Agenda Under New Business*
- The TMC will check whether the Sequence VIB reference oils can be reblended. The TMC will take appropriate action when and if reblends are required. *On Agenda Under New Business*

TMC Semi-annual report (Don Lind) - included as Attachment 4.

- *Reports will no longer be mailed unless requested. Reports will be posted on TMC website.*
- The report covered reference tests conducted during the period October 1, 2000 through March 31, 2001 covering 7 laboratories and 48 stand / engine combinations. Rejected operationally valid test percentage *decreased* for this reporting period. Precision alarms were triggered on industry control charts this reporting period for both FEI1 and FEI2. The precision alarms appear to be related to a mix of new engines that have a tendency to produce severe results and older engines that are near the end of the calibration life that give mild results. Precision alarms have cleared because new engines gained hours and older engines were removed at the end of their calibration life.
- Information letter 00-4 Sequence Number 7 was issued on October 31 and Information Letter 01-1, Sequence Number 8 was issued on January 19, 2001. Items changed with these information letters are documented in the Sequence VIB timeline (Table 3 in Attachment 4).
- Supplier of reference oil 1008 can reblend. Consensus of SP is to authorize reblend of 1008.

[Motion made by Don Lind and seconded by Dwight Bowden] The TMC report was unanimously accepted.

[Action Item] The VIB Surveillance Panel would like to pursue a re-blend of 1008.

Test Developer Semi-annual report (Barry Jecewski)

- Some labs have experienced problems with chain tensioner wear. Problem occurs on engines with more than 1000 hours. Guy Stubbs of SwRI provided view graphs of failed components - a copy of the view graphs is included as Attachment 5. Barry has delivered failed components to a special problem resolution team composed of FMC and the parts supplier. Same failure has occurred in taxi fleets. Patrick Lai has investigated and cannot see batch build differences but has seen change in plastic coating. Barry acknowledged that the supplier of the coating has been changed.

[Motion made by Charlie Leverett and seconded by Guy Stubbs] The labs are allowed to inspect the timing chain assembly and replace the right and left guides and the tension adjusters as needed. If any of these parts are changed, you must run one acceptable calibration test. The parts can be bought from the Ford dealers. Any parts that are removed should be sent to Barry Jecewski at Ford with the number of the test hours. A comment must also be included in the test report as to what was changed. Effective 5-25-01. Motion passed unanimously.

- Charlie estimates 10 tests before chain guides start to wear. Charlie to supply list of engine builds for minutes. Included as Attachment 6.

[Motion made by Dwight Bowden and seconded by Carl Stephens] Include a reference of Ford's 543 assembly manual in the Test Method. The TMC will maintain a copy on their website. Passed unanimously.

O&H Sub Panel Semi-annual report (Charlie Leverett) - The O&H members were polled by e-mail (included as Attachment 7) prior to the SP meeting and no response was returned concerning O&H business which would require a meeting to resolve.

Reference Oils and Fuel Sub Panel Semi-annual report (Gordon Farnsworth) - No Report

CPD Semi-annual report (Ron Buck) - included as Attachment 8.

- 41 engines built in Dec 2000. 35 remaining at AER. Next build dependent on engine usage. 89 build parts remain after purchase of oil pumps. Remaining life is estimated at a 3 year supply
- 3-year parts supply – Solicitation of Ford Power Products for new parts supply – should be available Summer 2001.

[Motion made by Charlie Leverett and seconded by Dwight Bowden] The CPD report was unanimously accepted as presented.

R.S.I. Semi-annual report (Rick Oliver) - included as Attachment 9.

New web site address http://www.registration-systems.com USER: acc PASSWORD: rsi999 Anyone having trouble with website please contact Rick Oliver.

[Motion made by Rick Oliver and seconded by Charlie Leverett] The RSI report was unanimously accepted as presented.

New Business:

1. New Blend of BC/BCFHD, TMC survey review of inventory is included as Attachment 10.

[Action Item] The TMC will facilitate a possible redistribution of BC and BCFHD oils.

[Motion made by Gordon Farnsworth and seconded by Guy Stubbs] The Surveillance Panel approves a re-blend of BC and BCFHD for a 5-year supply. The TMC will proceed by contacting the Industy Labs. Passed unanimously.

2. Reblend 1008? The supplier has informed TMC that it could be done at this time but may not be available at a later date. Note - this was covered during TMC's semi-annual report.

3. Request for TMC to include additional data on VIB LTMS database.

[Motion made by Charlie Leverett and seconded by Zack Bishop] The O&H panel will mark the report forms as to what data they want listed on the TMC Website and in what priority. The O&H will have final authority to implement their actions. Passed unanimously.

4. Appendix Changes to Test Method:
   A. AER Contact Change to X1.3: Charris Wagoner will be the AER contact for engine purchases. Charris may be contacted at 972-417-3182 (phone) or 972-417-3165 (fax).
   B. TEI to replace LABECO in X1.19 as Electric Oil Heater Housing Supplier.

[Motion made by Charlie Leverett and seconded by Carl Stephens] Amend the Test Method with the following:

- *AER Contact Change to X1.3: Charris Wagoner will be the AER contact for engine purchases. Charris may be contacted at 972-417-3182 (phone) or 972-417-3165 (fax).*
- *TEI to replace LABECO in X1.19 as Electric Oil Heater Housing*
  Passed unanimously.

5. Posting Meeting minutes including attachments on TMC web site. TGC action item is included as Attachment 11.

6. VIB Blowby (Keep or Remove required reading)
   Presentation of data by Don Lind is included as Attachment 12. Discussion – Patrick Lai wants to keep. Ben Weber supports the use of blowby for diagnostics. Barry – blowby is a useful tool.
   [Motion made by Carl Stephens and seconded by Bill Buscher, Jr.] Remove blowby as a measured and recorded parameter in the Test Method. 5-1-9. Many panel members who waived, voiced concern that because the laboratories did not all use the same device to measure blowby the data would be scattered when reviewed as an industry. This motion was tabled for further consideration later.
   [Action Item] The TMC will research their database by lab to see if there are any blowby correlations. The surveillance panel chairman will distribute this data to the panel.

7. Introduction of 5W20 VIB reference oil and possibly others? Don Lind presented results of a potential 5W20 reference oil. His presentation is included as Attachment 13. Discussion – Gordon Fransworth would like to see individual stage data for all three tests.
   [Motion made by Charlie Leverett and seconded by Carl Stephens] Accept the 5W20 oil as presented at this meeting as reference oil for the Sequence VIB. The TMC will request the supplier to provide a 5-year supply of this oil. Motion passed by a vote of 12-0-2.
   Discussion ensued on how to bring this new reference oil into the system.
   [Motion made by Gordon Farnsworth and seconded by Guy Stubbs] TMC to choose a time shortly after the new 5W20 oil is available to bring in a minimum of 7 reference tests, one test at each of the current labs, using test stand/engine combinations that are currently in reference or just gone out of reference. Reference periods will be adjusted as appropriate. It is desirable to get a good mix of old and newer engines for this testing. Passed unanimously.

8. Revisit Used Oil Analysis, better define methods and add the wording explaining modifications to the VIB procedure as required. Editorial changes to Form #19 (add space for nitration value). Presentation for Recommendations for Definitions of Used Oil Analysis by Charlie Leverett is included as Attachment 14.
   [Motion by Charlie Leverett and seconded by Guy Stubbs that the analysis procedures in the presentation be added to the Sequence VIB procedure. The effective date of compliance is 30 days from issuance of the information letter. Any reference tests completing on the effective date will require this data (Form #19). 8-0-5. Motion carries.
   Discussion ensued on how to treat existing used oil analysis data in the TMC database.
   Motion made by Charlie Leverett and seconded by Carl Stephens] Purge all previous CCS, Nitration, Oxidation, HFRR, Fuel Dilution chemical data from the TMC database. Labs have the option to resubmit data that can be confirmed to have used the methods in the previous motion. Passed unanimously.

9. Off Test Time Options. Proposals for off test time options by Charlie Leverett are included as Attachment 15.
   [Motion made by Guy Stubbs and seconded by Dave Glaenzer]
   - *Keep the current wording/rules in 11.5.8.1, which states 10 hours as the maximum allowable downtime, 4 shutdowns maximum, no one shutdown exceeding 8 hours.*
   - *Add a statement to 13.2.8 "Total Test Length" section stating that the total test length cannot exceed 150:00 hours. Any test exceeding this is invalid.*
   - *Add an off test time definition to the procedure stating that off test time is defined as when the test is not at the scheduled conditions, but shutting down the engine is not required.*
   - *If during aging, limit the off test time to 2 hours maximum.*

   Passed unanimously.

10. D4485, Using VIB for API SJ (alternative to a VIA). If a VIB is terminated at the completion of Test Oil I (approx. 32 hrs) for an SJ test, is this considered "1" run number? Discussion by panel members - precedence has already been established in the Sequence VIII test. When a Sequence VIII is terminated at 10 hours for strip viscosity, the run number increments by one for the next test conducted on that stand. Panel members agreed that the run number should increment by one when a VIB is terminated early for SJ purposes.

11. Add statement to VIB procedure stating that a VIB if being run for a VIA result may be shutdown at the completion of TO I and be considered a valid test.
    [Motion made by Bill Buscher, Jr. and seconded by Bill Nahumck] Add statement to VIB procedure stating that a VIB if being run for SJ result may be shutdown at the completion of TO I and be considered a valid test. Schedule as VIBSJ. Surveillance Panel to work with TMC on Report Forms.12-0-1. Motion Passed.

12. Cam tension assembly (Inspect/Replace/Neither) - this topic was discussed during the Test Developer Semi-annual report.

13. Allow Micro Motion Model CMF010 mass flow to be used on the VIA.
    [Motion made by Carl Stephens and seconded by Guy Stubbs] Allow Micro Motion Model CMF010 mass flow to be used on the VIA. Passed unanimously.

14. EBP correction Table 5, replace 104.00 ± 2 with 104.00 ± .20.
    [Motion made by Guy Stubbs and seconded by Bill Buscher, Jr.] Correct EBP listed in Table 5 from 104.00 ± 2.0 to 104.00 ± 0.20. Passed unanimously.

15. Form #3 correction.
    [Motion made by Guy Stubbs and seconded by Bill Buscher, Jr.] Change Form #3 to 1993 Ford 4.6L. Passed unanimously.

16. AFR Range - Patrick Lai reports his laboratory always runs below centerline. A review of TMC data revels that all laboratories run below centerline. Perhaps the AFR range needs to be reviewed.
    [Action item] O&H to review AFR Range.

Old Business

1. 1007 was suspended for the VIB due to poor performance. The panel needs to decide if it is to be officially removed.
   Motion made by Gordon Farnsworth and seconded by Bill Buscher, Jr.] Officially remove 1007 and replace it at a later date with the new 5w20. Motion passed by a vote of 12-0-1.

Review of Scope and Objectives

The Scope and Objectives prior to this meeting are included as 16.

Objectives

~~Establish SJ limits for VIB test – completed.~~

Define new hardware for future VIB testing – 12/01

[Action Item] Define new hardware for future VIB testing. This is required by 12/01/01.

Identify 10W30 Reference Oil - 11/01

Incorporate 5w20 Reference Oil - 11/01

BC/BCFHD reblend complete and approve Batch 5 – 5/02

If available introduce GF-3 oil - 5/02

Panel accepted scope and Objectives.

Adjourn

The next meeting will be held in November 2001 in San Antonio at Embassy Suites.
Acting Chairman Charlie Leverett moved for adjournment and was approved by the panel.

Attachment 1

Sequence VIA/B Surveillance Panel Meeting Agenda

May 24, 2001 (08:00 to 12:00)
Hosted by Southwest Research Institute

1.) Welcome

2.) Chairman's Comments

3.) Secretary Items:

A. Selection of Secretary (Ron Buck of TEI has agreed to take on this position)
B. Action Items and Motion recorder (Ben Weber of SwRI has agreed to take on this position)
C. Approval of November 2000 minutes (Bill Busher Jr., acting secretary)
D. Hand Count of Voting Members

4.) **Review of Action Items:**

Action Items from Nov. 2000 Meeting

- AER is authorized to purchase oil pumps to complete builds. Flow the pumps to ensure they are in specification. Reject parts if required. Track these pumps separately in the builds.
- ~~AER is asked to plan for the 130 engine builds.~~ *In process*
- ~~The next AER engine build is scheduled for 12/9/00~~ *Completed*
- The TMC Engineer, the Surveillance Panel Chairman, and the O&H Chairman are charged with determining a recommendation for maximum allowable "off test" run time on the candidate oil. On agenda
- The TMC will check whether the Sequence VIB reference oils can be re-blended. The TMC will take appropriate action when and if reblends are required. On agenda

5.) Semi-annual Reports:

A.) TMC (Don Lind)
B.) Test Developer (Barry Jecewski)
C.) O&H Sub Panel (Charlie Leverett)
D.) Reference Oils & Fuel Sub Panel (Gordon Farnsworth)
E.) CPD (Ron Buck)
F.) R.S.I (Rick Oliver)

6.) New Business:

- New blend of BC/BCFHD, TMC survey review.
- Re-blend 1008? The supplier has informed TMC that it could be done at this time but may not be available at a later date.
- Request for TMC to include additional data on VIB LTMS database

- Appendix Changes:

  A.) AER Contact Change to **X1.3**: Charris Wagoner will be the AER contact for engine purchases. Charris may be contacted at 972-417-3182 (phone) or 972-417-3165 (fax).
  B.) TEI to replace LABECO in **X1.19** as Electric Oil Heater Housing supplier.

- Posting Meeting minutes (including attachments) on TMC web site

- VIB Blowby (Keep or Remove required reading)

- Introduction of 5W 20 VIB reference oil and possibly others?

- Revisit Use Oil Analysis, better define methods and add the wording explaining modifications to the VIB procedure as required. Editorial changes to Form #19 (add space for nitration value)

- Off Test time options

- D 4485, Using VIB for API SJ (alternative to a VIA). If a VIB is terminated at the completion of Test Oil I (approx. 32 hrs) for an SJ test, is this considered "1" run number?

- Add statement to VIB procedure stating that a VIB if being run for VIA result may be shutdown at the completion of TO I and be considered a valid test.

- Cam tension assembly (Inspect/Replace/Neither)

- Allow Micro Motion Model CMF010 mass flow to be used on the VIA.

- EBP correction Table 5, replace 104.00 ± 2 with 104.00 ±.**20**

7.) **Old Business**:

- 1007 was suspended from the VIB due to poor performance, We need to decide if it is to be officially removed.

8.) Review of Scope and Objectives

9.) Adjourn

May 24, 2001 Sequence VI Surveillance Panel Meeting
San Antonio, Texas
Motions and Actions Items as Recorded at the Meeting

1. [Motion made by Don Lind and seconded by Dwight Bowden] The TMC report was unanimously accepted.
2. [Action Item] The VIB Surveillance Panel would like to pursue a re-blend of 1008.
3. [Action Item] Ford has developed a team to investigate the failure mode of the chain tensioners and provide a permanent remedy.
4. [Motion made by Charlie Leverett and seconded by Guy Stubbs] The labs are allowed to inspect the timing chain assembly and replace the right and left guides and the tension adjusters as needed. If any of these parts are changed, you must run one acceptable calibration test. The parts can be bought from the Ford dealers. Any parts that are removed should be sent to Barry Jecewski at Ford with the number of the test hours. A comment must also be included in the test report as to what was changed. Effective 5-25-01. Motion passed unanimously.
5. [Motion made by Dwight Bowden and seconded by Carl Stephens] Include a reference of Ford's 543 assembly manual in the Test Method. The TMC will maintain a copy on their website. Passed unanimously.
6. [Motion made by Charlie Leverett and seconded by Dwight Bowden] The CPD report was unanimously accepted as presented.
7. [Motion made by Rick Oliver and seconded by Charlie Leverett] The RSI report was unanimously accepted as presented.
8. [Action Item] The TMC will facilitate a possible redistribution of BC and BCFHD oils.
9. [Motion made by Gordon Farnsworth and seconded by Guy Stubbs] The Surveillance Panel approves a re-blend of BC and BCFHD for a 5-year supply. The TMC will proceed by contacting the Industy Labs. Passed unanimously.
10. [Motion made by Charlie Leverett and seconded by Zack Bishop] The O&H panel will mark the report forms as to what data they want listed on the TMC Website and in what priority. The O&H will have final authority to implement their actions. Passed unanimously.
11. [Motion made by Charlie Leverett and seconded by Carl Stephens] Amend the Test Method with the following:
    - AER Contact Change to X1.3: Charris Wagoner will be the AER contact for engine purchases. Charris may be contacted at: 972-417-3182 (phone) or 972-417-3165 (fax).
    - TEI to replace LABECO in X1.19 as Electric Oil Heater Housing

    Passed unanimously.
12. [Motion made by Carl Stephens and seconded by Bill Buscher, Jr.] Remove blowby as a measured and recorded parameter in the Test Method. This motion was tabled for further consideration later.
13. [Action Item] The TMC will research their database by lab to see if there are any blowby correlations. The surveillance panel chairman will distribute this data to the panel.

14. [Motion made by Charlie Leverett and seconded by Carl Stephens] Accept the 5W20 oil as presented at this meeting as reference oil for the Sequence VIB. The TMC will request the supplier to provide a 5-year supply of this oil. Motion passed by a vote of 12-0-2.
15. [Motion made by Gordon Farnsworth and seconded by Guy Stubbs] TMC to choose a time shortly after the new 5W20 oil is available to bring in a minimum of 7 reference tests, one test at each of the current labs, using test stand/engine combinations that are currently in reference or just gone out of reference. Reference periods will be adjusted as appropriate. It is desirable to get a good mix of old and newer engines for this testing. Passed unanimously.
16. [Motion made by and seconded by]

CCS D 5293

What temp should be used, SAE J 300 97 or 99? Use the J 300-99 standard.

HFRR D 6079

Is the HFRR test to be run to the ASTM Method with only the exception of the temperature?

Ford has requested that we used the procedure modifications they used in SAE Paper 982623. This modified procedure needs to be approved by the SP and added to the VIB procedure. The procedure is as follows:

Tests are conducted with 9.8 N load, 20 Hz frequency and a 1 mm stroke length. Test time is 30 minutes @ 105 °C Standard 52100 steel ball and disk specimens, available from PCS Instruments, are to be used. Also, there may be some run-in time before some friction modifiers become active; therefore, the friction coefficient obtained during the last 5 - 10 minutes should be reported. Friction coefficient will be the reported value, not wear scar diameter.

DIR (differential infrared) E 168

Is peak or area measured?

Peak, this is the same data used by Ford in their SAE Paper.

We only have 1 field for oxidation and nitration, how do we handle this?

We will have to revise Form 19 to allow another field, this is on the agenda for the SP meeting.

Method for VIB Oxidation and Nitration by FTIR (differential infrared) E168

Data Collection

Cell type: Infrared Liquid Transmission Sampling Cell (KBr, BaF2, etc.)

16 scans or better

4 cm-1 resolution or better

Collect spectra for each oil

Data Analysis

-Subtract the fresh oil spectra from each used oil spectra.

-Then process the Differential spectra as follows:

Single baseline point at 1950cm-1, baseline drawn parallel to x-axis.

Oxidation - max height from baseline between 1800cm-1 to 1660cm-1.

Nitration - max height from baseline between 1650cm-1 to 1600cm-1.

-Results - Report Absorbance/1cm

Fuel Dilution D 3525M

What is the "M" for on the end of this procedure?
A: The "M" was intended to reflect the modified version of fuel dilution measurement, as currently used by other ASTM test types. This modified procedure needs to be approved by the SP and included in the VIB Procedure (May SP Meeting). The modifications consist of the following:

Fuel Dilution-Determine the fuel dilution percent mass, by gas chromatography with the following modifications to D3525:

- Use C16 in place of C14 for the internal standard (1µL injector volume)
- Presume that all components lighter than C16 are fuel.
- The integrator should establish the horizontal baseline under the output curve until the leading edge of C16 is reached. Establish a second baseline extending horizontally from the output curve, at the intersection of the output curve, and the leading edge of the C16 peak.
- Column details are 10 ft by 0.125in. (305 cm X 3.2 mm) SS and the packing material is 5 % OV-1 on Chromosorb W HP.
- Increase the oven temperature from 60 to 320 °C, with the rate change of temperature controlled at 8 °C/min. Hold the temperature at 320 °C for 16 minutes to elute oil.

8-0-5 Motion passed.

17. [Motion made by Charlie Leverett and seconded by Carl Stephens] Purge all previous CCS, Nitration, Oxidation, HFRR, Fuel Dilution chemical data from the TMC database. Labs have the option to resubmit data that can be confirmed to have used the methods in the previous motion. Passed unanimously.
    [Motion made by Guy Stubbs and seconded by Dave Glaenser] Keep the current wording/rules in 11.5.8.1, which states 10 hours as the maximum allowable downtime, 4 shutdowns maximum, no one shutdown exceeding 8 hours.
    Add a statement to 13.2.8 "Total Test Length" section stating that the total test length cannot exceed 150:00 hours. Any test exceeding this is invalid.
    Add a off test time defination to the procedure stating that this is when the test is not at the scheduled conditions, but shutting down the engine is not required. If during aging, limit the off test time to 2 hours maximum.
    Passed unanimously.
18. [Motion made by Bill Buscher, Jr. and seconded by Bill Nahumck] Add statement to VIB procedure stating that a VIB if being run for SJ result may be shutdown at the completion of TO I and be considered a valid test. Schedule as VIBSJ. Survillance Panel to work with TMC on Report Forms.
    12,0,1 passed.
19. [Motion made by Carl Stephens and seconded by Guy Stubbs] Allow Micro Motion Model CMF010 mass flow to be used on the VIA. Passed unanimously.
20. [Motion made by Guy Stubbs and seconded by Bill Buscher, Jr.] Correct EBP listed in Table 5 from 104.00 ± 2.0 to 104.00 ± 0.20. Passed unanimously.

21. [Motion made by Guy Stubbs and seconded by ?] Change Form #3 to 1993. Passed unanimously.
22. [Action item] O&H to review AFR Range.
23. [Motion made by Gordon Farnsworth and seconded by Bill Buscher, Jr.] Offically remove 1007 and replace it at a later date with the new 5w20. Motion passed by a vote of 12-0-1.
24. [Action Item] Define new hardware for future VIB testing. This is required by 12/01/01.

Attachment 3

ASTM SEQUENCE VIA/VIB SURVEILLANCE PANEL

Name	Address	Phone/Fax/Email	Attendance
Bowden, Dwight member	OH Technologies, Inc. P.O. Box 5039 Mentor, OH 44061-5039	Phone: 440-354-7007 Fax: 440-354-7080 dhbowden@ohtech.com	
Buck, Ron member	Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249-3423	Phone: 877-0221 Fax: 690-1959 rbuck@testeng.com	
Buscher, Jr., Bill ~~mailing~~ Member	Buscher Consulting Services P.O. Box 112 Hopewell Jct., NY 12533	Phone: 845-897-8069 Fax: 845-897-8069 BuschWA@aol.com	
Clark, Gil mailing	Haltermann Consulting 117 E. Church St. Lake Orion, MI 48362	Phone: 248-693-6434 Fax: 248-852-4957 sdclark63@Juno.com	
Clark, Sid member	General Motors Research & Development 30500 Mound Rd./MC 480-106-160 Warren, MI 48090-9055	Phone: 810-986-1929 Fax: 810-986-2094 sidney.l.clark@gm.com	
Duffey, Frank member	Chrysler Corporation 800 Chrysler Dr. E. CIMS 482-00-13 Auburn Hills, MI 48326-2757	Phone: 810-576-7476 Fax: 810-576-7490 fd13@chrysler.com	
Farber, Frank mailing	ASTM/TMC 6555 Penn Ave Pittsburgh, PA 15206-4489	Phone: 412-365-1030 Fax: 412-365-1047 fmf@tmc.tmc.astm.cmri.cmu.edu	
Farnsworth, Gordon member	Infineum P.O. Box 735 1900 East Linden Ave. Linden, NJ 07036-0735	Phone: 908-474-3351 Fax: 908-474-3637 gordon.farnsworth@infineum.com	
Fernandez, Frank mailing	Chevron Oronite Company LLC 4502 Centerview Ste. 210 San Antonio, TX 78228	Phone: 731-5603 Fax: 731-5699 ffer@chevron.com	
Ferner, Mark member	Pennzoil Quaker State 1520 Lake Front Circle P.O. Box 7569 The Woodlands, TX 77380	Phone: 281-363-8190 or 8053 Fax: 281-363-8092 or 8002 markferner@pzlqs.com	
Glaenzer, David member	Ethyl Research Center 500 Spring Street P.O. Box 2158 Richmond, VA 23218	Phone: 804-788-5214 Fax: 804-788-6358 Dave_Glaenzer@ethyl.com	
Goldblatt, Irwin member	BP Amoco 240 Centennial Piscataway, NJ 08854	Phone: 732-980-3606 Fax: 973-686-4224 irwin.goldblatt@castrolna.com	
Hall, Greg mailing	AER Mfg. Inc. P.O. Box 979 Carrollton, TX 75011-0979	Phone: Fax: greghall@aermfg.com	
Jecewski, Barry member	Ford Motor Company 21500 Oakwood Blvd POEE Bldg Rm DR 167 MD 44 Dearborn, MI 48121-2053	Phone: 313-594-6943 Fax: 313-845-3169 bjecewsk@ford.com	
Lai, Patrick member	Imperial Oil Ltd. of Canada P.O. Box 3022 453 Christina Street South Sarnia, N7T T8T8,	Phone: 519-336-5611 Fax: 519-339-5866 patrick.k.lai@esso.com	
Leverett, Charlie member	PerkinElmer Automotive Research 5404 Bandera Road San Antonio, TX 78238	Phone: 210-647-9422 Fax: 210-523-4607 charlie.leverett@perkinelmer.com	
Lind, Don Member	ASTM TMC 6555 Penn Ave. Pittsburgh, PA 15206-4489	Phone: 412-365-1034 Fax: 412-365-1047 dml@tmc.astm.cmri.cmu.edu	

dml

ASTM SEQUENCE VIA/VIB SURVEILLANCE PANEL

Name	Address	Phone/Fax/Email	Attendance
McDonnell, Thomas mailing	Ethyl Corporation 2000 Town Center, Ste. 1750 Southfield, MI 48075-1150	Phone: 248-350-0640 Fax: 248-350-0025	
McMillan, Michael mailing	General Motors Research & Development 30500 Mound Rd./MC 480-106-160 Warren, MI 48090-9055	Phone: 810-986-1935 Fax: 810-986-2094 mmcmillan@gmr.com	
Moffa, John member	Castrol International Whitchurch Hill, Pangbourne, Reading, Berkshire RG8 7QR, O.K.	Phone: 011-44-118-976-5263 Fax: 011-44-118-984-1095 moffaj@castrol.com	J.J. Moffa
Montez, Alfredo member ← Zack Bishop for	Chevron Oronite Company LLC 4502 Centerview Ste. 210 San Antonio, TX 78228	Phone: 731-5604 Fax: 731-5699 ammn@chevron.com	Zack Bishop
Mosher, Mark member	ExxonMobil 600 Billingsport Road Paulsboro, NJ 08066	Phone: 856-224-2132 Fax: 856-224-3628 mark.r.mosher@exxonmobil.com	M.R. Mosher
Nann, Norbert mailing	Nann Consultants, Inc. 59 Edgehill Dr. Wapplugers Falls, NY 12590	Phone: 914-297-4333 Fax: 914-297-4334	
Nielsen, Dennis mailing	AER Mfg. Inc. 796 Springfield Drive Northwille, MI 48167	Phone: 248-349-4114 Fax: 248-349-6647	
Oliver, Rick ~~member~~ mailing list	Registration Systems, Inc. 2805 Beverly Drive Flower Mound, TX 75022	Phone: 972-724-2136 Fax: n/a crickoliver@home.com	Rick Oliver
Patrick, Dick mailing	Citgo Petroleum Corporation P.O. Box 3758 Tulsa, OK 74102-3758	Phone: 918-459-5937 Fax: 918-495-5935 rpatri1@citgo.com	
Rumford, Robert mailing	Haltermann Products 1201 S. Sheldon Road P.O. Box 429 Channelview, TX 77530-0429	Phone: 281-457-2768 Fax: 281-457-1469 rhrumford@~~halterman~~haltermann-usa.com	
Rutherford, Jim mailing	Chevron Oronite Company LLC 100 Chevron Way P.O. Box 1627 Richmond, CA 94802-0627	Phone: 510-242-3410 Fax: 510-242-1930 jaru@chevron.com	
Schuettenberg, Alex mailing	Phillips Petroleum Company 148 A1, PRC Bartlesville, OK 74004	Phone: 918-661-3563 Fax: 918-661-8060 adschue@ppco.com	
Shaub, Harold mailing	Quaker State Corp 225 E. John Carpenter Frwy Irving, TX 75062	Phone: 972-868-0486 Fax: 972-868-0678	
Siemelink, Hans mailing	Shell Oil Products Co. LLC One Sehll Plaza Rm. 2256 Houston, TX 77002	Phone: 713-241-7426 Fax: 713-241-3463 hsiemelink@shell.com	
Stephens, Carl member	Ashland, Inc. 21st and Front Streets Ashland, KY 41101	Phone: 606-329-5198 Fax: 606-329-3009 cstephens@ashland.com	Carl Stephens
Stubbs, Guy member	Southwest Research Institute (SwRI) 6220 Culebra Road San Antonio, TX 78228	Phone: 522-~~5913~~ 5039 Fax: 210 684 7523 gstubbs@swri.edu	by Stubbs

ASTM SEQUENCE VIA/VIB SURVEILLANCE PANEL

Name	Address	Phone/Fax/Email	Attendance
Vujica, Joseph member	Lubrizol 29400 Lakeland Blvd. Wickliffe, OH 44092	Phone: 440-347-2058 Fax: 440-347-4096 jsvu@lubrizol.com	
Wagoner, Charris mailing	AER Mfg. Inc. P.O. Box 979 2030 Chenault Carrollton, TX 75006	Phone: 972-417-3182 Fax: 972-417-3165 charriswagoner@aermfg.com	Charris Wagoner
Williams, Lew mailing	The Lubrizol Corporation 29400 Lakeland Blvd. Wickliffe, OH 44092-2298	Phone: 440-347-1111 Fax: 440-943-9244 lawm@lubrizol.com	

BETO ARAIZA (Mailing) — TEI, 12718 Cimarron Path, San Antonio TX — Phone 210.877.0222, FAX - 210.690.1959, BARAIZA@Testeng.Com

DARYL BAUMGARDNER — LUBRIZOL CORP, 29400 LAKELAND BLVD., WICKLIFFE, OH 44092 — PHONE (440) 347-2116, FAX (440) 347-4096

Bill Nahumck — LUBRIZOL CORP, 29400 Lakeland Blvd., Wickliffe, OH 44092 — P 440 347-2596, F 440 347-4096, wmn@lubrizol.com — WMNahumck

Phil Scinto (mailing) — Lubrizol Corporation, 29400 Lakeland Blvd, Drop #152A, Wickliffe OH 44092 — Phone 440-347-2161, PRS@LUBRIZOL.COM — PRS

JOHN PANOSH (Mailing) — INFINEUM USA LP, 4335 WEST PIEDRAS DR, SUITE 101, SAN ANTONIO, TX 78228 — P 210 732-8123, F 210 732 8480, John.Pandosh@Infineum.Com — JPP

Joe Franklin (Guest) — PerkinElmer - AR, 5404 Bandera Road, San Antonio, Tx 78238 — P 210-523-4671, F 210-681-8300, joe.franklin@perkinelmer.com — JF

FLOYD ALBERT (MAILING LIST) — EQUILON ENTERPRISES LLC, WEST HOLLOW TECHNOLOGY CENTER, P.O. BOX 1380, HOUSTON, TX 77251-1380 — PHONE 281-544-8055, FAX 281-544-8150, E-MAIL fealbert@EquilonTech.com

Johnny De La Zerda (Guest) — PerkinElmer Automotive Research, 5404 Bandera Rd, San Antonio, Tx 78238 — Phone - 210/523-4621, E-mail - Johnny.deLazerda@PerkinElmer.com

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

MEMORANDUM: 01-037

DATE: April 17 , 2001

TO Charlie Leverett, Chairman, Sequence VIA/VIB Surveillance Panel

FROM: Donald Lind

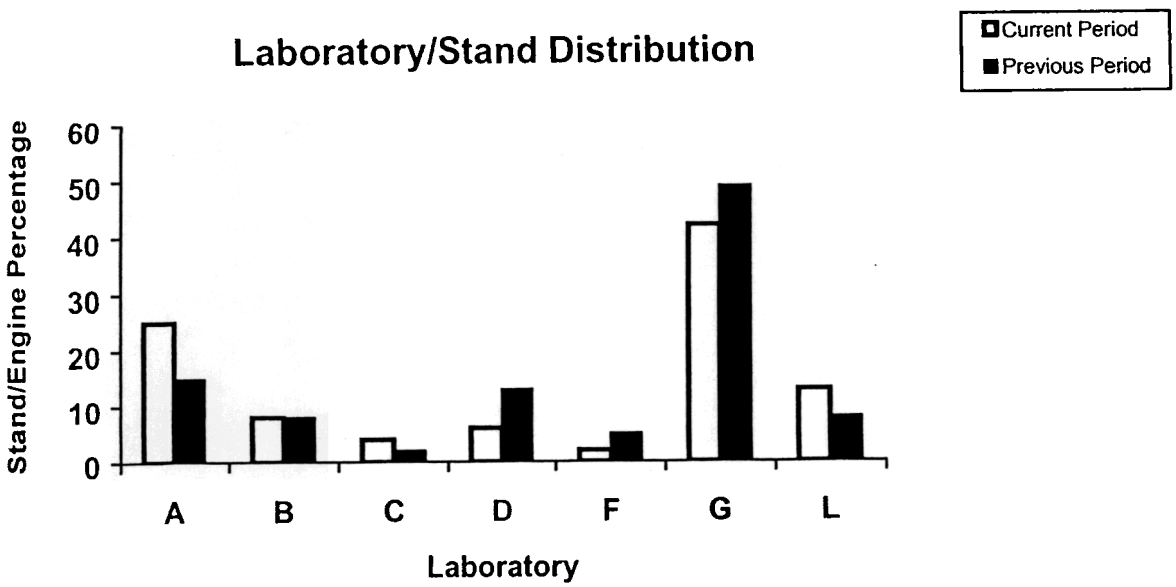
SUBJECT: Sequence VIB Test Results from October 1, 2000 through March 31, 2001

The following is a summary of Sequence VIB reference tests that were reported to the Test Monitoring Center during the period October 1, 2000 through March 31, 2001.

Lab and Stand Summary

	Reported Data During Period	Calibrated as of 03/31/2001
Laboratories	7	6
Stand/Engine Combinations	48	21

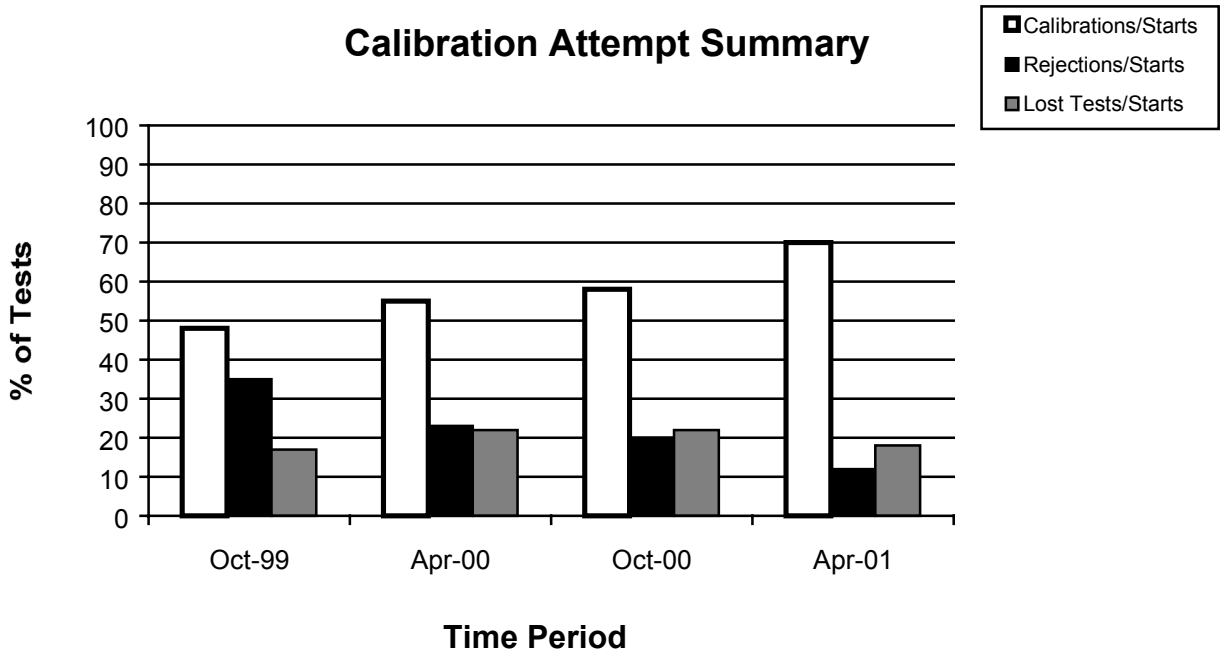
The following chart shows the laboratory stand/engine distribution for data reported during this report period:



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

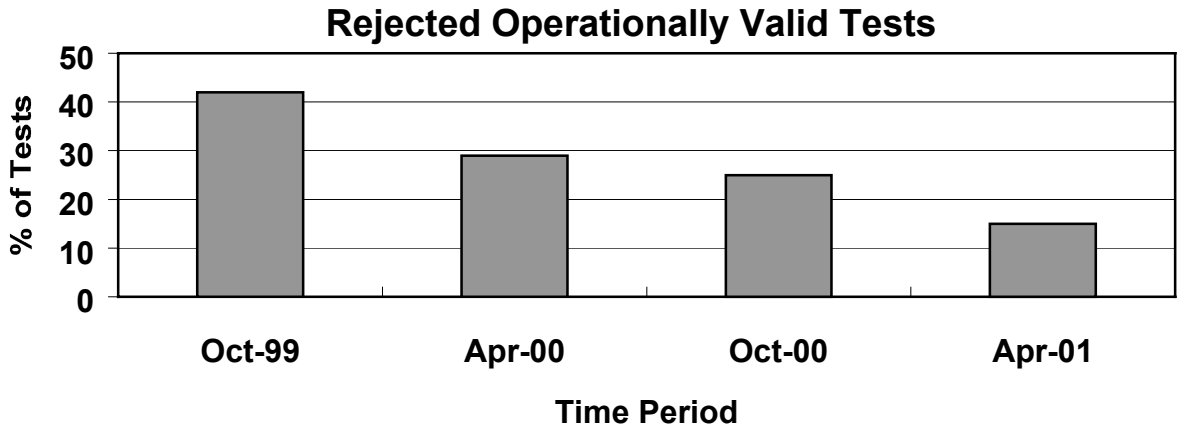
	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	96
Failed Acceptance Criteria	OC	16
Operationally Invalid (Laboratory Judgement)	LC	8
Operationally Invalid (Laboratory & TMC Judgement)	RC	0
Aborted	XC	6
Tests Lost Due to Abandoned Engines	MC	11
Total		137

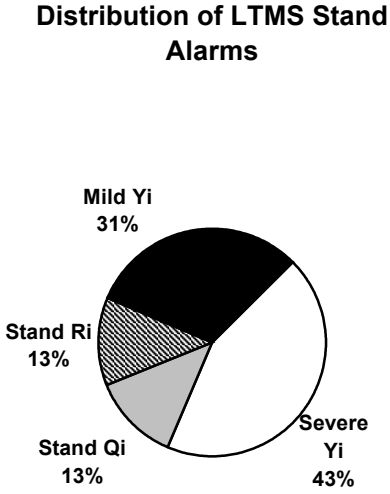
Attempted calibration tests are depicted graphically below by report period:

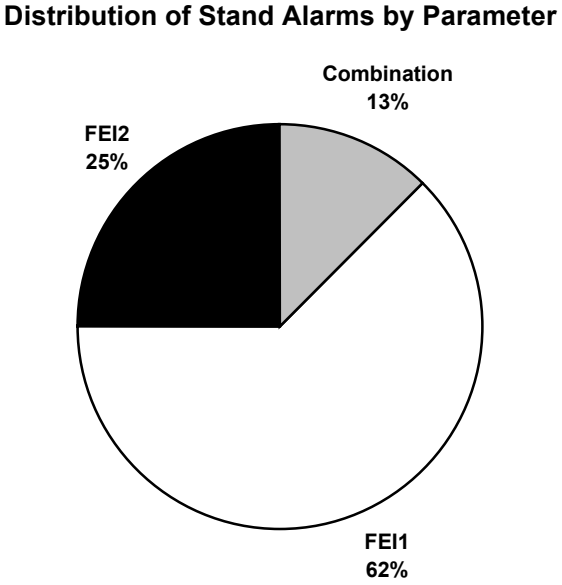


The calibration per start rate has increased this report period. The rejected per start rate and lost test per start rate has decreased this report period.

The percentage of tests failing the acceptance criteria for operationally valid tests decreased this report period. The percentages are depicted graphically below.

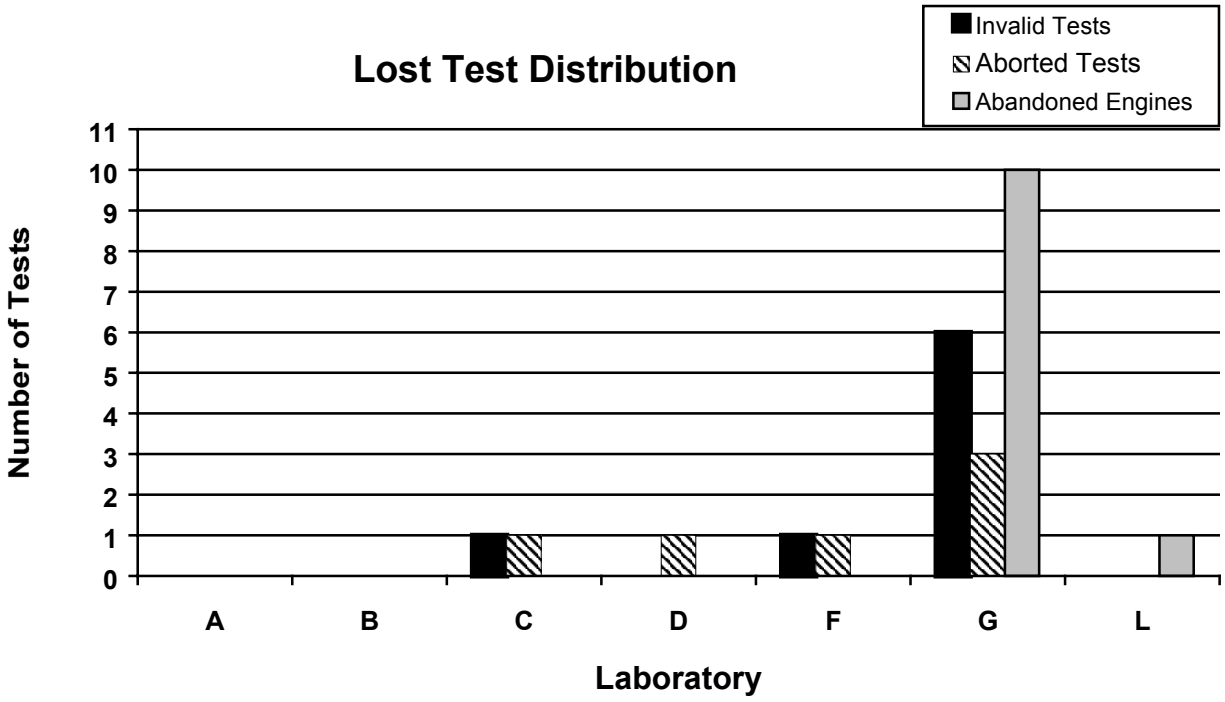




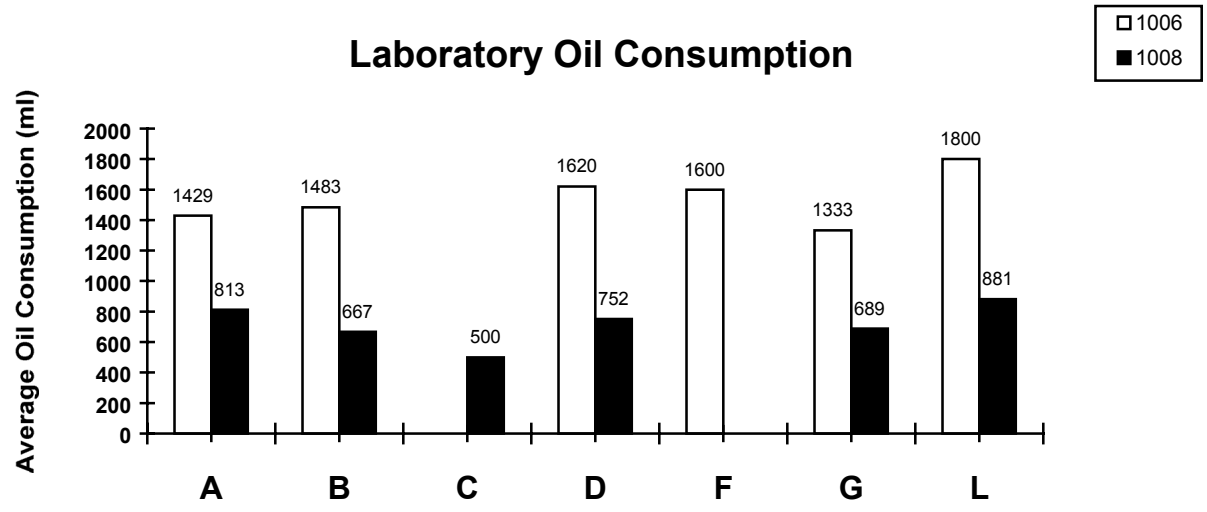


There were seven tests rejected for FEI Shewhart (Yi) severe, five tests rejected for FEI Shewhart (Yi) mild, two tests rejected for EWMA precision alarm (Qi), and two tests rejected for Shewhart precision alarm (Ri). There has never been an LTMS deviation written for Sequence VIB.

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).

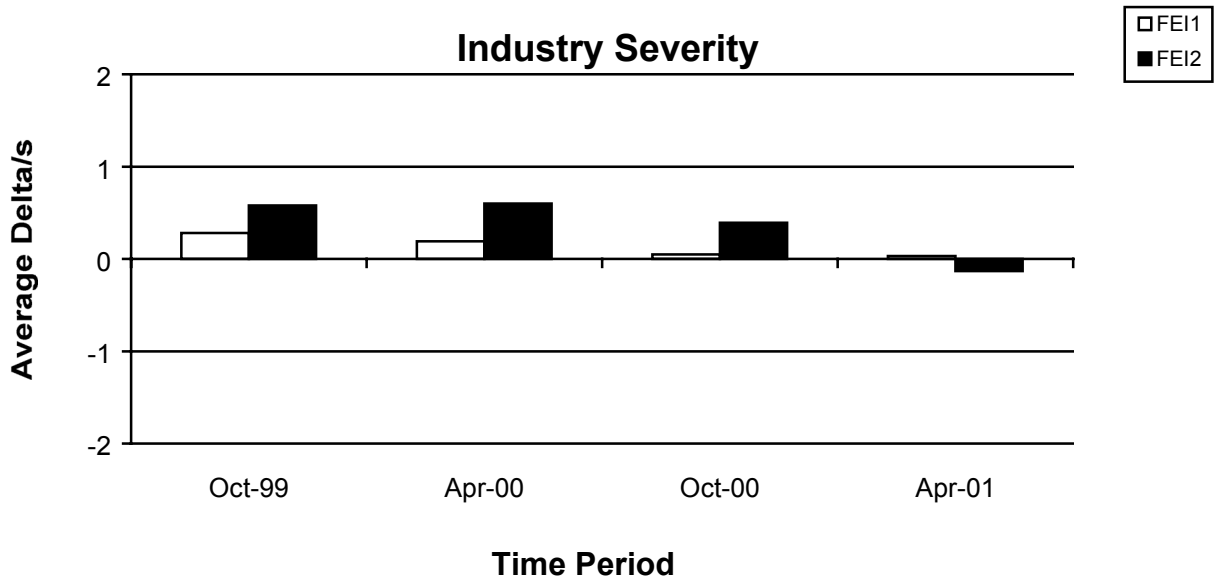


The average oil consumption by oil and laboratory are depicted graphically below. Shown below is a summary of the average oil consumption for all laboratories reporting data this report period.

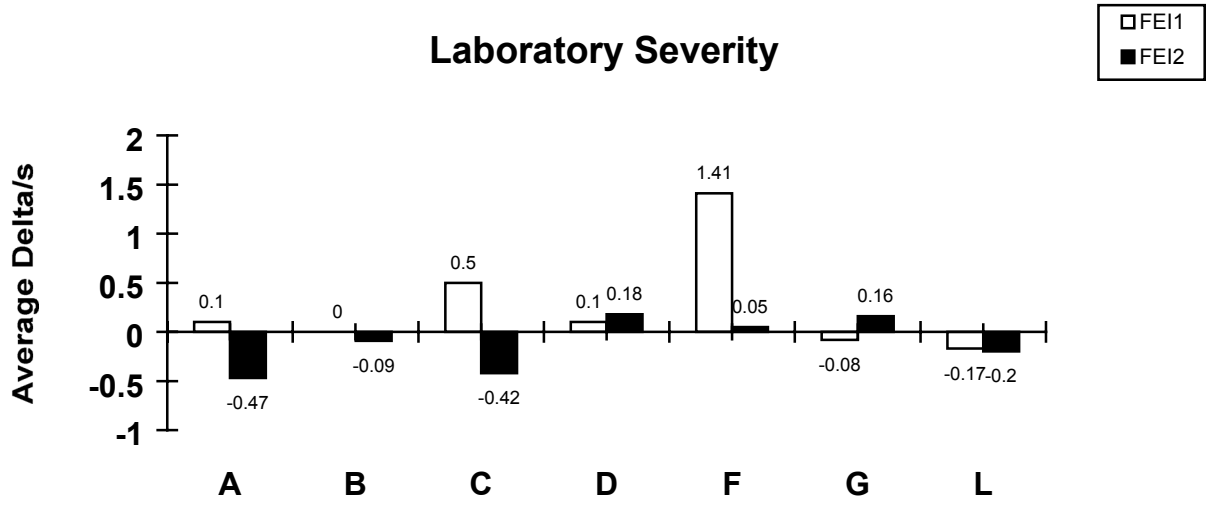


TEST SEVERITY AND PRECISION

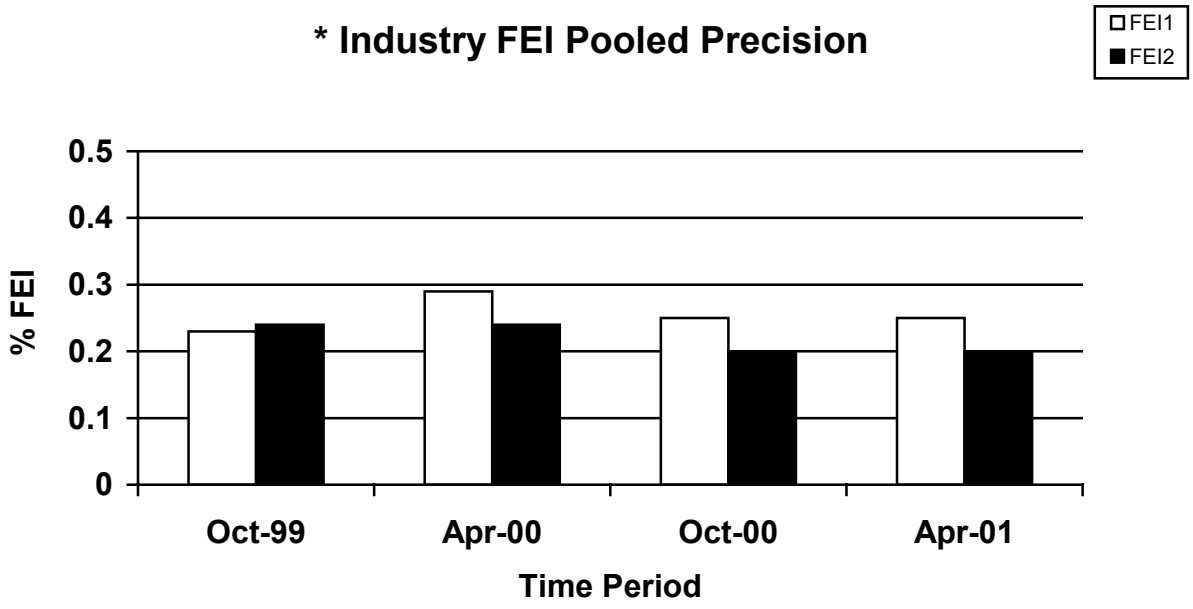
The industry mean Δ/s for FEI1 and FEI2, for this report period, are 0.03 mild and -0.13 severe, respectively. FEI1 and FEI2 severity are very close to on target for this report period.



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 0.25 and 0.20 (pooled s), respectively. FEI1 and FEI2 precision remains unchanged for this report period.



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

INDUSTRY CONTROL CHARTS

FEI1

There were two severity warning alarms and seventeen precision alarms (eight action and nine warning) triggered this report period as illustrated in Figure 1. The precision alarms appear to be related to a mix of new engines that have a tendency to produce severe results and older engines that are near the end of the calibration life that give mild results. An LTMS control chart for FEI1 with stand severity adjusted data is shown in Figure 3.

FEI2

There were two severity warning alarms and five precision alarms (one action and four warning) triggered this report period as illustrated in Figure 2. The alarms appear to be related to a mix of new engines that have a tendency to produce severe results and older engines that are near the end of their calibration life that give mild results. An LTMS control chart for FEI2 with stand severity adjusted data is shown in Figure 4.

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	1006	1007	1008
A	10	7	12
B	6	2	10
C	8	2	6
D	7	5	7
F	9	3	8
G	12	3	12
L	7	5	6
TMC	*	**	***

* 1,130 Gallons (Multiple test area usage)
** 657 Gallons (Multiple test area usage)
*** 493 Gallons (Multiple test area usage)

The following table addresses the potential for reblending the current Sequence VIB reference oils.

	1006	1007	1008
Viscosity Grade	5W30	5W30	5W30
Additional Reblends	Yes[1]	No	Yes[2]

[1] Currently two reblends of reference oil 1006 are in the TMC inventory (1006-1 & 1006-2).
[2] Currently this oil can be reblended however, the status a year from now is uncertain.

LAB VISITS

No lab visits were conducted during this report period.

INFORMATION LETTERS

There were two information letters issued this report period. Information Letter 00-4, Sequence Number 7, was issued on October 31, 2000 and Information Letter 01-1, Sequence Number 8, was issued on January 19 2001. Items changed with these information letters are documented in the Sequence VIB timeline (Table 3).

SUMMARY

Severity for FEI1 and FEI2 are close to being on target for this report period and compares well to historic data.

FEI1 and FEI2 precision remains unchanged compared to the last report period.

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

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

The percentage of statistically rejected tests per starts has decreased this report period.

The percentage of operationally valid tests rejected statistically has decreased this report period.

DML/dml

Attachments

c: Sequence VIA/VIB Surveillance Panel
Sequence VIA/VIB Test Engineers
ftp://www.tmc.astm.cmri.cmu.edu/docs/gas/sequencevi/semiannualreports/vib-04-2001.pdf

Sequence VIB Semiannual Report
List of Attachments

-- Table 1 is a historic statistical summary for reference oils through March 31, 2001.

-- 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.

-- Figure 2 graphically present the Industry control charts for FEI2.

-- Figure 3 graphically present the Industry control charts for FEI1 with stand severity adjustments applied.

-- Figure 4 graphically present the Industry control charts for FEI2 with stand severity adjustments applied.

SEQUENCE VIB
OPERATIONALLY VALID DATA SET
DATA PRIOR TO 04/01/01

OIL CODE 1006

N	TEST PARAMETER	MEAN	s	REPORTED RANGE
143	FEI1	1.42	0.30	0.61 - 2.50
143	FEI2	0.55	0.26	-.14 - 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
147	FEI1	1.84	0.24	1.19 - 2.41
147	FEI2	1.24	0.21	0.58 - 1.68

382 TOTAL

SEQUENCE VIB
OPERATIONALLY VALID DATA SET
DATA FROM 10/01/00 THRU 03/31/01

OIL CODE 1006

N	TEST PARAMETER	MEAN	s	REPORTED RANGE
56	FEI1	1.46	0.23	0.90 - 2.08
56	FEI2	0.50	0.20	-.06 - 0.92

OIL CODE 1008

N	TEST PARAMETER	MEAN	s	REPORTED RANGE
56	FEI1	1.84	0.27	1.19 - 2.37
56	FEI2	1.21	0.23	0.58 - 1.68

112 TOTAL

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
C	Oil Consumption	1	29%
	Coolant and Oil Temperature Control Problem	1	
D	Coolant Temperature Control Problem	1	8%
G	Exceeded Allowable Downtime Hours	5	37%
	Coolant Temperature Out of Specification	1	
	Exceeded Allowable Number of Shutdowns	2	
	Abandon Engine	10	
	Load Cell Calibration Shift	1	
F	Coolant Temperature Out of Specification	1	67%
	Abandon Engine	1	
L	Abandon Engine	1	6%

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 of Use 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

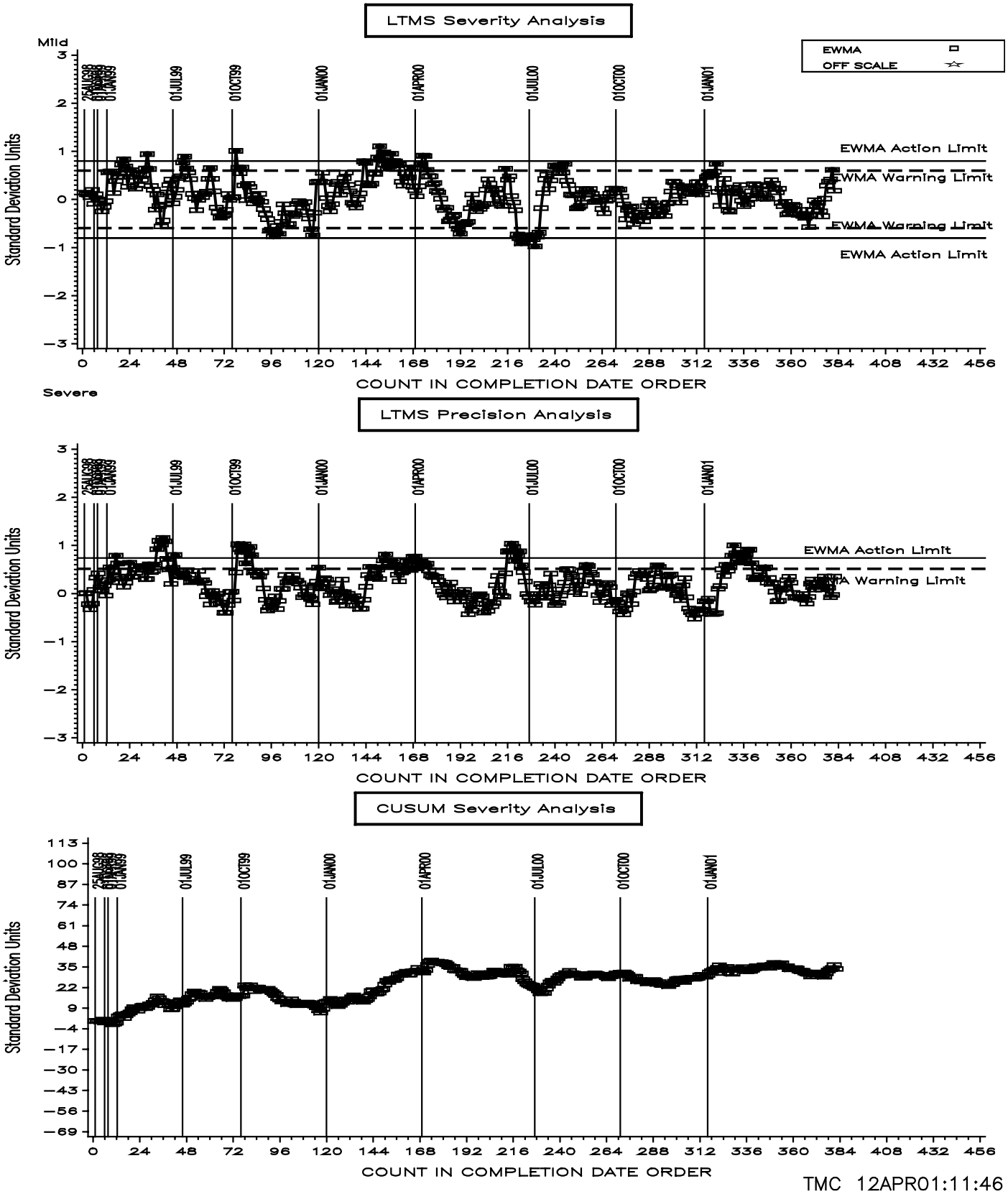
Sequence VIB Timeline

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

SEQUENCE VIB INDUSTRY OPERATIONALLY VALID DATA

FEI FINAL RESULT PHASE I (%)

FIGURE 1

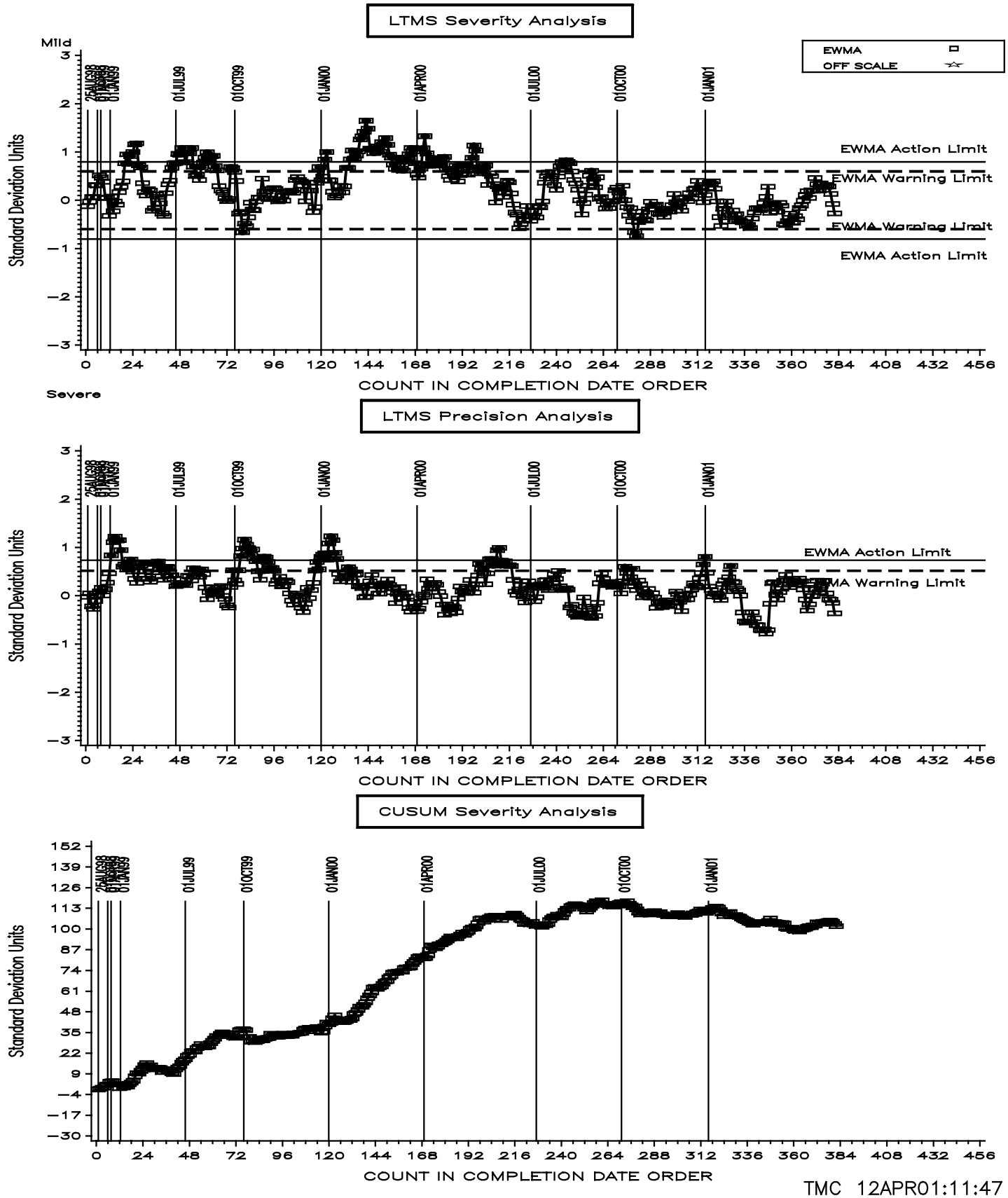


TMC 12APR01:11:46

SEQUENCE VIB INDUSTRY OPERATIONALLY VALID DATA

FEI FINAL RESULT PHASE II (%)

FIGURE 2



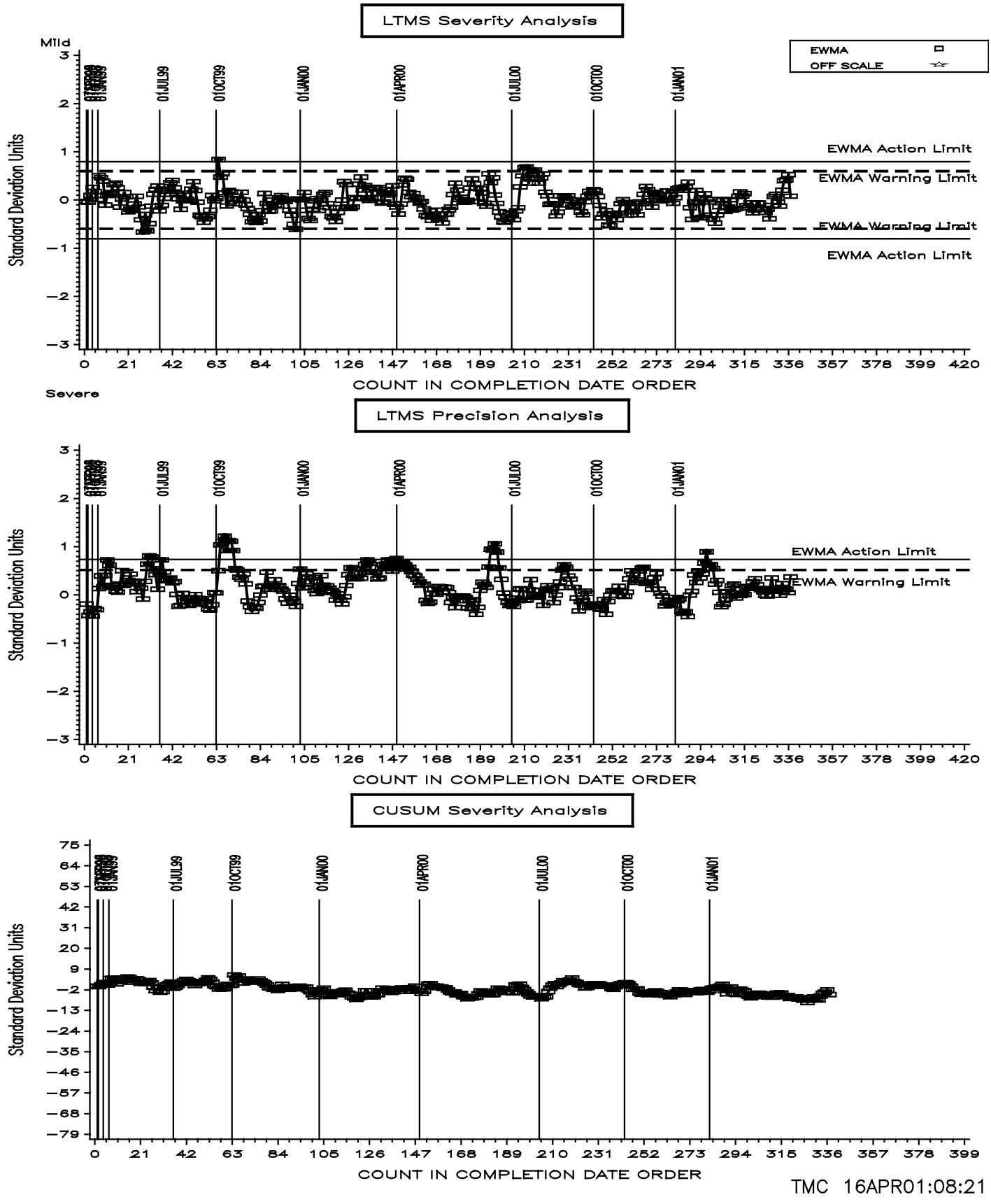
TMC 12APR01:11:47

SEQUENCE VIB INDUSTRY OPERATIONALLY VALID DATA

Stand Severity Adjusted Data

FEI FINAL RESULT PHASE I (%)

FIGURE 3



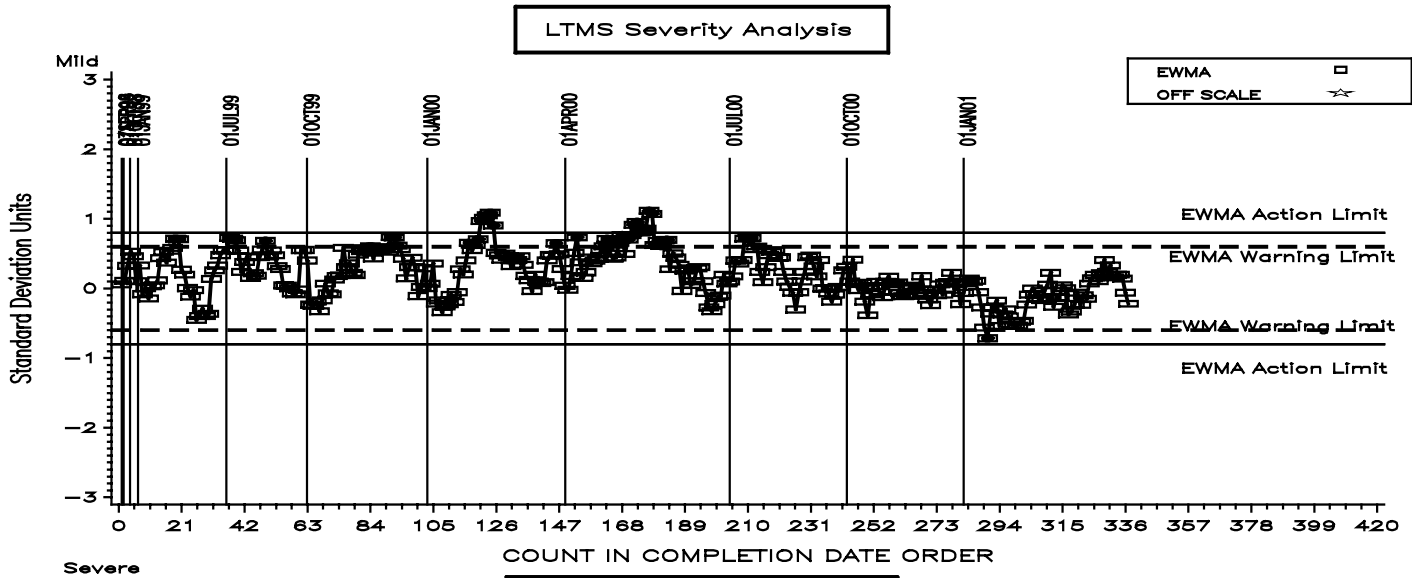
TMC 16APR01:08:21

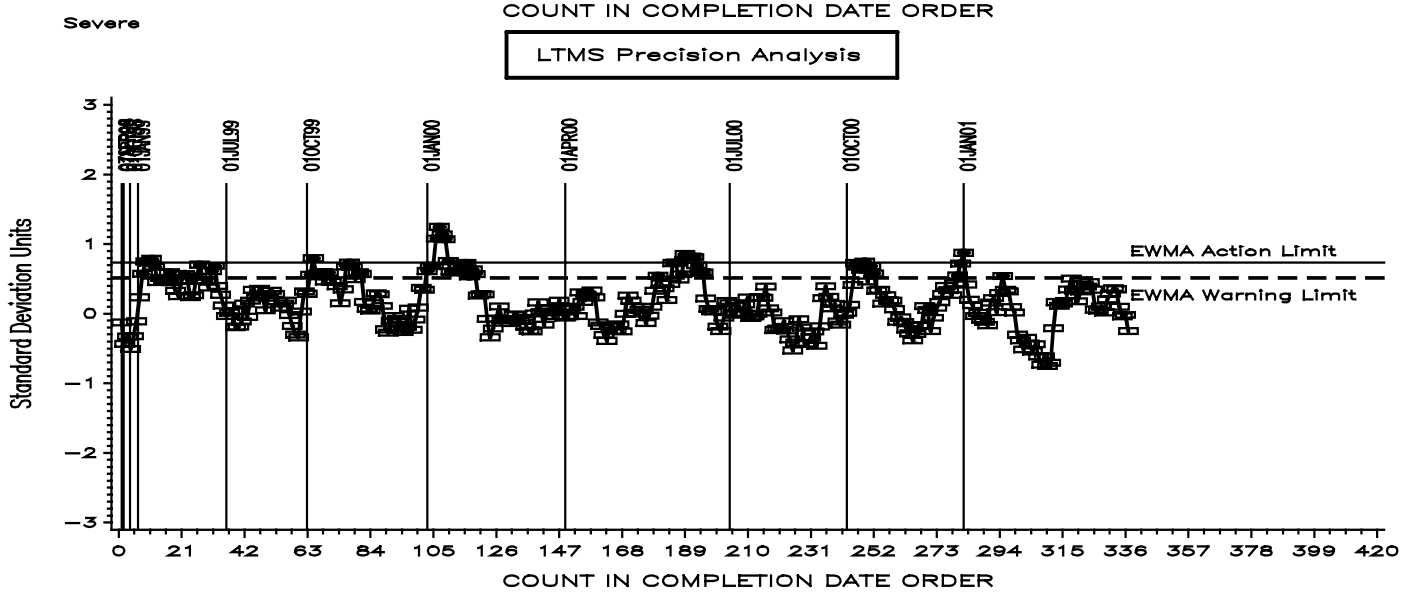
SEQUENCE VIB INDUSTRY OPERATIONALLY VALID DATA

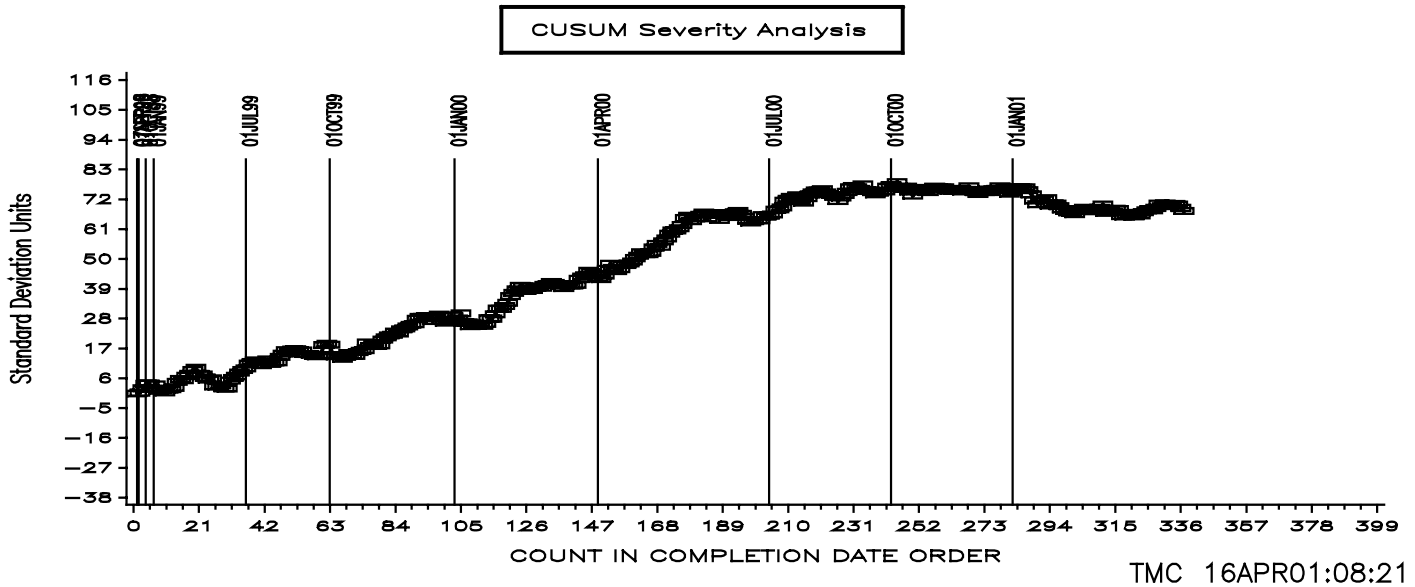
Stand Severity Adjusted Data

FEI FINAL RESULT PHASE II (%)

FIGURE 4



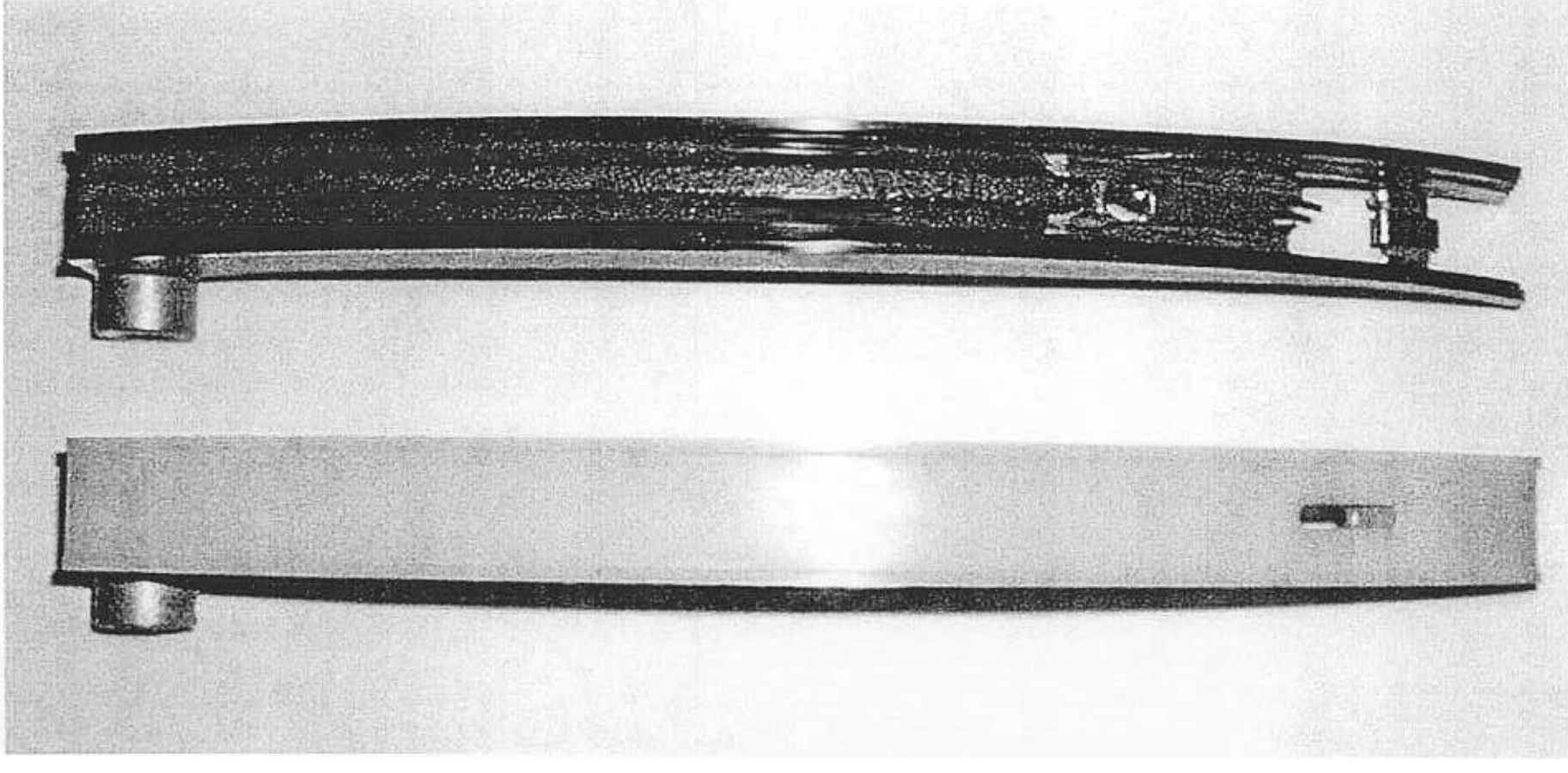


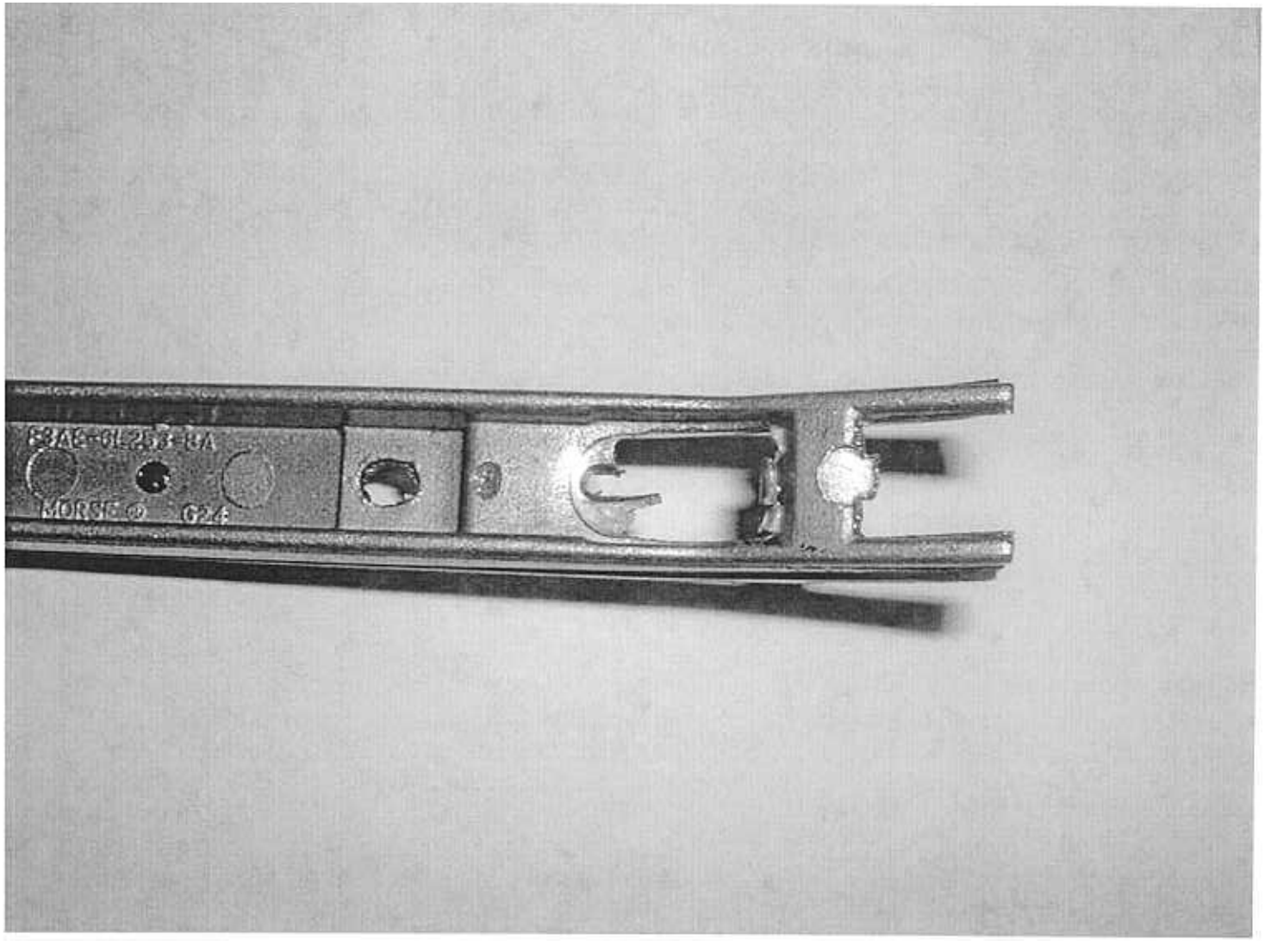


TMC 16APR01:08:21

VIB Cam Tension Assembly

Engine 42 1747 total hours




MORSE G24

Attachment 6

Sequence VIB Engine Serial Numbers

serial number	sequence number	date completed
7002106	1	8/19/94
7002109	2	8/19/94
7002107	3	8/19/94
7002108	4	8/19/94
7002110	5	8/19/94
7002111	6	8/19/94
7002159	7	8/24/94
7002160	8	8/24/94
7002161	9	8/24/94
7002162	10	8/25/94
7002163	11	8/25/94
7002164	12	8/25/94
7002165	13	8/25/94
7002166	14	8/25/94
7002167	15	8/25/94
7002168	16	8/25/94
7002169	17	8/25/94
7002170	18	8/25/94
7002177	19	8/25/94
7002171	20	8/25/94
7002172	21	8/25/94
7002173	22	8/25/94
7002174	23	8/25/94
7002175	24	8/25/94
7002176	25	8/25/94
7002184	26	8/26/94
7002178	27	8/25/94
7002179	28	8/26/94
7002180	29	8/26/94
7002181	30	8/26/94
7002181	31	8/26/94
7002183	32	8/26/94
7002185	33	8/26/94
7002186	34	8/26/94
7002187	35	8/26/94
7002188	36	8/26/94
7002435	37	9/28/94
7002436	38	9/28/94
7002437	39	9/28/94
7002438	40	9/28/94
7002440	41	9/28/94
7002439	42	9/28/94
7002441	43	9/28/94
7002442	44	9/29/94
7002443	45	9/29/94
7002444	46	9/29/94
7002445	47	9/29/94
7002446	48	9/29/94
7002447	49	9/29/94
7002448	50	9/29/94
7007775	51	8/4/95
7007776	52	8/4/95
7007779	53	8/4/95
7007777	54	8/4/95
7007778	55	8/4/95
7007780	56	8/4/95
7007784	57	8/4/95
7007781	58	8/4/95
7007783	59	8/4/95
7008442	60	8/4/95
7008450	61	9/21/95
7008454	62	9/21/95
7008443	64	9/21/95
7008444	65	9/21/95
7008445	66	9/21/95
7008446	67	9/22/95
7008447	68	9/22/95
7008448	69	9/22/95
7008449	70	9/22/95
7008451	71	9/22/95
7008452	72	9/22/95
7008453	73	9/22/95
7008455	74	9/22/95
7008456	75	9/22/95
7015121	76	6/1/96
7015122	77	6/1/96
7015123	78	6/1/96
7015124	79	6/1/96
7015125	80	6/1/96
7015126	81	6/1/96
7015281	82	6/1/96
7015128	83	6/1/96
7015127	84	6/1/96
7015129	85	6/1/96
7033827	86	6/24/98
7033851	87	6/24/98
7033828	88	6/23/98
7033829	89	6/23/98
7033848	90	6/2/98
7033832	91	6/2/98
7033831	93	6/24/98
7033833	94	6/2/98
7033834	95	7/22/98
7033836	96	6/2/98
7033837	97	6/2/98
7033839	98	6/2/98
7033835	99	6/24/98
7033838	100	6/2/98
7033841	101	6/2/98
7033840	102	6/24/98
7033843	103	6/2/98
7049830	188	6/29/99

Attachment 6

Sequence VIB Engine Serial Numbers

serial number	sequence number	date completed
7033846	104	8/14/98
7033844	105	6/2/98
7033842	106	6/2/98
7033850	107	6/2/98
7033845	108	8/14/98
7033847	109	6/2/98
7033849	110	8/14/98
7033852	111	6/25/98
7033853	112	6/24/98
7039050	113	9/23/98
7039053	115	9/23/98
7039062	116	9/23/98
7039061	117	9/23/98
7039054	118	9/23/98
7039056	119	9/23/98
7039058	120	9/23/98
7039055	121	9/23/98
7039074	122	9/23/98
7039060	123	9/23/98
7039051	124	9/23/98
7039057	125	9/23/98
7039064	126	9/23/98
7039063	127	9/23/98
7039059	130	9/23/98
7039065	134	9/23/98
7039052	137	9/23/98
7042627	132	12/16/98
7042026	158	12/16/98
7049814	128	6/29/99
7049815	142	6/29/99
7049812	143	6/29/99
7049817	152	6/29/99
7049813	154	6/29/99
7049816	156	6/29/99
7049835	157	6/29/99
7049839	160	6/29/99
7049818	161	6/29/99
7049820	162	6/29/99
7049819	163	6/29/99
7049821	165	6/29/99
7049822	174	6/29/99
7049831	178	6/29/99
7049823	179	6/29/99
7049834	180	6/29/99
7049824	181	6/29/99
7049825	182	6/29/99
7049828	184	6/29/99
7049833	185	6/29/99
7049827	187	6/29/99

serial number	sequence number	date completed
7049826	189	6/29/99
7049832	190	6/29/99
7049852	192	6/29/99
7049836	195	6/29/99
7049837	198	6/29/99
7049849	199	6/29/99
7049829	200	6/29/99
7049843	201	6/29/99
7049855	202	6/29/99
7049842	203	6/29/99
7049848	206	6/29/99
7049854	207	6/29/99
7049845	208	6/29/99
7049838	209	6/29/99
7049841	210	6/29/99
7049844	211	6/29/99
7049840	212	6/29/99
7049846	216	6/29/99
7049853	217	6/29/99
7049850	218	6/29/99
7049856	219	6/29/99
7049847	224	6/29/99
7072314	228	May-00
7072310	229	May-00
7072311	230	May-00
7072312	231	May-00
7072313	232	May-00
7072315	233	May-00
7072341	234	May-00
7072326	235	May-00
7072317	236	May-00
7072319	237	May-00
7072316	238	May-00
7072318	239	May-00
7072323	240	May-00
7072322	241	May-00
7072325	242	May-00
7072324	243	May-00
7072320	244	May-00
7072321	245	May-00
7072331	246	May-00
7072332	247	May-00
7072327	248	May-00
7072330	249	May-00
7072328	250	May-00
7072329	251	May-00
7072344	252	May-00
7072338	253	May-00
7072336	254	May-00

7072336	255	May-00
7072343	256	May-00

7086814	336	Dec-00
7086809	337	Dec-00

Attachment 6

Sequence VIB Engine Serial Numbers

serial number	sequence number	date completed
7072345	257	May-00
7072339	258	May-00
7072335	259	May-00
7072340	260	May-00
7072334	261	May-00
7072333	262	May-00
7072342	263	May-00
7079960	265	9/16/00
7079968	282	9/16/00
7079964	286	9/16/00
7079961	292	9/16/00
7079962	293	9/16/00
7079963	294	9/16/00
7079969	295	9/16/00
7079972	296	9/16/00
7079970	297	9/16/00
7079967	298	9/16/00
7079966	299	9/16/00
7079965	304	9/16/00
7079973	305	9/16/00
7079971	306	9/16/00
7079977	307	9/16/00
7079975	308	9/16/00
7079976	309	9/16/00
7079974	311	9/16/00
7079978	312	9/16/00
7079980	313	9/16/00
7079979	314	9/16/00
7079981	315	9/16/00
7079985	316	9/16/00
7079983	317	9/16/00
7079982	318	9/16/00
7079986	319	9/16/00
7079984	320	9/16/00
7079987	321	9/16/00
7079988	323	9/16/00
7079989	325	9/16/00
7086805	324	Dec-00
7086803	326	Dec-00
7086874	327	Dec-00
7086802	328	Dec-00
7086830	329	Dec-00
7086804	330	Dec-00
7086882	331	Dec-00
7086806	332	Dec-00
7086807	333	Dec-00
7086865	334	Dec-00
7086808	335	Dec-00

serial number	sequence number	date completed
7086810	338	Dec-00
7086815	339	Dec-00
7086816	340	Dec-00
7086817	341	Dec-00
7086818	342	Dec-00
7086826	343	Dec-00
7086821	344	Dec-00
7086819	345	Dec-00
7086820	346	Dec-00
7086822	347	Dec-00
7086823	348	Dec-00
7086872	349	Dec-00
7086881	351	Dec-00
7086824	352	Dec-00
7086885	353	Dec-00
7086825	354	Dec-00
7086873	355	Dec-00
7086827	356	Dec-00
7086867	357	Dec-00
7086871	358	Dec-00
7086828	359	Dec-00
7086884	360	Dec-00
7086829	361	Dec-00
7086866	362	Dec-00
7086870	363	Dec-00
7086868	365	Dec-00
7086869	366	Dec-00
7086883	368	Dec-00

We are quickly approaching the May 2001 semi annual Surveillance Panel meetings. If anyone has any items for the VIA/B O&H to consider please submit these to me ASAP. Once these items are received I will determine if a meeting or conference call is necessary. If you do have a response, please respond to all listed in this email.

At this time I am aware of two items which are:

* Don, Daryl and I are to make a proposal for maximum allowable "off test" time on VIB tests. (Action Item from 11/16/00 SP meeting)
* Revisions need to be made to Form 19 to allow values for both Oxidation and Nitration (Daryl noted this is on the SP agenda)

As I understand the SP meetings have been moved from the proposed location (Richmond) to San Antonio. I'd expect meeting notices to be coming shortly. If it is determined we will require an O&H meeting it would tentatively be held in San Antonio the same week as the Surveillance Panel (May 21, 2001).

Charlie Leverett
Sr. Engineering Technologist
Sequence VIA, VIB, VIII & L-38
Phone: 210.647.9422
Fax: 210.523.4607
E-mail: Charlie.Leverett@perkinelmer.com

PerkinElmer
fluid sciences
Automotive Research

TEST ENGINEERING, INC.
12718 CIMARRON PATH
SAN ANTONIO, TEXAS 78249-3423 USA
VX 210-690-1958 FX 210-690-1959
www.TEI-net.com

Report to Sequence VIB Surveillance Panel

24 May, 2001

- **Engine Status**
  - **41 Engines Built December 2000**
  - **~ 35 Remaining at AER**
  - **Next build dependent on engine usage**
  - **~ 89 build parts remain after purchase of oil pumps**

Attachment 8

TEST ENGINEERING, INC.
12718 CIMARRON PATH
SAN ANTONIO, TEXAS 78249-3423 USA
VX 210-690-1958 FX 210-690-1959
www.TEI-net.com

Report to Sequence VIB Surveillance Panel

24 May, 2001

- **3 Year Parts Supply**
  - **Solicitation received from FPP**
  - **Labs resurveyed**
  - **New solicitation expected soon from FPP**
  - **Hardware available mid-summer**

Seq. VIB Semi-Annual Report
Six-Month Period Ending March 2001

SEQUENCE VIB STATUS OF REPORTED TESTS

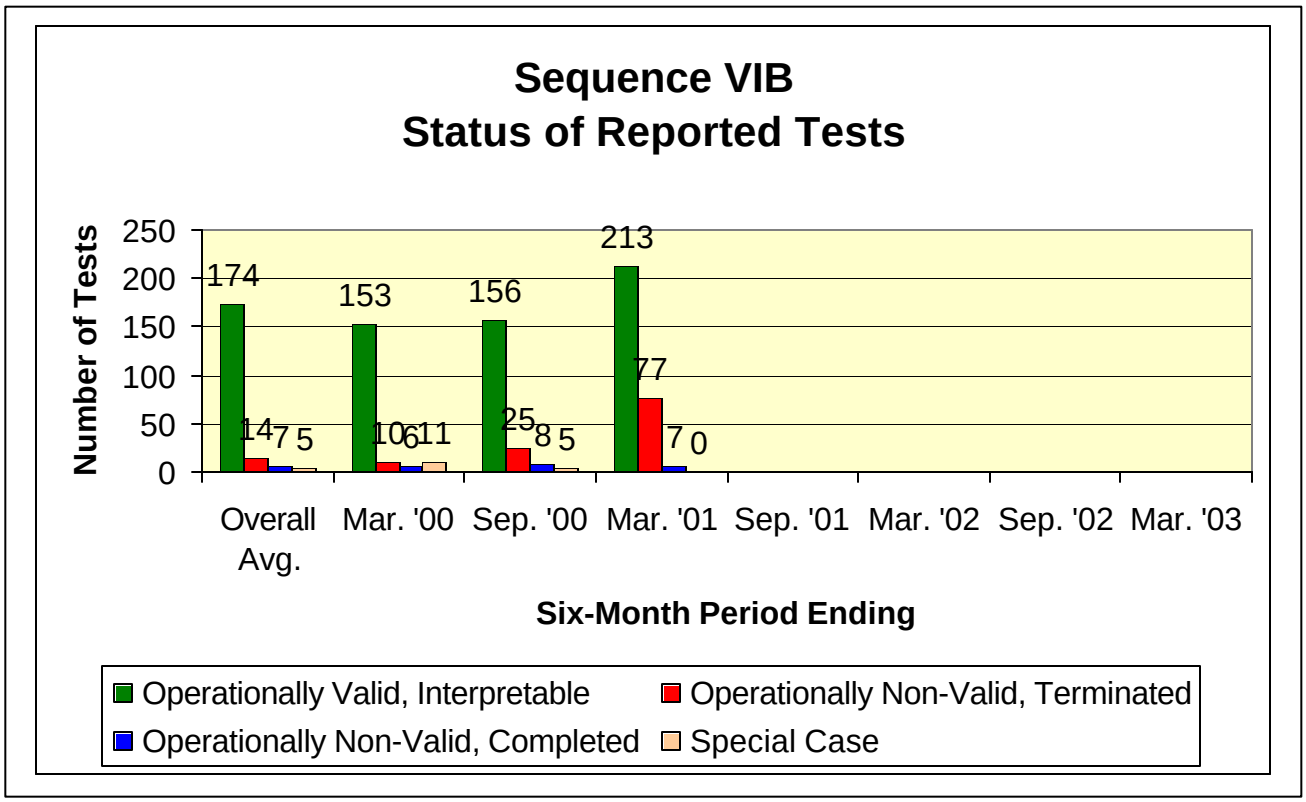
STATUS	N	PERCENT
Operationally Non-Valid, Terminated	77	25.9
Operationally Non-Valid, Completed	7	2.4
Special Case	0	0.0
Operationally Valid, Interpretable	213	71.7
Total Reported Tests	297	100.0

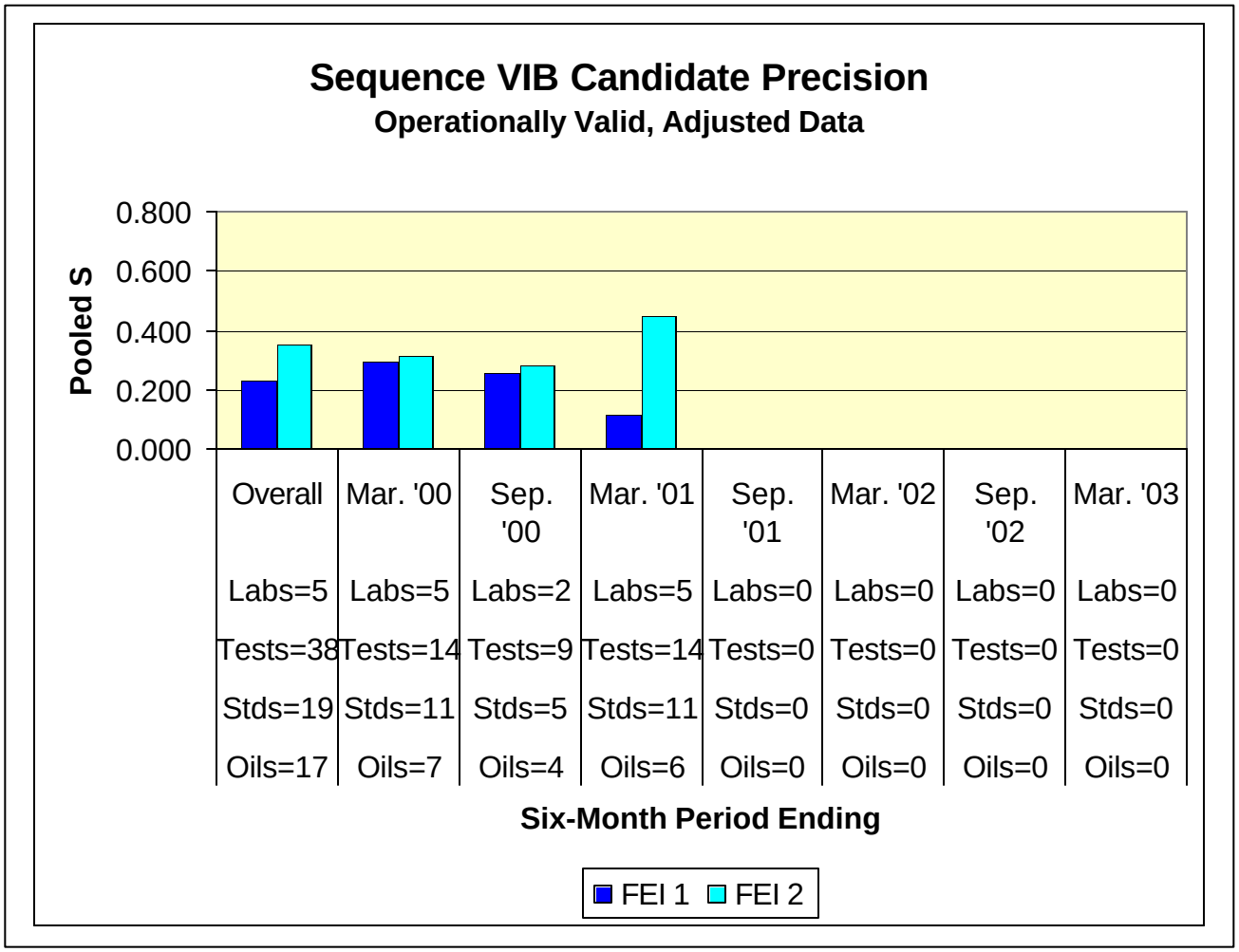
CAUSES FOR LOST TESTS	N
Down Time	2
Oil Consumption	4
Oil Loss	1
Engine Mechanical Problems	2
Support Equipment Problems	1
Sponsor Request	73
Miscellaneous	1

SEQUENCE VIB PRECISION

COMPONENTS OF REPLICATE DATA BASE	N
Number of Tests	14
Number of Oils	6
Number of Labs	5
Number of Stands	11
Number of Stand/Engine Combinations	11
Number of Severity Adjusted FEI 1	14
Number of Severity Adjusted FEI 2	13

VARIABLE	Pooled s	R
FEI 1, Non-Adjusted	0.116	0.326
FEI 1, Adjusted	0.118	0.331
FEI 2, Non-Adjusted	0.483	1.353
FEI 2, Adjusted	0.446	1.250


Sequence VIB
Status of Reported Tests
Number of Tests
250
200
150
100
50
0
174
14
7
5
153
10
6
11
156
25
8
5
213
77
7
0
Overall Avg.
Mar. '00
Sep. '00
Mar. '01
Sep. '01
Mar. '02
Sep. '02
Mar. '03
Six-Month Period Ending
Operationally Valid, Interpretable
Operationally Non-Valid, Terminated
Operationally Non-Valid, Completed
Special Case


Sequence VIB Candidate Precision
Operationally Valid, Adjusted Data
Pooled S
0.800
0.600
0.400
0.200
0.000
Overall
Labs=5
Tests=38
Stds=19
Oils=17
Mar. '00
Labs=5
Tests=14
Stds=11
Oils=7
Sep. '00
Labs=2
Tests=9
Stds=5
Oils=4
Mar. '01
Labs=5
Tests=14
Stds=11
Oils=6
Sep. '01
Labs=0
Tests=0
Stds=0
Oils=0
Mar. '02
Labs=0
Tests=0
Stds=0
Oils=0
Sep. '02
Labs=0
Tests=0
Stds=0
Oils=0
Mar. '03
Labs=0
Tests=0
Stds=0
Oils=0
Six-Month Period Ending
FEI 1
FEI 2

Attachment 10

BC/BCFHD INVENTORY		
LAB	BC	BCFHD
A	1 year	1 year
B	1 year	1.5 years
C	2.5 years	2.5 years
D	4 years	6 years
F	4 years	3 years
G	3 years	3 years
L	2.5 years	2.5 years

TGC Action Items and Recommendations
April 18, 2001

- API after-market testing: What standard deviation should the API use?
  - Use the standard deviation that is associated with the LTMS severity adjustment system for that specific test.
  - API should only test/schedule during periods when the specific test is in control as indicated by the Industry and Laboratory LTMS precision charts.

  Recommendation passed unanimously (9-0-0)

- Rater Calibration Proposals:
  - TGC agreed to the following changes to Zack Bishop's proposal:
    - Update page 3 concerning committee members
    - Add the word distress to pages 4 and 5
    - Change the words petroleum products on page 4
    - Add the words consensus value to the end of the paragraph on page 6
    - Replace the words generally ASTM or CRC with Industry [generally ASTM or CRC] on page 6
    - Add the words "or make-up session" to page 11
    - Add the word distress after deposit to page 11
    - Add the words reference and non-reference after the word results on page 10 to the category 1 definition
    - Add a list of the minimum fields to be collected by the Industry database
    - Add the words that we recommend that the TMC…to page 15, item 3
    - Add the words minimum requirement to the front cover of the report
  - Request surveillance panels write into their respective procedures that category 1 raters must accomplish all subjective ratings. Surveillance panels to determine the effective date
  - Recommend that the TMC establish a central database that will be available to our Industry
    - Specifics of the database to be defined by each surveillance panel using the minimum fields listing in Zack Bishop's proposal for starters
  - Implementation date for Rater Calibration will be determined by the surveillance panels
  - Each surveillance panel look at the details specific to their test type needs in adopting these minimum rater calibration proposals
  - Individual surveillance panels to look at utilizing further improvements/changes such as:
    - Use of statistics, similar to the LTMS, for category 1 rater calibration approval
    - Use of fixed parts as a constant standard for Industry calibration verifications
    - Adopting some of the parts of the L-37 Rater Calibration presentation made by Frank Farber such as:
      - Highly recommend the use of control chart points based on the average of 4 ratings, not just 1

- Develop a minimum number of rater participation to assure a proper mean and standard deviation if statistics are used
- Trial period such as 1 year
- Frequency of calibration such as every month

Passed unanimously

- Consensus Ratings:
  - The TGC recommends the following consistent definition to be added to each Test Method:
    - If multiple ratings are deemed necessary of a given part or parts, consensus rating may be used according to the following: The raters shall be from the laboratory in question or an outside rater if required (no other category 1 rater available in the lab). No averaging of ratings is permitted. Only one rating value is to be reported and is to be agreed to by the original rater involved. Any consensus rating shall be documented in the comment section of the test report.

  Passed unanimously

GF-3 Reference Oil:

- TGC does feel this is worth pursuing at this time
- Oils for consideration:
  - 1008 (need Sequence VIII, BRT and TEOST data to complete Gordon's Table)
  - 5W20 or 5W30 viscosity grades
- Would like data on potential oils submitted to the TMC by June 1, 2001

TMC web site data:

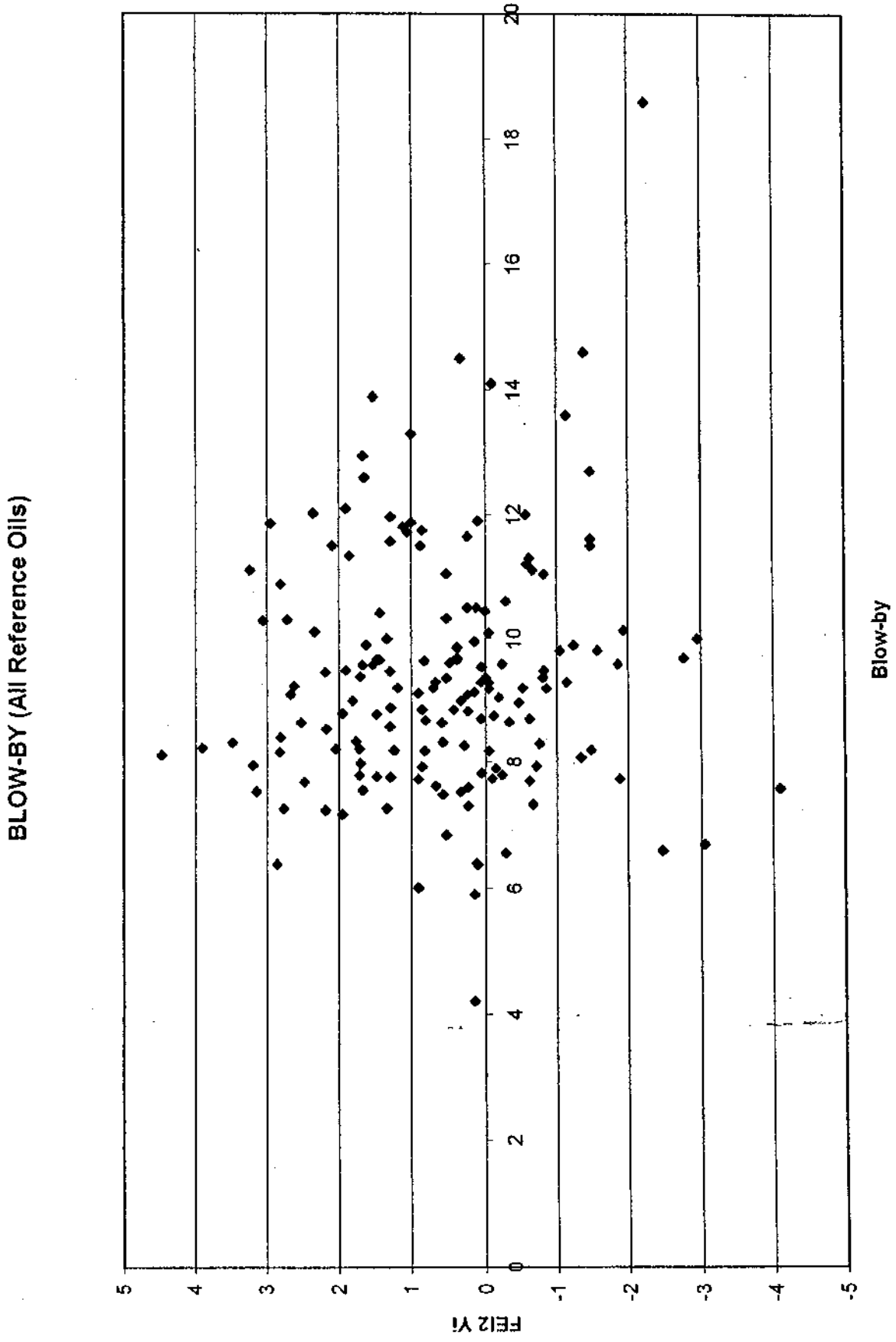
- Recommend that all reference oil test data, valid or invalid, be part of the TMC Industry database with appropriate labels
- Recommend that the TMC develop an Excel file for each test type with the following worksheets (where applicable) as a minimum:
  - Operational Data (includes the Qis, averages, standard deviations, etc.)
  - Rating Data
  - Chemical Analysis
  - Shutdown and Downtime Information
  - Metrology Data
  - Test Comments
  - Hardware Parts ID Data
  - Each Surveillance Panel could decide what report Form Numbers would make up each worksheet in the Excel file
  - This file would be an additional file listed on the TMC web site. It would not replace any of the existing CSV files currently in place.

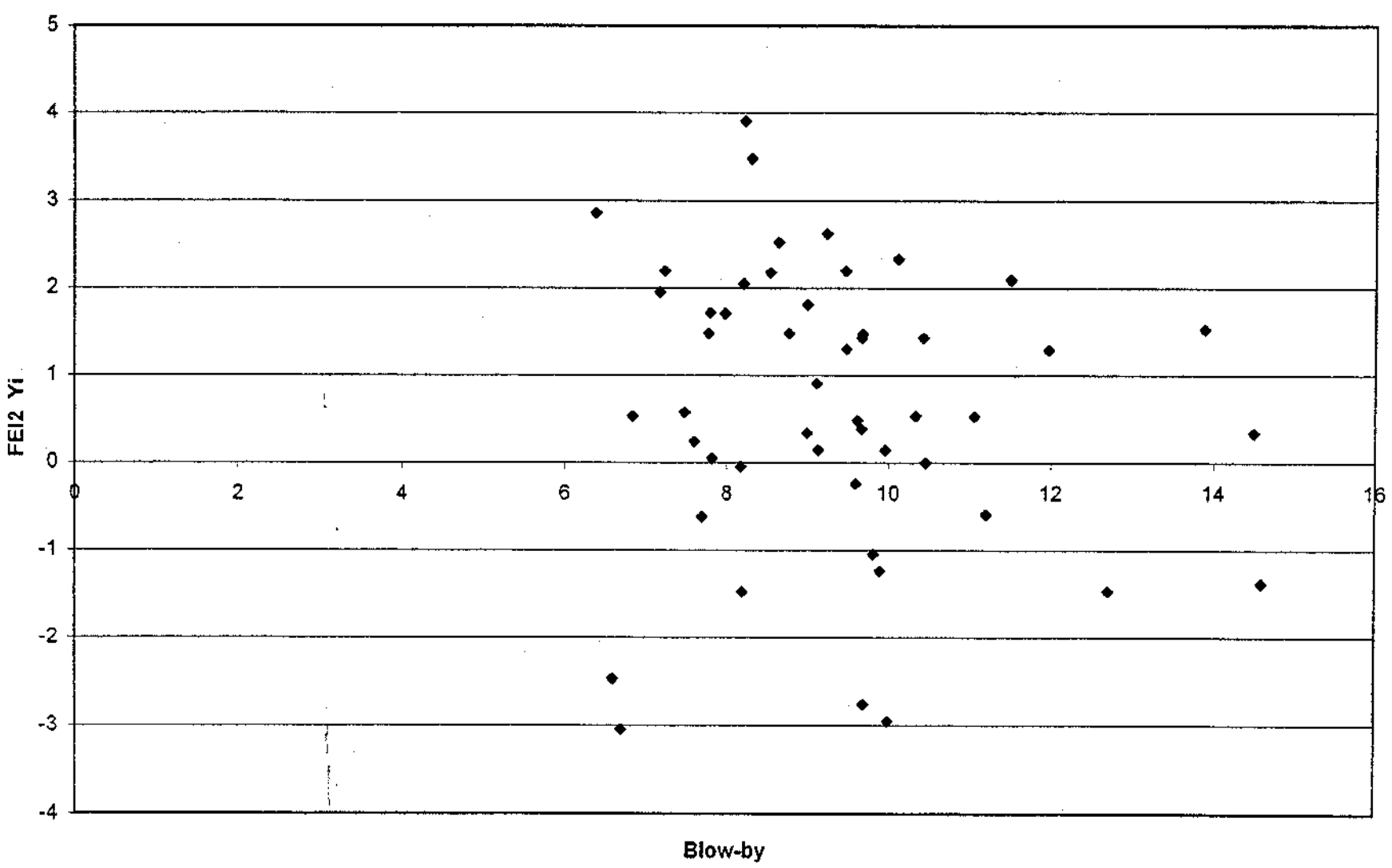
  Passed unanimously

- Each Surveillance Panel needs to confirm their definition for non-interpretable tests and document them if they don't exist in their Test Methods

- Secretaries for the Surveillance Panels
  - Item remain open for more discussion in the future

- LTMS
  - Formed a TGC LTMS Task Force to include the Industry statisticians, headed by Ben Weber, to review the LTMS for such items as:
    - Cost benefit analysis?
    - What has the system done or not done for us?
    - Look at decreasing the false alarm error rate
    - Should the lab alarm warning consequences be eliminated or changed?
    - Should the lab alarm action consequences be changed?
    - Review the verbiage in the LTMS document concerning the meeting requirement for each lab/industry alarm?
  - Gears wants to be part of the Task Force
  - Is Monday of the Passenger Car Surveillance Panel week in May available for our first face-to-face meeting?


BLOW-BY (All Reference Oils)
FEI2 Yi
Blow-by
5
4
3
2
1
0
-1
-2
-3
-4
0
2
4
6
8
10
12
14
16
18
20


BLOW-BY (Reference Oil 1006)
FEI2 Yi
Blow-by
5
4
3
2
1
0
-1
-2
-3
-4
0
2
4
6
8
10
12
14
16

Sequence VIB
Data Summary

Performance Requirements	Test Date 12/11/99 - 12/30/99	Specification	Test Results
FEI @16 Hours		2.0 %min	2.15
FEI @96 Hours		1.7 %min	1.71

- MTAC results include three runs with one discarded and average of two reported.

VIB Data Base

Viscosity Grade	**5W-20**	**5W-20**	**5W-20**
CCS, cP @ -25	2100	2100	2160
HTHS, cP @ 150	2.66	2.66	2.63
Raw FEI 1	**2.26**	**2.00**	**2.03**
Raw FEI 2	**1.76**	**1.81**	**1.85**
SA	-.14/-.24	0.23/-.11	0.04/-0.13
Final FEI 1	**2.12**	**2.23**	**2.07**
Final FEI 2	1.52	**1.70**	**1.72**
BC Shift	-0.26	0.19	0.53
Test Stand	A *	B	C
Stand Run #	270	208	64
Engine #	14	34	35
Engine Run #	13	5	11
Oil cons., ml	1300	400	600
Test Date	11/23	12/11	12/30
REF Oil	1008	1006	1006
Engine Run #	12B	2A	6
Ref Oil FEI 1	1.66	1.04	1.25
Ref Oil FEI 2	1.27	0.62	0.91

* Test on stand A discarded due to high oil consumption

VIB Data Base

Viscosity Grade	**5W-20**	**5W-20**	**5W-20**
CCS, cP @ -25	2100	2100	2160
HTHS, cP @ 150	2.66	2.66	2.63
Raw FEI 1	**2.26**	**2.00**	**2.03**
Raw FEI 2	**1.76**	**1.81**	**1.85**
SA	-.14/-.24	0.23/-.11	0.04/-0.13
Final FEI 1	**2.12**	**2.23**	**2.07**
Final FEI 2	1.52	**1.70**	**1.72**
BC Shift	-0.26	0.19	0.53
Test Stand	A *	B	C
Stand Run #	270	208	64
Engine #	14	34	35
Engine Run #	13	5	11
Oil cons., ml	1300	400	600
Test Date	11/23	12/11	12/30
REF Oil	1008	1006	1006
Engine Run #	12B	2A	6
Ref Oil FEI 1	1.66	1.04	1.25
Ref Oil FEI 2	1.27	0.62	0.91

* Test on stand A discarded due to high oil consumption

VIB Data Base

Viscosity Grade	**5W-20**	**5W-20**	**5W-20**
CCS, cP @ -25	2100	2100	2160
HTHS, cP @ 150	2.66	2.66	2.63
Raw FEI 1	**2.26**	**2.00**	**2.03**
Raw FEI 2	**1.76**	**1.81**	**1.85**
SA	-.14/-.24	0.23/-.11	0.04/-0.13
Final FEI 1	**2.12**	**2.23**	**2.07**
Final FEI 2	1.52	**1.70**	**1.72**
BC Shift	-0.26	0.19	0.53
Test Stand	A *	B	C
Stand Run #	270	208	64
Engine #	14	34	35
Engine Run #	13	5	11
Oil cons., ml	1300	400	600
Test Date	11/23	12/11	12/30
REF Oil	1008	1006	1006
Engine Run #	12B	2A	6
Ref Oil FEI 1	1.66	1.04	1.25
Ref Oil FEI 2	1.27	0.62	0.91

* Test on stand A discarded due to high oil consumption

Recommendations for Definitions of Used Oil Analysis:

CCS D 5293
What temp should be used, SAE J 300 97 or 99? **I will suggest we use the J 300-99.**

HFRR D 6079
Ford has requested that we used the procedure modifications they used in SAE Paper 982623. The procedure is as follows:

Tests are conducted with 9.8 N load, 20 Hz frequency and a 1 mm stroke length. Test time is 30 minutes @ 105 °C Standard 52100 steel ball and disk specimens, available from PCS Instruments, are to be used. Also, there may be some run in time before some friction modifiers become active; therefore, the friction coefficient obtained during the last 5 - 10 minutes should be reported. Friction coefficient will be the reported value, not wear scar diameter.

Method for VIB Oxidation and Nitration by FTIR (differential infrared) E 168

Data Collection
Cell type: Infrared Liquid Transmission Sampling Cell (KBr, BaF2, etc.)
16 scans or better
4cm-1 resolution or better
Collect spectra for each oil

Data Analysis
-Subtract the fresh oil spectra from each used oil spectra.
-Then process the Differential spectra as follows:
Single baseline point at 1950cm-1, baseline drawn parallel to x-axis.
Oxidation - max height from baseline between 1800cm-1 to 1660cm-1.
Nitration - max height from baseline between 1650cm-1 to 1600cm-1.
-Results - Report Absorbance/1cm

Fuel Dilution D 3525M
The "M" was intended to reflect the modified version of fuel dilution measurement, as currently used by other ASTM test types. This modified procedure needs to be approved by the SP and included in the VIB Procedure (May SP Meeting). The modifications consist of the following:

Fuel Dilution-Determine the fuel dilution percent mass, by gas chromatography with the following modifications to D3525:

- Use C16 in place of C14 for the internal standard (1μL injector volume)

- Presume that all components lighter than C16 are fuel.

- The integrator should establish the horizontal baseline under the output curve until the leading edge of C16 is reached. Establish a second baseline extending horizontally from the output curve, at the intersection of the output curve, and the leading edge of the C16 peak.

- Column details are 10 ft by 0.125in. (305 cm X 3.2 mm) SS and the packing material is 5 % OV-1 on Chromosorb W HP.

- Increase the oven temperature from 60 to 320 °C, with the rate change of temperature controlled at 8 °C/min. Hold the temperature at 320 °C for 16 minutes to elute oil.

It is recommended that these analysis procedures be added to the Sequence VIB procedure. The effective date of compliance is 30 days from issuance of the information letter. Any reference tests completing on the effective date will require this data (Form #19).

The following action item is from the November 2000 VIB SP meeting:

The TMC Engineer, the Surveillance Panel Chairman, and the O&H Chairman are charged with determining a recommendation for maximum allowable "off test" run time on the candidate oil.

Here are the two proposals:

Proposal #1

- Keep the current wording/rules in 11.5.8.1, which states 10 hrs as the max. allowable downtime, 4 shutdowns max, no one shutdown exceeding 8 hrs.
- Add a statement to 13.2.8 "Total Test Length" section stating that the total test length can not exceed 150:00 hrs, any test exceeding is Invalid.
- Add "Off Test Time" definition to the procedure stating that this is when the test is not at the scheduled conditions but shutting down the engine is not required.

Proposal #2

- Eliminate current downtime definitions.
- Maximum elapsed time between the start of pre-BC and the completion of Post BC is 160 hours.
- No more than 4 deviations from the outlined test sequence in the test procedure.
- That means shutdowns, hold time, downtime, re-run of stages, etc all count as deviations.

ASTM Sequence VIA / VIB Surveillance Panel

Scope and Objectives

Scope:

The Sequence VIA / VIB Surveillance Panel is responsible for the surveillance and continued improvement of the Sequence VIA test documented in ASTM Standard D6202 and of the Sequence VIB test as documented in Draft #5 as each is updated by the Information Letter System. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least every six months. 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.01, 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. The panel will review development and correlation of updated test procedures with previous test procedures. 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
~~Establish SJ limits for VIB test~~	~~11/00~~
Define new hardware for future VIB testing (After current supply is exhausted)	12/01
Identify 10W30 ~~and 5W20~~ Reference oil~~s~~	11/01
Incorporate 5W 20 into VIB LTMS	11/01
Complete and approve Batch 5 BC & BCFHD	05/02
If available introduce GF-3 oil into VIB LTMS	05/02