

August 27, 2002

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UNCONFIRMED MINUTES from the SEQUENCE VIII SURVEILLANCE PANEL

**Romulus, MI
May 14, 2002**

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Welcome

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

Chairman's Comments

Zack Bishop was unable to attend this meeting and sends his regards. Zack requested Charlie Leverett chair this meeting only. Zack will be retiring before the next surveillance panel meeting. Fred Gerhart has agreed to accept the chairman's position of the Sequence VIII Surveillance Panel.

Secretary Items

- Fred Gerhart is the temporary secretary for this meeting only.
- No replies were received for the minutes for the meetings of November 2001. These minutes are approved as posted to the TMC web site.
- Attendance list was distributed and is included as Attachment 2 with 9 out of 16 voting members present.
- Membership changes
Carl Stephens has retired. Timothy Caudill from Valvoline will be his replacement.
- Ben Weber recorded the motions and action items for this meeting. The motion and action items are included as Attachment 3.

TMC Semi-annual report presented by Michael Kasmirsky (Attachment 4)

The time period for this report is October 1, 2001 to March 31, 2002. The report may be found at:

<ftp://ftp.astmtmc.cmu.edu/docs/gas/sequenceviii/semiannualreports/>

A summary of this report is:

Laboratory / Stand distribution

- Laboratory/Stand distribution shows three calibrated labs with 7 engine/stand combinations reporting data during this period.
- There were a total of 12 calibration attempts during the reporting period.
- Of the 12 calibration attempts, 9 were operationally and statistically acceptable.
- No donated tests were conducted during this reported period.
- No LTMS deviations during the reported period.
- During the reporting period, the TMC visited two laboratories.
- Lost test summary – two tests were lost this period due to mechanical bearing wear.

Bearing storage oil lead levels are still increasing over time but with no impact at this time on test results.

No hardware changes occurred during the reporting period.

1006-2 two tests have been conducted and passed using old targets. At this time no impact to Sequence VIII test using the new blend of 1006-2 as compared to previous 1006 data. The current statistics for 1006 will be used until 5 data points are obtained on 1006-2.

Introduction of reference oil 1009 - GF3 category. Oil is at TMC and should be available for shipment in about 6 weeks.

How to introduce oil and set target limits?

Any supplier data that can be used? BWL mg 10.1 strip 9.54 cst

Motion made by Charlie Leverett and seconded by Gordon Fransworth – PE, SwRI and Ashland will donate 2, 2, and 1 runs respectively on the new reference oil 1009 by October 2002. The TMC will extend the lab calibration period by the same number of runs donated. Motion carried with 1 waive.

Strip viscosity investigation

Three labs were reviewed.

Mechanical stirrer used only at one lab

1 um filter paper rather than 0.5 um filter paper used at one lab

The one hour stripping clock was started at 115 C at one one lab and at 120 C at the other two labs. Procedure spec is 115 C +- 5.

Motion made by Michael Kasmirsky and seconded by Charlie Leverett – all laboratories to start clock at 115 C and disallow mechanical stirring. This change to be effective June 15, 2002. Motion passed

Sequence VIII test procedure is now available as ASTM document D-6709-01

CPD Semi-annual report presented by Beto Araiza

8231 US camshaft bearings have been received

Lead deposit levels have been measured for batches 9 through 15
Bearing inspection for surface problems is resulting in about 20% rejection for dark spots.
Federal Mogul representative said problem was not EF 411 related but was due to finger prints
on bearing surface prior to placing in EF 411 storage oil.
Can anything else be used for bearing storage? Vacuum packing was investigated but found to be
not practical.

Action item – TEI to improve the current packaging method by storing packaged bearings in
their current containers in 55 gallon Argon sealed bulk containers.

CPD report was accepted by the panel as presented.

R.S.I. Semi-annual report presented by Rick Oliver – (Attachment 5)

The report covered the period ending March 2002. The most recent version of this report can be
found at <http://www.registration-systems.com> . Anyone having trouble with website please
contact Rick Oliver.

During the reporting period 84 tests were conducted with only one test reported operationally
invalid due to engine mechanical problems. There were no replicates during the reporting period.

The RSI report was accepted as presented.

New Business:

About 6 months of the current batch of KA24E fuel is available.

SAE TC-8 Committee Chair for Aviation Piston Engine Lubricants was unable to attend
this meeting. However, an e-mail was sent, explaining the position of this particular
committee in regards to adopting the Sequence VIII test as a replacement for the L38
engine test is SAE standards J-1899 and J-1966. The e-mail is included as attachment 6.

Old Business:

Strip Viscosity Round Robin – investigation to continue with a fresh sample of oil
That will be created by a laboratory immediately after a calibration test. TMC will issue a
second can of the same oil that just ran in the engine. The lab will remove the end of test
bearings, install another set of bearings, charge the engine with the second can of test oil,
and run 10 hours at standard test conditions. At the end of the 10 hour interval, stop the
engine and drain. The entire drain is to be sent to TMC for blind coding for strip viscosity
round robin. TMC will then distribute the used oil samples to the labs to gather additional
round robin data.

Review of Scope and Objectives

The Scope and Objectives were reviewed and revised. The current version is included as the
attachment 7.

Adjournment

The next meeting will be at the call of the chairman.

Sequence VIII Surveillance Panel

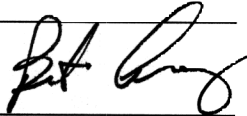




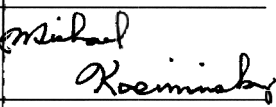



May 14, 2002

Detroit MI

Agenda

- 1.) Welcome
- 2.) Attendance Sign-in sheet distributed
- 3.) Membership changes and/or additions.
- 4.) Minutes Approval from November 01
- 5.) TMC Report
- 6.) RSI Report
- 7.) CPD Report
- 8.) Old Business
 - a.) Action Items
- 9.) New Business:
- 10.) Adjournment

**ASTM L-38 / SEQUENCE VIII SURVEILLANCE PANEL
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Motions & Action Items
Sequence VIII Surveillance Panel
May 14, 2002
As Recorded at the Meeting by Ben Weber

1. Fred Gerhart will be the new SP chairman after this meeting.
2. Previous meeting minutes accepted as written.
3. TMC report accepted as reported.
4. PE, SwRI and Ashland will donate 2, 2, and 1 runs respectively on the new reference oil 1009 by October 2002. The TMC will extend the lab calibration period by the same number of runs donated.
5. All labs are to perform the stripped viscosity measurement using the same technique i.e., bubbling nitrogen through the oil instead of using a mechanical stirrer, and the one-hour stripping clock started at 115C. Effective June 15, 2002. Passed unanimously.
6. RSI report accepted as presented.
7. TEI will store the bearing containers in Argon in a 55 gallon drum.
8. The test labs and TMC will continue to use the round robin technique to check strip viscosity in the industry.



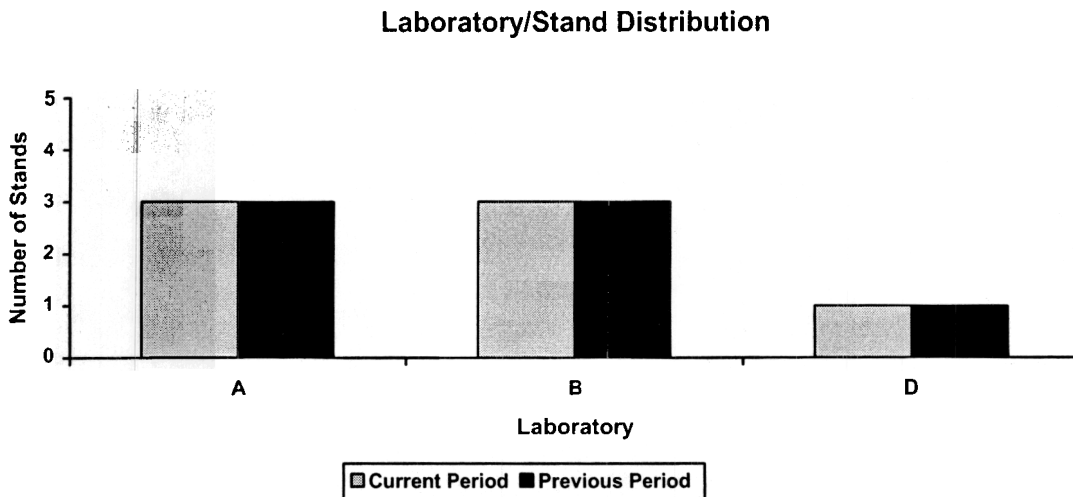
Memorandum: 02-027
 April 25, 2002
 To: Zack Bishop, Chairman Emeritus, Sequence VIII Surveillance Panel
 Michael T. Kasimirsky *Michael T. Kasimirsky*
 Subject: Sequence VIII Semiannual Report: October 1, 2001 to March 31, 2002

The following is a summary of Sequence VIII reference oil tests that were reported to the Test Monitoring Center during the period from October 1, 2001 to March 31, 2002.

Lab/Stand Distribution

	Reporting Data	Calibrated as of March 31, 2002
Number of Laboratories:	3	3
Number of Stand/Engine Combinations:	7	7

The following chart shows the laboratory/stand distribution:



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

Memo 02-027

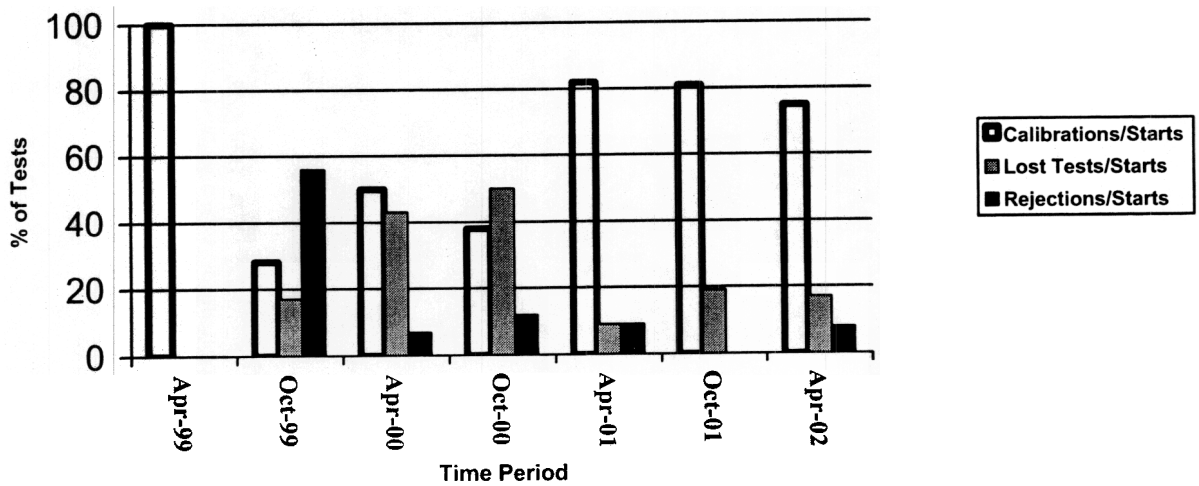
Page 2

Calibration Start Outcomes	TMC Validity Code	No. of Tests
Operationally and Statistically Acceptable	AC	9
Failed Acceptance Criteria	OC	1
Stand/Engine failed to successfully calibrate, engine abandoned and data pulled	MC	0
Operationally Invalid (Laboratory Judgment)	LC	2
Operationally Invalid (Laboratory & TMC Judgment)	RC	0
Aborted	XC	0
Total		12

Donated & Industry Support Outcomes	TMC Validity Code	No. of Tests
Shakedown Run	AG	0
Total		0

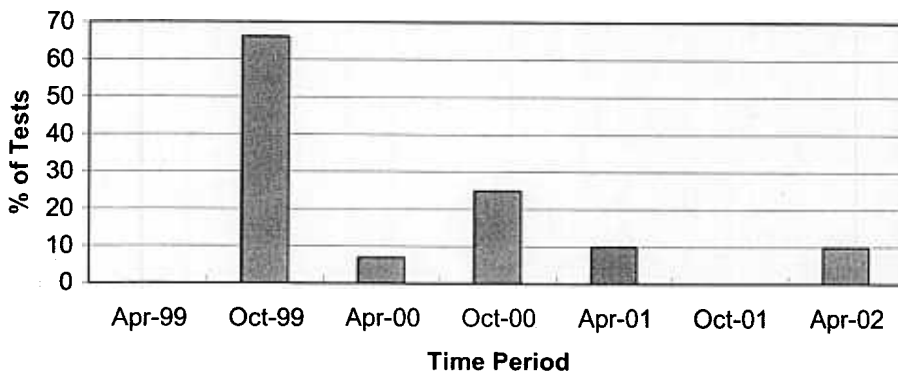
Calibrations per start, lost tests per start and rejection rates are summarized below:

Calibration Attempt Summary



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Page 3

Rejected Operationally Valid Tests



One test failed this period due to mild BWL results.

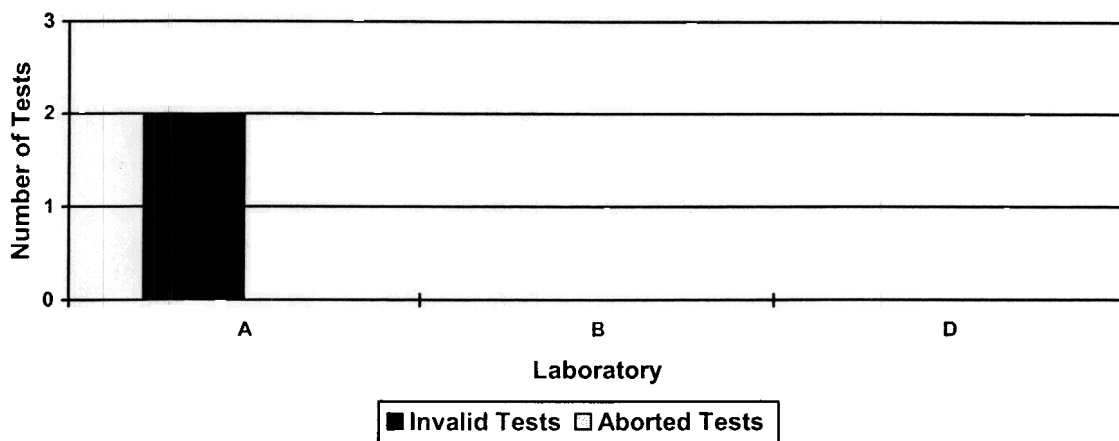
There were no LTMS Deviations this period. There have been no deviations from the LTMS since its introduction in 1999.

During the period, the TMC visited two laboratories. Any discrepancies noted during these visits were identified to the laboratory and corrective action is being taken.

Lost Test Summary

Two tests were lost this period due to mechanical bearing wear. Aborts and Operationally Invalid tests, reported by laboratory, are summarized with the following chart:

Lost Test Distribution



Information Letters

No Information Letters were issued this period.

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Severity and Precision Analysis

Below is a summary of the average Δ/s , pooled standard deviation, and average Δ in reported units for the tests reported during this period. Also below is a summary of the average Δ/s value for all laboratories reporting data during this period.

Industry Severity Summary			
Parameter	Average Δ/s	Pooled standard deviation (degrees of freedom)	Average Δ , in reported units
BWL	-0.35	2.36 (df=8)	-0.8 mg
SVIS	-0.66	0.070 (df=8)	-0.05 cSt

Average Δ/s by Laboratory		
Lab	BWL	SVIS
A	-0.07	-1.05
B	-0.38	-0.26
D	-1.33	-1.09

Bearing Weight Loss (BWL)

The Industry BWL mean Δ/s is -0.35 mild for this report period (see Figure 3). This equates to a shift of -0.8 mg in reported units. The pooled standard deviation for the period is 2.36 mg (see Figure 4). During the period, the industry experienced a single-point severity alarm and two precision alarms of one and two data points (see Figure 1). The first precision alarm was driven by the failing result on BWL that was reported during the period. Subsequent testing cleared that alarm. The severity alarm and second precision alarm were caused by reference oil tests, run at different laboratories, which were on opposite sides of the test target. Both tests generated passing results and subsequent testing cleared both the severity and precision alarms in the industry. Figures 7 and 8 graphically illustrate the lead content, in ppm, in the bearing storage oil. The highest concentration of lead reported this period was 130 ppm.

Stripped Viscosity (SVIS)

The Industry SVIS mean Δ/s is -0.66 severe for this report period (see Figure 5). This equates to a shift of -0.05 in reported units. The pooled standard deviation for the period is 0.070 cSt (see Figure 6). The industry has been within limits for both severity and precision for the period (see Figure 2).

Hardware

There were no hardware changes for the period.

Reference Oils

Oil	TMC Inventory, In gallons	TMC Inventory, In tests	Laboratory Inventory, in tests	Estimated Life
704-1	471	235	9	10+ years ¹
1006	46	23	4	3 months ¹
1006-2	5,246	2,623	10	3+ years ¹

¹ Multiple test area reference oil; total TMC inventory shown

Reference oil 1006-2 was introduced into the Sequence VIII test at the November meeting of the Sequence VIII Surveillance Panel. The panel approved a motion to introduce this reference oil using the existing test targets for reference oil 1006 until five data points have been generated on this new reference oil. At that time, the TMC was tasked with generating test targets based upon these five data points and then

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circulating them to the industry for review and subsequent approval. The panel would then decide if it wanted to use these targets or wait for 10 data points to become available and generate targets at that time. The targets would be automatically updated at 10, 20, and 30 data points as usual. However, reference oil 1006-2 had been performing differently than the original blend of 1006 in other test areas so the TMC, after consultation with the Surveillance Panel Chairman, had held off on assigning 1006-2 until some investigation could be done on this oil to assure that it would perform similarly to the previous blend in the Sequence VIII test. Consultation with the oil suppliers confirmed that they were not surprised by the performance of that oil in other test areas and that they did not expect it to behave differently in the Sequence VIII test. As such, after consultation with the Surveillance Panel Chairman, the TMC has resumed implementation of the introduction plan for this reference oil and will begin assigning it on Sequence VIII reference oil tests in the very near future. The targets for this oil will be established according to the guidelines approved by the Surveillance Panel in November 2001.

The GF-3 Category Reference Oil, reference oil 1009, has arrived at the TMC and work is continuing on getting this reference oil ready to ship out to the industry for introduction into the LTMS. It should be available for shipment in approximately six weeks.

Stripped Viscosity Measurement Investigation

During lab visits, the TMC has been conducting an investigation into the procedures used at the calibrated test labs to determine the stripped viscosity of the 10-h used oil sample as required by the Sequence VIII Test Method. This activity was performed in conjunction with the Stripped Viscosity Round Robin activities that have been conducted recently and was completed during the last period.

To summarize, all three calibrated test labs were found to use a fairly similar apparatus and test procedure to perform this measurement. However, some slight differences in the apparatus and test procedures were found. Only one of the three labs uses a mechanical stirrer in the stripping apparatus as required in Section A14.1.1 of the Sequence VIII Test Method (D6709). The other two laboratories rely on the nitrogen sparge to stir the oil sample during the stripping procedure, rather than some mechanical stirring method.

Another difference noted was that one of the three test laboratories uses a 1 μm filter pad instead of the 0.5 μm filter pad required in section A14.1.3 of the Test Method.

The only other difference of note is in the timing of the stripping procedure. The Test Method defines the stripping procedure as heating the sample at $120 \pm 5^\circ\text{C}$ for one hour in a vacuum of 100 mmHg, etc. One laboratory begins the one-hour clock at 115°C while the others begin the one-hour time clock when the sample reaches 120°C . The procedure listed in the Test Method is not clear as to which interpretation is correct.

Of the differences noted above, only the mechanical stirring and filter media differences are considered significant. The laboratories that did not conform to the requirements listed in the Test Method on these two items have been made aware of the deficiencies and are working to correct those deficiencies in their procedures.

The Surveillance Panel will need to decide if the Stripped Viscosity Round Robin activity that has taken place in the past should be continued in the future. If so, the specifics of when, how, and the repercussions of failing to perform this activity or generate acceptable results will need to be addressed by the Surveillance Panel before the process can be formally put in place.

MTK/mtk

Attachments

c: F. M. Farber, TMC
Sequence VIII Surveillance Panel
<ftp://ftp.astmtmc.cmu.edu/docs/gas/sequenceviii/semiannualreports/VIII-04-2002.pdf>

Distribution: Electronic Mail

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List of Figures

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

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

Figure 3 graphically presents a historic perspective for BWL mean delta/s by report period.

- Figure 4 graphically presents a historic perspective for BWL pooled standard deviations by report period.

Figure 5 graphically presents a historic perspective for SVIS mean delta/s by report period.

Figure 6 graphically presents a historic perspective for SVIS pooled standard deviations by report period.

Figure 7 graphically presents a comparison of Total Bearing Weight Loss (Delta/s) vs. the amount of lead content, in ppm, in the bearing storage oil.

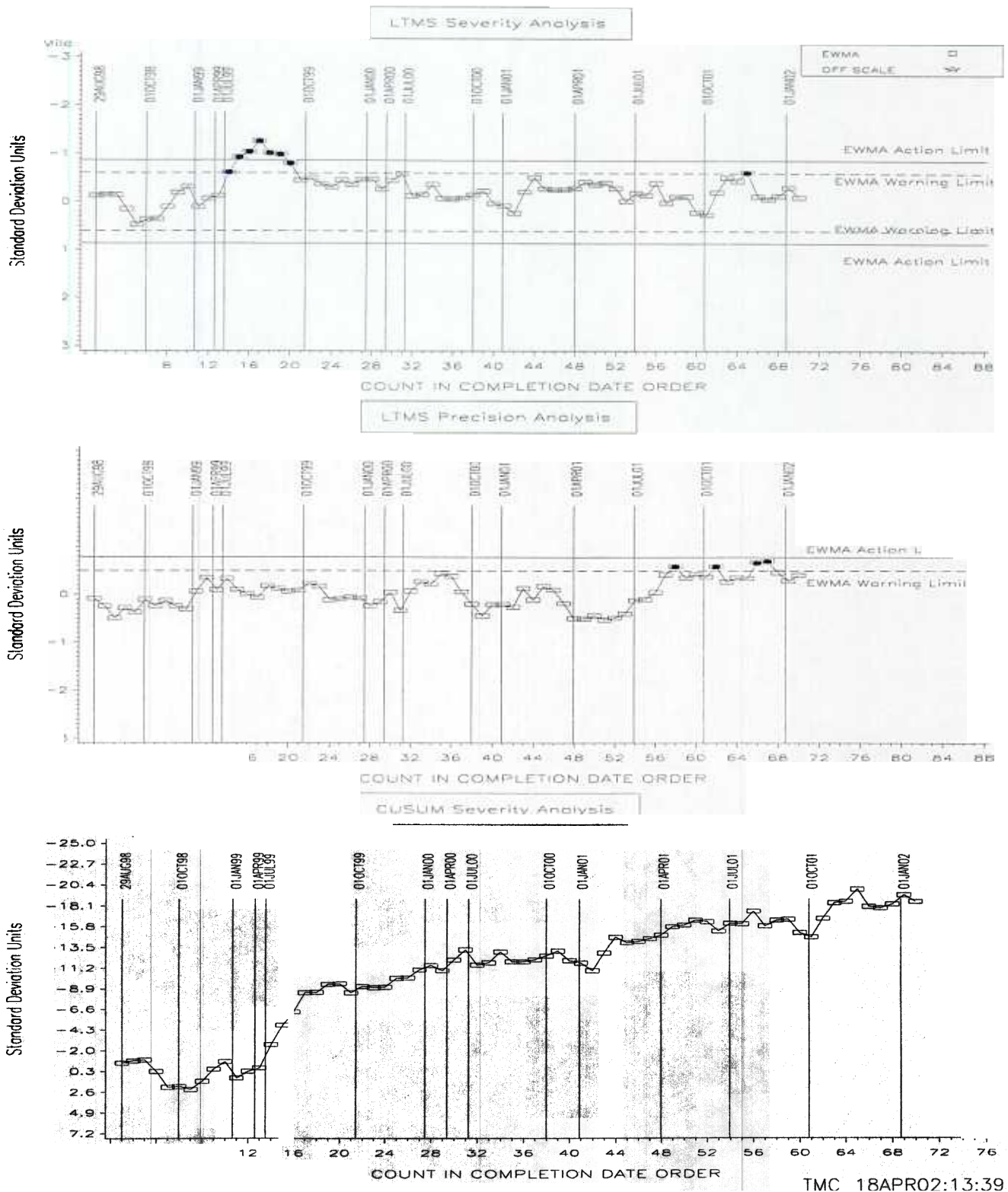
Figure 8 graphically presents the amount of lead content, in ppm, in the bearing storage oil by completion date order (Sequence VIII and L-38 data combined).

Figure 9 is the Sequence VIII Timeline, created to track changes in test hardware and operations.

SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA

FINAL BEARING WEIGHT LOSS

Figure 1



SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA

STRIPPED VIS. @ 100 DEG C

Figure 2

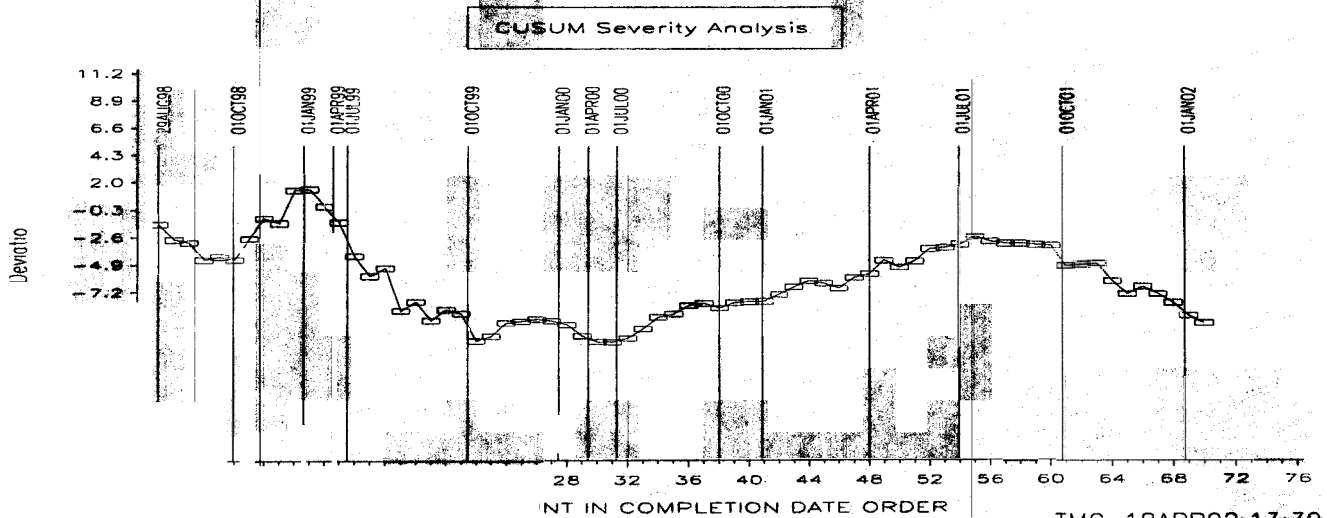
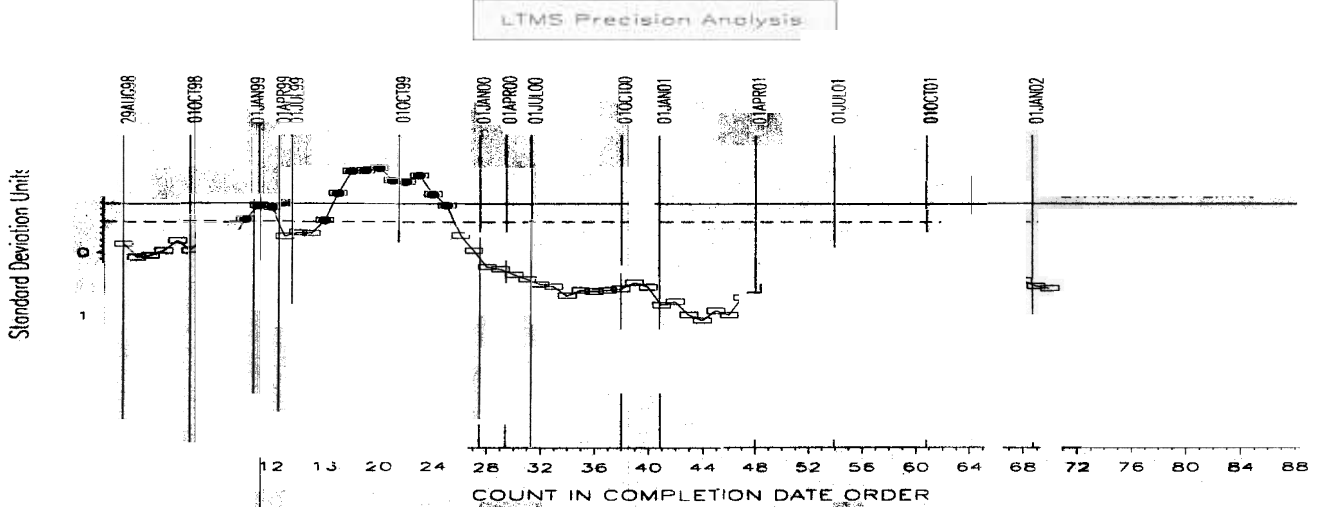
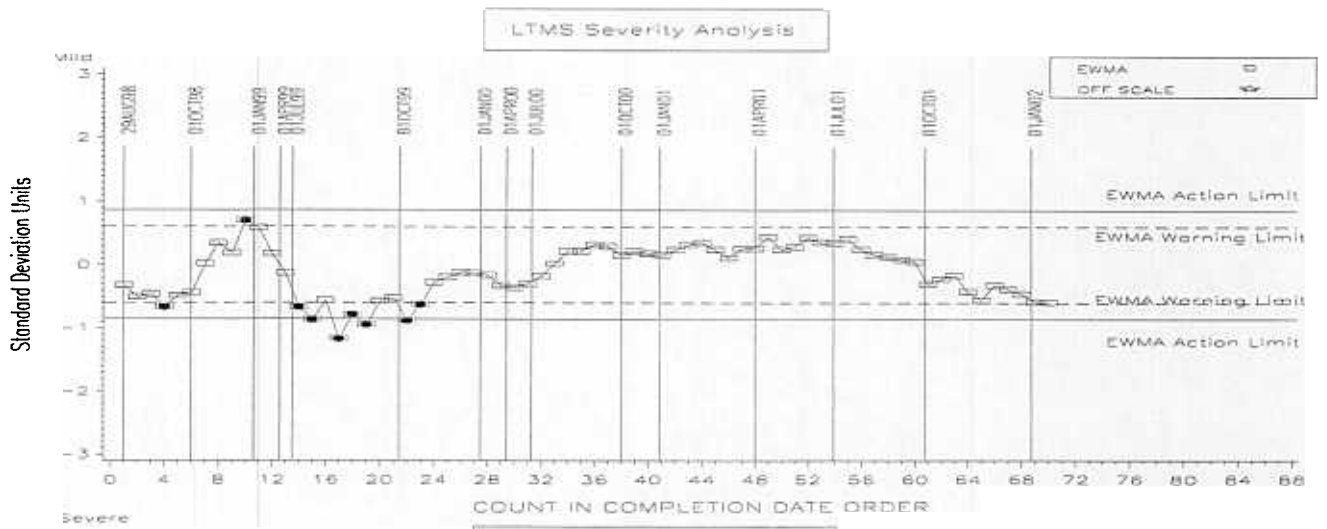


Figure 3 - Sequence VIII Reference Oil Data
Bearing Weight Loss

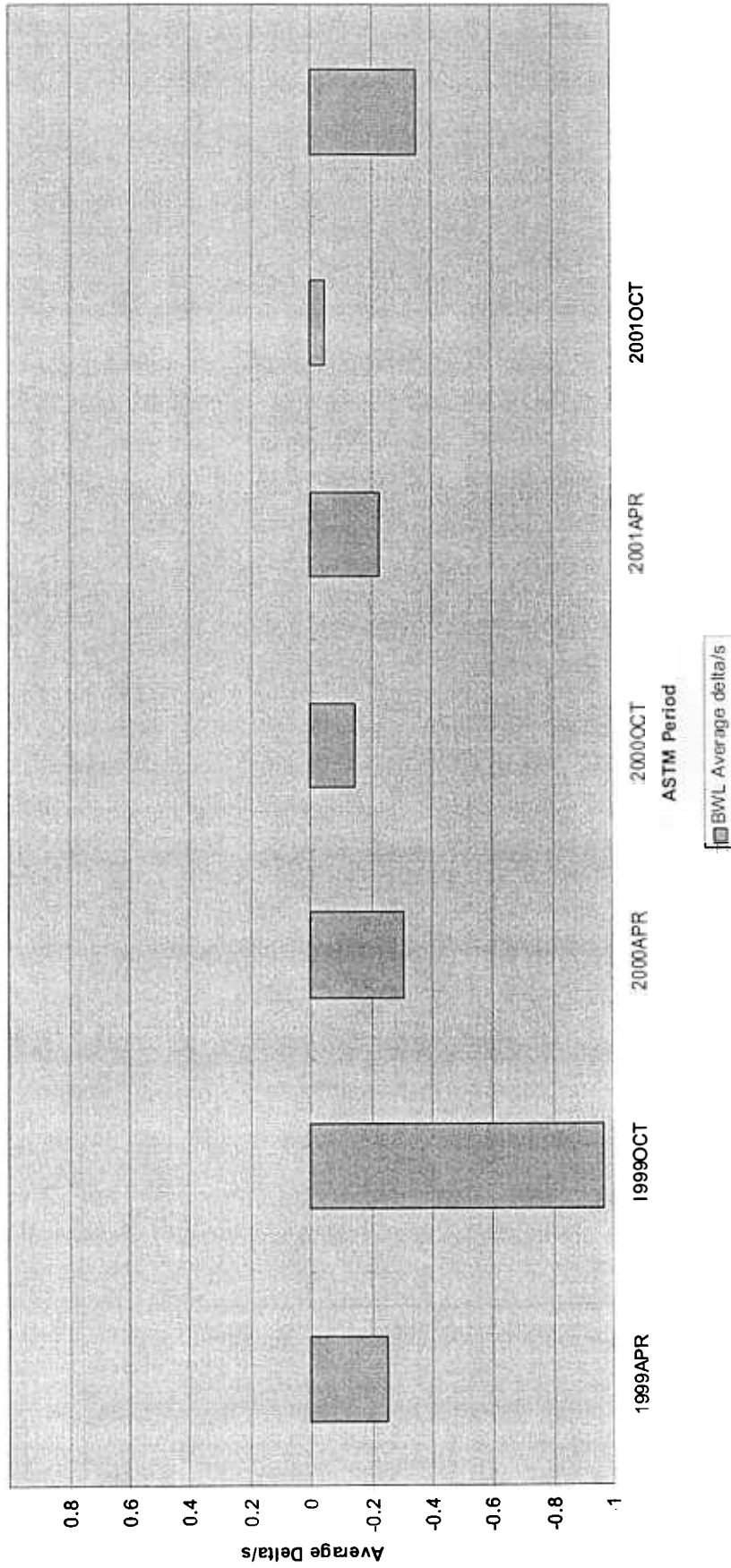


Figure 4 - Sequence VIII Reference Oil Data
Bearing Weight Loss

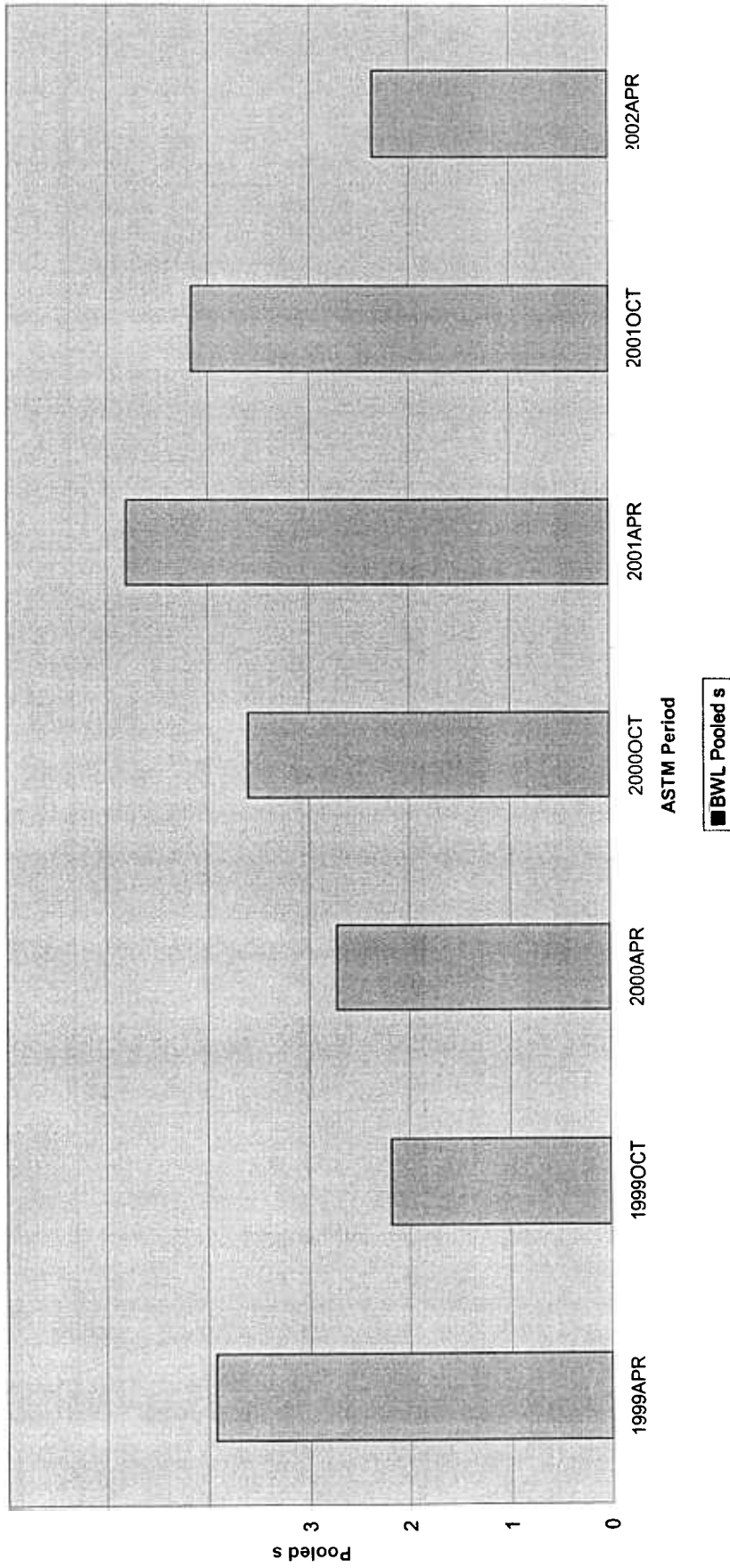
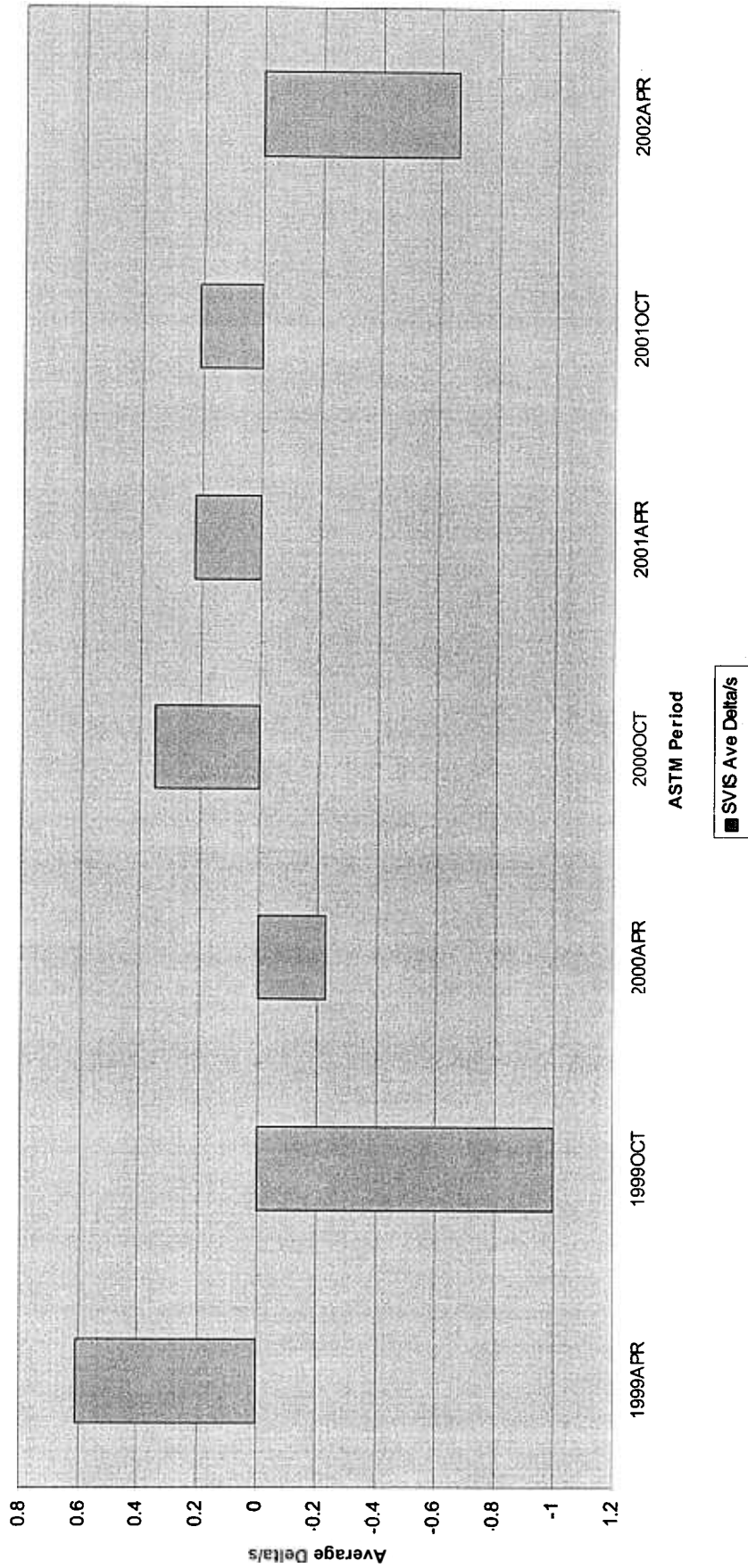
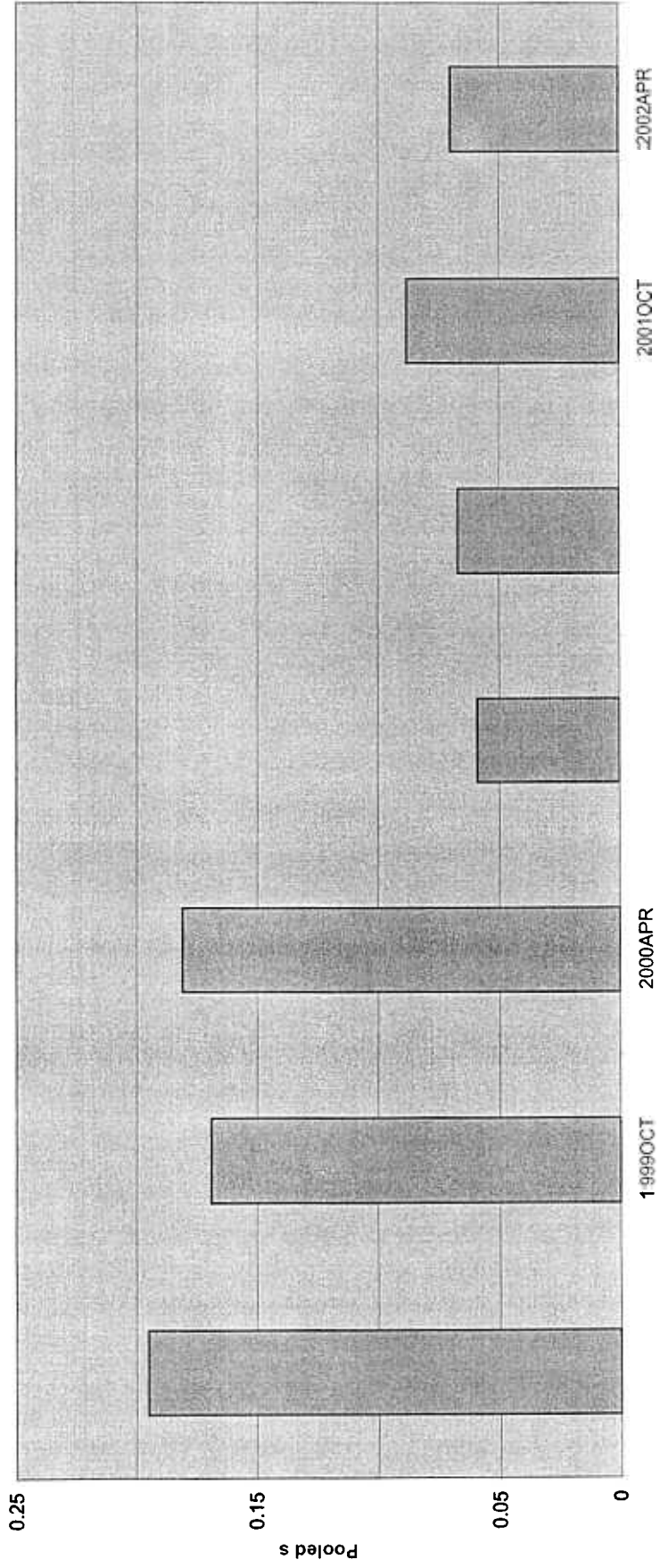


Figure 5 - Sequence VIII Reference Oil Data
Stripped Viscosity



Reference Oil Data
Pooled Viscosity



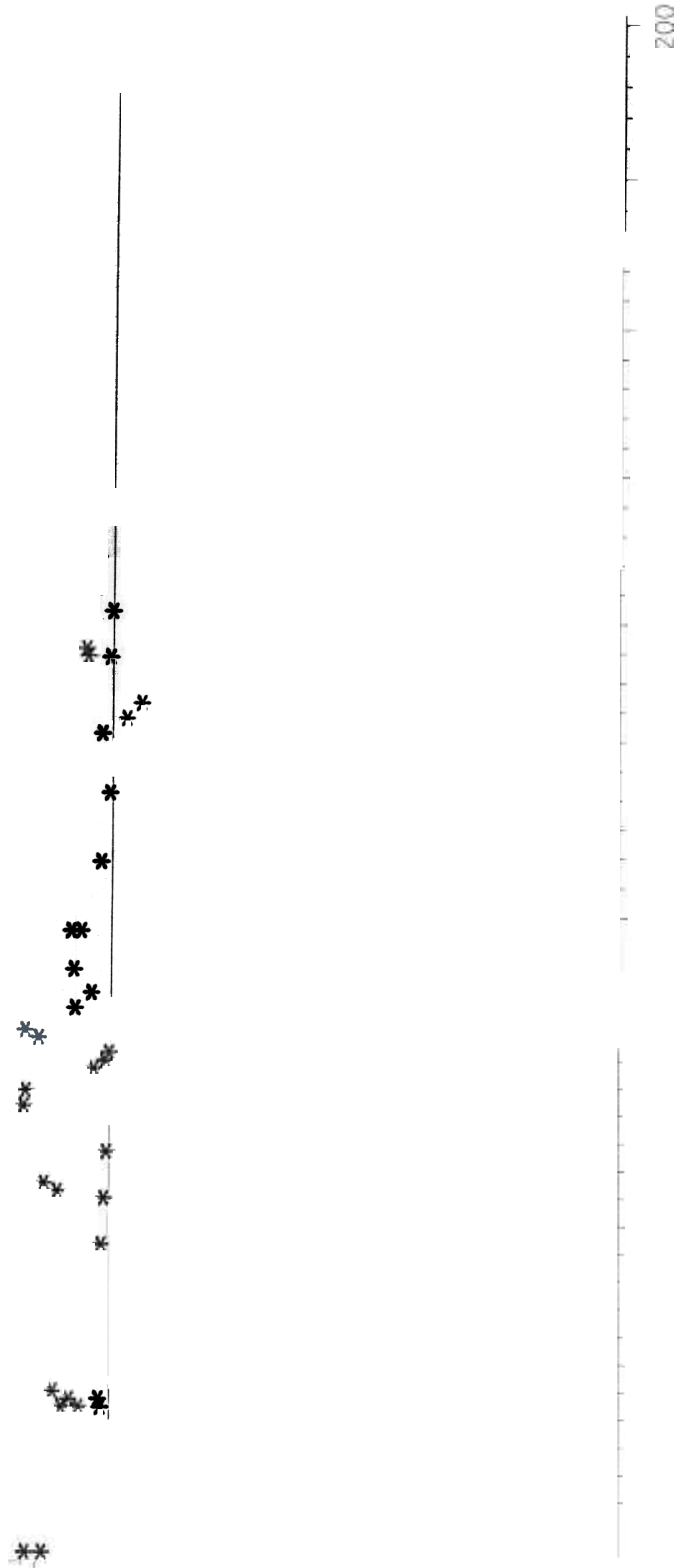
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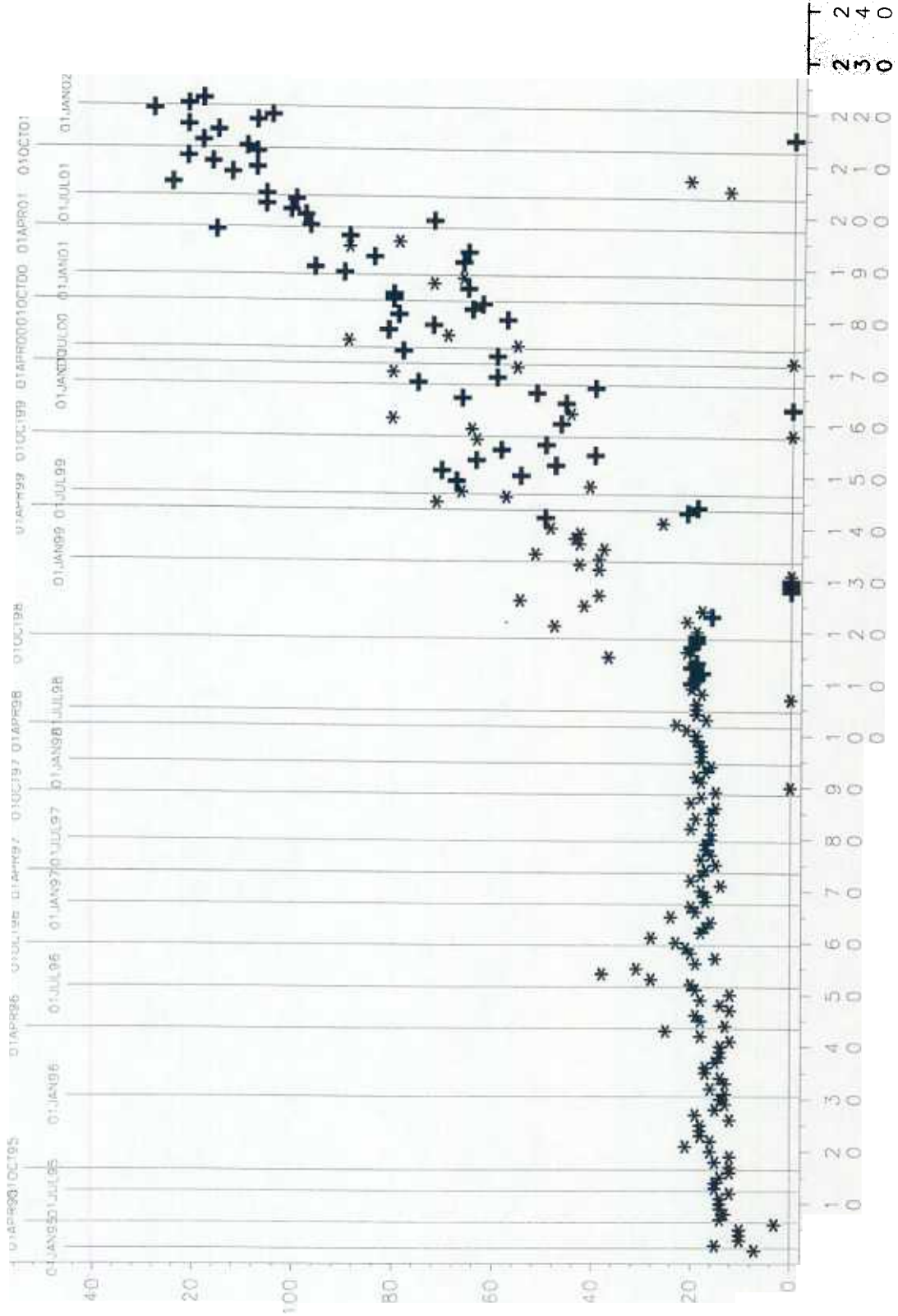
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BEARING DATA

FIGURE 8
 ARIN OIL STORAGE LEAD PPM vs COMPLETION DATE
 September 1, 1994 through March 31, 2002



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Figure 9 - Sequence VIII Timeline		
Date	Topic	Information Letter
2/10/1999	NEW PISTON RING BATCH APPROVED FOR USE IN SEQUENCE VIII TESTING	00-1
4/16/1999	DRAFT 3.1 OF THE SEQUENCE VIII TEST PROCEDURE ISSUED	99-1
5/19/1999	REMOVAL OF RING BATCH REPORTING REQUIREMENTS	00-1
5/19/1999	NEW OIL FILTER (RAYCOR LFS-62) IMPLEMENTED INTO TESTING	00-1
11/16/1999	TEST ENGINEERING INC. NEW TEST PARTS SUPPLIER	00-1
1/28/2000	PISTON CLEANING PROCEDURE FOR REUSING PISTONS IN SEQUENCE VIII TESTING	00-1



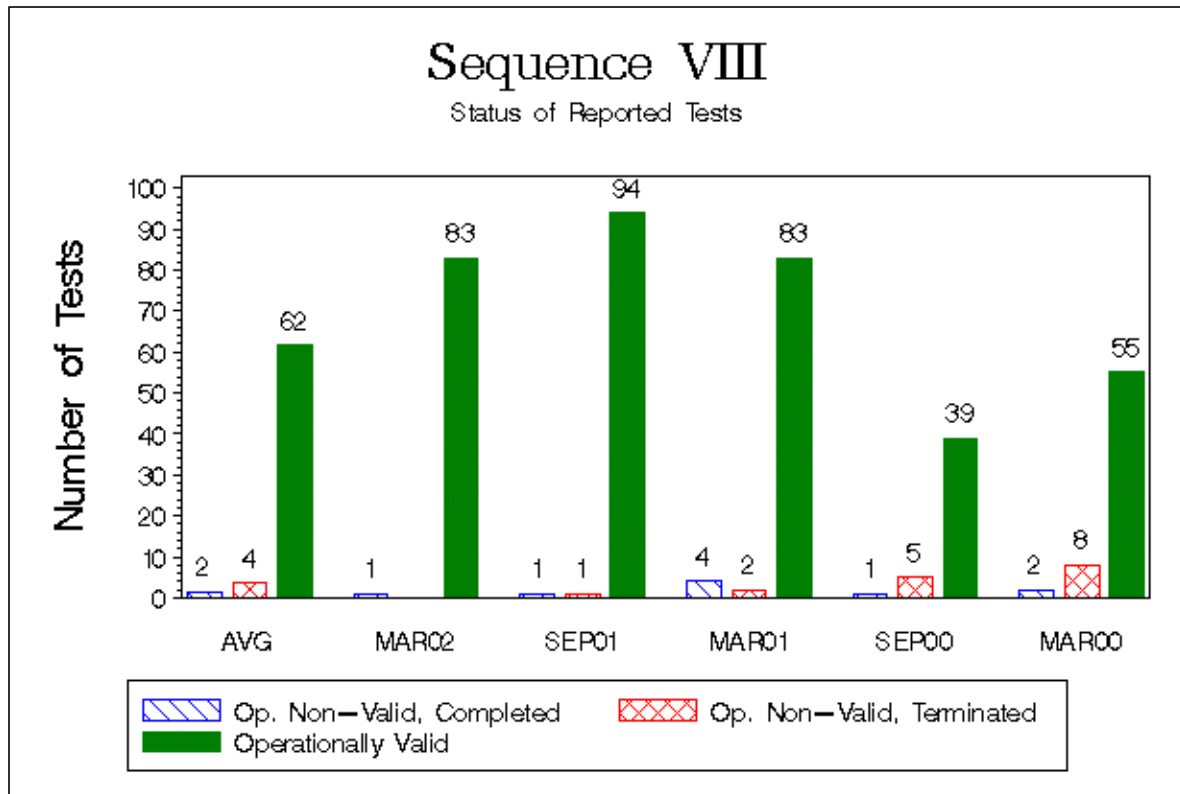
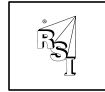
**RSI Sequence VIII Semi-Annual Report
Six-Month Period Ending March 2002**

STATUS OF REPORTED TESTS		
STATUS	N	PERCENT
Operationally Non-Valid, Completed	1	1.2%
Operationally Valid	83	98.8%
<i>Total Reported Tests</i>	<i>84</i>	<i>100.0%</i>

CAUSES FOR LOST TESTS	N
Engine Mechanical Problems	1

SEQUENCE VIII PRECISION		
COMPONENTS OF REPLICATED DATA BASE	N	
Number of Tests	0	
Number of Oils	0	
Number of Labs	0	
Number of Stands	0	
Number of Stand/Engine Combinations	0	
Number of Severity Adjusted Bearing Weight Loss Tests	0	

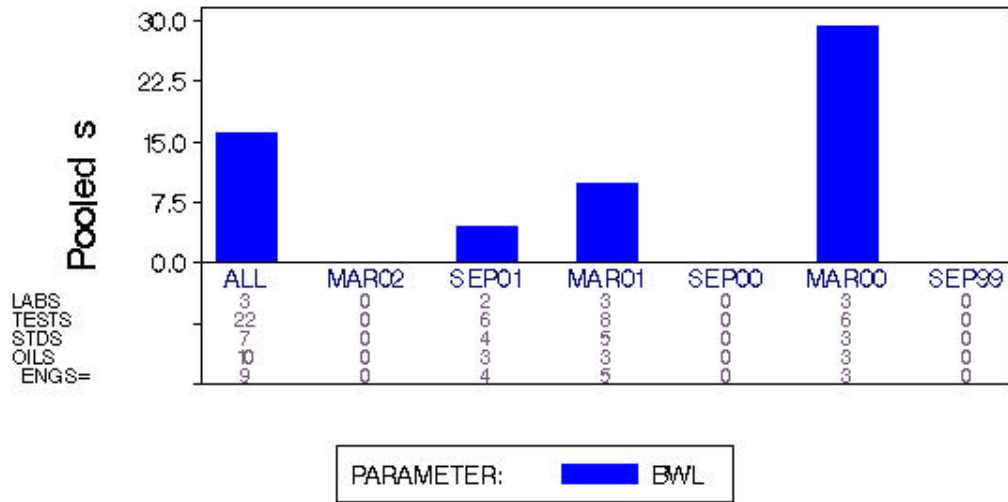
VARIABLE	Pooled s	R
Bearing Weight Loss, Adjusted	-	-
Bearing Weight Loss, Non-Adjusted	-	-





Sequence VIII Candidate Precision

Operationally Valid, Adjusted Data



Leverett, Charlie

From: Shimski, John T [ShimskiJT@navair.navy.mil]
Sent: Wednesday, May 08, 2002 8:29 AM
To: 'Leverett, Charlie'
Subject: SEQ VIII MEETING

Hello Charlie:

Due to other commitments I will not be attending the meeting in Detroit next week. I thought I would just give you a short statement to express our continued interest in your committee's activities. The Navy has been keeping me busy for the last few months doing other things and I have not done much regarding the Seq VIII / L-38 replacement effort. I hope to move on this during the summer. Here is a brief statement for the minutes as an information item.

The SAE TC-8 Committee for Aviation Piston Engine Lubricants continues to be interested in adopting the Sequence VIII engine test as a replacement for the L-38 in SAE Standards J-1899 and J-1966. While the test method may be adopted, a different interpretation of the results may be required. Limited Sequence VIII testing on aviation oils previously run in the L-38 have not produced the desired Bearing Weight Loss correlation. Depending on the oil used, BWL has increased from 60 to 600 or dropped from 350 to 35 (L-38 to Seq VIII comparison using approximate values). From the limited number of oils examined (five with two duplicates included) it appears doubtful that BWL will be a highly useful value to the TC-8 Committee. However, lubricant property changes (viscosity and total acid number) are similar from both tests and have performance limits in the J-standards. There is a desire to keep a fired engine test in these standards as part of the basic performance requirements prior to actual aircraft engine testing. The Seq VIII remains the leading candidate to fulfill this need.

Our next TC-8 meeting will be held this summer (date not yet set) to discuss this issue. The anticipated outcome is to have all oil formulators conduct Sequence VIII testing on multiple products in order to compile a performance database. Following examination of the data we will make the final decision regarding the status of the Seq VIII test in our J-Standards.

If anyone has any insight regarding our test results I would appreciate their comments.

Please continue to keep me on your distribution list for SEQ VIII items.

Sincerely, -- John

John Shimski
Fuels and Lubricants Division
Naval Air Systems Command
voice: 301.757.3412
Fax: 301.757.3614

SCOPE AND OBJECTIVES
SEQUENCE VIII SURVEILLANCE PANEL

SCOPE

The Sequence VIII Surveillance Panel is responsible for the surveillance of the Sequence VIII test procedure (ASTM D 6709-01). This panel works in conjunction with **Test Engineering Inc. (TEI)** who supplies the test hardware. Improvements in the test operation, test monitoring, and test validation will be accomplished through continual communications with the test hardware supplier, the **ASTM Test Monitoring Center**, the **Technical Guidance Committee**, and the **ACC Monitoring Agency**. The panel will maintain an up-to-date evaluation of the precision of the VIII reference oils and will report this precision and test severity levels to D02.BO.01 Oil Classification Panel and section. These combined efforts will help to assure that the Sequence VIII test will continue to provide the industry with a precise method for evaluating a lubricant's ability to protect against copper-lead bearing weight loss and to evaluate the viscosity stability of multi-viscosity-grade oils.

OBJECTIVES

- | | |
|---|----------------|
| Work with TGC to bring one to two GF-3 oils into the VIII LTMS. | November, 2002 |
| Improve Strip Viscosity | November, 2002 |
| Introduction of Reference Oil 1006-2 | November, 2002 |