



Test Monitoring Center

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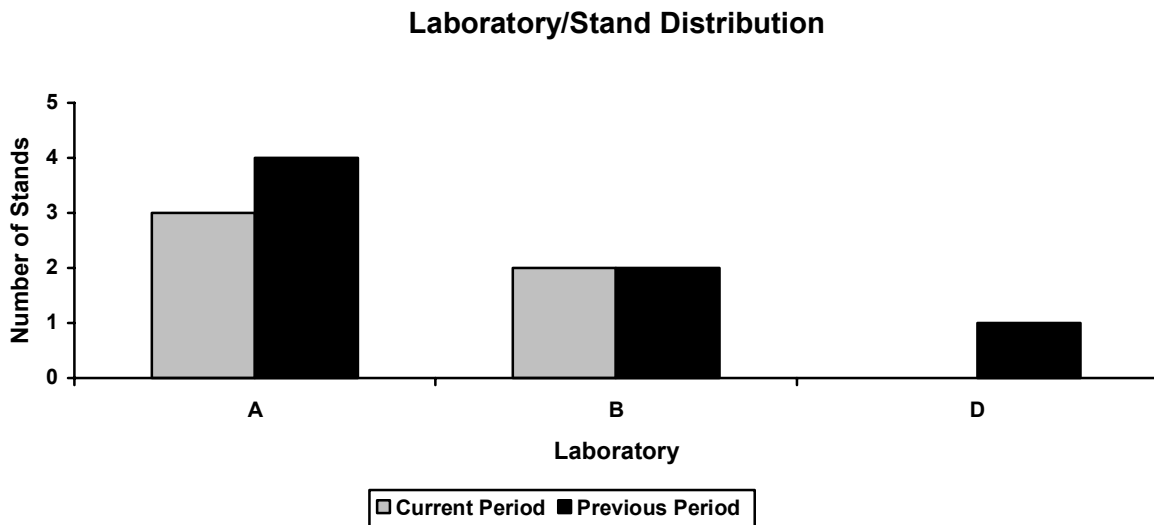
Memorandum: 03-105
Date: October 21, 2003
To: Fred Gerhart, Chairman, Sequence VIII Surveillance Panel
From: Michael T. Kasimirsky *Michael T. Kasimirsky*
Subject: Sequence VIII Semiannual Report: April 1, 2003 to September 30, 2003

The following is a summary of Sequence VIII reference oil tests that were reported to the Test Monitoring Center during the period from April 1, 2003 to September 30, 2003.

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2003
Number of Laboratories:	2	2
Number of Stand/Engine Combinations:	5	5

The following chart shows the laboratory/stand distribution:



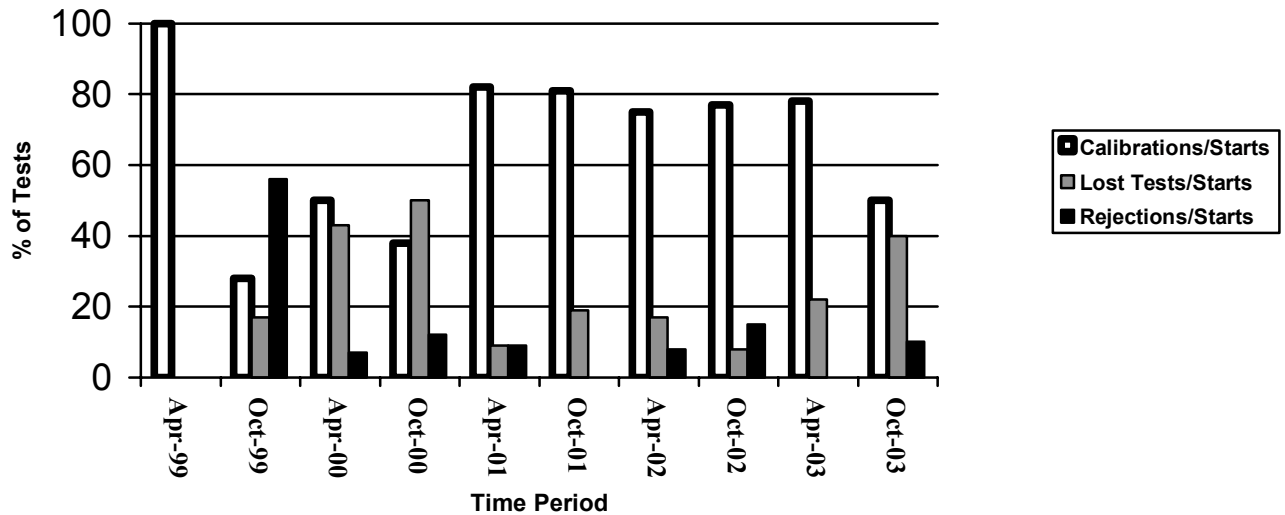
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Code	No. of Tests
Operationally and Statistically Acceptable	AC	5
Failed Acceptance Criteria	OC	1
Stand/Engine failed to successfully calibrate, engine abandoned and data pulled	MC	0
Operationally Invalid (Laboratory Judgment)	LC	3
Operationally Invalid (Laboratory & TMC Judgment)	RC	0
Aborted	XC	1
Total		10

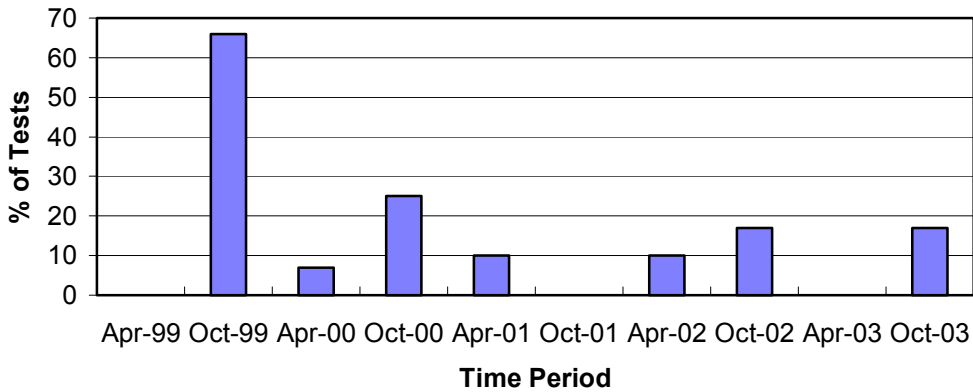
Donated & Industry Support Outcomes	TMC Validity Code	No. of Tests
Donated Tests	AG	0
Total		0

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

Calibration Attempt Summary



Rejected Operationally Valid Tests



One test failed this period for mild BWL.

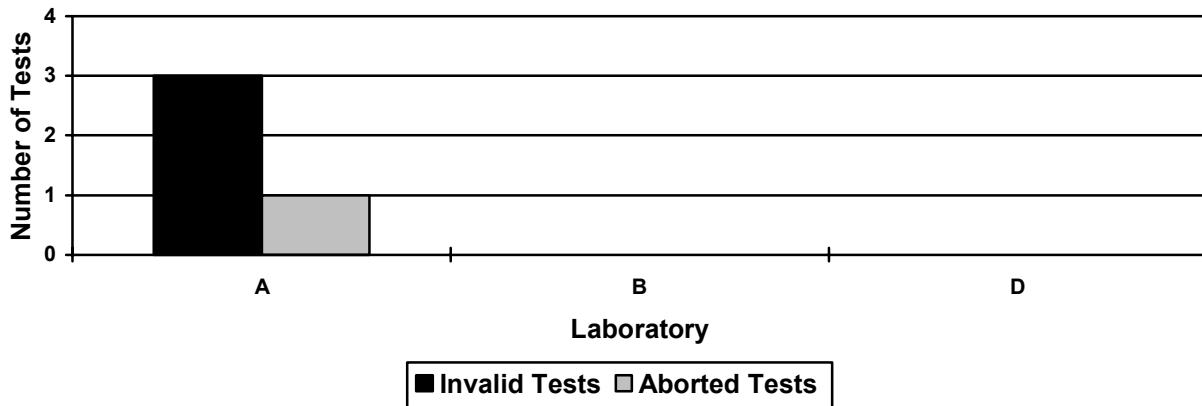
There were no LTMS Deviations this period. There have been no deviations from the LTMS since its introduction in 1999.

One lab visit was performed this period. No significant problems were found.

Lost Test Summary

Four tests were lost this period: one due to mechanical bearing wear, one due to excessive downtime, one due to improper valve timing, and one due to a blown head gasket. All four tests were conducted on the same power section at one laboratory. 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.

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	-0.98	2.45 (df=4)	-2.4 mg
SVIS	0.40	0.044 (df=4)	0.001 cSt

Average Δ/s by Laboratory		
Lab	BWL	SVIS
A	-0.62	0.48
B	-1.33	0.32
D	-	-

Bearing Weight Loss (BWL)

During the period, the industry was within limits on precision (see Figure 1) but is currently experiencing a mild EWMA severity alarm. This alarm was caused by a single mild failing result ($-2.5 Y_i$ result) at one laboratory. The rerun of this test and a subsequent test at another laboratory have been within limits (-0.82 and $-1.00 Y_i$ results, respectively) but have not cleared the industry alarm at this time. The Industry BWL mean Δ/s is -0.98 mild for this report period (see Figure 3), which is comparable to the mildest periods of historical performance. This equates to a shift of -2.4 mg in reported units. The pooled standard deviation for the period is 2.45 mg (see Figure 4), which is also comparable to recent historical performance.

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 169 ppm. The lead levels in the bearing storage oil continue to rise. This increase in lead levels in the bearing storage oil may be related to the overall mild trend in BWL results. However, further investigation is necessary to determine what effect, if any, this rise in lead levels is having on overall BWL results.

Stripped Viscosity (SVIS)

The industry has been within limits for both severity and precision for the period (see Figure 2).

The Industry SVIS mean Δ/s is 0.40 mild for this report period (see Figures 2 & 5). This equates to a shift of 0.001 cSt in reported units. The pooled standard deviation for the period is 0.044 cSt (see Figure 6), which exceeds the best historical performance to date.

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	433	216	5	10+ years
1006	44	22	4	3 months ¹
1006-2	4,967	2,483	4	3+ years ¹
1009	958	479	5	3+ years ¹

¹ Multiple test area reference oil; total TMC inventory shown

On November 13, 2001, the Sequence VIII Surveillance Panel approved a motion to introduce reference oil 1006-2 into the LTMS. This motion required that the test targets be updated when the TMC had received 10, 20, and 30 data points on this oil. During the period, the TMC reached the 10-test limit and the targets were updated. The updated test targets are shown below:

Updated Reference Oil 1006-2 Test Targets (N=12)		
Parameter	Mean	Standard Deviation
BWL	12.4	2.59
SVIS	9.24	0.06

These targets are effective for all tests completed on or after September 1, 2003.

Stripped Viscosity Measurement Investigation

The TMC was tasked with obtaining a used oil sample for use in the stripped viscosity investigation from a calibration test on reference oil 1009. All calibrated laboratories have been required to supply a used oil sample for this task, following a normal reference oil test. At this time a sample has not yet been obtained because the next laboratory in the rotation has not conducted a reference oil test. When one is obtained, samples will be sent out to the testing laboratories for the next iteration of the stripped viscosity investigation.

MTK/mtk

Attachments

c: F. M. Farber, TMC
Sequence VIII Surveillance Panel
<ftp://astmtmc.cmu.edu/docs/gas/sequenceviii/semiannualreports/VIII-10-2003.pdf>

Distribution: Electronic Mail

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.

Figure 1

SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA

FINAL BEARING WEIGHT LOSS

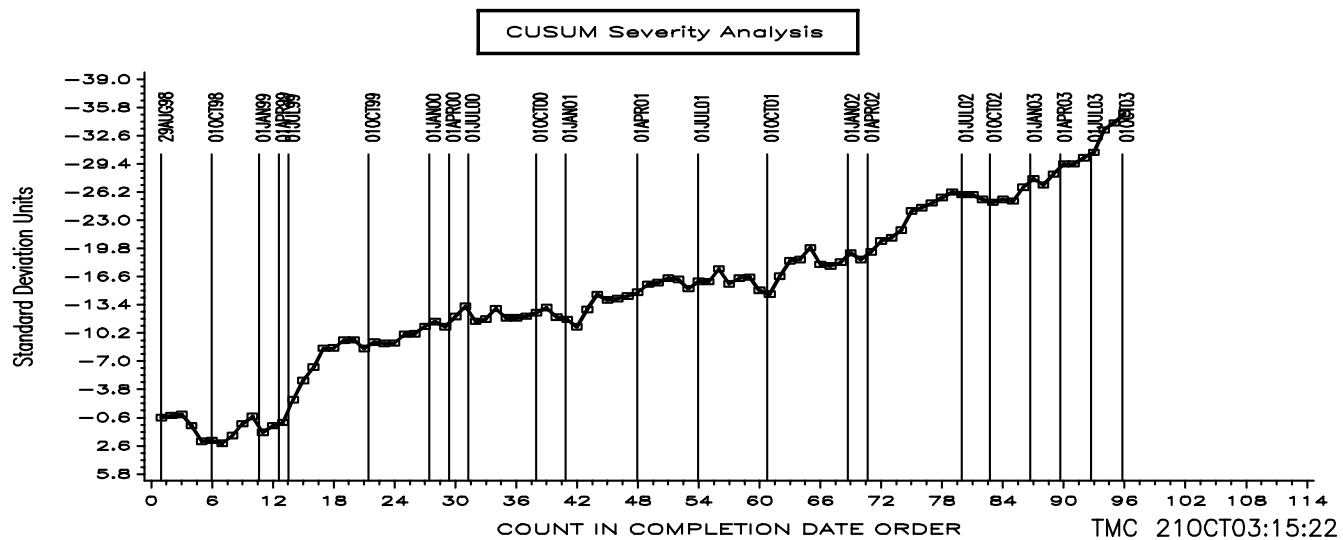
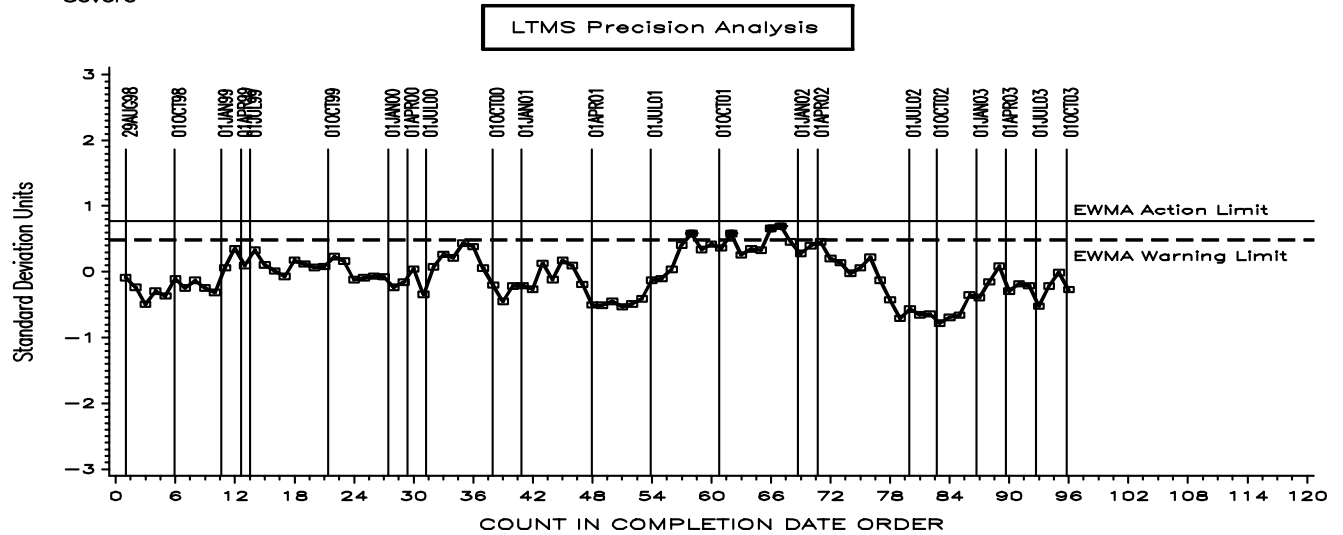
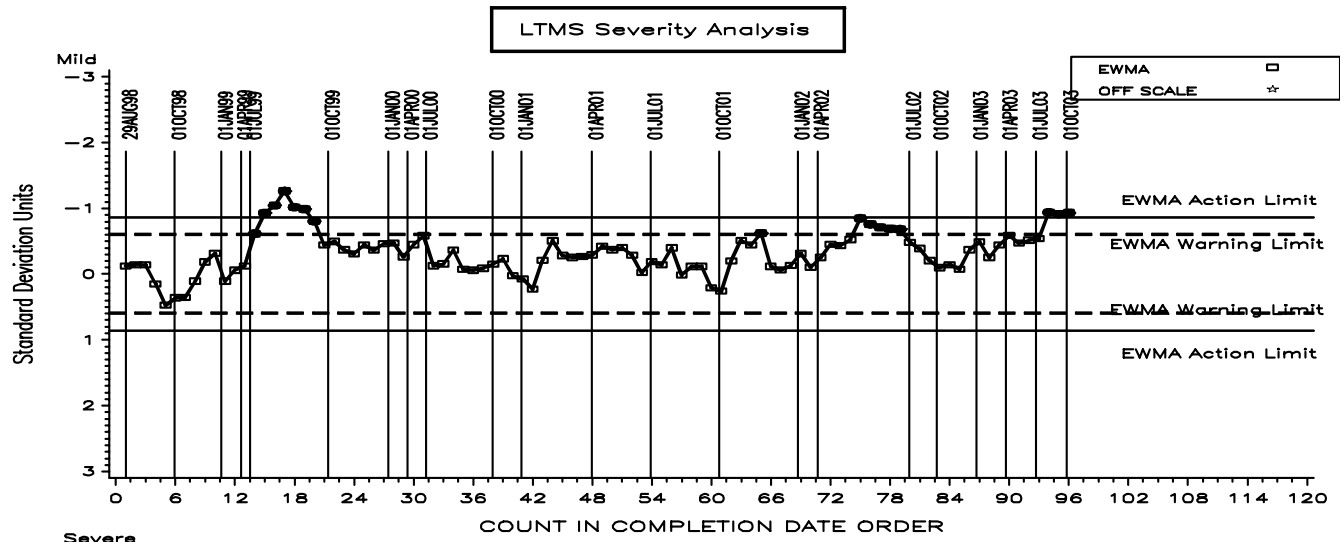


Figure 2

SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA

STRIPPED VIS. @ 100 DEG C

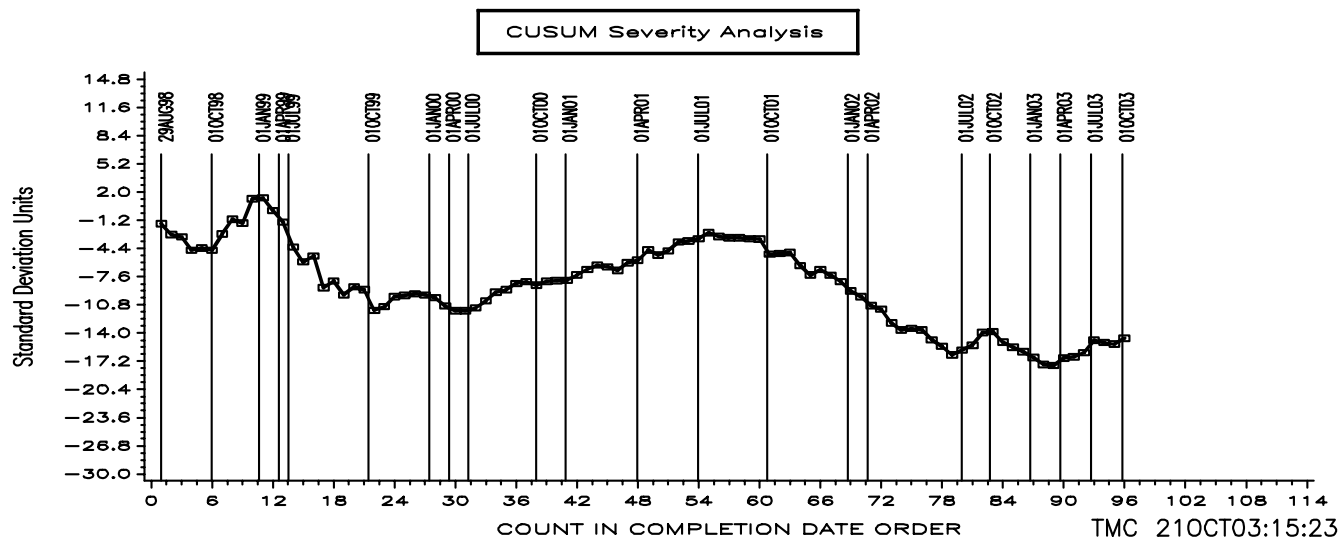
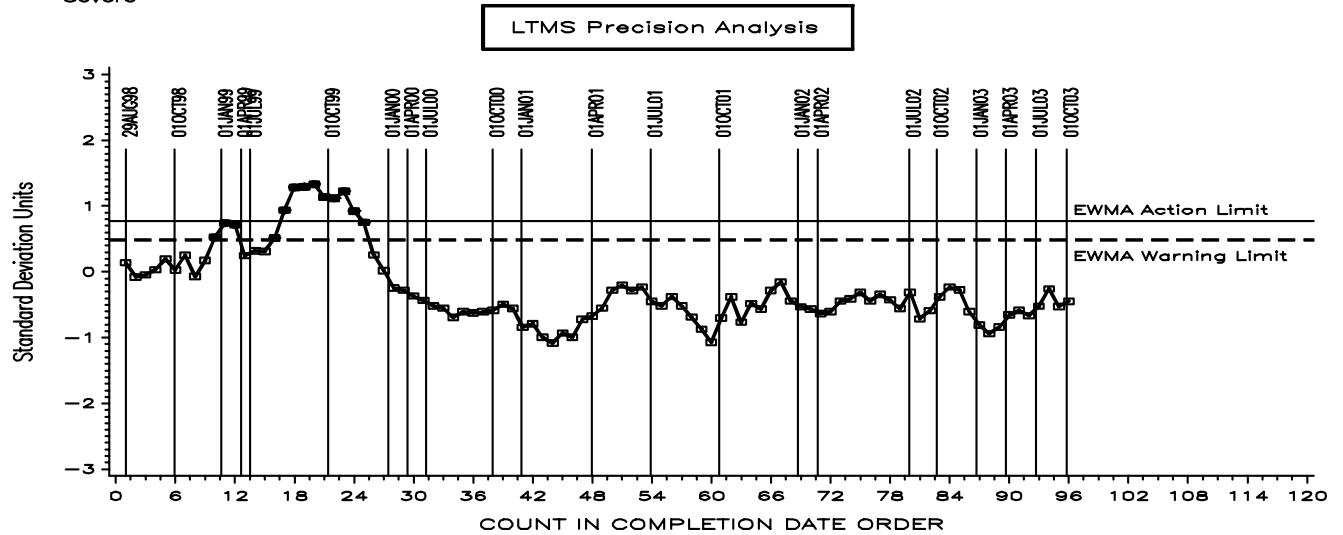
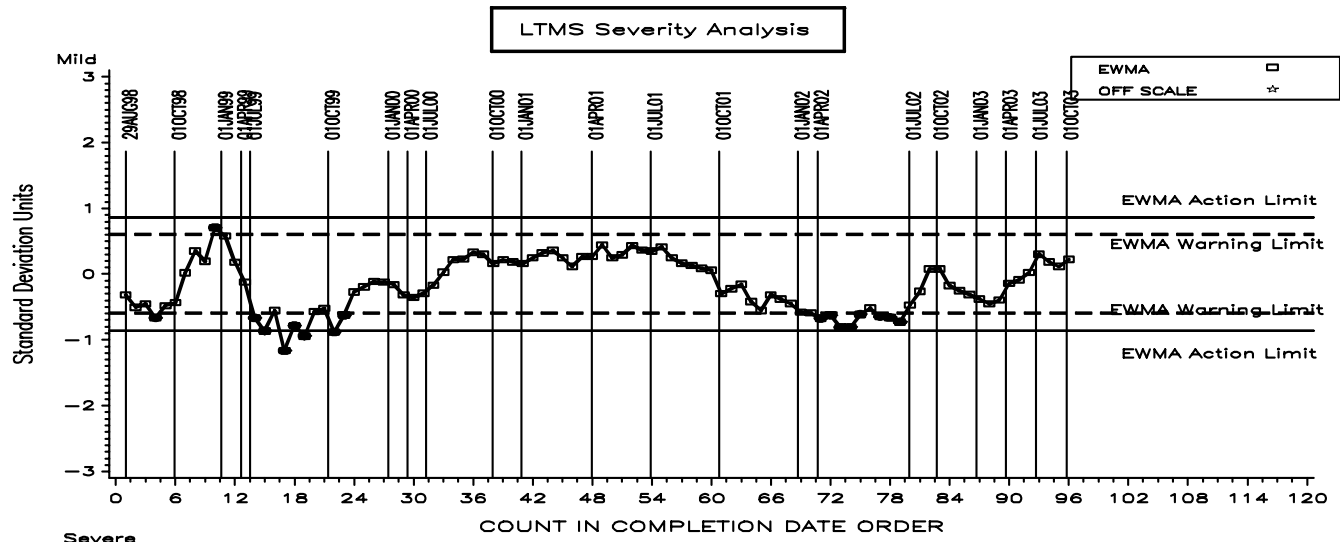
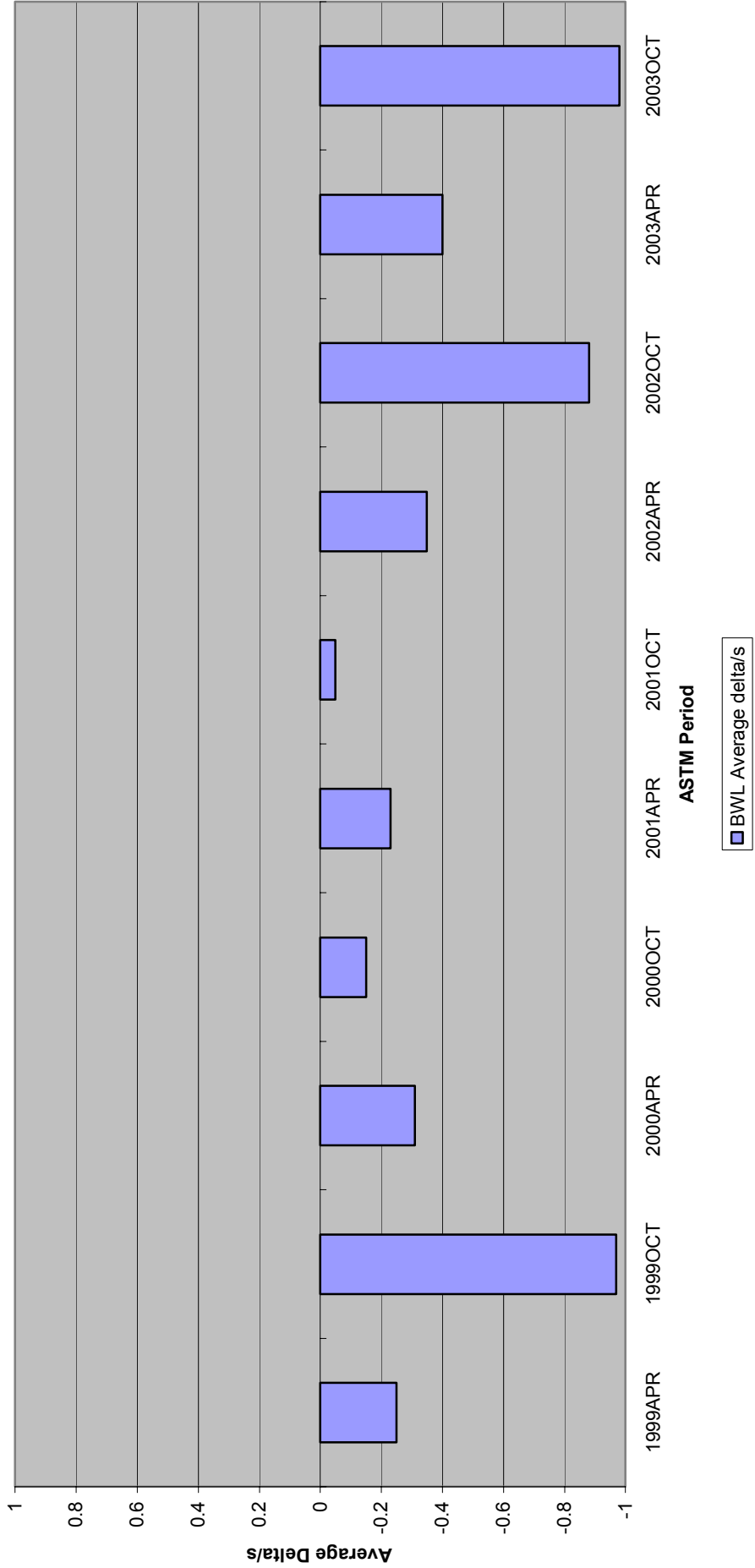


Figure 3 - Sequence VIII Reference Oil Data
Bearing Weight Loss



**Figure 4 - Sequence VIII Reference Oil Data
Bearing Weight Loss**

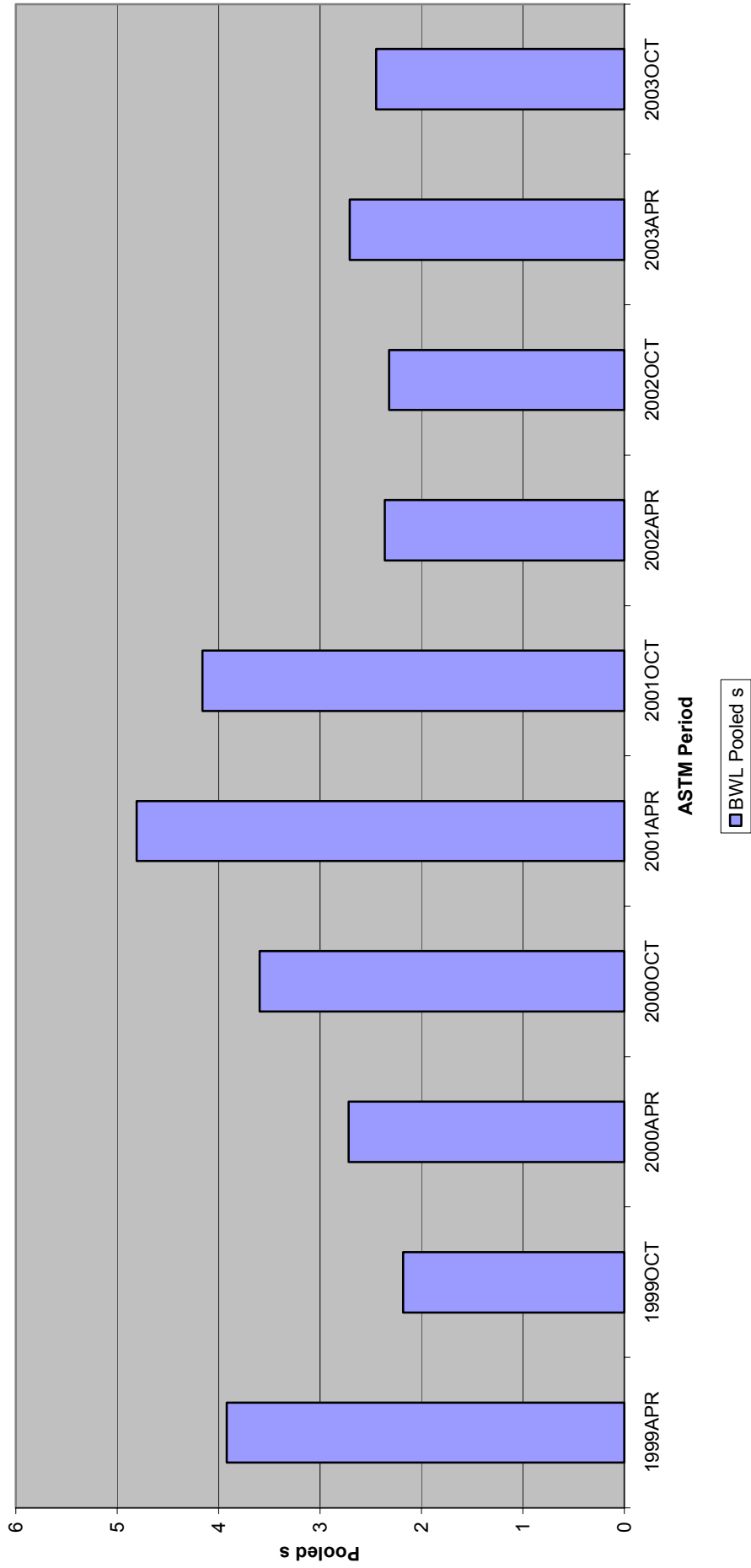
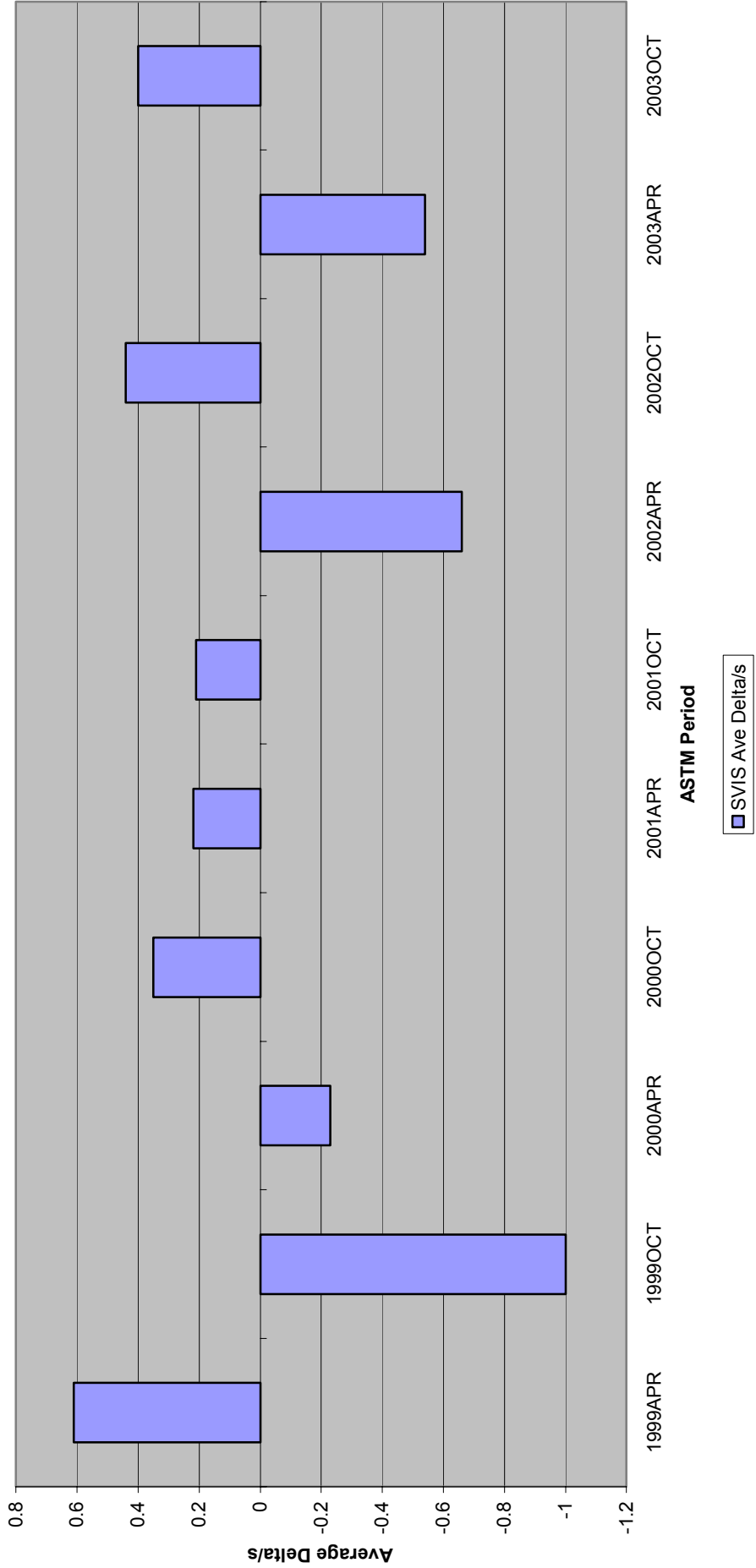


Figure 5 - Sequence VIII Reference Oil Data
Stripped Viscosity



**Figure 6 - Sequence VIII Reference Oil Data
Stripped Viscosity**

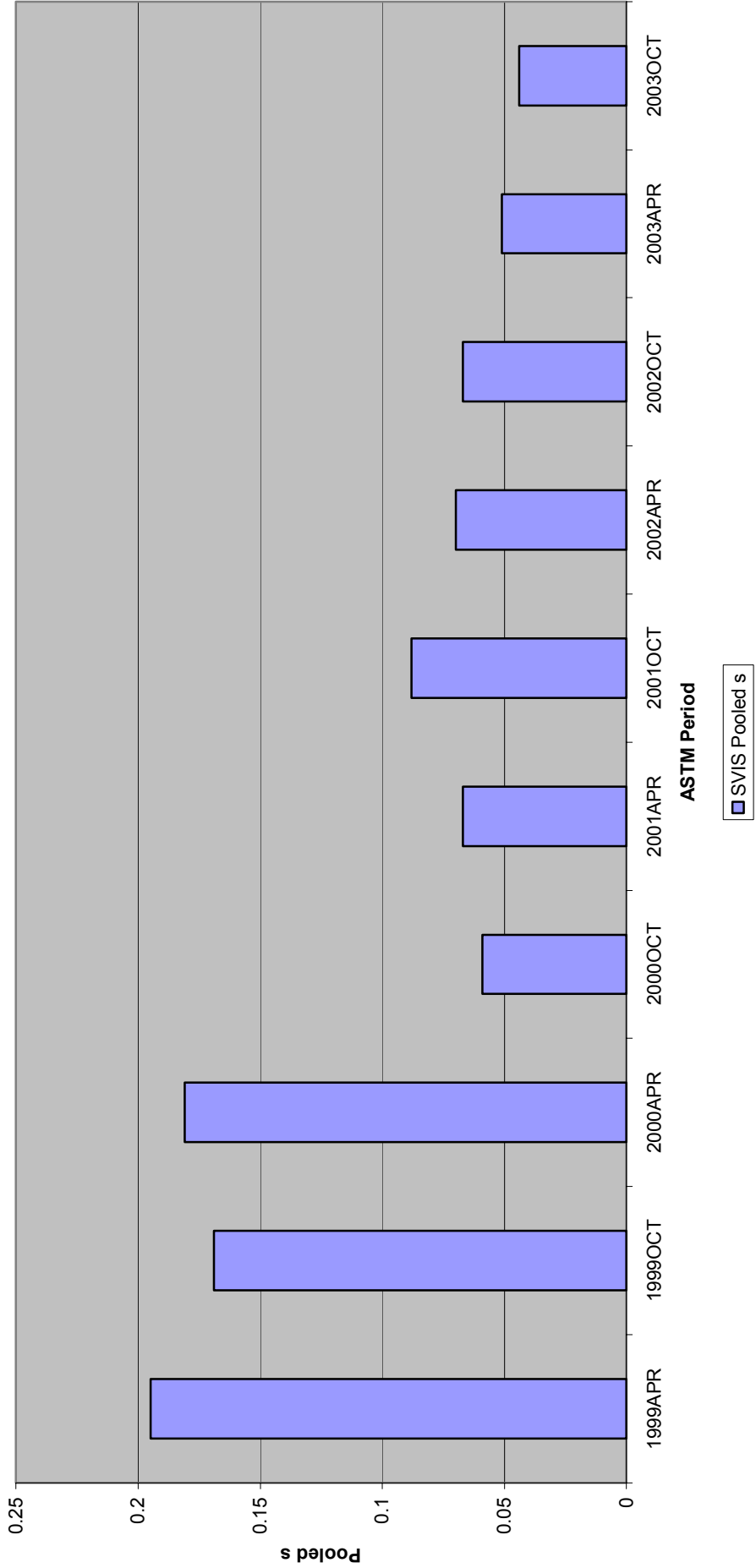
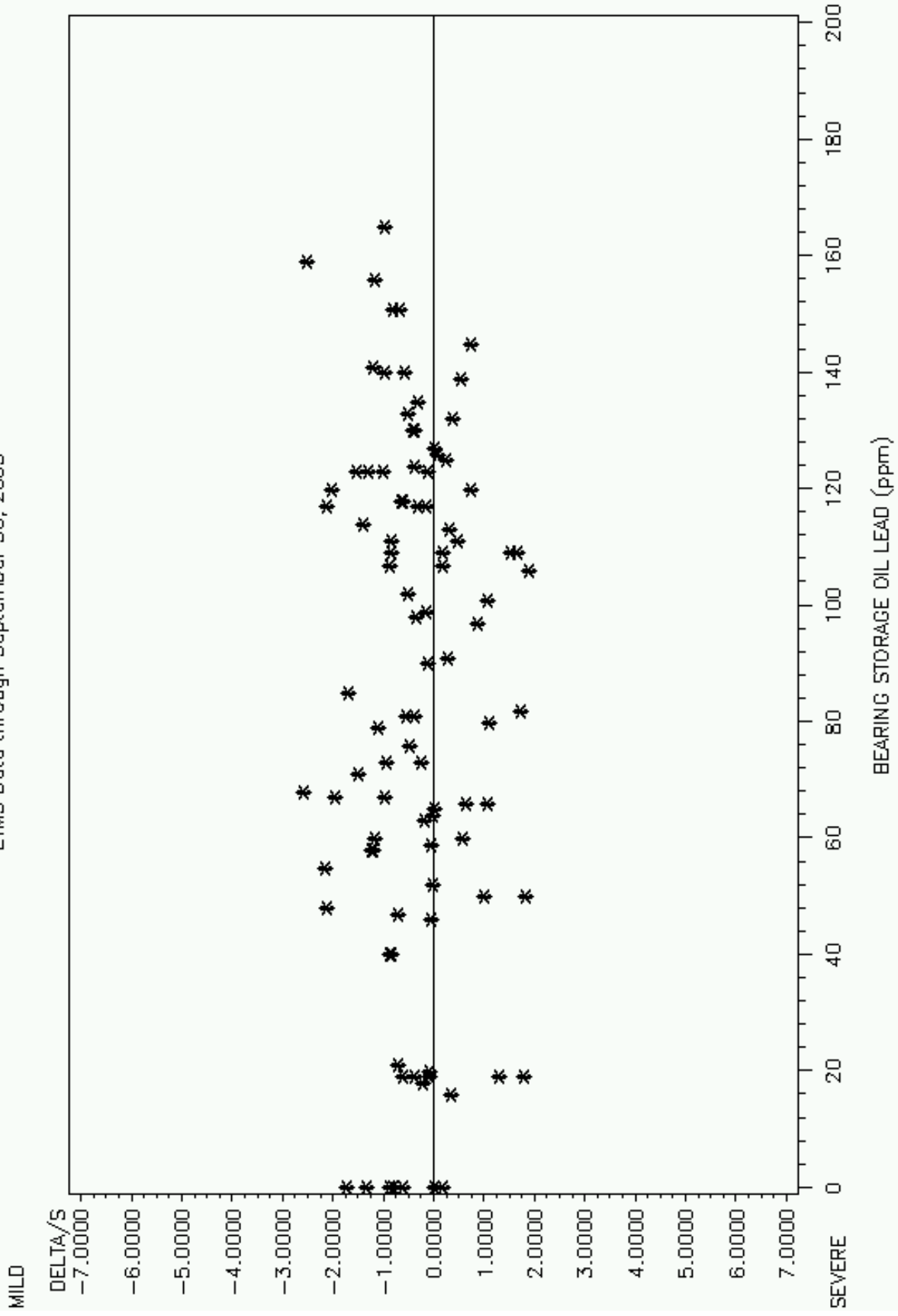


Figure 7

SEQUENCE VIII BWL DELTA/S vs LEAD PPM

LTMS Data through September 30, 2003



(*) BEARING BATCH 11/93

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
6/15/2002	REVISED STAY-IN-GRADE PROCEDURE IMPLEMENTED	02-1
11/18/2002	EDITORIAL REVISIONS TO D6709-01	02-2