



Test Monitoring Center

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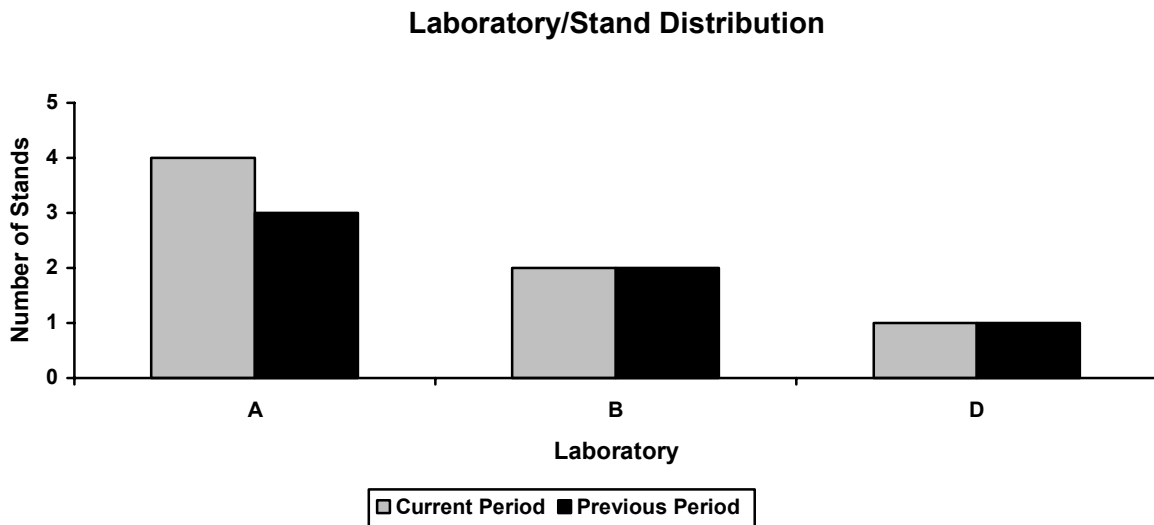
Memorandum: 04-095
Date: November 1, 2004
To: Fred Gerhart, Chairman, Sequence VIII Surveillance Panel
From: Michael T. Kasimirsky *Michael T. Kasimirsky*
Subject: Sequence VIII Semiannual Report: April 1, 2004 to September 30, 2004

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, 2004 to September 30, 2004.

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2004
Number of Laboratories:	3	3
Number of Stand/Engine Combinations:	7	7

The following chart shows the laboratory/stand distribution:



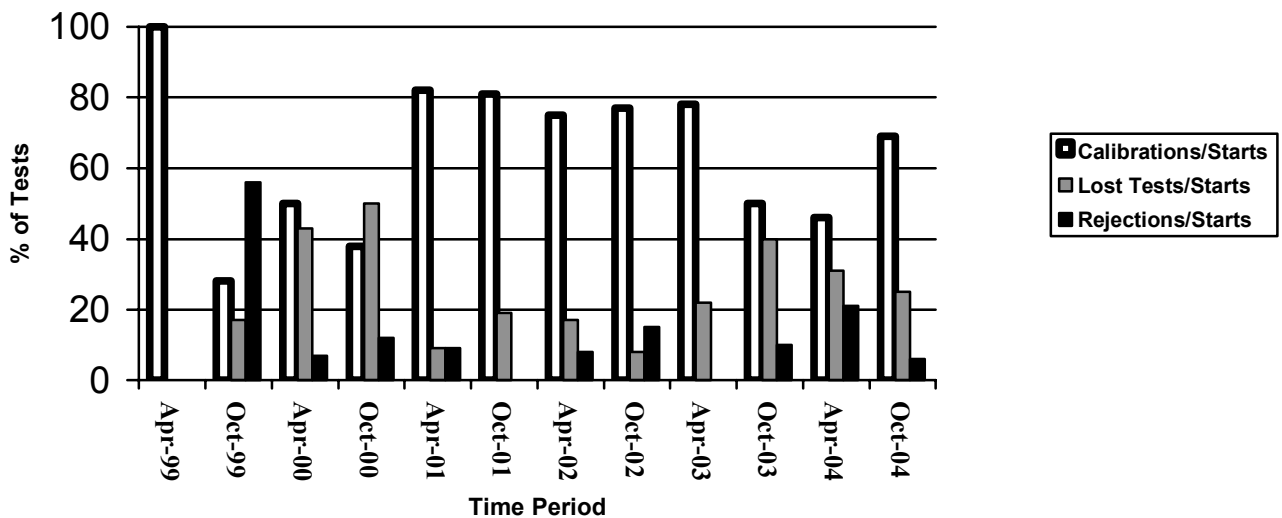
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Code	No. of Tests
Operationally and Statistically Acceptable	AC	11
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		16

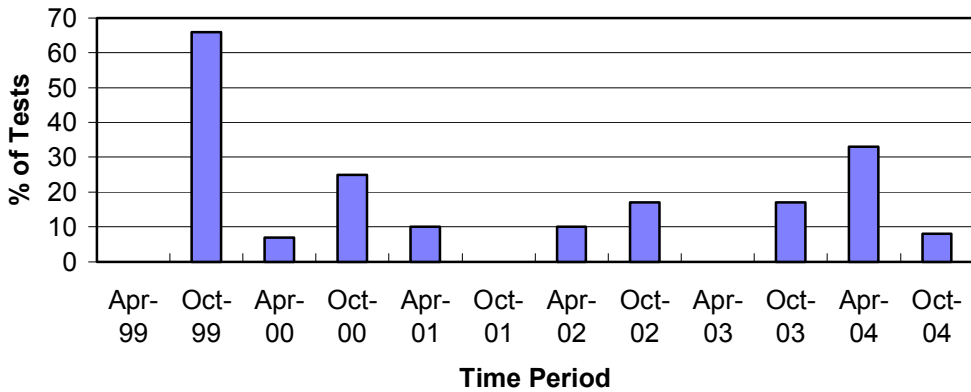
Donated & Industry Support Outcomes	TMC Validity Code	No. of Tests
Decoded Oil for stand shakedown run	AG	1
Total		1

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

Calibration Attempt Summary



Rejected Operationally Valid Tests



One tests failed this period due to an EWMA Stand Precision Alarm on BWL.

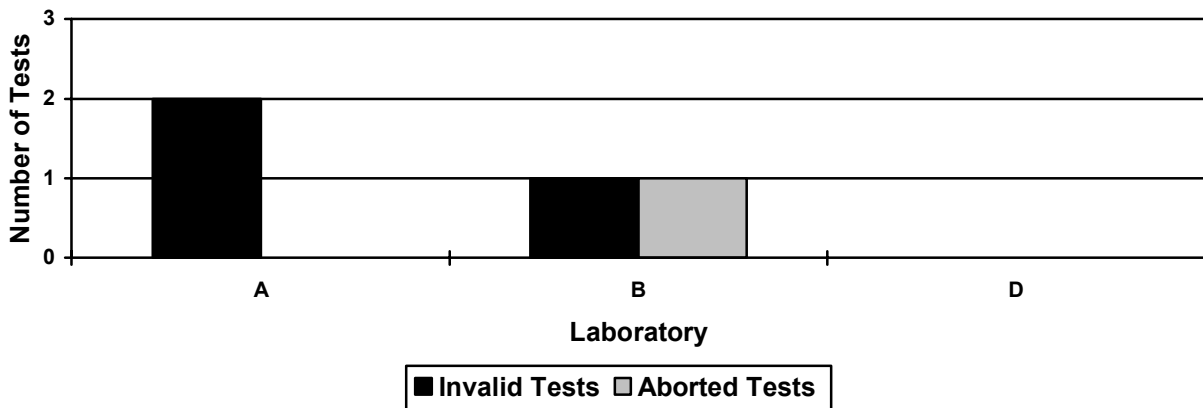
There were no LTMS Deviations this period. There have been no deviations from the LTMS since its introduction in 1999.

No labs visit was performed this period.

Lost Test Summary

Four tests were lost this period: three due to mechanical bearing wear and one test was aborted due to low oil pressure. These tests were conducted on two stand/engine combinations at two different laboratories. Aborts and Operationally Invalid tests, reported by laboratory, are summarized with the following chart:

Lost Test Distribution



Information Letters

No Sequence VIII 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	-0.56	1.83 (df=9)	-1.0 mg
SVIS	-0.49	0.078 (df=9)	-0.04 cSt

Average Δ/s by Laboratory		
Lab	BWL	SVIS
A	-0.20	-1.26
B	-0.85	0.41
D	-1.29	-0.36

Bearing Weight Loss (BWL)

The industry exceeded the limits for severity (see Figure 1) three times during the period, for periods of two, one, and one data point respectively. The first alarm was caused by a test that triggered a laboratory precision alarm, which was subsequently cleared by additional testing. No other causes for these alarms have been identified and the industry is currently within limits for severity.

The Industry BWL mean Δ/s is -0.56 mild for this report period (see Figure 3), which resumes the industry's long-standing mild performance trend. This equates to a shift of 1.0 mg in reported units. The pooled standard deviation for the period is 1.83 mg (see Figure 4), which is comparable to the periods of best overall 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 460 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 is currently experiencing a severity alarm on SVIS (see Figure 2). The most recent reference oil test sounded the alarm. During the period, the industry also experienced another single-point severity alarm on SVIS. No cause for that alarm has been identified.

The Industry SVIS mean Δ/s is -0.49 severe for this report period (see Figures 2 & 5). This equates to a shift of -0.04 cSt in reported units. During the period, the industry experienced a four-point precision alarm on SVIS due to a single run on reference oil 1006-2 (3.0 Y_i result). The pooled standard deviation for the period is 0.078 cSt (see Figure 6), which is comparable to historical performance.

Hardware

No hardware changes were made during the period.

Reference Oils

Oil	TMC Inventory, In gallons	TMC Inventory, In tests	Laboratory Inventory, in tests	Estimated Life
704-1	407	203	6	5+ years
1006	43	21	3	3 months ¹
1006-2	4,774	2,387	4	3+ years ¹
1009	834	417	1	3+ years ¹

¹ Multiple test area reference oil; total TMC inventory shown

MTK/mtk

Attachments

c: F. M. Farber, TMC
Sequence VIII Surveillance Panel
<ftp://ftp.astmtmc.cmu.edu/docs/gas/sequenceviii/semiannualreports/VIII-10-2004.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

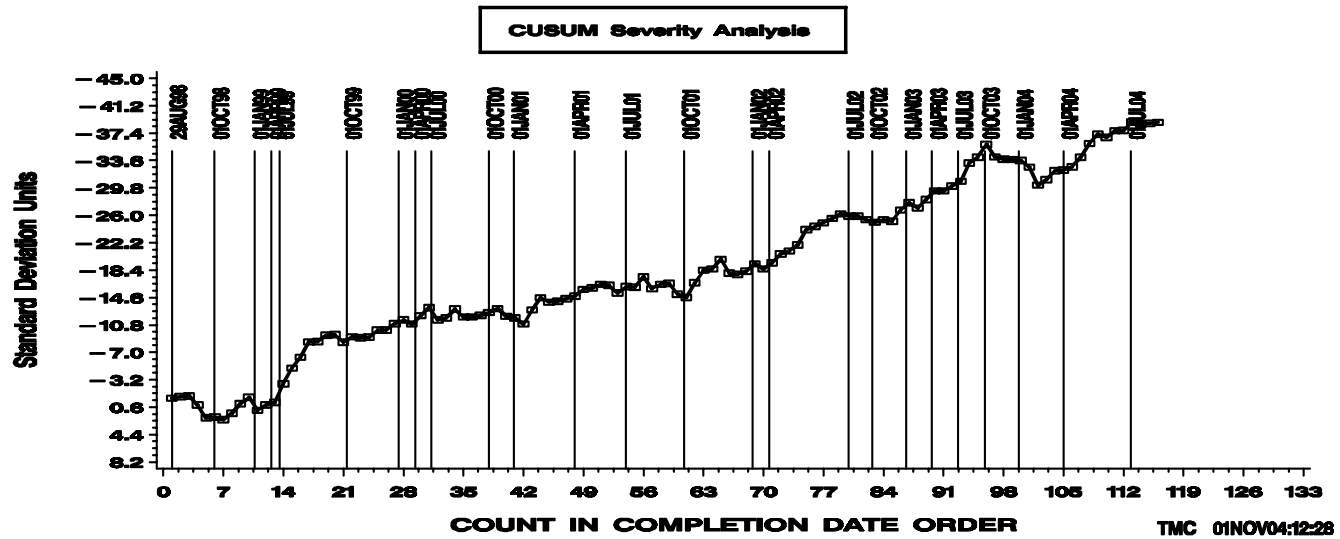
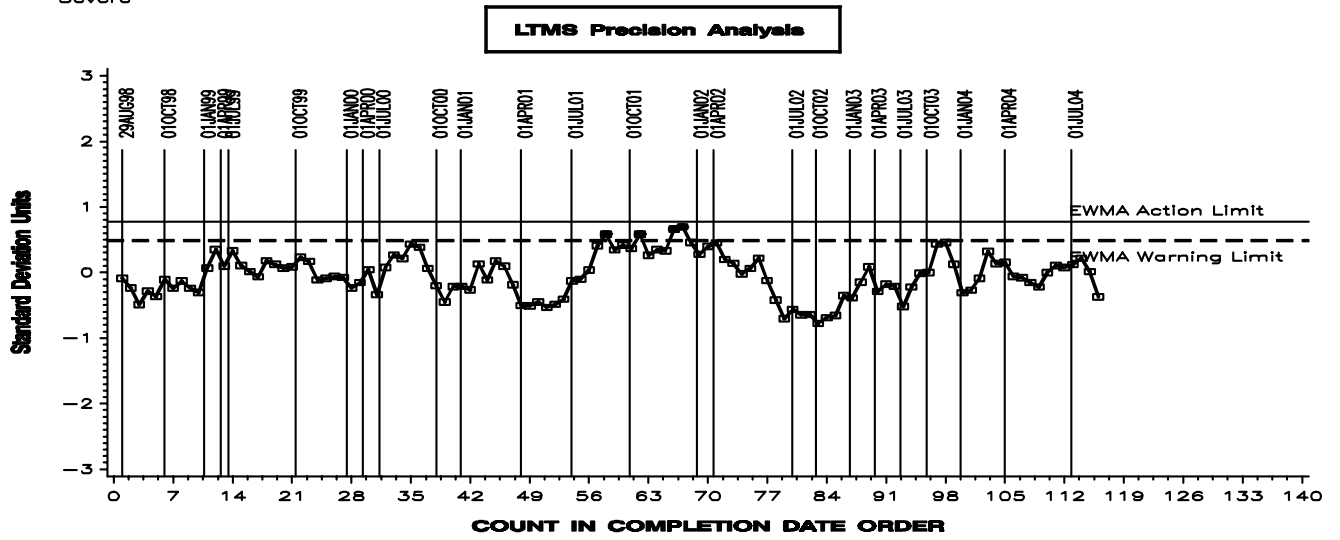
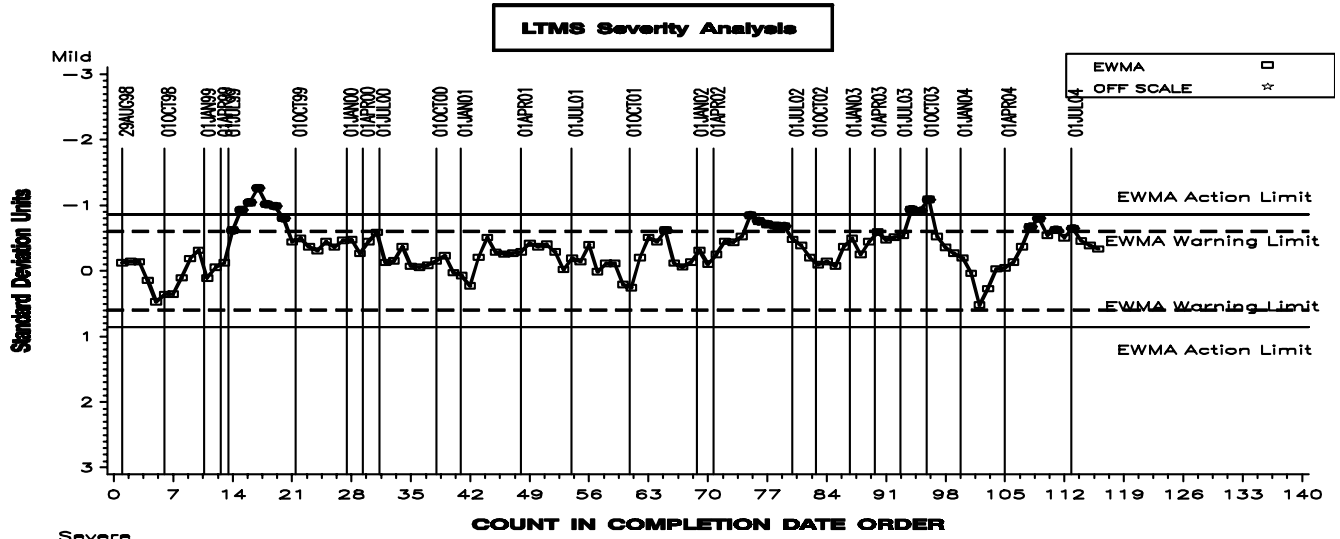


Figure 2

SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA

STRIPPED VIS. @ 100 DEG C

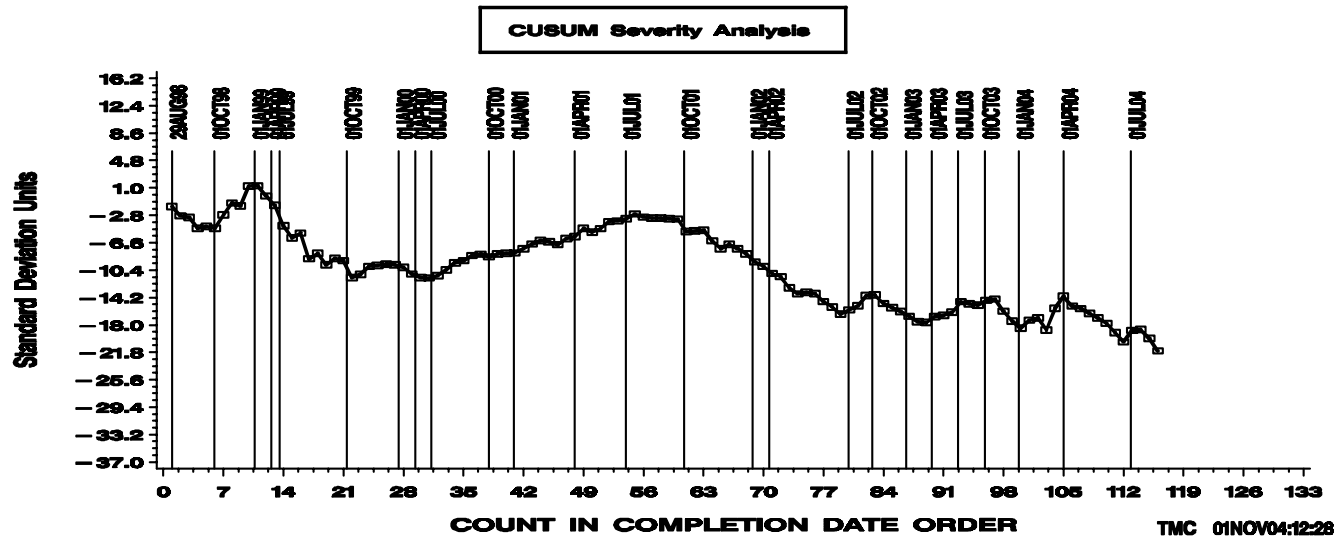
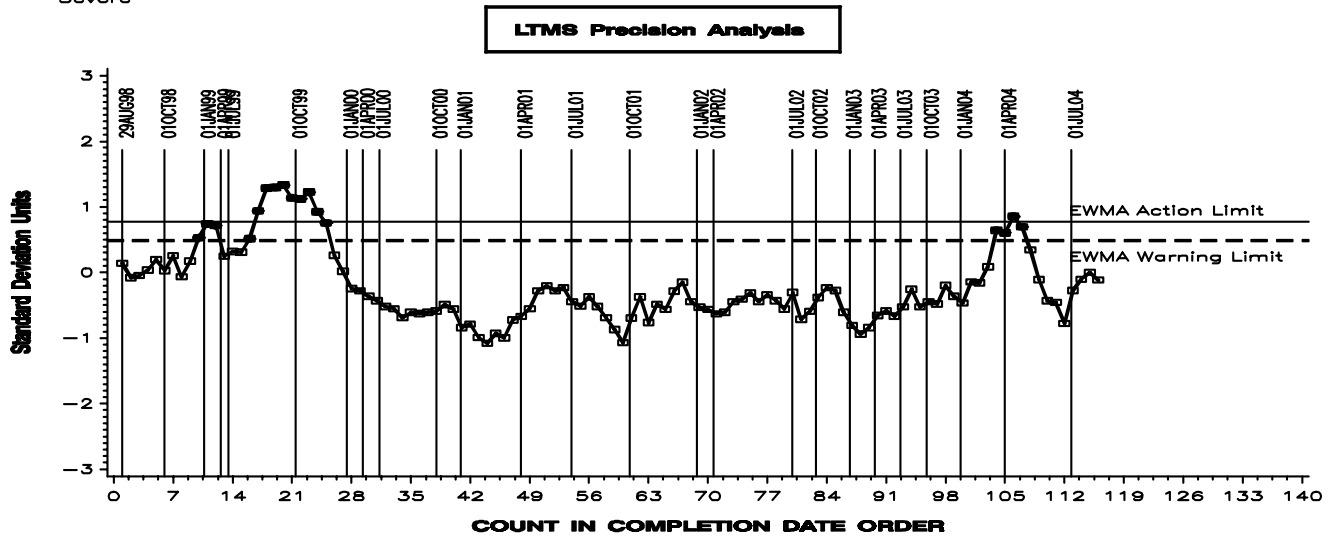
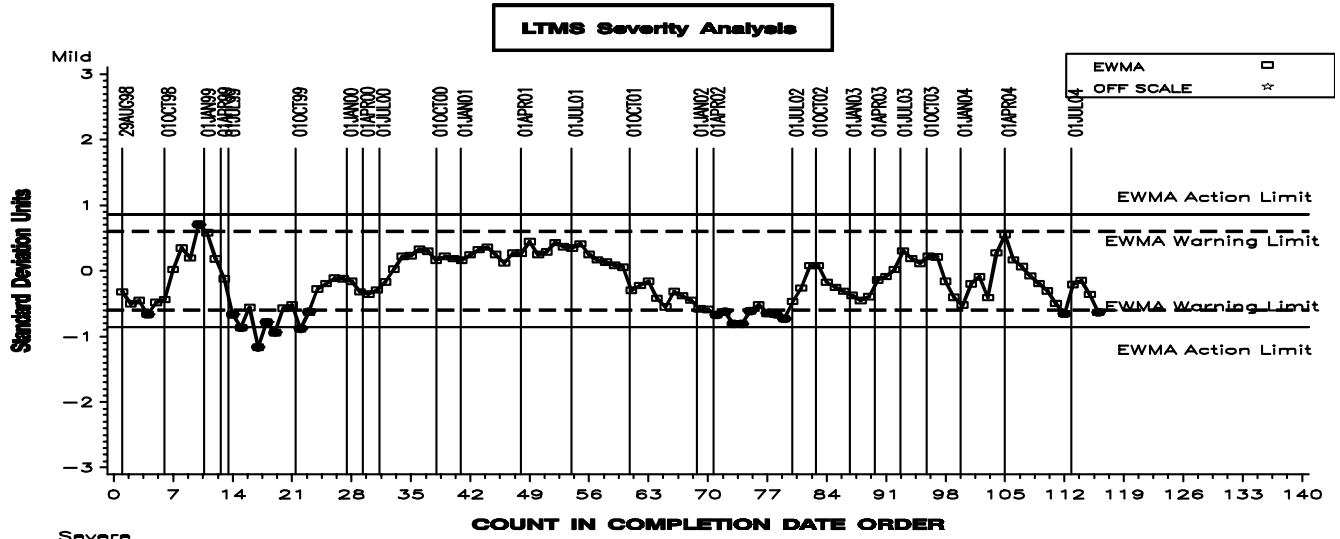


Figure 3 - Sequence VIII Reference Oil Data
Bearing Weight Loss

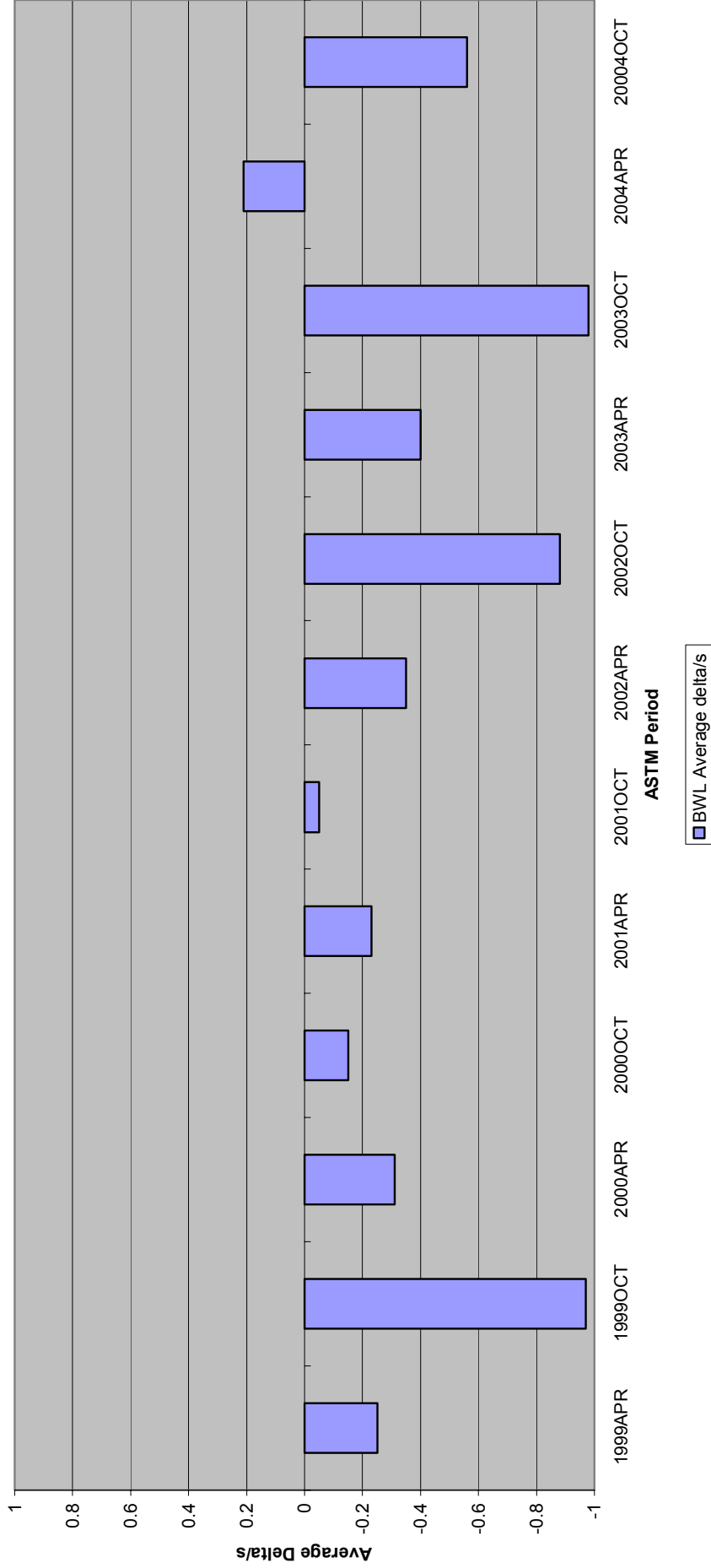


Figure 4 - Sequence VIII Reference Oil Data
Bearing Weight Loss

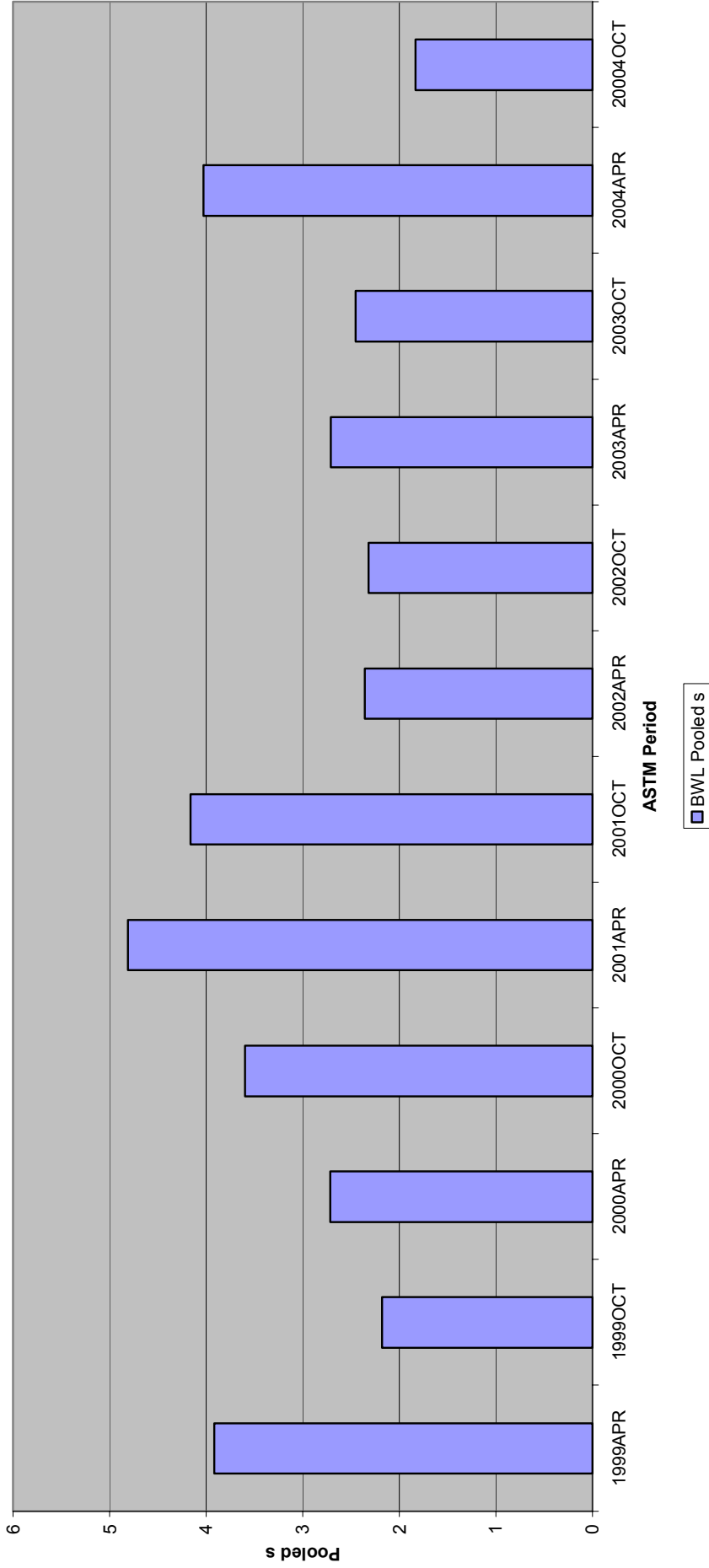
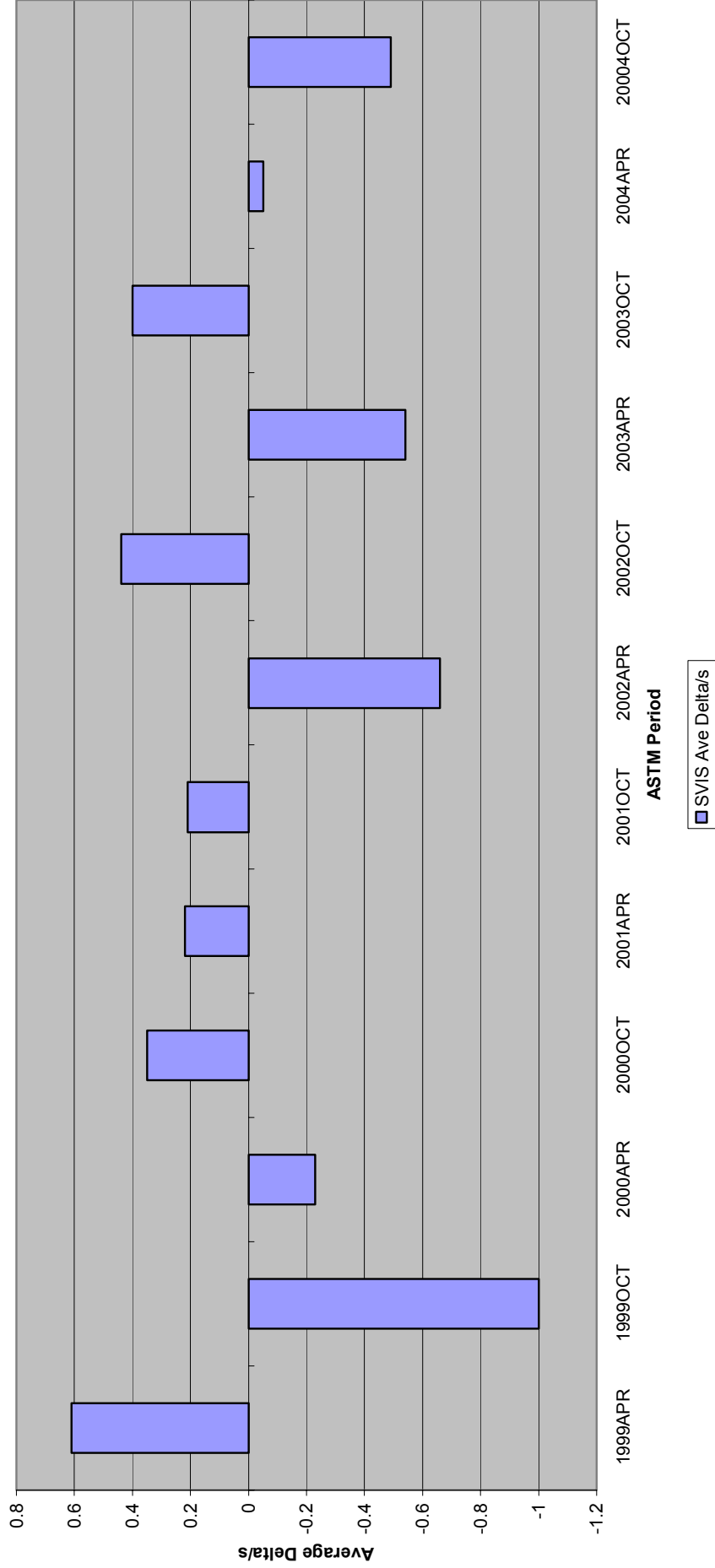


Figure 5 - Sequence VIII Reference Oil Data
Stripped Viscosity



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

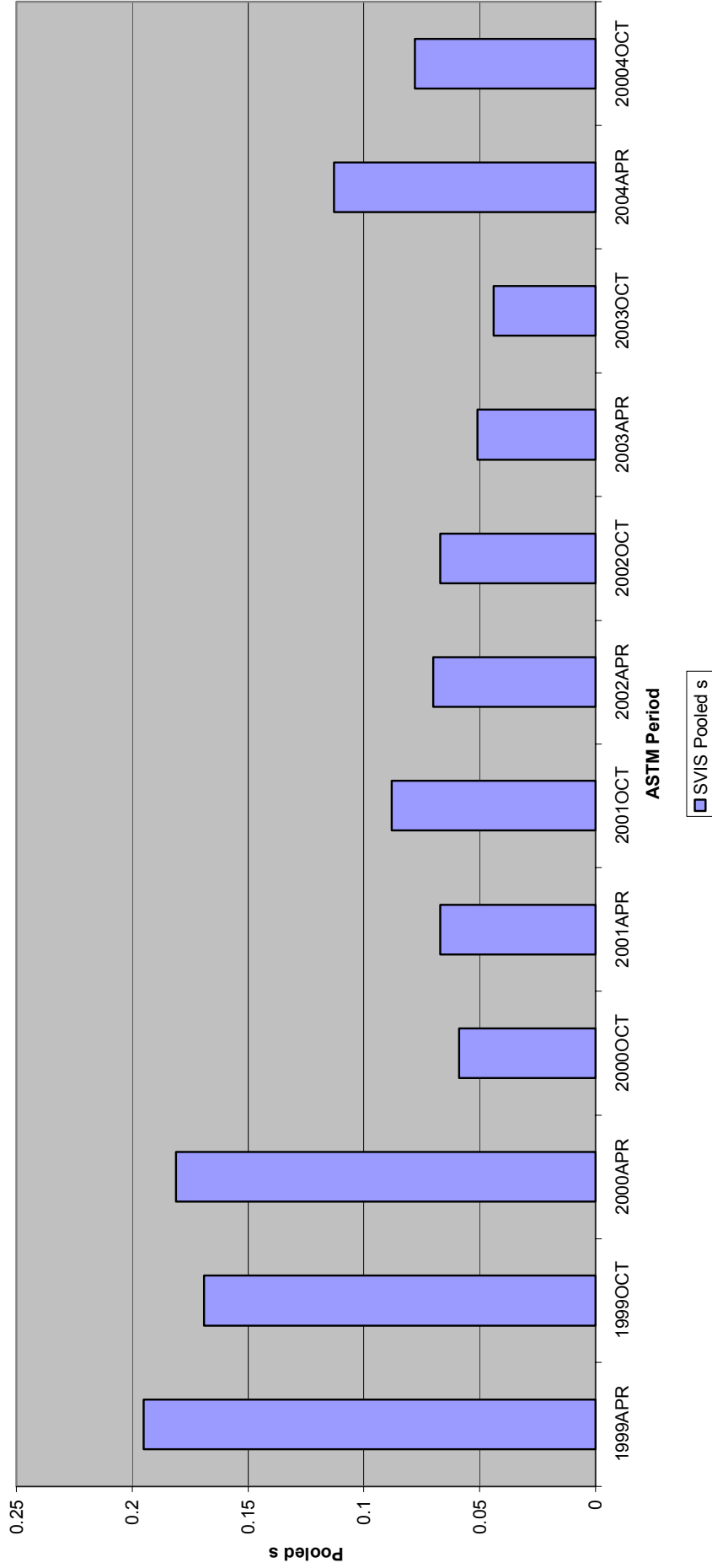


Figure 7

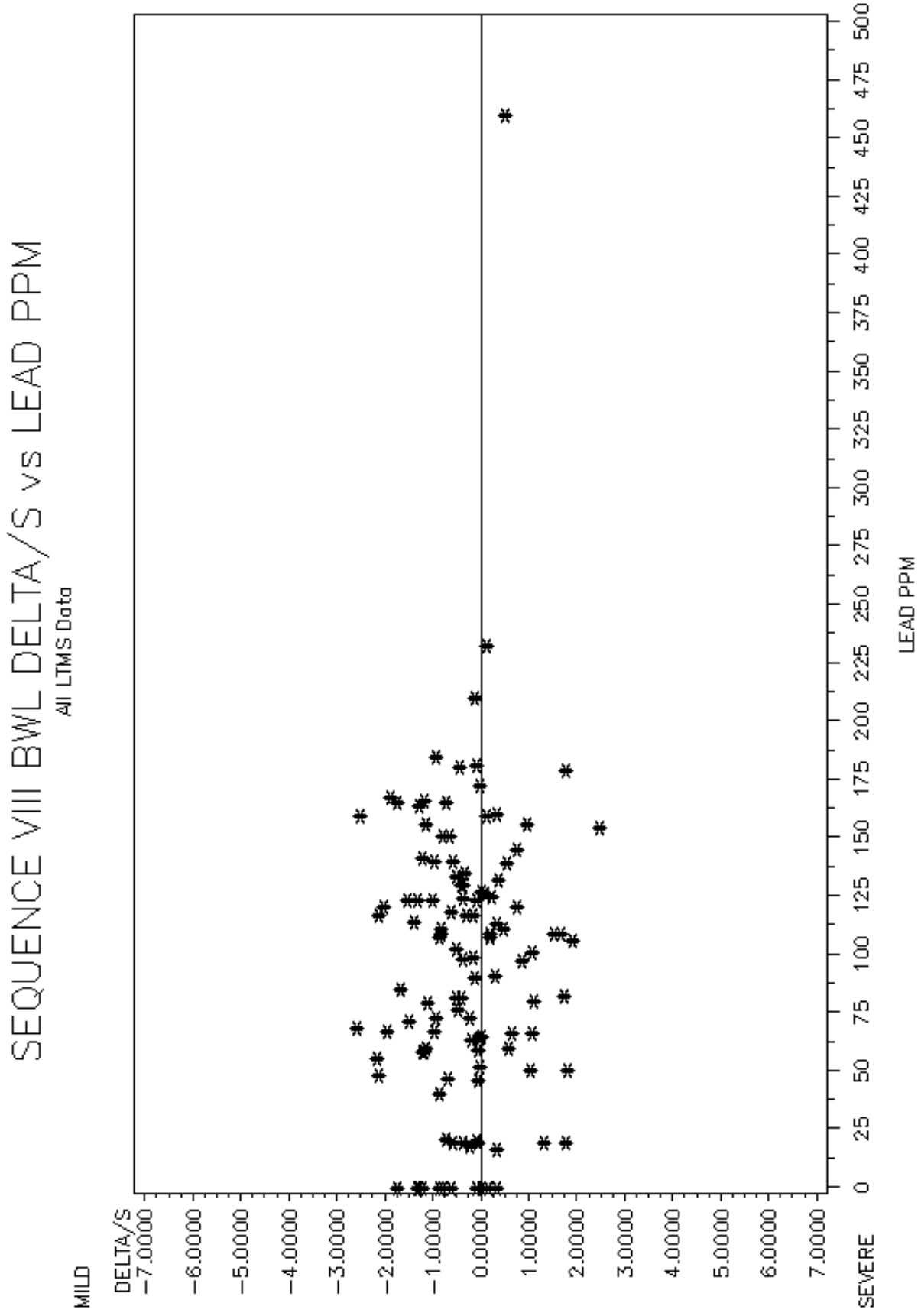


Figure 8

BEARING OIL STORAGE LEAD PPM vs COMPLETION DATE
All LTMS Data

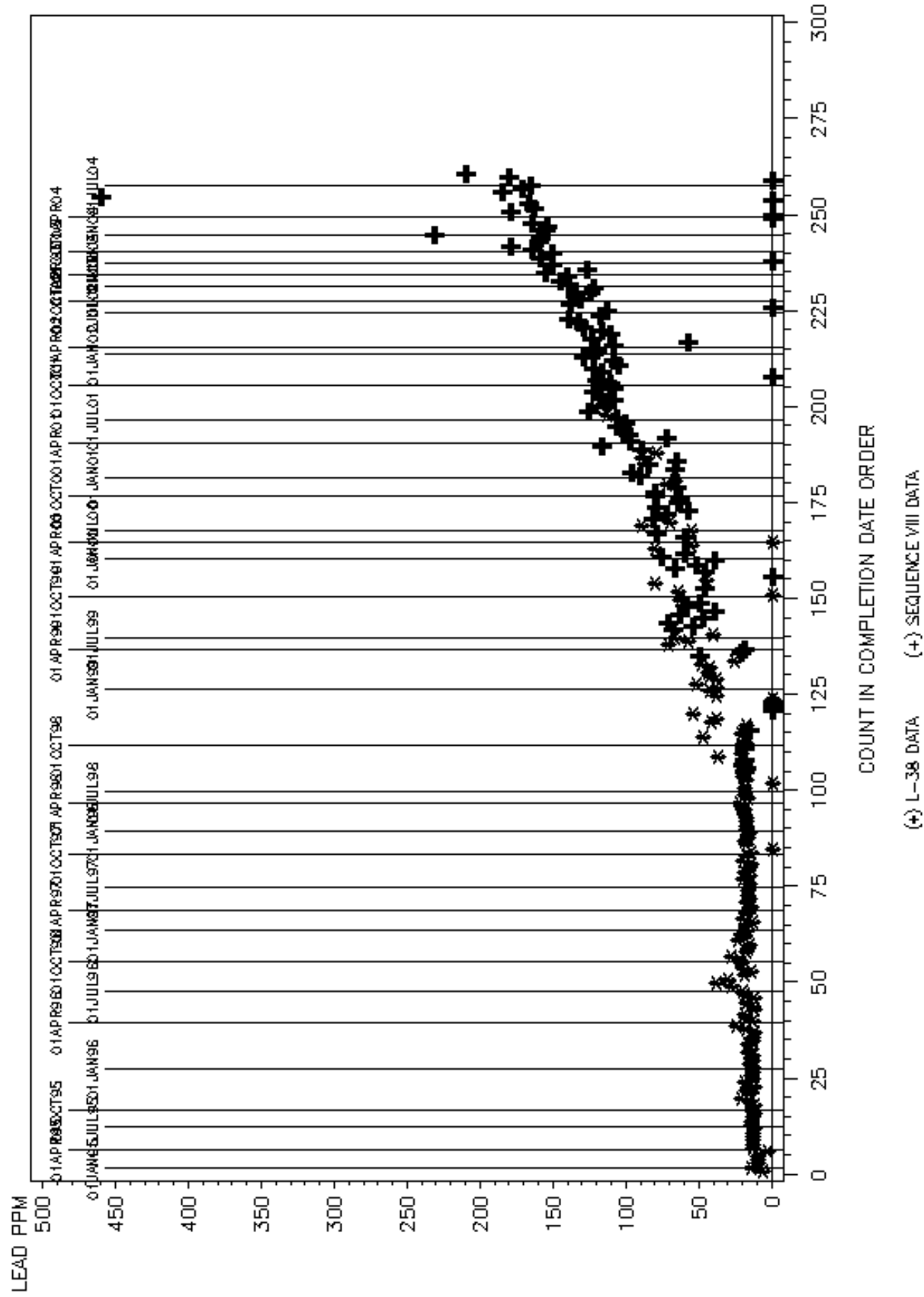


Figure 9 - Sequence VIII Timeline

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
1/1/2004	New MINIERAL SPIRITIS SPECIFICATION	03-1
1/26/04	BILLET CRANKSHAFT APPROVED FOR USE IN SEQUENCE VIII TESTING	