




# Test Monitoring Center

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412-365-1000

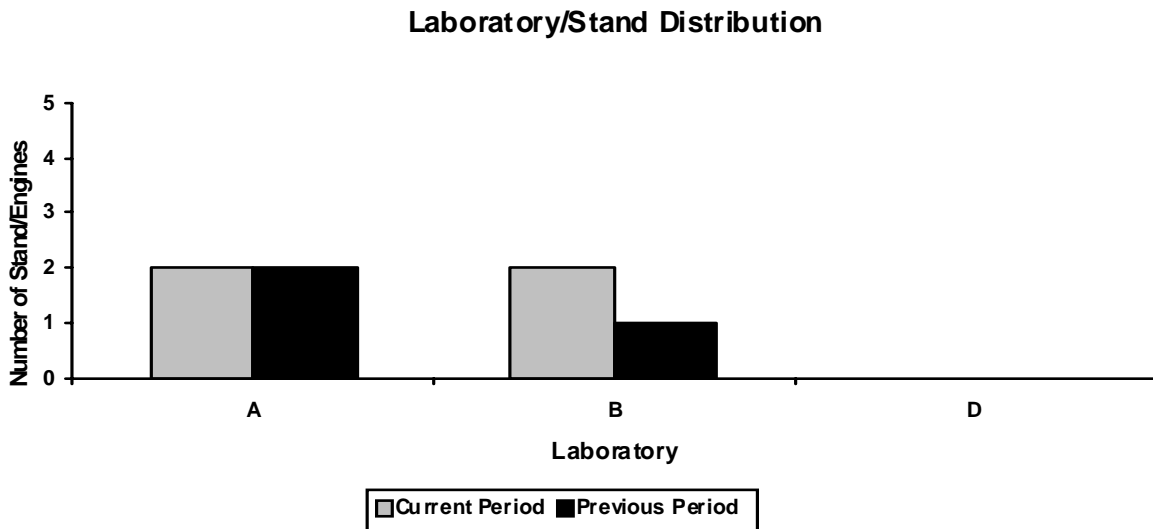
Memorandum: 09-005  
Date: April 9, 2009  
To: Fred Gerhart, Chairman, Sequence VIII Surveillance Panel  
From: Richard E. Grundza   
Subject: Sequence VIII Semiannual Report: October 1, 2008 to March 31, 2009

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, 2008 to March 31, 2009.

## Lab/Stand Distribution

	Reporting Data	Calibrated as of March 31, 2009
Number of Laboratories:	2	2
Number of Stand/Engine Combinations:	4	4

The following chart shows the laboratory/stand distribution:

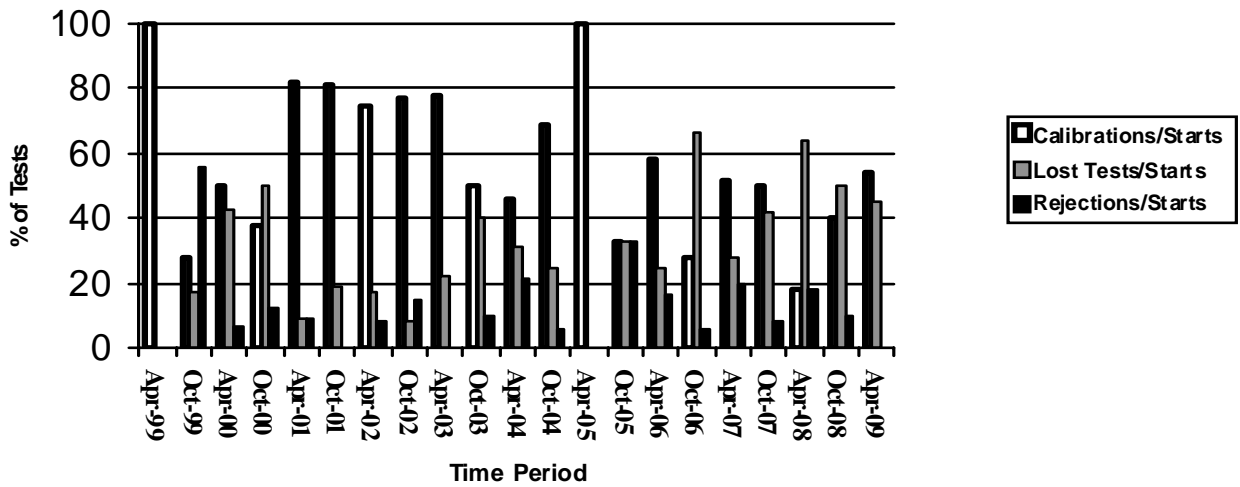


The following summarizes the status of the reference oil tests reported to the TMC:

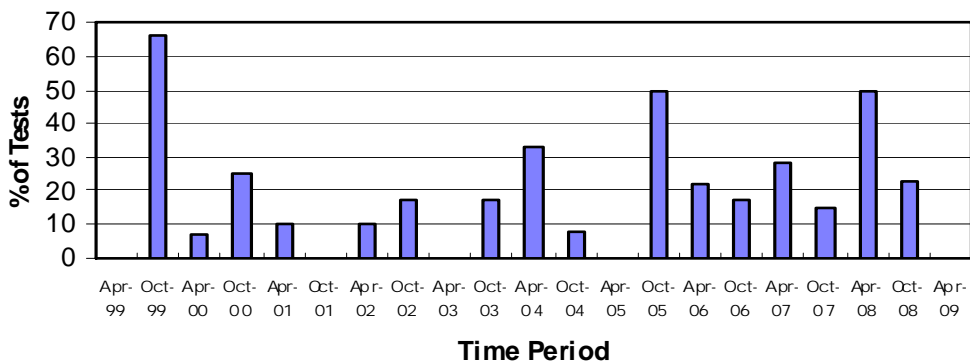
Calibration Start Outcomes	TMC Validity Code	No. of Tests
Operationally and Statistically Acceptable	AC	6
Operationally Invalid (laboratory judgment)	LC	5
Total		11

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

### Calibration Attempt Summary



### Rejected Operationally Valid Tests



There were no failing tests this report period.

There were no LTMS Deviations this period. There have been three deviations from the LTMS to date.

No lab visits were conducted by the TMC this period.

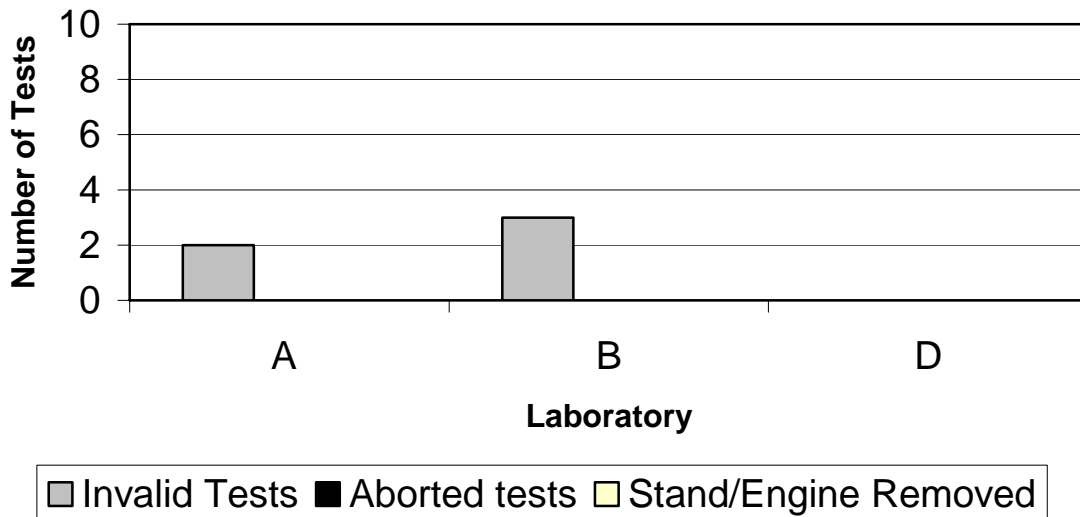
Lost Test Summary

Five tests were lost this period. The reasons for the lost tests are tabulated below:

Reasons for Lost Test(s)	Number
High mechanical wear	3
% deviation exceeded, offgas	1
% deviation exceeded, spark advance	1

Aborts and operationally invalid tests, reported by laboratory, are summarized in 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  $\Delta/s$ , pooled standard deviation, and average  $\Delta$  in reported units for the tests reported during this period. Also below is a summary of the average  $\Delta/s$  values for all laboratories reporting data during this period.

<b>Industry Severity Summary</b>			
<b>Parameter</b>	<b>Average <math>\Delta/s</math></b>	<b>Pooled standard deviation (degrees of freedom)</b>	<b>Average <math>\Delta</math>, in reported units</b>
BWL	-0.036	3.964 (df=5)	-0.14 mg
SVIS	-0.727	0.042 (df=5)	-0.03 cSt

<b>Average <math>\Delta/s</math> by Laboratory</b>		
<b>Lab</b>	<b>BWL</b>	<b>SVIS</b>
A	-0.362	-0.801
B	0.289	-0.654
D	-	-

**Bearing Weight Loss (BWL)**

The industry control charts for severity precision were in control for the period (see Figure 1).

The Industry BWL mean  $\Delta/s$  was -0.036 mild for this report period (see Figure 3). This equates to a shift of -0.14 mg in reported units. The pooled standard deviation for the period is 3.964 mg (see Figure 4), which has improved with respect to the previous period and compares well with historical estimates.

**Stripped Viscosity (SVIS)**

The industry control chart for severity began the period in control, but went into warning and action alarm with the last three tests reported during the period. Precision was in control for the period (see Figure 2).

The Industry SVIS mean  $\Delta/s$  is -0.727 severe for this report period (see Figure 5), and equates to a shift of -0.03 cSt in reported units. The pooled standard deviation for the period is 0.042 cSt (see Figure 6), which has improved with respect to the previous period and is comparable to historical performance.

Hardware

No hardware changes were noted this period. All reference oil tests were conducted on 05-08 bearings.

TMC Memoranda

No TMC Memoranda were generated this report period.

Reference Oils

Oil	TMC Inventory, In gallons	TMC Inventory, In tests	Laboratory Inventory, in tests	Estimated Life
704-1	266	133	5	5+ years
1006	41	20	1	3 months <sup>1</sup>
1006-2	4,161	2,080	3	3+ years <sup>1</sup>
1009	585	292	4	3+ years <sup>1</sup>

<sup>1</sup> Multiple test area reference oil; total TMC inventory shown

REG/reg

Attachments

c: F. M. Farber, TMC

Sequence VIII Surveillance Panel

<ftp://ftp.astmtmc.cmu.edu/docs/gas/sequenceviii/semiannualreports/VIII-04-2009.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 is the Sequence VIII Timeline, created to track changes in test hardware and operations.

Figure 1

# SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA

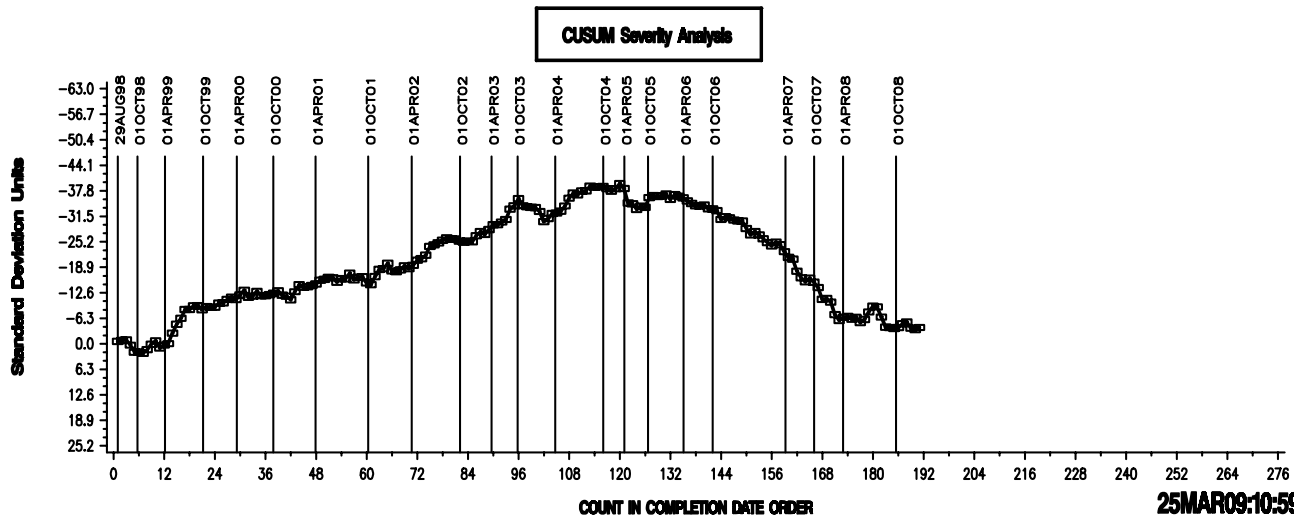
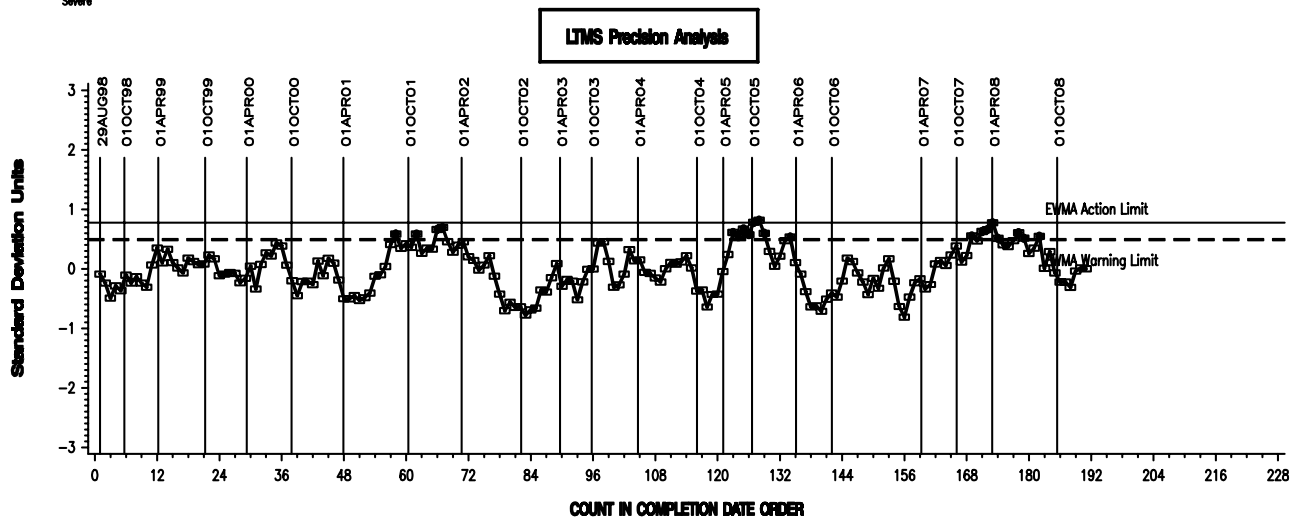
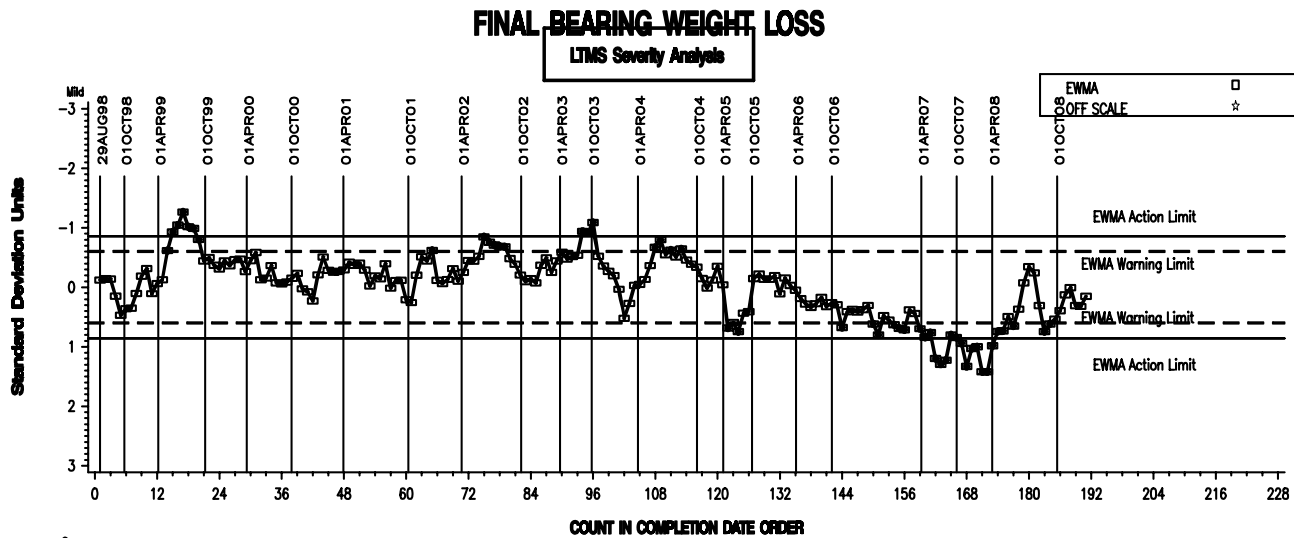
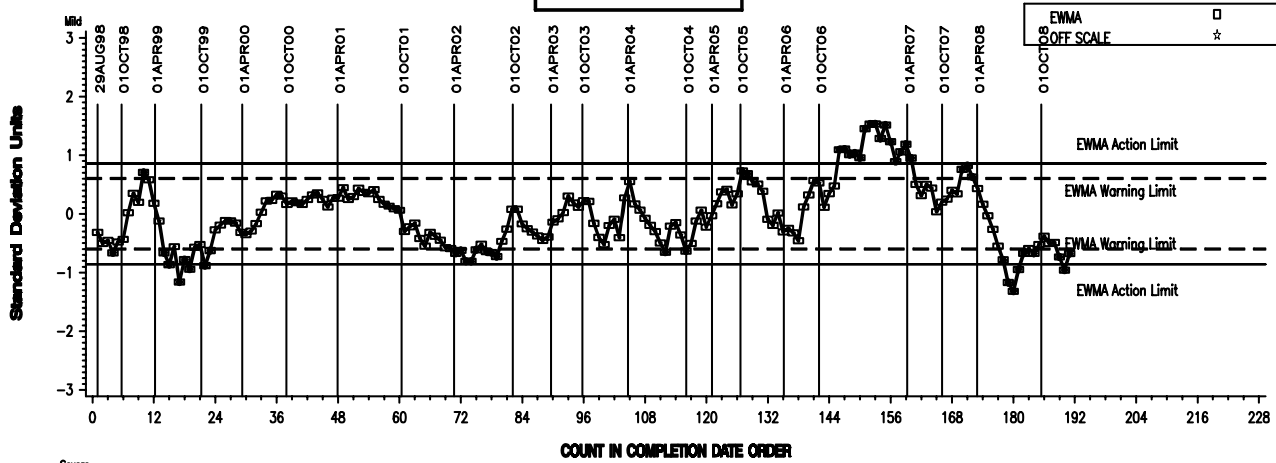


Figure 2

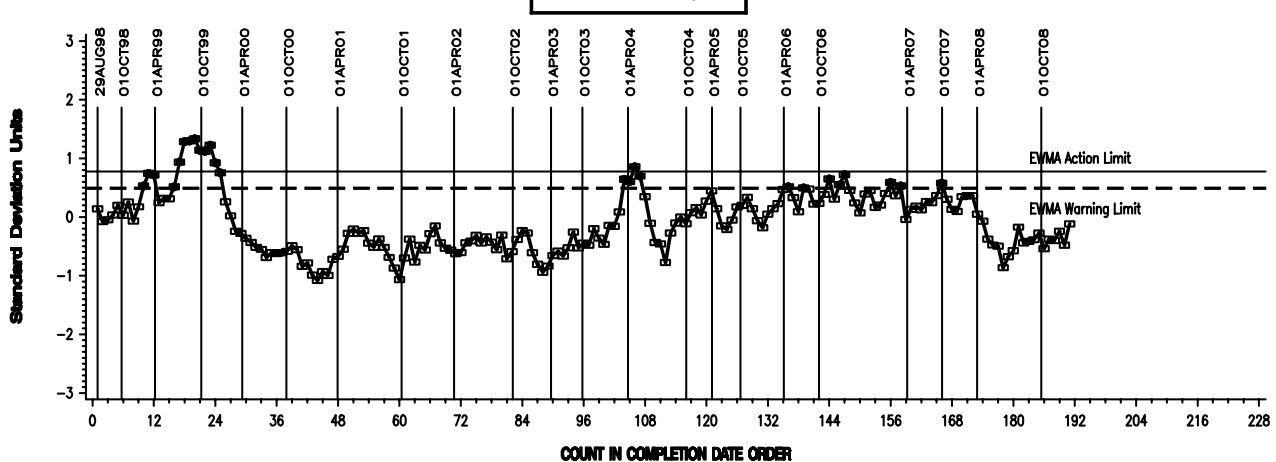
# SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA

## STRIPPED VIS. @ 100 DEG C

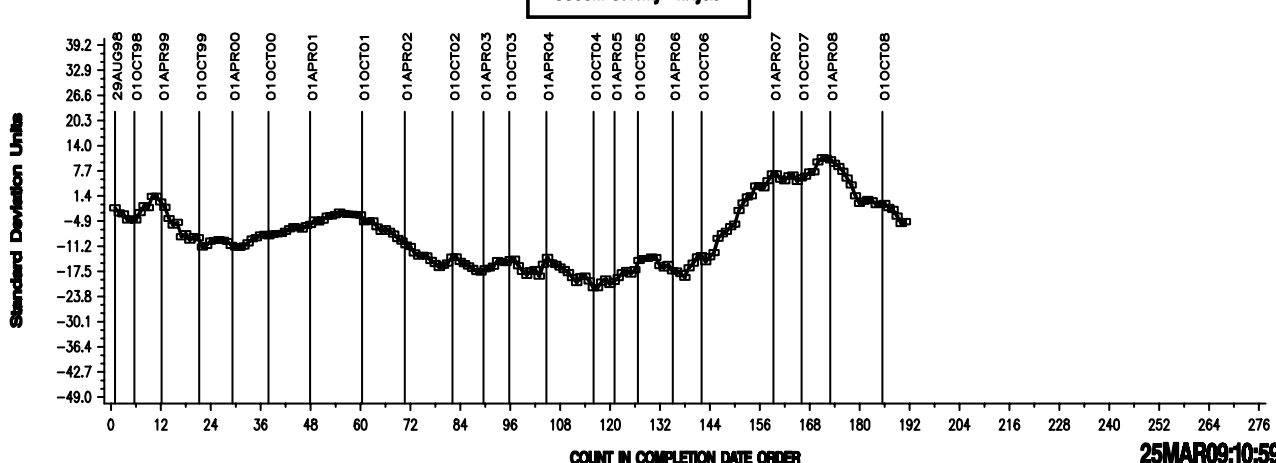
### LIMS Severity Analysis



### LIMS Precision Analysis

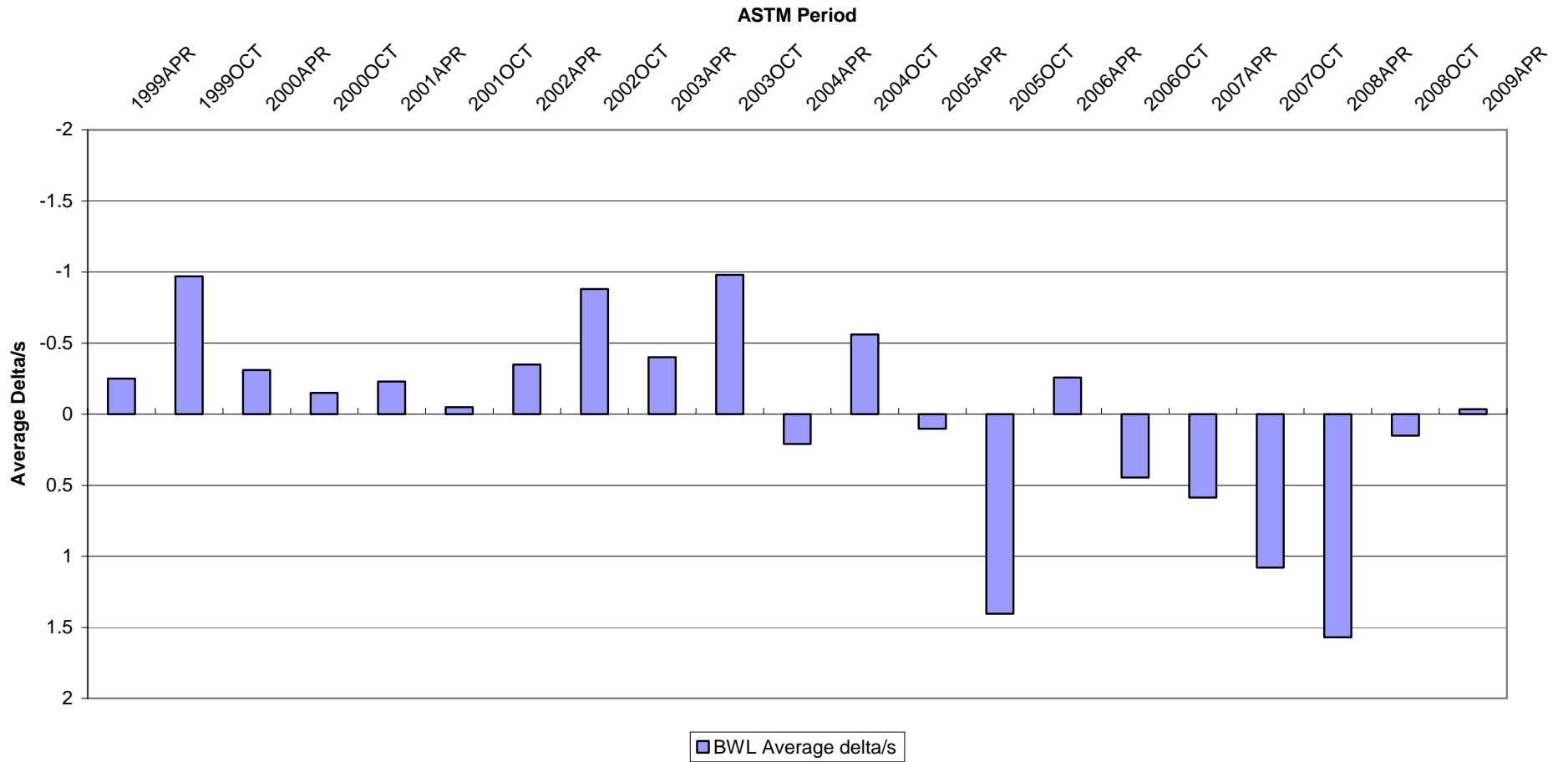


### CUSUM Severity Analysis

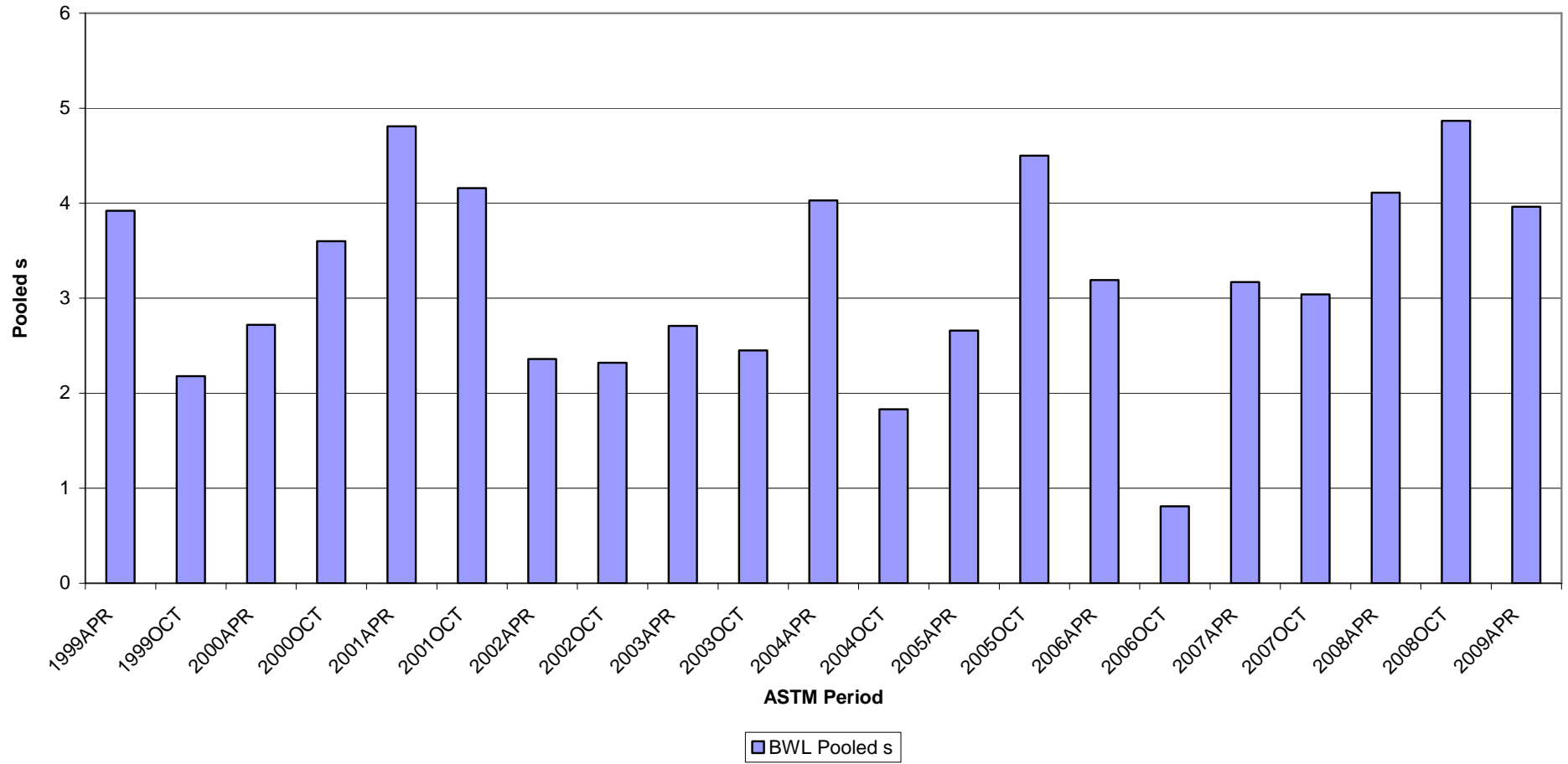




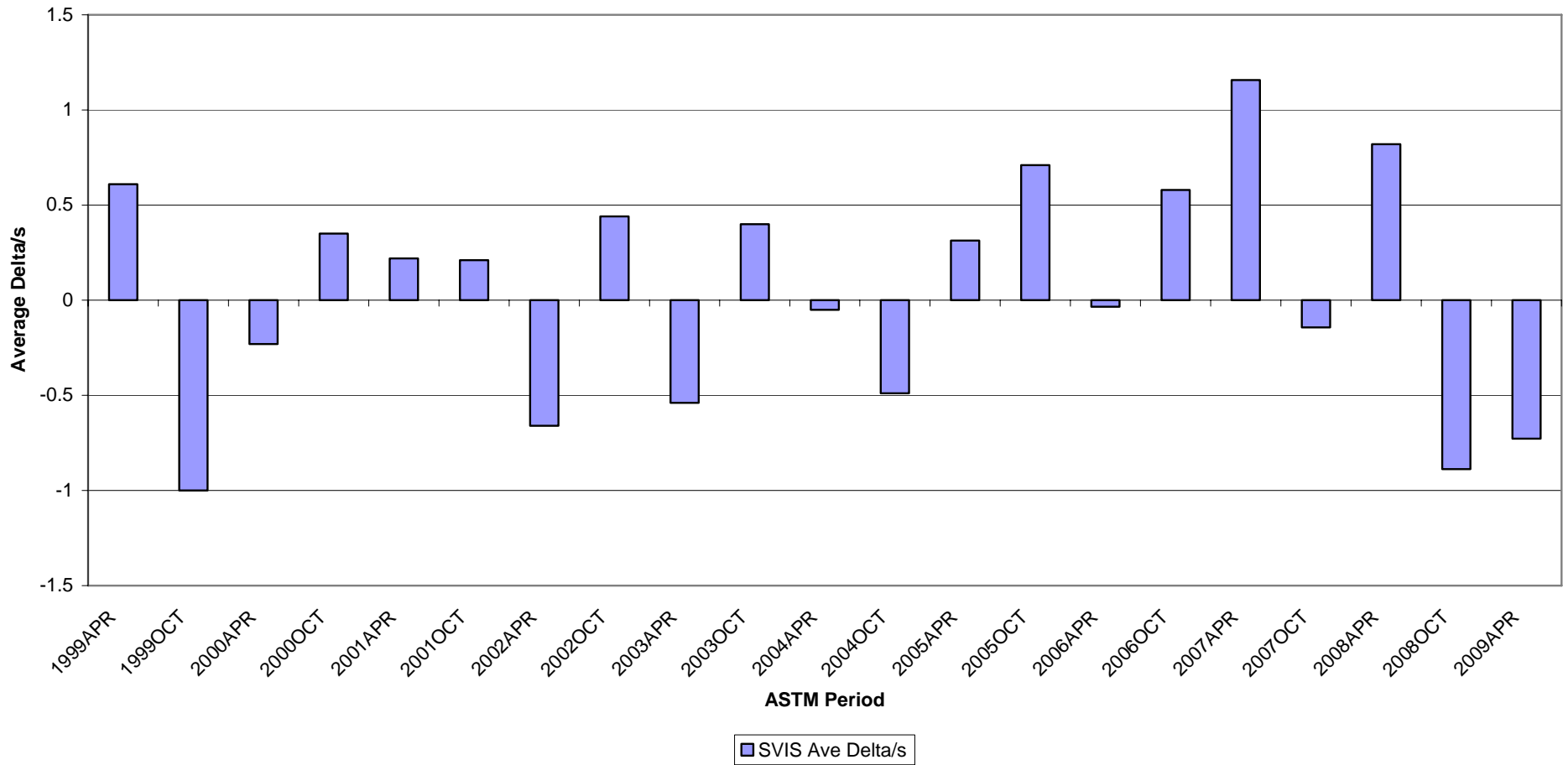
**Figure 3 - Sequence VIII Reference Oil Data  
Bearing Weight Loss**



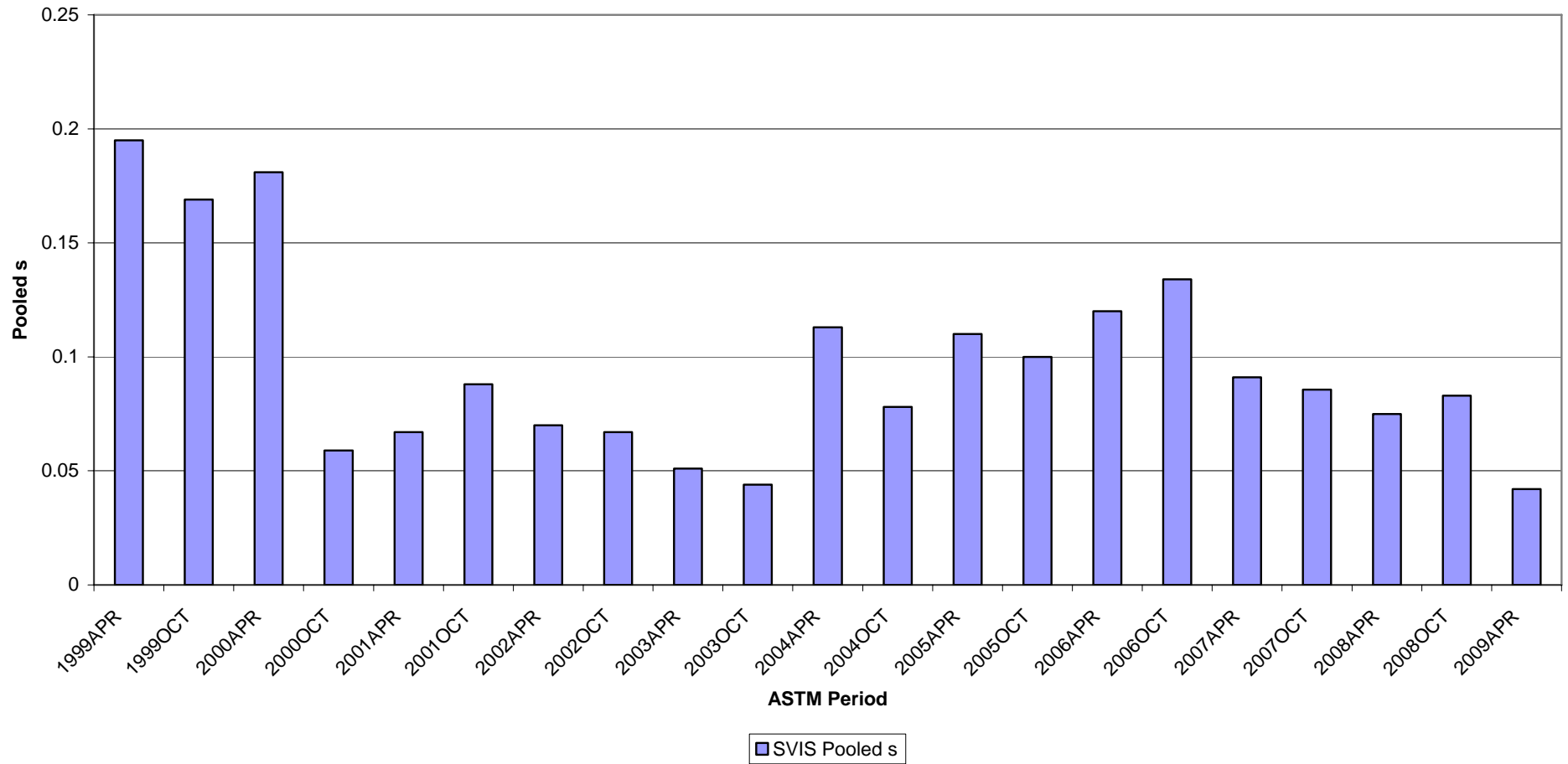
**Figure 4 - Sequence VIII Reference Oil Data  
Bearing Weight Loss**



**Figure 5 - Sequence VIII Reference Oil Data  
Stripped Viscosity**



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



<b>Figure 7 - Sequence VIII Timeline</b>		
<b>Date</b>	<b>Topic</b>	<b>Information Letter</b>
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	NEWINERAL SPIRITS SPECIFICATION	03-1
1/26/04	BILLET CRANKSHAFT APPROVED FOR USE IN SEQUENCE VIII TESTING	
12/9/2004	CLARIFIED SOLVENT SPECIFICATION	04-1
12/9/2004	REVISED FUEL FLOW SPECIFICATION	04-1
12/9/2004	REQUIREMENTS FOR BUILDS WITH OVERSIZE PISTONS	04-1
6/23/05	DELETED ROCKER COVER INLET TEMPERATURE AND PRESSURE SENSORS, UPDATED PRECISION STATEMENT	05-1
9/20/06	FIRST TEST ON 03-06 BEARINGS	
10/24/06	REVISED BEARING CLEANING PROCEDURE IN ANNEX A9	06-1
3/12/07	TARGET UPDATE, REFERENCE OIL 1006-2	
5/15/08	ADDED RESERVIOR TO ROCKER COVER INLET	08-1
6/12/08	CLARIFIED HARDWARE REUSE GUIDELINES	08-2