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

Memorandum: 02-103

Date: October 23, 2002

To: Bill Buscher, Chairman, Sequence IVA Surveillance Panel

From: Michael T. Kasimirsky

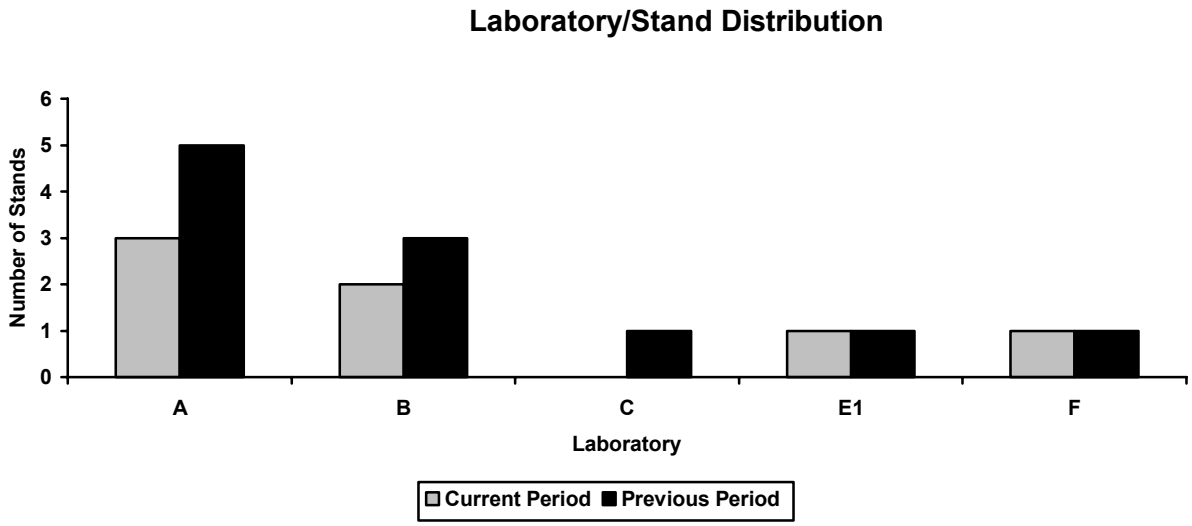
Subject: Sequence IVA Semiannual Report: April 1, 2002 through September 30, 2002

The following is a summary of Sequence IVA reference tests that were reported to the Test Monitoring Center during the period April 1, 2002 through September 30, 2002.

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2002
Number of Laboratories:	4	3
Number of Test Stands:	7	5

The following chart shows the laboratory/stand distribution:

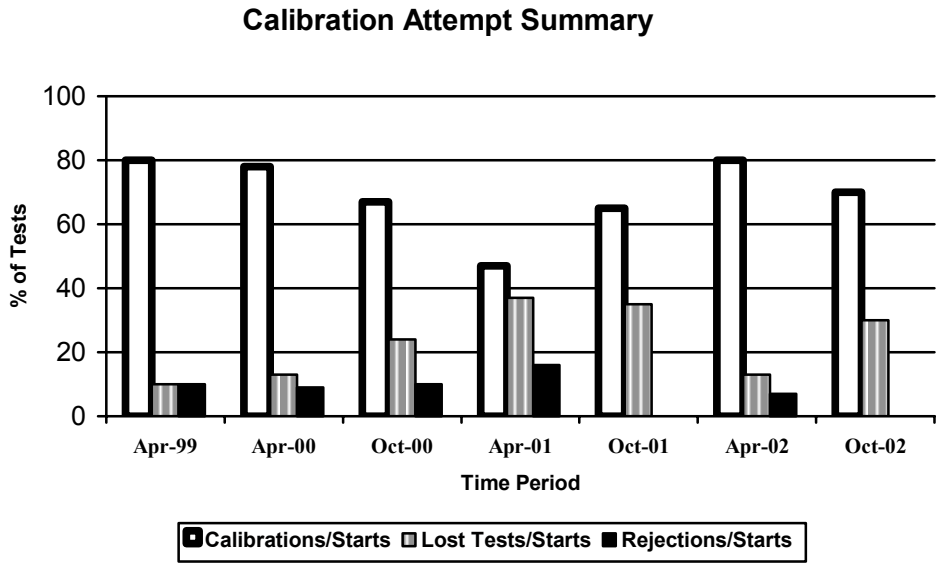


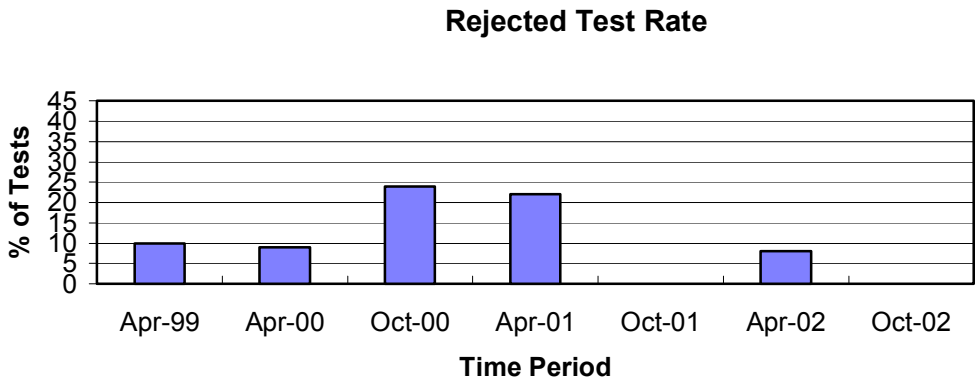
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	7
Failed Acceptance Criteria	OC	0
Stand Failed Reference Sequence – data pulled	MC	0
Operationally Invalid (Laboratory Judgment)	LC	3
Operationally Invalid (Lab & TMC Judgment)	RC	0
Aborted	XC	0
Total		10

Donated & Industry Support Outcomes	TMC Validity Codes	No. of Tests
Acceptable Decoded Runs	AG	0
Total		0

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





There were no failed tests this period.

There were no LTMS Deviations written this period. There has been one deviation from the LTMS since its introduction in 1999.

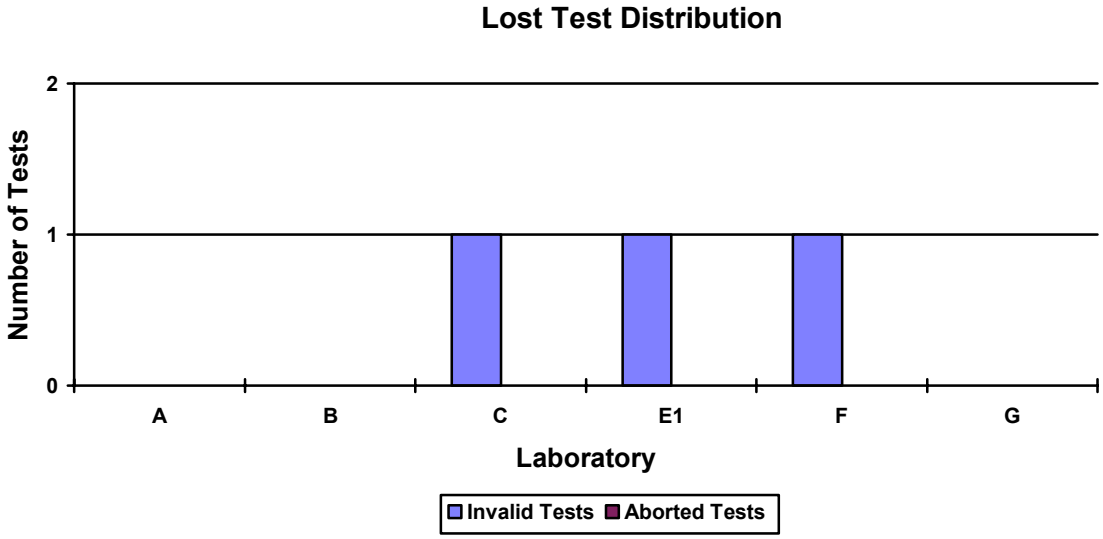
There were no QI Deviations written this period.

No lab visits were performed this period.

Lost Test Summary

Three tests were lost this period. The causes are summarized in the following chart:

Lab	Reason for Lost Test	Number of Tests	Breakdown of Tests (LC/RC/XC)
F	Coolant Flow Measurement Problems	1	1/0/0
E1	Improper Oil Cylinder Head Thermocouple Installation	1	1/0/0
C	Oil Cylinder Head Thermocouple Calibration Offset	1	1/0/0



Information Letters

Sequence IVA Information Letter No. 02-3, Sequence No. 9, dated May 30, 2002, was issued during the period and contained a change to the oil sample tap location, revisions to the stand calibration requirements, revisions to the stand instrumentation calibration requirements, and various editorial corrections.

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, by parameter, for all laboratories reporting data during this period.

Industry Severity Summary			
Parameter	Average Δ/s	Pooled standard deviation (degrees of freedom)	Average Δ, in micrometers
ACW	0.000	12.79 (df=4)	0.0

ACW Results, by Laboratory	
Laboratory	Average Δ/s
A	-0.153
B	0.611
C	–
E1	-1.134
F	0.370

The industry has been within limits for both severity and precision for the period (see Figure 1). Severity was on target for the period (see Figure 2). Precision has degraded slightly compared to last period but is still comparable to overall historical performance (see Figure 3).

Hardware

No hardware changes were made this period.

Reference Oils

Oil	TMC Inventory, in gallons	TMC Inventory, in tests (4gal/test)	Laboratory Inventory, in tests	Estimated life
1006	45	11	14	1 month or less[1]
1006-2	5,154	1,288	15	3+ years[1]
1007[2]	3,763	940	16	3+ years[1]
1009	1,015	253	10	3+ years[1]

[1] Multiple test area reference oil; total TMC inventory shown
[2] Cannot be reblended

The TMC currently has sufficient data on reference oil 1006-2 to update the test targets. New targets will be generated and distributed to the industry shortly.

The GF-3 Category Reference Oil, reference oil 1009, is ready for introduction into the LTMS. The Surveillance Panel approved a motion to require one donated test per calibrated laboratory on this reference oil for the purposes of test target generation. At this time the TMC has received two data points on this oil. These results are shown below:

Lab	LTMS Date	ACW
F	10/13/02	16.14
A	10/15/02	15.00

One additional test is currently running and two other donated tests are expected. The Surveillance Panel has approved no plan for introduction of this reference oil at this time.

MTK/mtk

Attachments

c: F. M. Farber, TMC
Sequence IVA Surveillance Panel
ftp://astmtmc.cmu.edu/docs/gas/sequenceiv/semiannualreports/IVA-10-2002.pdf

Distribution: Electronic Mail

List of Figures

- Figure 1 graphically presents the Industry control charts for ACW and also the CUSUM delta/s plot (by count in completion date order) of average camshaft wear for operationally valid tests.

- Figure 2 graphically presents a historic perspective for ACW mean delta/s by report period.

- Figure 3 graphically presents a historic perspective for ACW pooled standard deviations by report period.

- Figure 4 is the Sequence IVA Timeline, created to track changes in test hardware and operations.

Figure 1

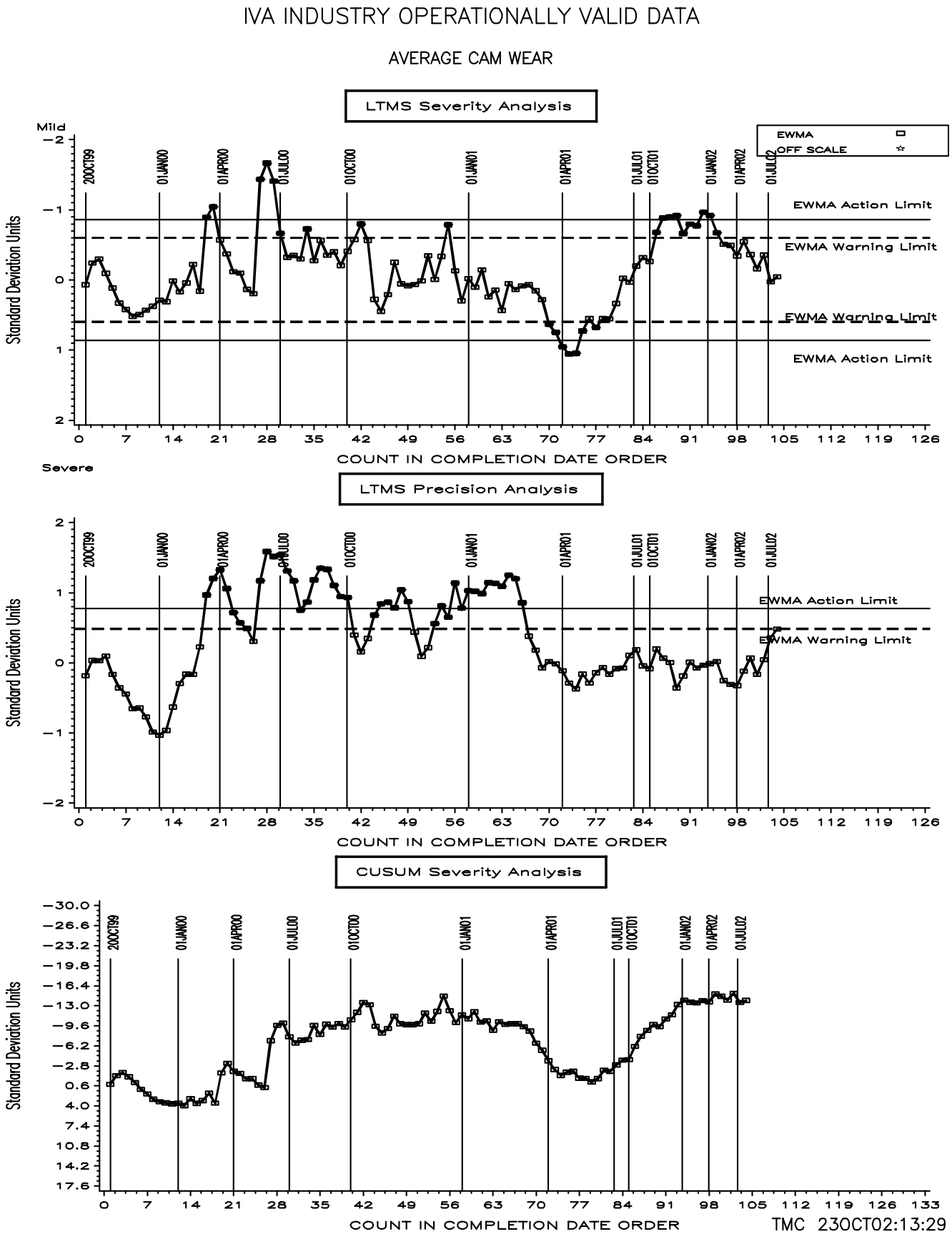

IVA INDUSTRY OPERATIONALLY VALID DATA
AVERAGE CAM WEAR
LTMS Severity Analysis
Mild
Standard Deviation Units
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
20OCT99
01JAN00
01APR00
01JUL00
01OCT00
01JAN01
01APR01
01JUL01
01OCT01
01JAN02
01APR02
01JUL02
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
Standard Deviation Units
EWMA Action Limit
EWMA Warning Limit
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
TMC 23OCT02:13:29

Figure 2 - Sequence IVA Reference Oil Data
Average Camshaft Wear

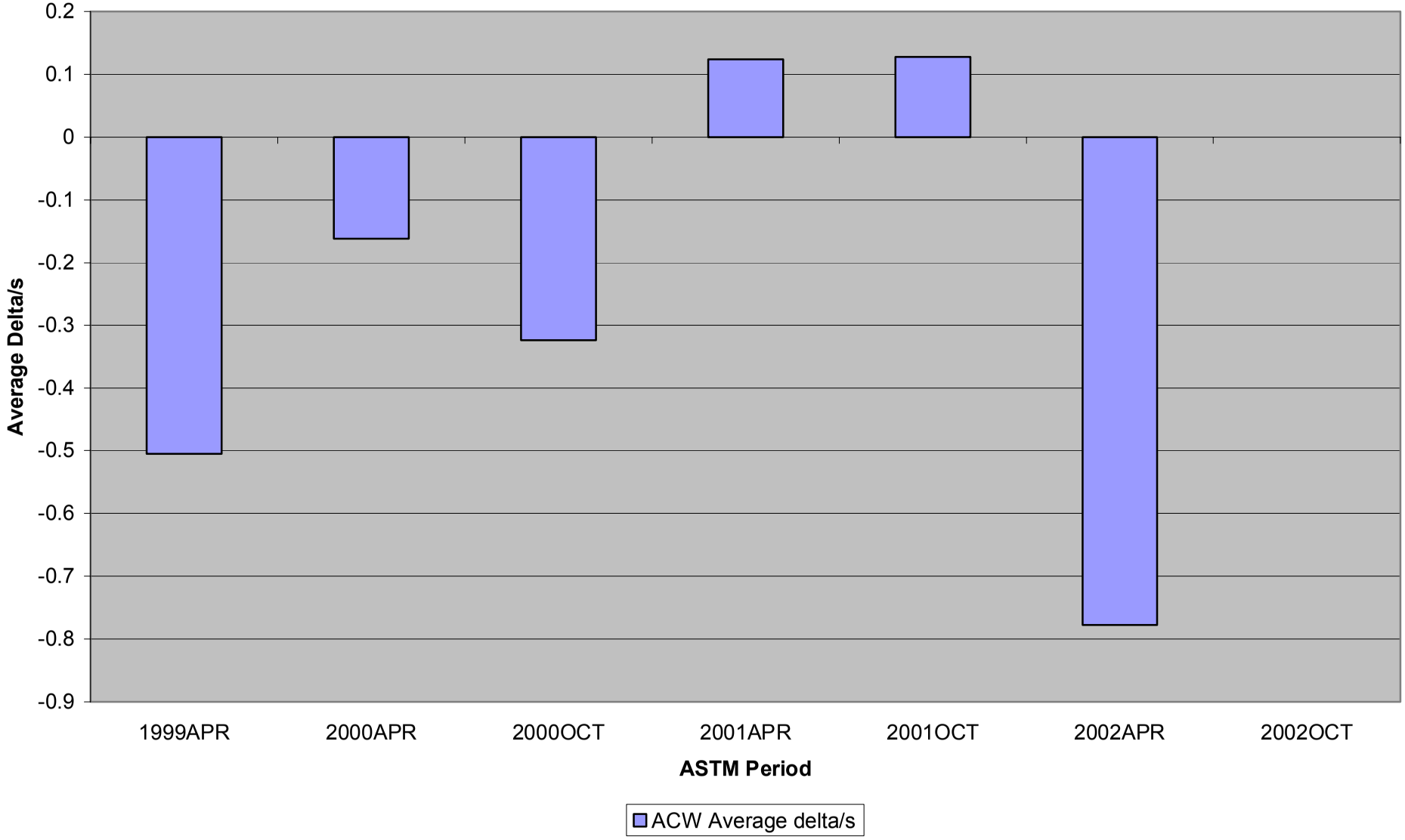


Figure 3 - Sequence IVA Reference Oil Data
Average Camshaft Wear

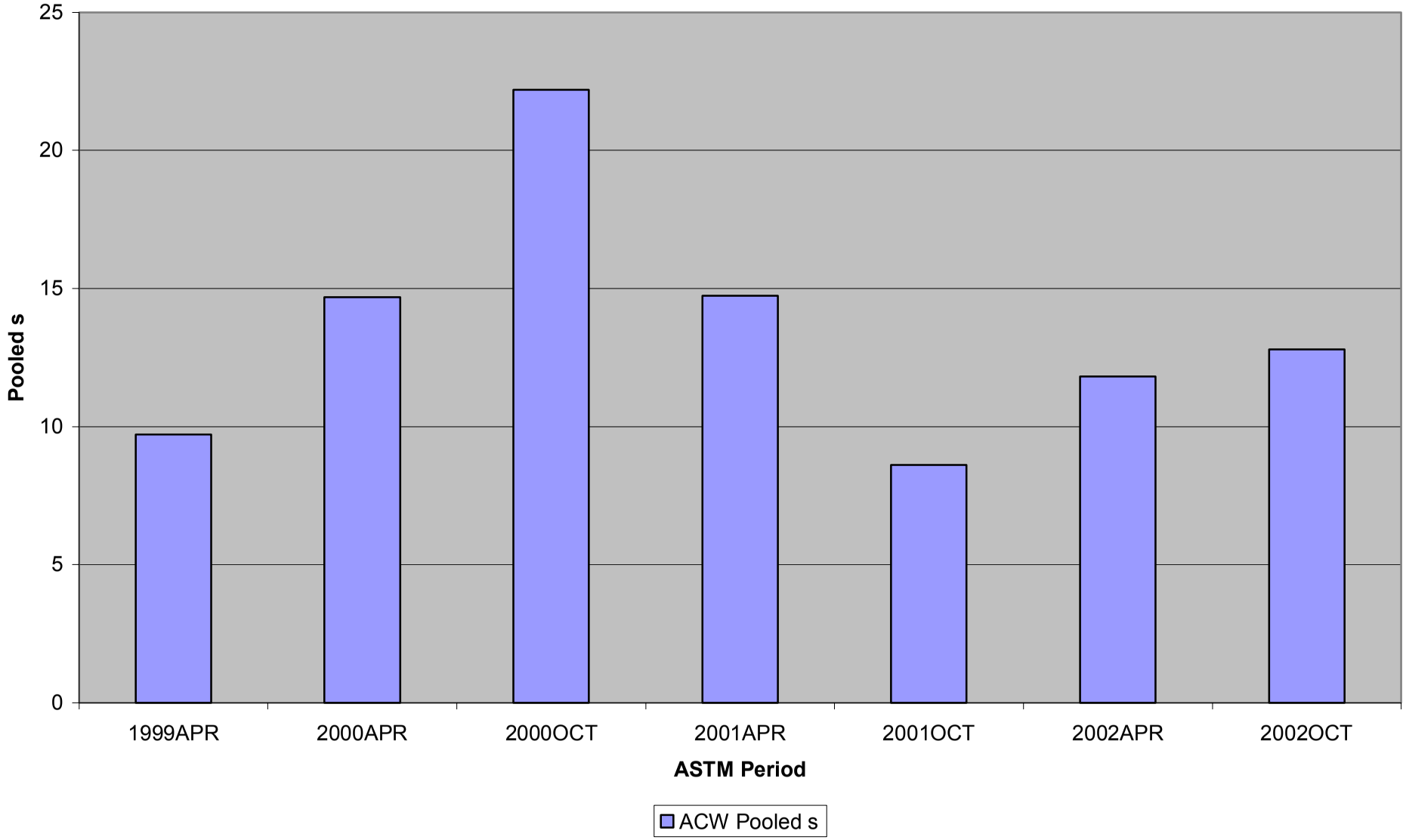


Figure 4 - Sequence IVA Timeline		
Date	**Topic**	**Information Letter**
2/10/99	SEQUENCE IVA TEST LTMS ESTABLISHED BY SURVEILLANCE PANEL	
11/17/99	CALIBRATION STATUS RESUMED	
2/16/00	DRAFT 4 OF TEST PROCEDURE ISSUED. INCORPORATED JACKETED ROCKER COVER, CONTROLLED FLOW OF FRESH AIR TO ROCKER COVER, AND OIL CYLINDER HEAD AS OIL TEMPERATURE CONTROL POINT.	00-1
8/1/00	REVISED DATA DICTIONARY AND REPORT FORM SET (VERSION 20000126) GOES INTO EFFECT.	00-2
6/12/00	REVSED DOUBLE-FLUSH COOLANT CONTROL REQUIREMENTS EFFECTIVE	00-3
6/12/00	REVISED ENGINE STARTING PROCEDURE EFFECTIVE	00-3
6/12/00	ELIMINATE THE REQUIREMENT FOR LINEAR RAMPING OF TRANSIENT PARAMETERS	00-3
6/12/00	REVISED OIL SAMPLING PROCEDURE	00-3
6/12/00	REVISED DOUBLE-FLUSH OIL DRAIN REQUIREMENT	00-3
6/12/00	REVISED COMPRESSION TEST REQUIREMENTS	00-3
6/12/00	NEW CAMSHAFT CLEANING REQUIREMENTS	00-3
1/24/01	CAMSHAFT LOT RESTRICTIONS	00-4
7/22/01	ROCKER COVER COOLANT FLOW MEASUREMENT & REPORTING	01-1
5/24/01	REVISED CYLINDER HEAD AND TEST ENGINE REPLACEMENT REQUIREMENTS	01-2
5/25/01	REVISED TEST NUMBERING REQUIREMENTS	01-2
2/12/02	REVISED ENGINE BREAK-IN SPECIFICATIONS	02-1
2/12/02	UPDATED DRAFT STANDARD OF SEQUENCE IVA TEST PROCEDURE RELEASED	02-1
4/5/02	REVISED CAMSHAFT MEASUREMENT PROCEDURES	02-2
5/14/02	STAND CALIBRATION REQUIREMENT REVISIONS	02-3
5/14/02	STAND INSTRUMENTATION CALIBRATION REQUIREMENT REVISIONS	02-3
6/1/02	REVISED OIL SAMPLE TAP LOCATION	02-3