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

Memorandum: 08-050

Date: October 16, 2008

To: Bill Buscher, Chairman, Sequence IVA Surveillance Panel

From: Richard E. Grundza

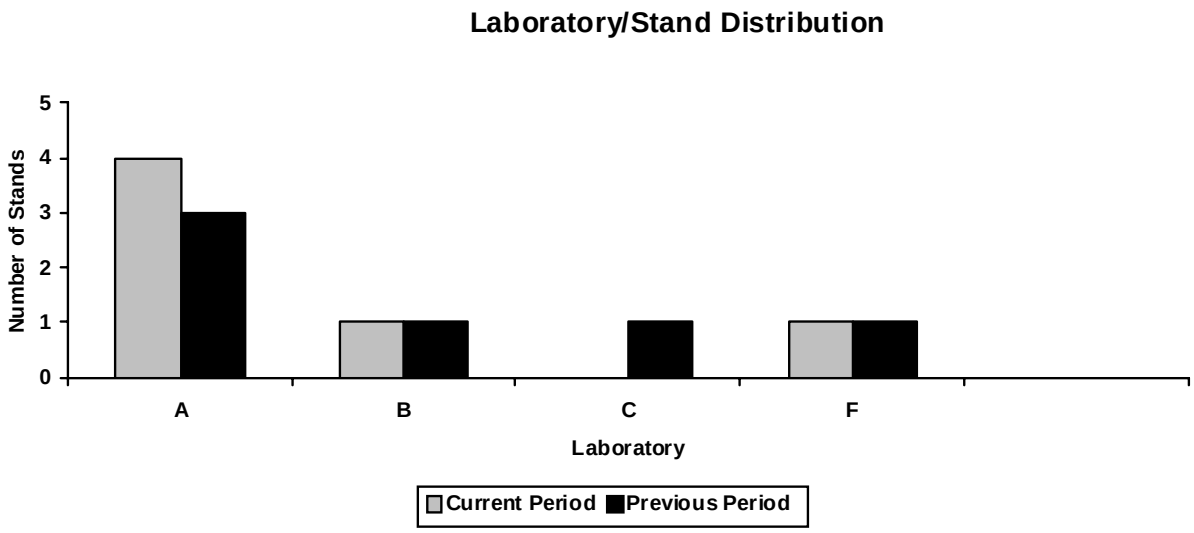
Subject: Sequence IVA Semiannual Report: April 1, 2008 through September 30, 2008

The following is a summary of Sequence IVA reference tests that were reported to the Test Monitoring Center during the period April 1, 2008 through September 30, 2008.

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2008
Number of Laboratories:	3	2
Number of Test Stands:	6	5

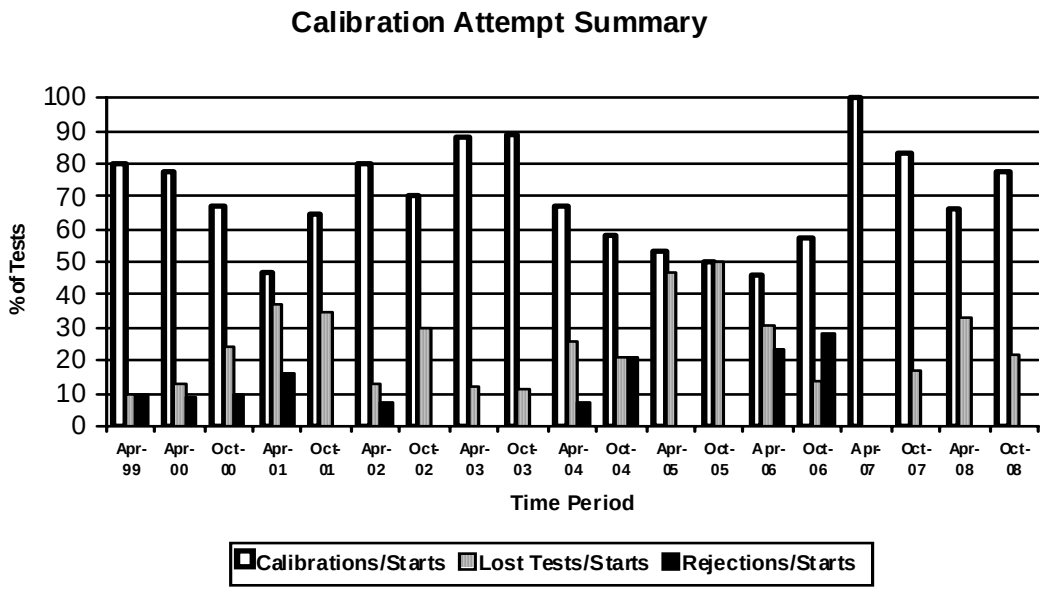
The following chart shows the laboratory/stand distribution:



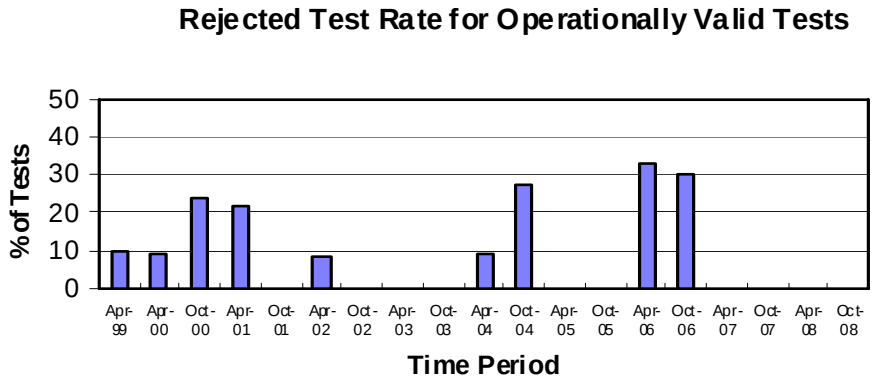
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	7
Operationally Invalid, Laboratory Judgement	LC	2
Total		9

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



The calibration per start rate has increased since last period. The lost test per start rate has decreased since last period. There were no rejected 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.

Four lab visits were conducted this period.

Information Letters

No information letters were generated during 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 report period. Also below is a summary of the average Δ/s value, by laboratory.

Industry Severity Summary			
Parameter	Average Δ/s	Pooled standard deviation (degrees of freedom)	Average Δ, in micrometers
ACW	0.415	6.317 (df=3)	2.62 μm

ACW Results, by Laboratory	
Laboratory	Average Δ/s
A	0.606
B	N/A
C	N/A
F	-0.728

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

The industry was severe for the period (see Figure 2) with an average Δ/s result of 0.415 which equates to 2.62 µm in reported units. The pooled standard deviation for the period is 6.71 µm, which is improved when compared to the last period, and compares well with 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	41	10	7	1 month or less[1]
1006-2	4,281	1070	5	3+ years[1]
1007[2]	366	91	5	3+ years[1]
1009	631	157	3	3+ years[1]

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

Summary

Calibration per start rate has increased with respect to the previous period. The lost test per start rate has decreased with respect to the previous period. There were no rejected tests this report period. ACW severity trended severe for the period. Pooled precision estimates show precision has improved when compared with the previous period, and compares well with historical estimates.

REG/reg

Attachments

c: F. M. Farber, TMC
Sequence IVA Surveillance Panel
ftp://astmtmc.cmu.edu/docs/gas/sequenceiv/semiannualreports/IVA-10-2008.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

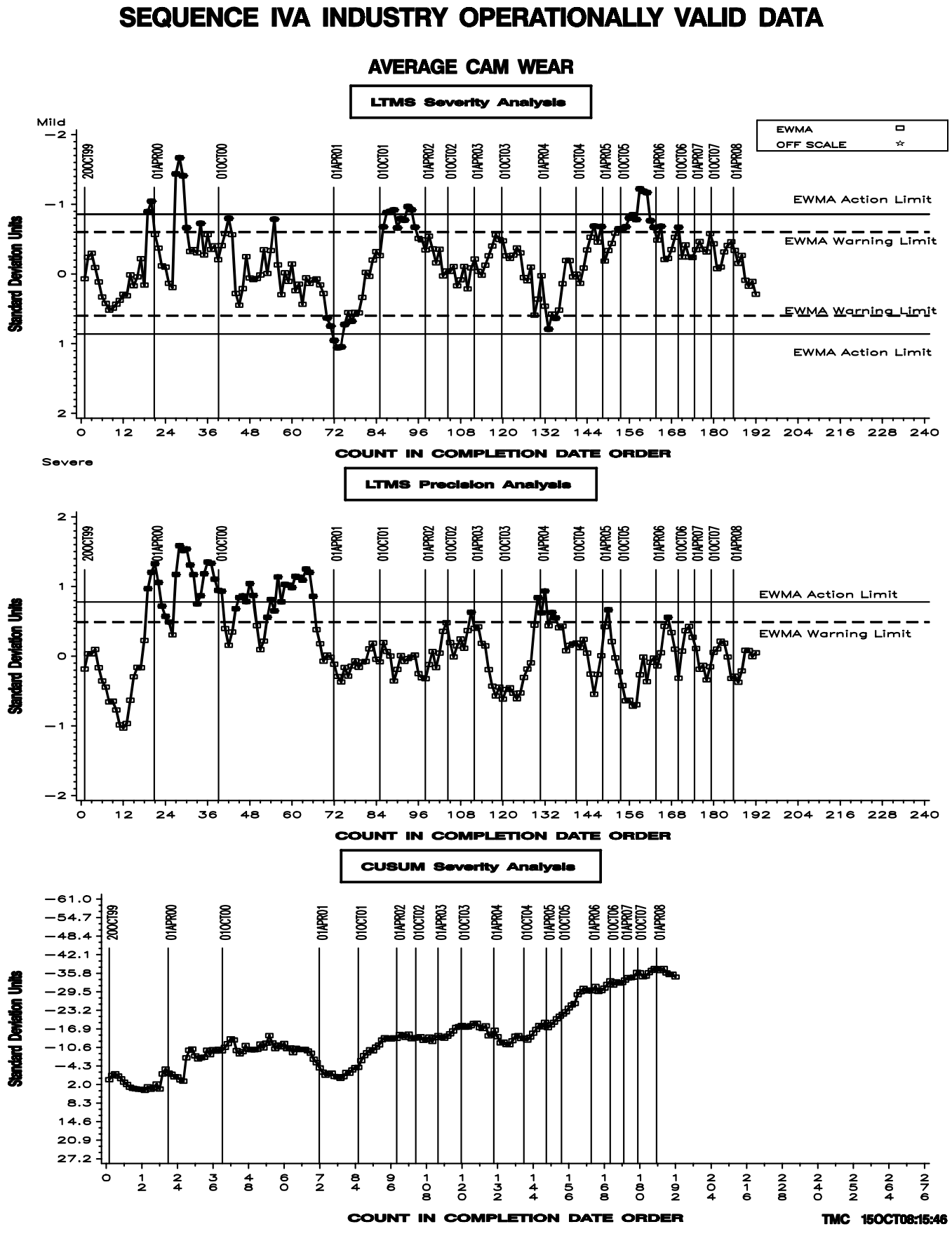

SEQUENCE IVA INDUSTRY OPERATIONALLY VALID DATA
AVERAGE CAM WEAR
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
CUSUM Severity Analysis
TMC 15OCT08:15:46

Figure 2 - Sequence IVA Reference Oil Data
Average Camshaft Wear

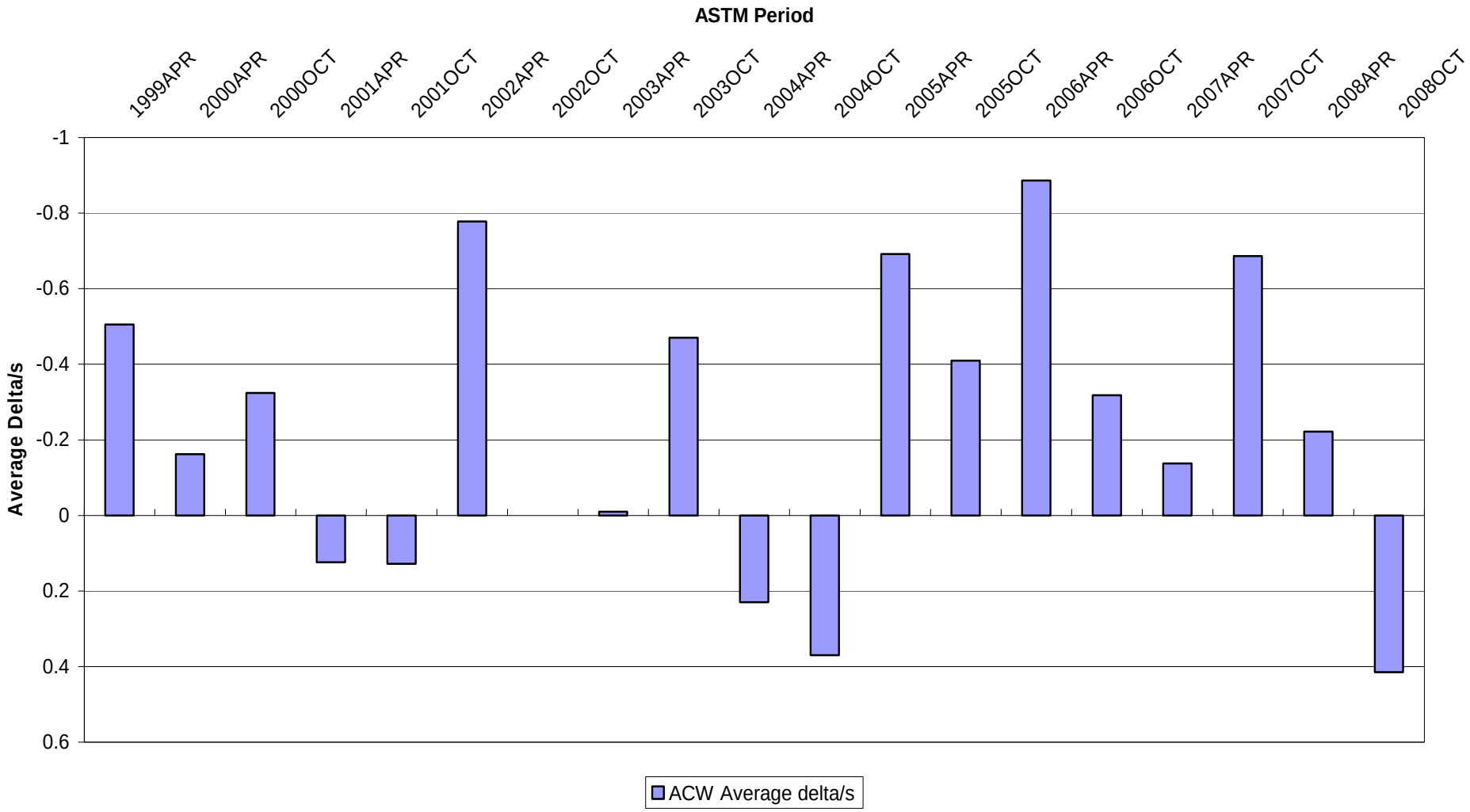


Figure 3 - Sequence IVA Reference Oil Data
Average Camshaft Wear

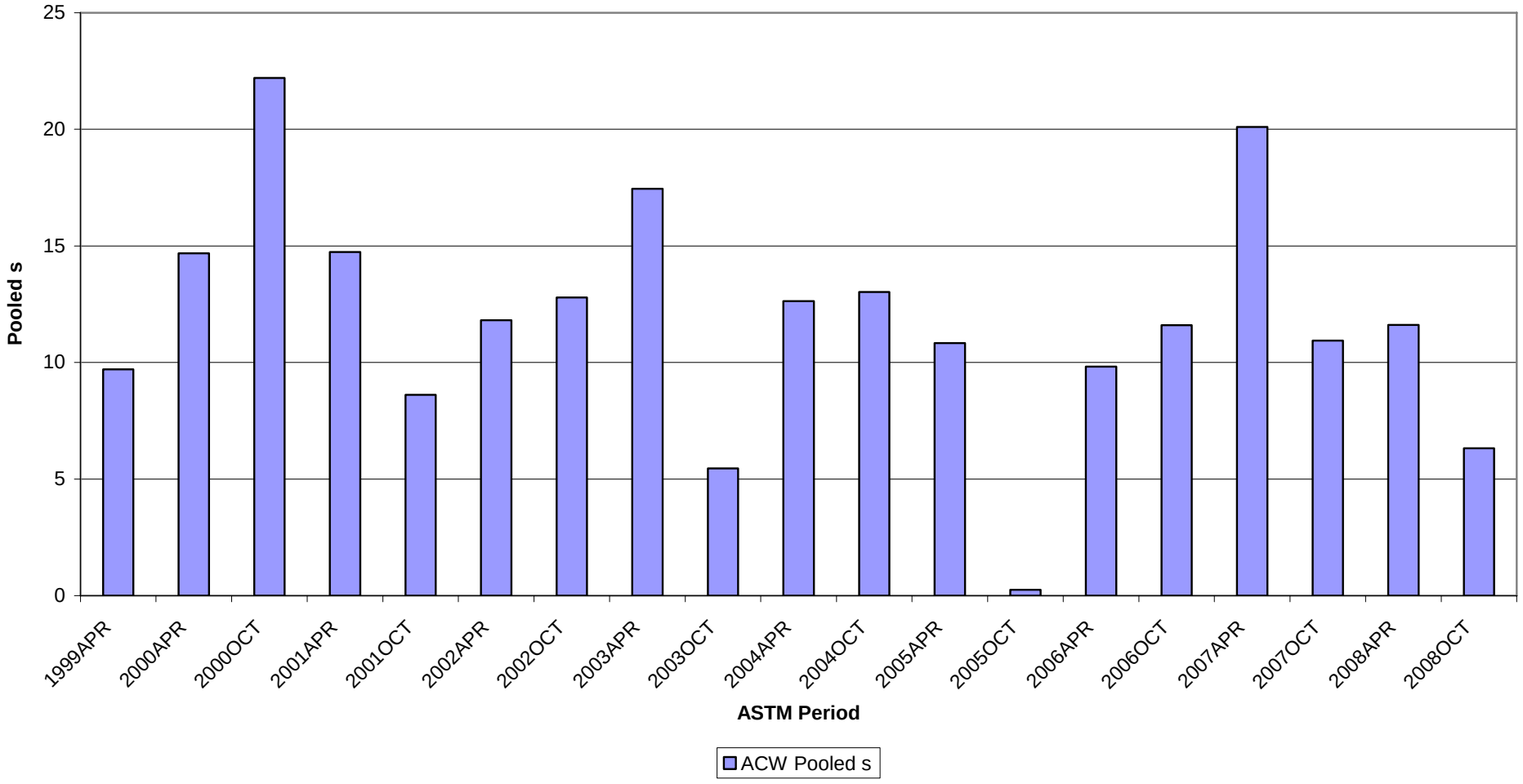


Figure 4 - Sequence IVA Timeline		
Date	**Topic**	**Information Letter**
2/10/1999	SEQUENCE IVA TEST LTMS ESTABLISHED BY SURVEILLANCE PANEL	
11/17/1999	CALIBRATION STATUS RESUMED	
2/16/2000	DRAFT 4 OF TEST PROCEDURE ISSUED. INCORPORATED JACKETED ROCKER COVER, CONTROLLED FLOW OF FRESH AIR TO ROCKER COVER, AND OIL CYLINDER HEAD AS OIL TEMPERATURE CONTROL POINT.	00-1
8/1/2000	REVISED DATA DICTIONARY AND REPORT FORM SET (VERSION 20000126) GOES INTO EFFECT.	00-2
6/12/2000	REVISED DOUBLE-FLUSH COOLANT CONTROL REQUIREMENTS EFFECTIVE	00-3
6/12/2000	REVISED ENGINE STARTING PROCEDURE EFFECTIVE	00-3
6/12/2000	ELIMINATE THE REQUIREMENT FOR LINEAR RAMPING OF TRANSIENT PARAMETERS	00-3
6/12/2000	REVISED OIL SAMPLING PROCEDURE	00-3
6/12/2000	REVISED DOUBLE-FLUSH OIL DRAIN REQUIREMENT	00-3
6/12/2000	REVISED COMPRESSION TEST REQUIREMENTS	00-3
6/12/2000	NEW CAMSHAFT CLEANING REQUIREMENTS	00-3
1/24/2001	CAMSHAFT LOT RESTRICTIONS	00-4
7/22/2001	ROCKER COVER COOLANT FLOW MEASUREMENT & REPORTING	01-1
5/24/2001	REVISED CYLINDER HEAD AND TEST ENGINE REPLACEMENT REQUIREMENTS	01-2
5/25/2001	REVISED TEST NUMBERING REQUIREMENTS	01-2
2/12/2002	REVISED ENGINE BREAK-IN SPECIFICATIONS	02-1
2/12/2002	UPDATED DRAFT STANDARD OF SEQUENCE IVA TEST PROCEDURE RELEASED	02-1
4/5/2002	REVISED CAMSHAFT MEASUREMENT PROCEDURES	02-2
5/14/2002	STAND CALIBRATION REQUIREMENT REVISIONS	02-3
5/14/2002	STAND INSTRUMENTATION CALIBRATION REQUIREMENT REVISIONS	02-3
6/1/2002	REVISED OIL SAMPLE TAP LOCATION	02-3
12/16/2002	LUBRICATION OF CAMSHAFT DURING INSTALLATION	02-4
5/11/2004	CAMSHAFT BEARING BORE MEASUREMENTS ELIMINATED EXCEPT FOR INITIAL ENGINE BUILD	04-1
6/2/2004	NEW SOLVENT SPECIFICATIONS	04-1
7/19/2004	REVISED PRECISION DEFINITIONS	04-1
11/19/2004	REVISED REPLACEMENT CRITERIA FOR CYLINDER HEADS AND ENGINES	05-1
11/19/2004	CLARIFIED SOLVENT SPECIFICATION REQUIREMENTS	05-1
11/19/2004	REVISED QI U&L VALUES FOR COOLANT OUTLET TEMPERATURE	05-1
11/192004	REVISED CALIBRATION FREQUENCY FOR INSTRUMENTATION CHANNELS	05-1
11/19/2004	ADDED SECTIONS AND ANNEX TO DEFINE ROLE OF TMC AND EXTEND CALIBRATION PERIODS FOR DONATED TEST PROGRAMS	05-1
6/8/2005	UPDATED PRECISION ESTIMATE	05-2
12/13/2005	ADDED TOLERANCES TO MEASUREMENT DEVICE LOCATIONS	05-3
12/13/2005	INCREASED NUMBER OF RUNS ALLOWED ON BLOCK AND HEADS	05-3
12/13/2005	ADDED/REVISED SCHEDULE FOR OIL COOLER, PCV VALVE AND COOLANT SYSTEM CLEANING/REPLACEMENT	05-3
12/13/2005	ADDED LIMITS ON LOST OPERATIONAL DATA	05-3
12/13/2005	REVISED FUEL TEMPERATURE CONTROL LIMITS	05-3
12/13/2005	REVISED TORQUE CONTROL STRATEGY	05-3
02/16/2006	REVISED WEAR MEASUREMENT TECHNIQUES	06-1
02/16/2006	ADDRESSED EDITORIAL CHANGES	06-1
2007/11/16	UPDATED REFERENCE OIL TARGETS (N = 29) REFERENCE OIL 1009	