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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Originally Issued: November 15, 2003

Reply to: Frank Farber
ASTM Test Monitoring Center
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Unapproved Minutes of the October 29,2003 Sequence III Surveillance Panel Meeting held in San Antonio, Texas

The meeting was called to order at 8:00 am by Chairman Bill Nahumck. A membership list was circulated for members & guests to sign in. It's shown in Attachment 1.

Agenda Review

Ben Weber is Action & Motion recorder.
The status of the Sequence IIIF standard was added to the agenda.

The Agenda was accepted as attached (Attachment 2).

Membership Changes

No membership changes.

Joe Noles will be representing Infineum this meeting.

Gordon Farnsworth is on medical leave. Gordon is doing well and undergoing chemotherapy. Everyone on the panel wishes Gordon the best and a quick return.

Bob Olree has Hanna Murray's proxy.

Meeting Minute Status
June 2003 (corrections posted) and subsequent minutes from three teleconference meetings are posted to the ASTM TMC website. All were approved.

TMC Sequence IIIF Reference Reports

Report attached (Attachment 3).

Reference oil 1009 introduction has not been acted on to date. The surveillance panel indicated that it has no desire to introduce this oil into the Sequence IIIF system.

RSI Report

No formal report given.

CPD Report

Report attached (Attachment 4).

GM Motorsports

No formal report given.

Fuel Supplier Report

Report attached (Attachment 5).

Sequence IIIG TMC Report

Report attached (Attachment 6).

RSI Report

No formal report given. There is very limited data in the RSI data base at this point.

Updating IIIG LTMS Targets

Phil Scinto presented a proposal to update the IIIG LTMS targets as shown in Attachment 7. The current LTMS data indicates that there is a viscosity increase and MRV bias because of lab G's rough ring data. Phil's recommendation is to correct for the rough ring data at lab G in order to maintain a reasonable n-size. Eliminating the rough ring data would reduce n-sizes to 5 on 434, 3 on 435 and 6 on 438. Phil also recommended that a correction be applied to Lab G WPD data because a significant difference was found between their data and the rest of industry.

Phil noted that not accepting the revised targets would have repercussions on the LTMS. The LTMS targets must be based upon a homogeneous data set (data set without special causes).

The panel's opinion was that there was no issue with rough rings and felt that the current targets should be the anchor moving forward. Presently no data exists on the corrected ring batch to confirm the conclusion that the ring surface effects severity. The panel did not accept the recommendation to correct the test targets at this time.

IIIG Severity Adjustment for MRV

Phil Scinto noted to the panel that MRV was a pass/fail parameter without a severity adjustment process. Data indicates that percent viscosity increase and MRV are highly correlated. Because reference oil 435 MRV is affected by yield stress, the recommendation was to use the Yi from percent viscosity increase for oil 435. By doing this a more manageable transformation (natural log) could then be used for MRV. The panel accepted this recommendation. A pooled s for the severity adjustment was to be determined from results on reference oil 434 & 438. After the meeting the pooled s MRV was determined to be 0.30673. In addition, to determining an SA protocol for MRV the issue of an LTMS pass/fail parameter was discussed. Because of the delay of getting the MRV results from when the test completes the panel did not approve a severity and precision monitoring system for MRV. Since the MRV was going to be removed from the Sequence IIIG and moved to the Sequence IIIGA the following motion was made.

Frank Farber motioned and Dwight Bowden seconded: To make MRV a Sequence IIIGA parameter with no LTMS repercussions and to use the above MRV severity adjustment protocol. 11 approves, 1 waive no disapproves.

Sequence IIIGA ACC Request

Joan Evans presented ACC's request for the use of a Sequence IIIGA to evaluate MRV performance (Attachment 8). The Sequence IIIG procedure/report packet will not contain the measurement or reporting of CCS & MRV. Aside from operational information the Sequence IIIGA will only address CCS & MRV results. Sequence IIIG and IIIGA results can be produced from the same test. A Sequence IIIGA can be run separate from a Sequence IIIG. Two report packets were requested by the panel for the Sequence IIIG and IIIGA.

A motion was made to accept the ILSAC/ACC recommendation for the IIIG and IIIGA tests. The motion passed with 11 approves and one waive, no disapproves.

Sequence IIIG Oil Consumption Correction Equation Coordinating Team

Attachment 9 is the report from the Coordinating Team. The surveillance panel reviewed the following recommendations:

1. The surveillance panel should closely monitor oil consumption for Sequence IIIG tests run with new size 1 through 4 rings. Is OC consistent with size 5 and 6 rings?

2. The surveillance panel should document the lessons learned by Lab G and use that information, if appropriate, to maintain or improve Sequence IIIG precision industry wide.

3. The surveillance panel should consider if additional measurements and controls on cylinder honing is necessary to assure industry-wide OC precision in the Sequence IIIG.

4. The surveillance panel should determine oil consumption validity criteria early in the Sequence IIIG test and total oil consumption interpretability.

Items 1 - 3 the panel is currently addressing. Given that items 1 – 3 will be implemented short–term the panel felt that sufficient data needed to be collected before addressing item 4. Once this data is available the panel will address item 4.

IIIG CPD Report

The report was included in Attachment 4.

GM Motorsport Report

GM stated that they will be able to supply blocks. Schwartz is currently machining blocks supplied from Plant 36 and will have them available shortly.

Sequence III O & H Report

Recommendations are Attachment 10.

TMC is to back populate the correct 100 hour milliliters low oil level from form 5 to their database.

Motion (Dwight Bowden/Hanna Murray (by proxy)), to accept the first 12 recommendations proposed by O & H. The motioned passed unanimously by voice vote.

Motion (Dwight Bowden/Michael Kasimirsky) All Raters who rate Sequence III parts are to attend a rating workshop annually. If a rater misses a scheduled workshop, they must attend alternative training within 90 days, as directed by the TMC. The motion passed unanimously by voice vote.

Honing Guidelines: Presented by Sid Clark (Attachment 11)

Motion (Dwight Bowden/Sid Clark) The Sequence III Surveillance Panel agrees that the honing process described by PerkinElmer is considered a refinement, not a change, to the Sequence IIIG test procedure. The motion passed unanimously by voice vote.

The O&H was tasked with completing the following items by December 17, 2003:

1. Review configuration and calibration by a certified Sunnen technician of all CV-616 honers with the portable torque meter.
2. Develop new stone and break-in procedure guidelines.
3. Determine if batch code information for stones, brushes, and fluids is available and useful.
4. Conduct a workshop for laboratory technician training.
5. Run a reference oil test to verify performance.

Bob Olree as chair of ILSAC expect/requires honer calibration/workshop refinements to be completed by December 17, 2003. Emphasis was made that this action needs to happen.

Motion (Pat Lang/Michael Kasmirsky) Change Yield Stress units to Pa and report Yield Stress in Pascals (Pa = 3.5*mass in grams). The TMC is to correct the database, after working with the laboratories to confirm their results. The motion passed unanimously by voice vote.

Motion (Charlie Leverett/Pat Lang) Move APV to "Other Results" on Form 4. The motion passed unanimously by voice vote.

The TMC is to review the piston wiping procedure and location description for under crown.

O&H chair and TMC to investigate ring groove rating issues.

IIIF Standard Status

Currently the Sequence IIIF standard is in D2 ballot. It has already passed B ballot.

Scope & Objectives

The Sequence IIIGA will be added to scope.

The scope and revised objectives are shown on Attachment 12.

Adjournment

The meeting was adjourned at approximately 3 pm

Motions & Action Items

As Recorded at the Meeting by Ben Weber

1. TMC, OHT & fuel supplier reports were unanimously accepted as presented.
2. (Frank Farber/Dwight Bowden) For the IIIGA, the MRV parameter will only have severity adjustments and no LTMS pass/fail repercussions. Accept the use of the IIIG viscosity increase Yi values for MRV on oil 435 only. Oil 434 & 438 will have the MRV results charted as normal. Use a natural log transformation for MRV and a pooled standard deviation .41868 *(note this number was subsequently changed to 0.30673)* for severity adjustment calculations. Effective November 3, 2003. The motion passed unanimously with one waive from TMC.
3. (Ben Weber/Sid Clark) Motion for the Sequence III SP to accept the ILSAC/Oil recommendation to register the IIIGA as an engine test for measuring MRV & CCS only. The test procedure will be an annex to the IIIG and the first draft is available now. The test report and datacomm will be finalized shortly with separate report packages and data-dictionaries. The first Sequence IIIG run on a candidate oil will be dually registered as a Sequence IIIG and a Sequence IIIGA. Subsequent attempts to obtain passing MRV results would be registered as Sequence IIIGA. Effective as the same date of RSI registration. The MRV & CCS data reported in the IIIG prior to this motion will be used as IIIGA data. Passed unanimously with one waive from TMC.
4. The SP will add to their scope and objectives to monitor appropriate limits for the 20-h and EOT oil consumption with oil effects like volatility, etc. taken into account are necessary. The SP already has a limit of 4.65L for EOT oil consumption interpretability, but will continue to monitor it. Also keep in mind the SP is about to adopt several other changes such as honing, etc. that need to be evaluated before implementing any new/suggested limits.
5. The monitoring of the 1-4 rings will also be added to the SP scope and objectives.
6. The 12 recommended changes from the O&H panel report were accepted as presented with the modification of #10 from 100-h to EOT. All items relate to both the IIIF and IIIG, unless otherwise specified. Motion passed unanimously.
7. Pat Lang/Mike K motion that all raters who rate Sequence III parts must attend a rating workshop annually. If a rater misses a scheduled workshop, they must attend alternative training within 90 days, as directed by the TMC. Passed unanimously.
8. Dwight Bowden/Sid Clark made the motion the Surveillance Panel agreed that the honing process described by PerkinElmer and discussed by the O&H sub-panel is considered a refinement, not a change, to the Sequence III test procedures. Passed unanimously.
9. The five items listed under Honing Recommendations from the O&H report will be addressed by the Surveillance Panel.
10. Pat Lang/Dave G moved to accept Pat's report as presented.
11. Pat Lang/Mike K moved that the yield stress units on form 6 should be Pa versus cP and calculate the Pa by multiplying the weight in grams by 3.5. The TMC database will be corrected as well. Motion passed unanimously.
12. Charlie L/Pat Lang motioned to move the APV to the other results of form 4. Motion passed unanimously.

ATTACHMENT 1

ASTM SEQUENCE IIIF LIST

October 29, 2003 **San Antonio, Texas**

NAME / ADDRESS	PHONE / FAX / E-MAIL		SIGNATURE
Ed Altman Ethyl Petroleum Additives, Inc. P.O. Box 2158 Richmond, VA 23218-2158 USA	804-788-5279 804-788-6358 ed_altman@ethyl.com	☐ IIIF SURV PANEL ☑ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present
Beto Araiza Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249 USA	210-877-0222 210-690-1959 baraiza@tei-net.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present
Monica Beyer The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, OH 44092 USA	440-347-2006 440-347-4096 mbey@lubrizol.com	☐ IIIF SURV PANEL ☑ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present
Dwight H. Bowden OH Technologies, Inc. 9300 Progress Parkway P.O. Box 5039 Mentor, OH 44061-5039 USA	440-354-7007 440-354-7080 dhbowden@ohtech.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present
Donald Bryant The Lubrizol Corporation 28400 Lakeland Boulevard Wickliffe, OH 44092 USA	440-347-2159 440-943-9004 debr@lubrizol.com	☐ IIIF SURV PANEL ☑ IIIF MAILING LIST ☐ O&H SUBPANEL ☑ O&H Mailing List	Present

ASTM SEQUENCE IIIF LIST

October 29, 2003 **San Antonio, Texas**

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Don Burnett ChevronPhillips Chemical Compan Chevron Tower 1301 McKinney Street Suite 2130 Houston, TX 77010-3030 USA	713-289-4859 713-289-4865 burnede@cpchem.com	☐ IIIF SURV PANEL ☑ IIIF MAILING LIST ☐ O&H SUBPANEL ☐ O&H Mailing List	Present
James Carter Haltermann Products 3520 Okemos Rd. Suite #6-176 Okemos, MI USA	517-347-3021 517-347-1024 JECarter@dow.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☐ O&H SUBPANEL ☐ O&H Mailing List	Present
Timothy L. Caudill Ashland Oil Inc. 22nd & Front Streets Ashland, KY 41101 USA	606-329-~~5708~~ 1960 x5708 606-329-~~8000~~ 2044 tlcaudill@ashland.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present Timothy L Caudill
Sid Clark GM Powertrain General Motors Corporation MC - 483-730-322 823 Joslyn Rd. Pontiac, MI 48340-2920 USA	248-857-9959 248-857-4405 sidney.l.clark@gm.com Test Sponsor Rep	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present Sid Clark
Mark Cooper Chevron Oronite Company LLC 4502 Centerview Drive Suite 210 San Antonio, TX 78228 USA	210-731-5606 210-731-5699 mawc@chevrontexaco.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present

Mark Sutherland attending for Mark Cooper

ASTM SEQUENCE IIIF LIST

October 29, 2003 **San Antonio, Texas**

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Gordon R. Farnsworth Infineum P.O. Box 735 Linden, NJ 07036 USA	908-474-3351 908-474-3637 gordon.farnsworth@infineum.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☐ O&H SUBPANEL ☑ O&H Mailing List	Present Joe Nobes for
Frank Fernandez ChevronOronite Co., LLC 4502 Centerview Drive Suite 210 San Antonio, TX 78228 USA	210-731-5603 210-731-5699 ffer@chevron.con PCEOCP Chair	☐ IIIF SURV PANEL ☑ IIIF MAILING LIST ☐ O&H SUBPANEL ☐ O&H Mailing List	Present
Dennis Florkowski DaimlerChrysler 800 Chrysler Road CIMS 482-00-13 Auburn Hills, MI 48236-2757 USA	248-576-7477 248-576-7490 df11@daimlerchrysler.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☐ O&H SUBPANEL ☐ O&H Mailing List	Present
Thomas M. Franklin PerkinElmer Automotive Research, 5404 Bandera Road San Antonio, TX 78238 USA	210-647-9446 210-523-4607 tom.franklin@perkinelmer.com Sub-Committee D02.B Chair	☐ IIIF SURV PANEL ☑ IIIF MAILING LIST ☐ O&H SUBPANEL ☐ O&H Mailing List	Present

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October 29, 2003 **San Antonio, Texas**

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Irwin L. Goldblatt Castrol Americas 240 Centennial Avenue Piscataway, NJ 08854-3910 USA	732-980-3606 973-686-4224 irwin.goldblatt@cnacm.com	☐ IIIF SURV PANEL ☑ IIIF MAILING LIST ☐ O&H SUBPANEL ☐ O&H Mailing List	Present
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Michael T. Kasimirsky ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 USA	412-365-1033 412-365-1047 mtk@astmtmc.cmu.cdu	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present
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ASTM SEQUENCE IIIF LIST

October 29, 2003 San Antonio, Texas

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October 29, 2003 **San Antonio, Texas**

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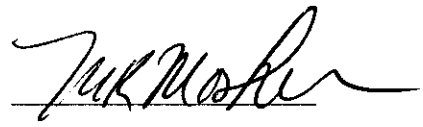
Mark Mosher ExxonMobil Technology Company Billingsport Road Paulsboro, NJ 08066 USA	856-224-2132 856-224-3628 mark.r.mosher@exxonmobil.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present 
Hannah Murray Toyota Technical Center, USA, Inc. 1588 Woodridge RR #7 Ann Arbor, MI 48105 USA	734-995-3762 734-995-5971 hmurray@ttc-usa.com	☑ IIIF SURV PANEL ☐ IIIF MAILING LIST ☑ O&H SUBPANEL ☐ O&H Mailing List	Present

ASTM SEQUENCE IIIF LIST

October 29, 2003 **San Antonio, Texas**

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ASTM SEQUENCE IIIF LIST

October 29, 2003 **San Antonio, Texas**

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SEQUENCE III SURVEILLANCE PANEL MEETING
GUEST LIST
October 29, 2003
San Antonio, Texas

NAME/ADDRESS	PHONE/FAX/EMAIL	SIGNATURE
Joan Evans- Infineum 1900 E Linden Ave Linden NJ 07036	908 474 6510 - ph 908 474 3363 - fax joan.evans@infineum.com	
JOE NOCES 1900 E Linden Ave Linden NJ 07036	908-474-2796 ph 908-474-3363 fax joe.noles@infineum.com	*IIIF SP
MARTIN CHADWICK PERKINELMER 3404 BANDERA RD SAN ANTONIO, TX	210.706.1543 ~~VOICE~~ MARTIN.CHADWICK@PERKINELMER.COM	MRC
Jason Bowden P.O. Box 5039 Mentor, OH 44061-5039	440-354-7007 440-354-7000 jhbowden@ohtel.com	
CHARLES SEYMOUR CASTROL-BP 240 Centennial Ave Piscataway NJ 08854	732-980-3611 P 973-686-4092 F charles.seymour@bp.com	

ATTACHMENT 2

AGENDA

SEQUENCE III SURVEILLANCE PANEL MEETING

Southwest Research Institute, San Antonio, Texas
October 29, 2003
8:00 AM to 4:00 PM

1. **APPOINTMENT OF RECORDER OF ACTIONS/MOTIONS**
2. **AGENDA REVIEW**
3. **MEMBERSHIP CHANGES**
4. **Approval of Minutes from the June 2003 meeting and the June 30, 2003, August 1, 2003 and September 18, 2003 Teleconferences.**

SEQUENCE IIIF

1. **IIIF TMC TEST STATUS UPDATE – Mike Kasimirsky**
2. **IIIF RSI REPORT – Rick Oliver**
3. **IIIF O&H REPORT – Pat Lang**
4. **IIIF FUEL SUPPLIER REPORT**
5. **IIIF CPD SUPPLIER REPORTS**
   - A. **OHT**
   - B. **GM MOTORSPORTS**

SEQUENCE IIIG

1. **IIIG TMC TEST STATUS UPDATE – Mike Kasimirsky**
   - A. **Updating IIIG LTMS Targets – Phil Scinto**
   - B. **IIIG Severity Adjustments for MRV– Phil Scinto**
   - C. **NEW Business Item - ACC Request for Sequence IIIGA Test - Joan Evans**
2. **IIIG CPD SUPPLIER REPORTS**
   - A. **OHT**
   - B. **GM MOTORSPORTS**
3. **IIIG O&H REPORT – Pat Lang**
   - A. **Test Reporting Issues**
   - B. **Honing Task Force Review**
4. **REPORT FROM IIIF OIL CONSUMPTION CORRECTION EQUATION COORDINATING TEAM**

OLD BUSINESS

1. **Status of IIIF Standard**
2. **Review of Scope & Objectives** – Add Δ's to oil consumption issues

NEW BUSINESS

1.

ADJOURNMENT

ATTACHMENT 3

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

Memorandum: 03-107

Date: October 23, 2003

To: William M. Nahumck, Chairman, Sequence IIIF Surveillance Panel

From: Michael T. Kasimirsky Michael T. Kasimirsky

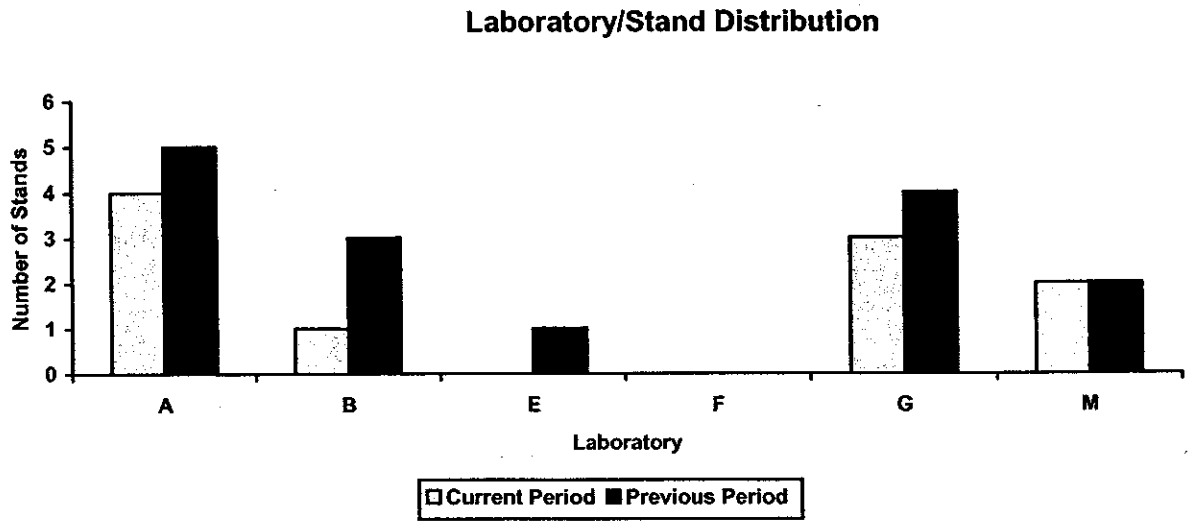
Subject: Sequence IIIF Semiannual Report: April 1, 2003 through September 30, 2003

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

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2003
Number of Laboratories:	4	4
Number of Test Stands:	10	7

The following chart shows the laboratory/stand distribution:

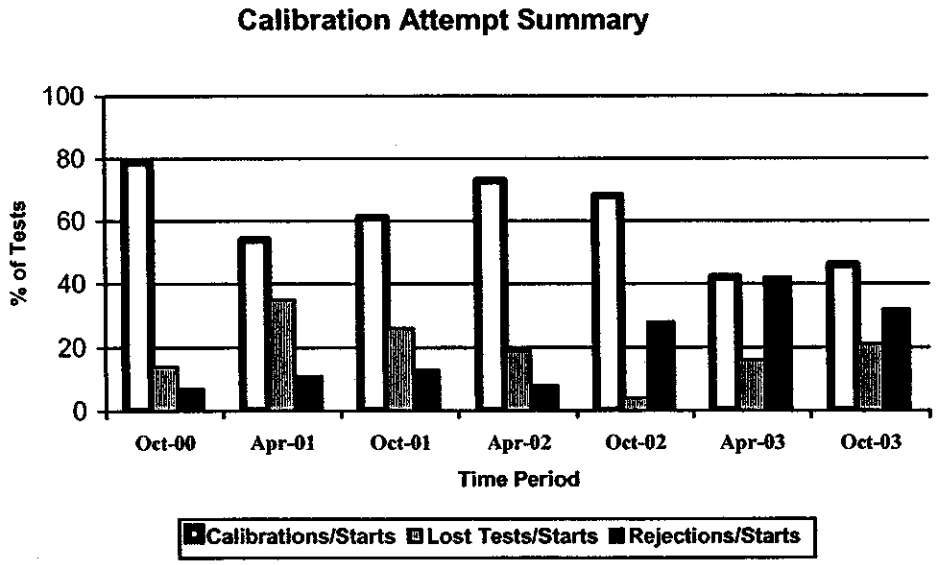


The following summarizes the status of the reference oil tests reported to the TMC:

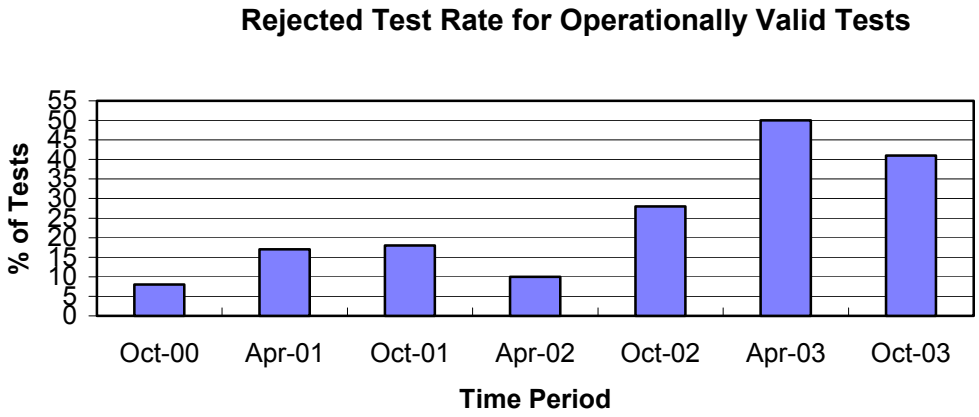
Calibration Start Outcomes	TMC Validity Codes	No. of Tests
Operationally and Statistically Acceptable	AC	13
Failed Acceptance Criteria	OC	9
Operationally Invalid (Laboratory Judgment)	LC	5
Operationally Invalid (Lab & TMC Judgment)	RC	1
Stand Failed Reference Sequence – data pulled	MC	0
Aborted	XC	0
Total		28

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

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

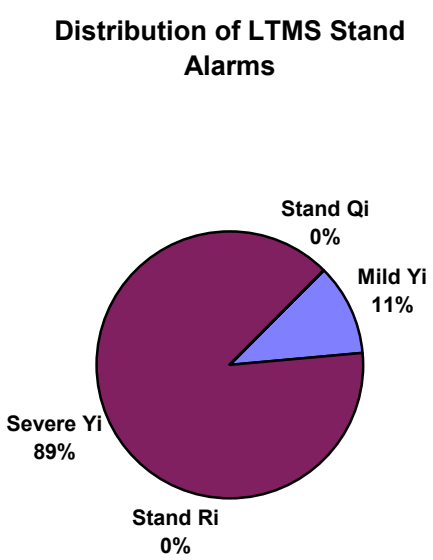


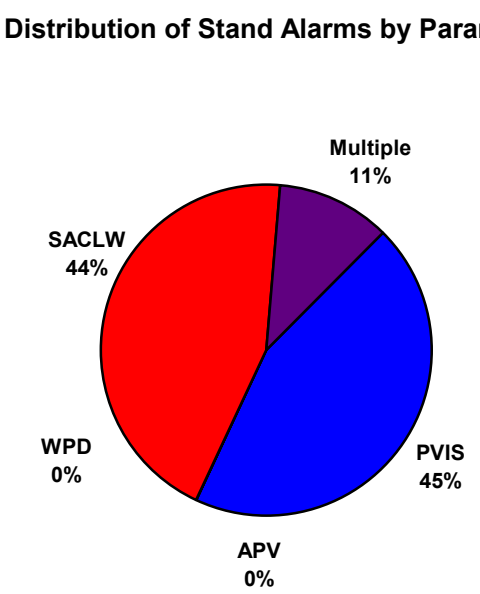
The calibration per start rate is higher than last period. The lost test rate is higher than last period. The rejected test rate is lower than last period.



The rate of rejection of operationally valid tests has decreased from last period.

There were nine failing tests for the period. The following charts summarize the reasons and breakdown by parameter for the failed test:





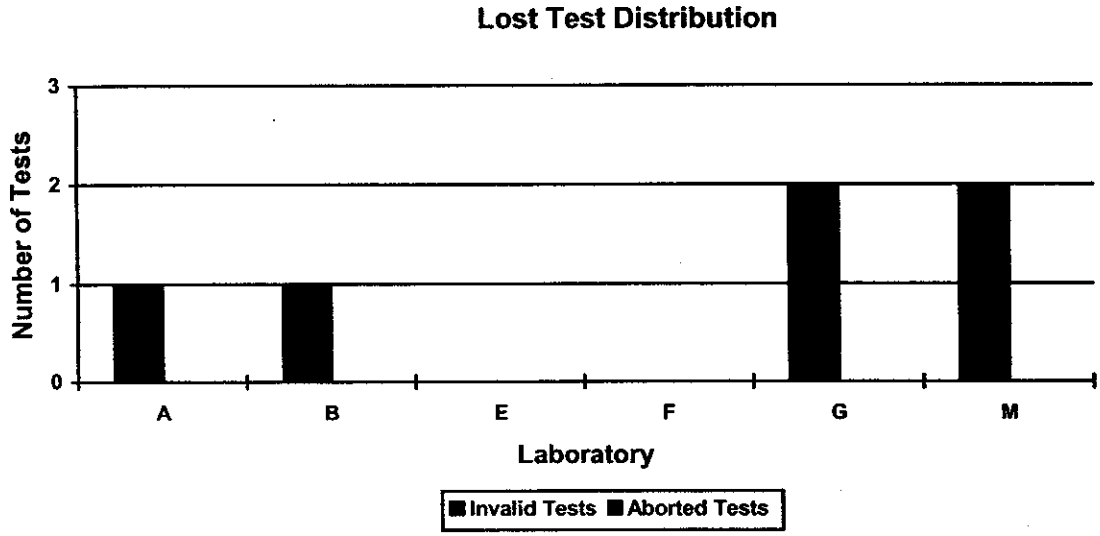
There were no LTMS Deviations written this period. There have been three other deviations from the LTMS since its introduction in June of 2000.

Two Sequence IIIF lab visits were performed this period. No significant problems were found.

Lost Test Summary

Six tests were lost this period. The reasons for the lost tests are shown in the following table:

Lab	Reason for Lost Test	Number of Tests	Breakdown of Tests (LC/RC/XC)
A	Corrupted Data Files – no QI results	1	1/0/0
B1	Unknown viscosity increase problems	1	1/0/0
G	Negative QI on Oil Filter Block Temp	1	1/1/0
G	Downtime	1	
M	Intake Air Humidity Lost	1	2/0/0
M	Negative QI on Intake Air	1	



Information Letters

Sequence IIIF Information Letter No. 03-1, Sequence No. 11, was issued during the period on July 18, 2003, and contained the following topics: New Oil Filter, Revised Front Cover & Oil Filter Housing, New Dip Stick, New Solvent Specifications, Calibrated Flask for Initial Oil Charge Measurement, ACC Registration Information, and 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 reported units
PVIS	-0.476	0.012 (df=17)	60.5 % Viscosity Increase[1]
APV	-0.368	0.184 (df=17)	-0.07 Merits
WPD	-0.206	0.382 (df=17)	-0.08 Merits
PV60[2]	-0.022	0.175 (df=17)	-1.1% Viscosity Increase[3]

[1] At the GF-3 Pass Limit of 275% Viscosity Increase

[2] Not a pass/fail parameter in the Sequence IIIF test; Sequence IIIFHD use only

[3] At the CH-4 Pass Limit of 295% Viscosity Increase @ 60 Hours; Sequence IIIFHD use only.

Average Δ/s Results, by Laboratory				
Laboratory	PVIS	APV	WPD	PV60
A	-0.32	-0.42	-0.39	0.21
B1	-1.37	-0.48	-0.21	-0.34
E	-	-	-	-
F	-	-	-	-
G	0.04	-0.98	-0.62	0.56
M	0.38	1.02	0.91	-0.78

Percent Viscosity Increase (PVIS)

The industry was within limits for precision during the period (see Figure 1), but is currently experiencing an EWMA Severity Alarm in the severe direction. This alarm appears to be driven by severe results at a single laboratory as three of the last four data points have been from this laboratory and all have been severe of target (-2.33, -1.71, and –1.00 Y_i results respectively), while the remaining fourth point was slightly mild of target (0.21 Y_i result). The industry was on the severe side of target for the period, with an average Δ/s value of -0.476 for the period (see Figure 5), making this the most severe period in history. Precision for the period has degraded slightly this period but is still comparable to the periods of best historical performance (see Figure 9).

Weighted Piston Deposits (WPD)

The industry was within limits on both severity and precision for the period (see Figure 2). The industry was severe for the period, with an average Δ/s value of –0.206, or -0.08 merits (see Figure 6). Precision for the period improved with a pooled standard deviation of 0.382 (see Figure 10) making it the most precise period in history.

Average Piston Skirt Varnish (APV)

The industry began the period in a precision alarm (see Figure 3) which was caused by several severe failing tests on APV in the last period. Subsequent testing has cleared the precision alarm. The industry also experienced a three-point severity alarm during the period. This test was caused by a single failing result on reference oil 1006-2 (-3.05 Y_i result) and subsequent testing has cleared the alarm. The industry was -0.07 Merits severe for the period with an average Δ/s value of -0.368 (see Figure 7), making it the most severe period on record. Precision for the period has improved over last period, with a pooled standard deviation of 0.184, and is in line with historical performance on this parameter (see Figure 11).

Average Camshaft-plus-Lifter Wear (ACLW)/Screened Average Camshaft-plus-Lifter Wear (SACLW)

Four tests failed during the period on SACLW. Three of the four were run on reference oil 433-1 and one on reference oil 1008-1. All four were run on NJ camshafts. Two tests had two lobes with high wear, the other two had eight and eleven high wear lobes on the camshafts. No cause for either failure has been found at this time.

Percent Viscosity Increase at 60 Hours

The industry control chart for PV60 is shown in Figure 4. The average Δ/s and pooled standard deviation for this period, and previous report periods, are shown in Figures 8 and 12 respectively. This parameter is not a pass-fail parameter in the Sequence IIIF test and is used only in Sequence IIIFHD testing. Therefore, the industry control charts are presented for information purposes only and any alarms

Shown on those charts do not require action by the Sequence IIIF Surveillance Panel. A review of Figure 4 shows that the industry has recently returned within limits after being consistently severe of target on this parameter.

QI Deviations

There were no QI Deviations written this period. There have been a total of 25 QI Deviations written since the test was introduced in June of 2000.

Hardware

A new oil filter was implemented during the period in an effort to prevent bypass operation in the engine's oil system. An epoxy-impregnated front cover and oil filter housing were also implemented this period to eliminate any chances of casting porosity causing glycol contamination or additive carryover in the test. The longer Sequence IIIG dipstick was introduced into Sequence IIIF testing this period to standardize on one dipstick laboratory wide. A calibrated flask for initial oil charge measurement was also put into place this period to standardize the initial oil charge in the test engine. Finally, a new solvent specification was implemented to standardize the aliphatic naphtha product used to clean Sequence IIIG test parts.

Reference Oils

Oil	TMC Inventory, in gallons	TMC Inventory, in tests (4 gal/test)	Laboratory Inventory, in tests	Estimated life
1006	44	11	8	Not currently used in IIIF[1]
1006-2	4,967	1,241	16	~3+ years[1]
1007	483	120	12	Not currently used in IIIF[2]
1008	29	7	8	No longer shipped[1]
1008-1	2,224	556	13	~3+ years[1]
1009	958	239	13	~Not currently used in IIIF[1]
432	118	29	13	Not currently used in IIIF
433	10	2	2	No longer shipped
433-1	618	154	15	~3+ years

[1] Multiple test area reference oil; total TMC inventory shown
[2] Not reblendable

The GF-3 Category Reference Oil, 1009, is awaiting a matrix of five simultaneous reference oil tests so that test targets may be generated. A plan for this matrix has not been finalized at this time. This issue was discussed at the November 2002 meeting of the Sequence IIIF Surveillance Panel but was tabled at that time. No further action has been taken on this reference oil to date.

During the period the TMC also received sufficient data to generate initial test targets on Reference Oil 1008-1. This oil was originally introduced into the LTMS using the final test targets for Reference Oil 1008, which are shown in the table below:

Final Reference Oil 1008 Test Targets		
Parameter	*Mean*	*Standard Deviation*
PVIS	0.0899551	0.009667
APV	9.74	0.100
WPD	4.52	0.773
PV60	4.21605	0.122356

The 10 data points on this reference oil were adjusted using any applicable severity adjustments and then new test targets were calculated. The new targets are shown below:

Initial Reference Oil 1008-1 Test Targets		
Parameter	*Mean*	*Standard Deviation*
PVIS	0.0911968	0.006381
APV	9.75	0.099
WPD	4.75	0.823
PV60	4.34110	0.139270

These targets will be updated again when the TMC has 20 and 30 data points available on this reference oil. These new targets are effective for all tests completed on or after April 21, 2003.

During the period the TMC received sufficient data to update the test targets for reference oil 1006-2 based upon this data. The updated targets for reference oil 1006-2, based on these 22 data points, are shown in the following table:

Updated Reference Oil 1006-2 Test Targets		
Parameter	*Mean*	*Standard Deviation*
PVIS	0.0461786	0.0079007
WPD	4.00	0.459
APV	9.38	0.227
PV60	5.43687	0.171445

These targets will be updated again when the TMC has 30 data points available on this reference oil. These targets are effective for all tests completed on or after July 1, 2003.

MTK/mtk

Attachments

c: F. M. Farber, TMC
Sequence IIIF Surveillance Panel
ftp://astmtmc.cmu.edu/docs/gas/sequenceiii/semiannualreports/IIIF-10-2003.pdf

Distribution: Electronic Mail

List of Figures

- Figures 1, 2, 3, and 4 are EWMA severity and precision control charts and also the CUSUM Δ/s plots of PVIS, WPD, APV, and PV60, annotated with date lines, using the same data set as the EWMA severity and precision control charts. Transformed units are used, when appropriate.

- Figures 5, 6, 7, and 8 are bar charts of average Δ/s, by report period, for PVIS, WPD, APV, and PV60.

- Figures 9, 10, 11, and 12 are bar charts of pooled standard deviation, by report period, for PVIS, WPD, APV, and PV60.

- Figure 13 is the Sequence IIIF Timeline.

Figure 1

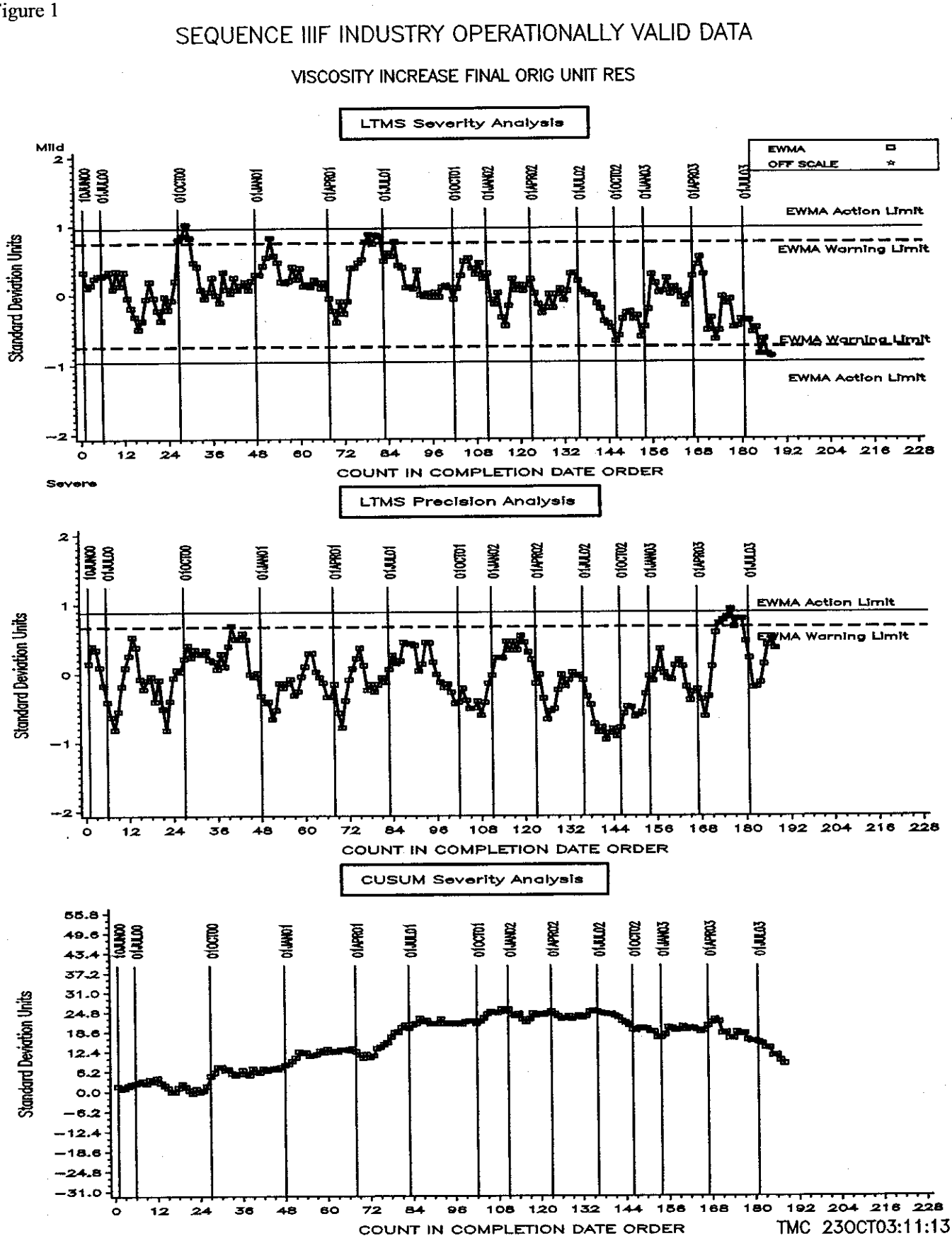

SEQUENCE IIIF INDUSTRY OPERATIONALLY VALID DATA
VISCOSITY INCREASE FINAL ORIG UNIT RES
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
TMC 23OCT03:11:13

Figure 2

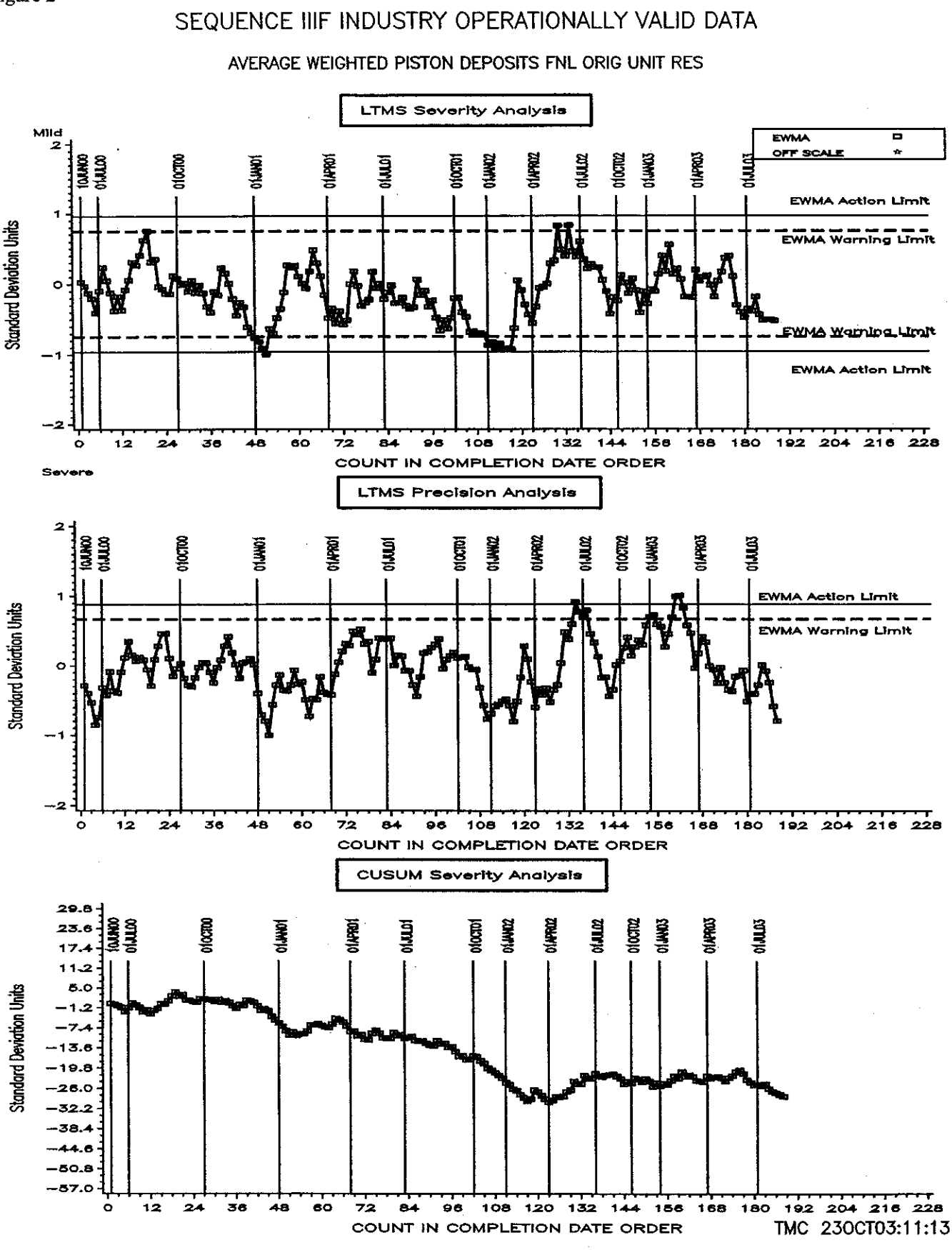

SEQUENCE IIIF INDUSTRY OPERATIONALLY VALID DATA
AVERAGE WEIGHTED PISTON DEPOSITS FNL ORIG UNIT RES
LTMS Severity Analysis
Mild
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
Severe
LTMS Precision Analysis
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
TMC 23OCT03:11:13

Figure 3

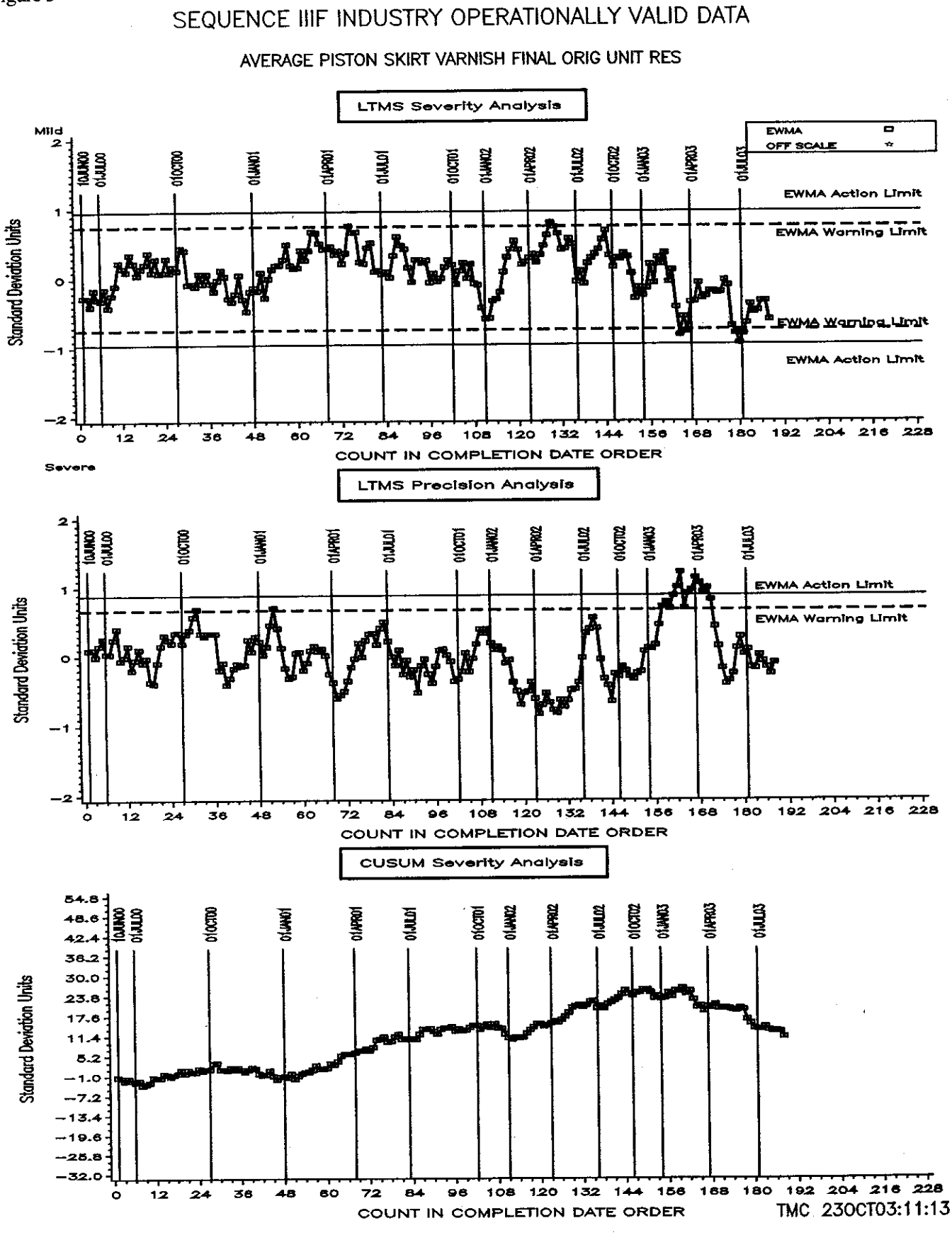

SEQUENCE IIIF INDUSTRY OPERATIONALLY VALID DATA
AVERAGE PISTON SKIRT VARNISH FINAL ORIG UNIT RES
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
CUSUM Severity Analysis
TMC 23OCT03:11:13

Figure 4

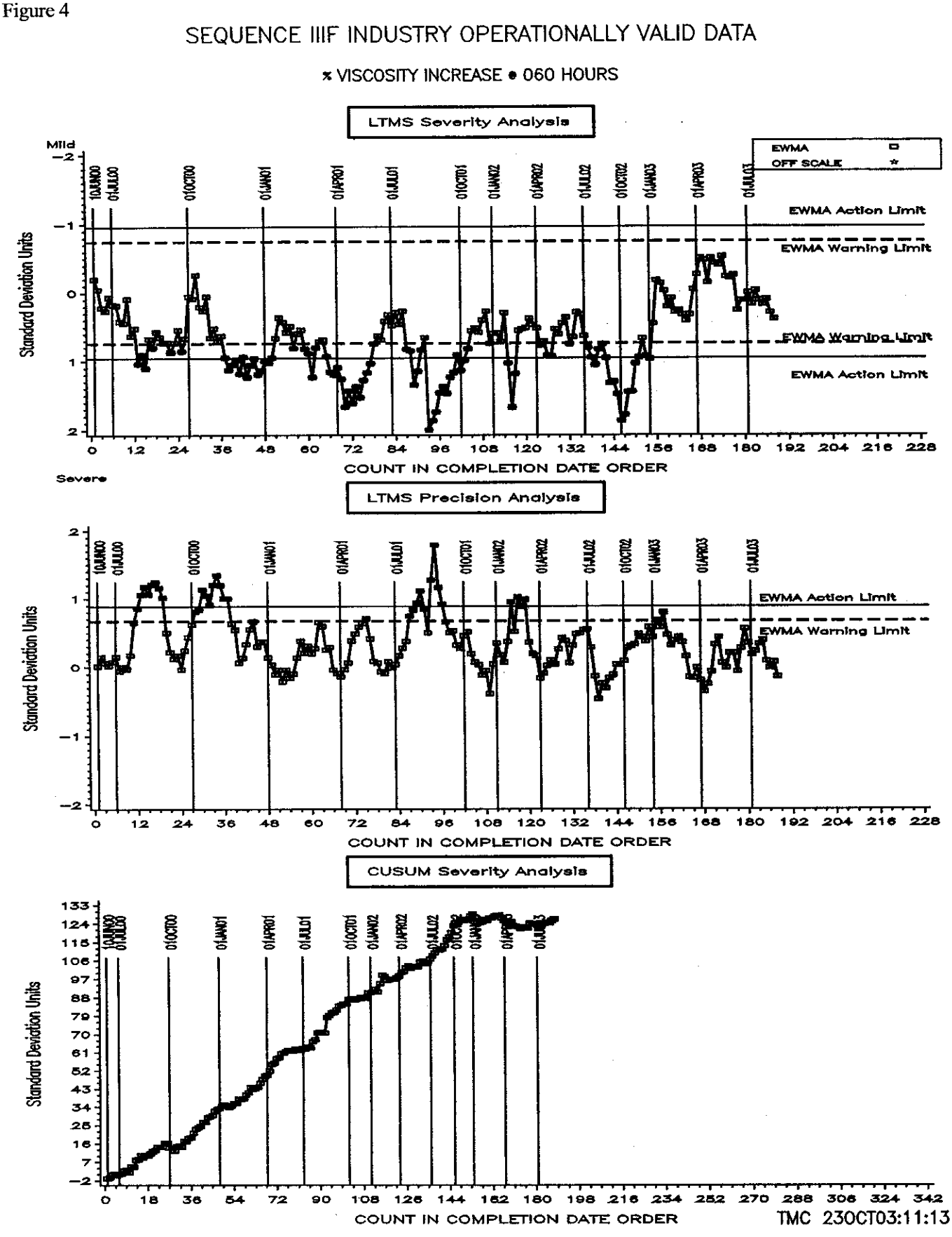
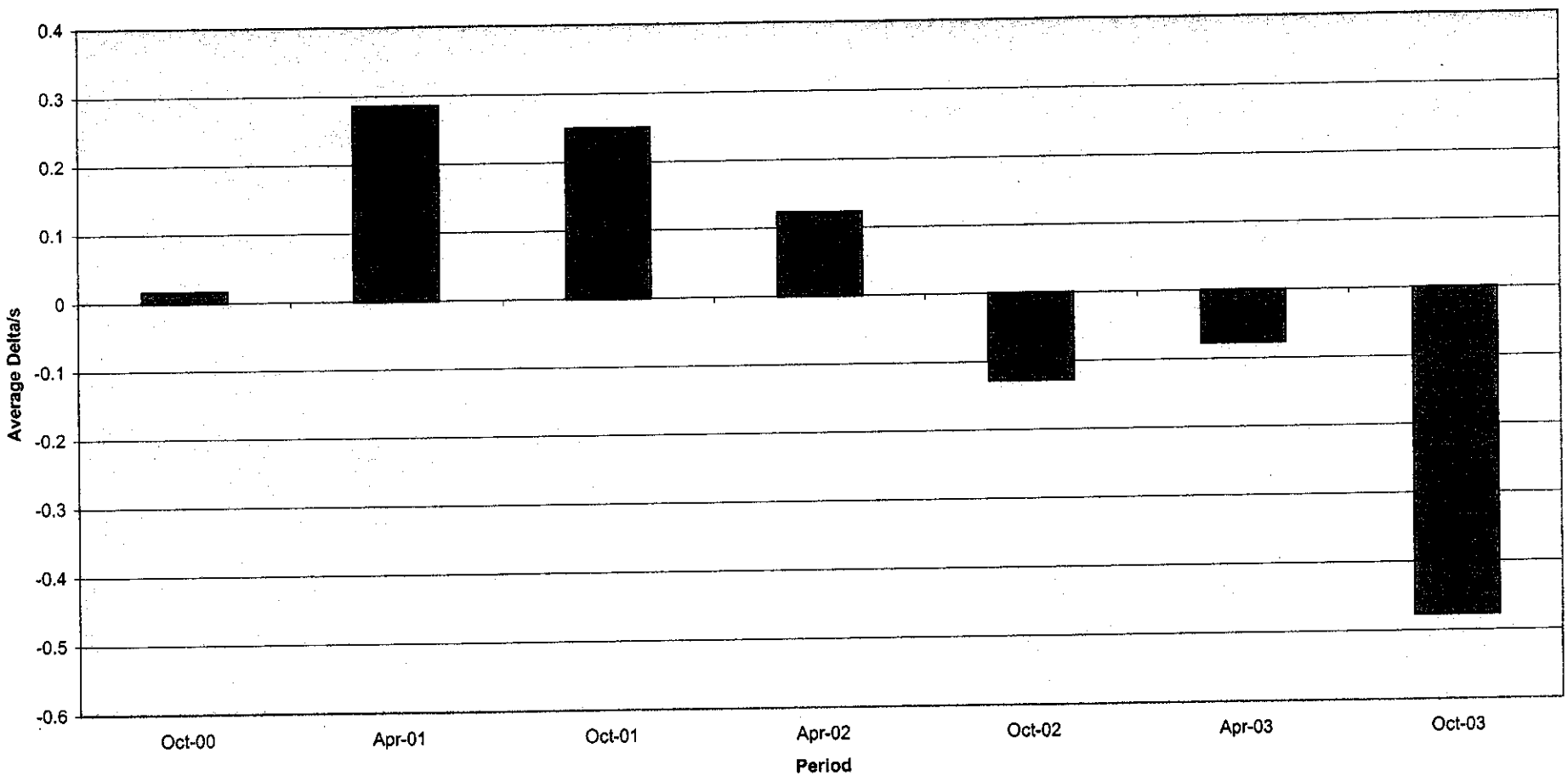

SEQUENCE IIIF INDUSTRY OPERATIONALLY VALID DATA
* VISCOSITY INCREASE • 060 HOURS
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
CUSUM Severity Analysis
TMC 230CT03:11:13

Figure 5 - Percent Viscosity Increase, Average Delta/s



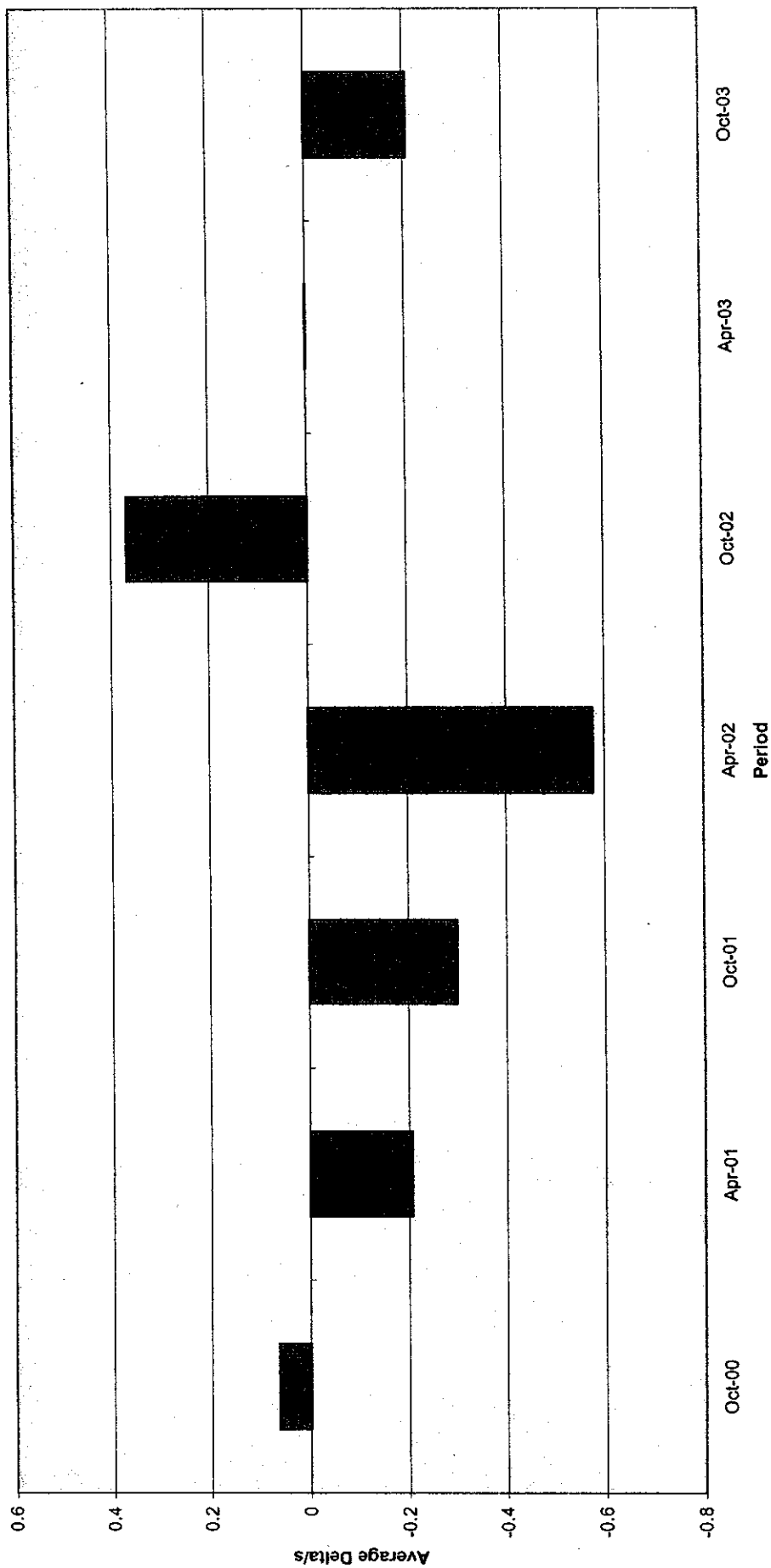


Figure 6 - Weighted Piston Deposits, Average Delta/s

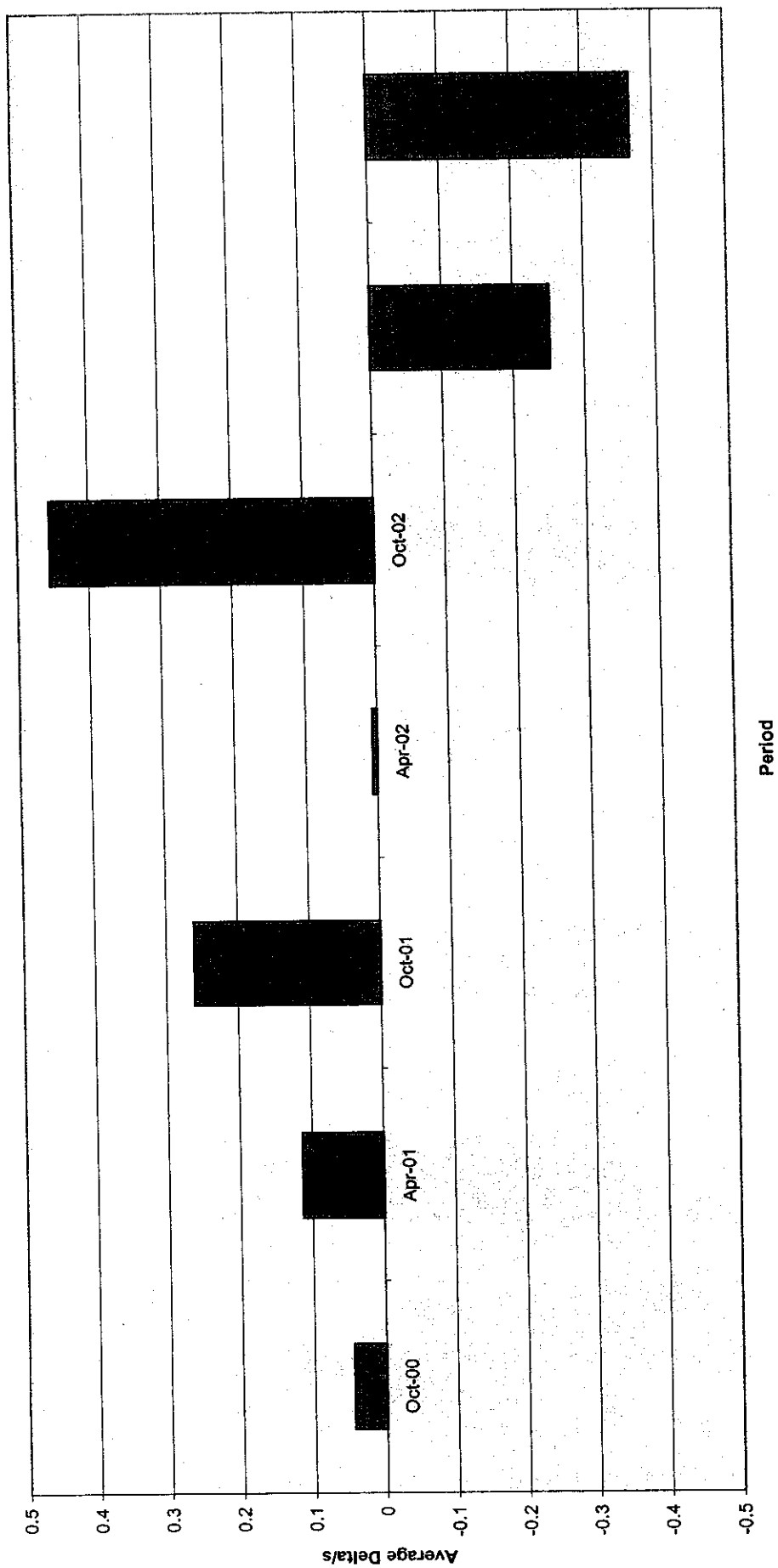


Figure 7 - Average Piston Varnish, Average Delta/s

Figure 8 - Percent Viscosity Increase @ 60 Hours (Sequence IIIFHD), Average Delta/s

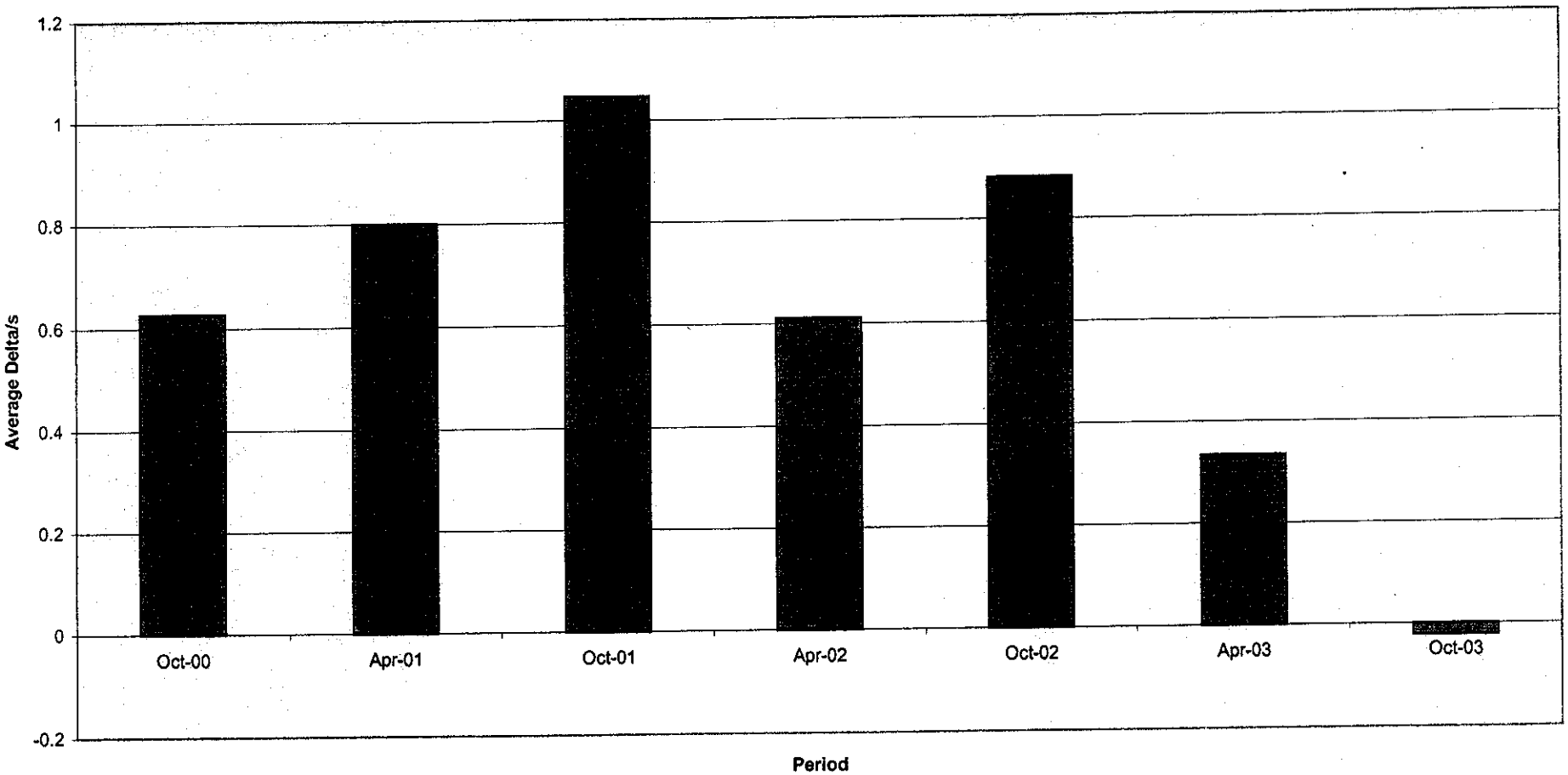


Figure 9 - Percent Viscosity Increase, Pooled Standard Deviation

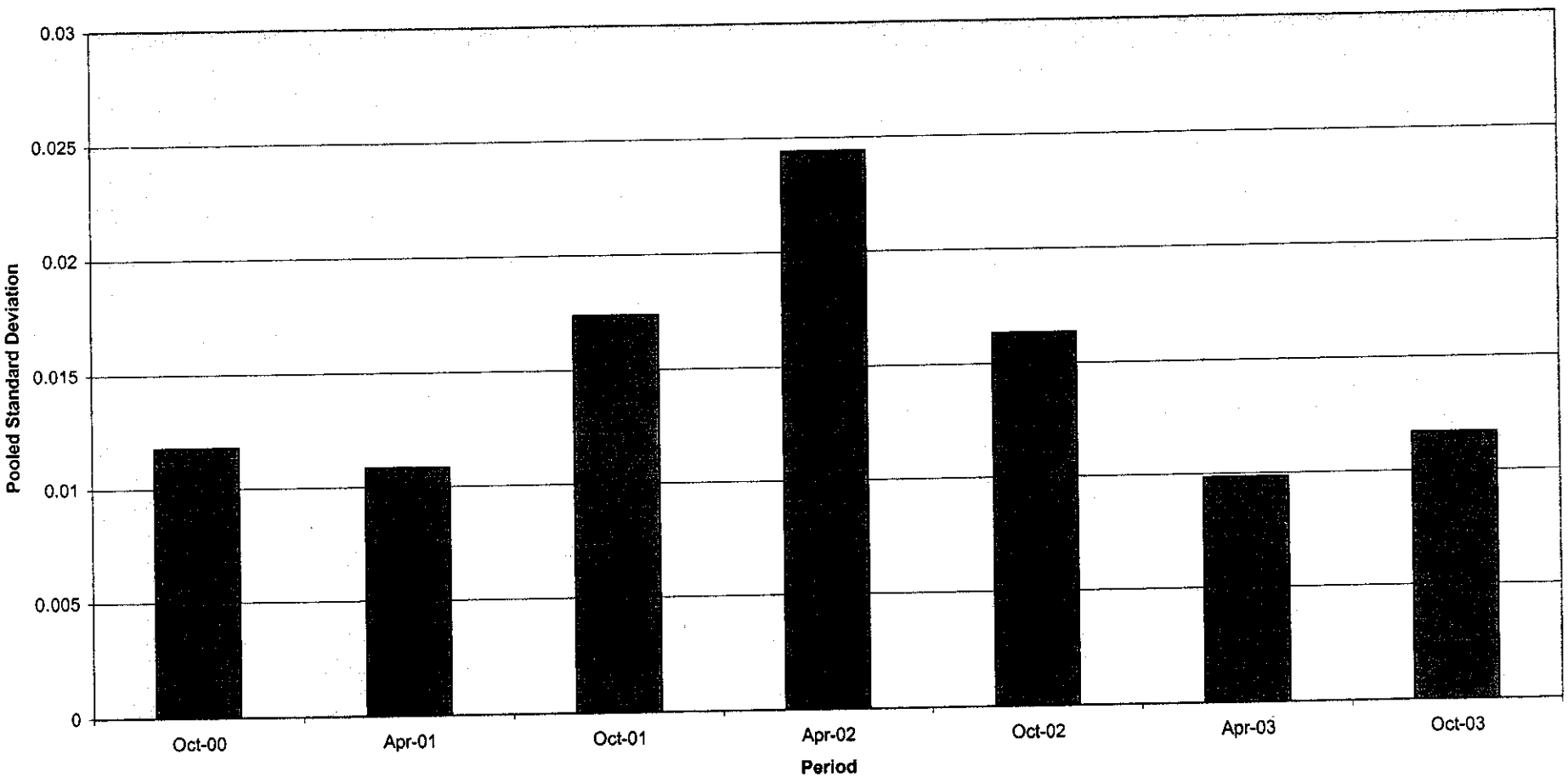


Figure 10 - Weighted Piston Deposits, Pooled Standard Deviation

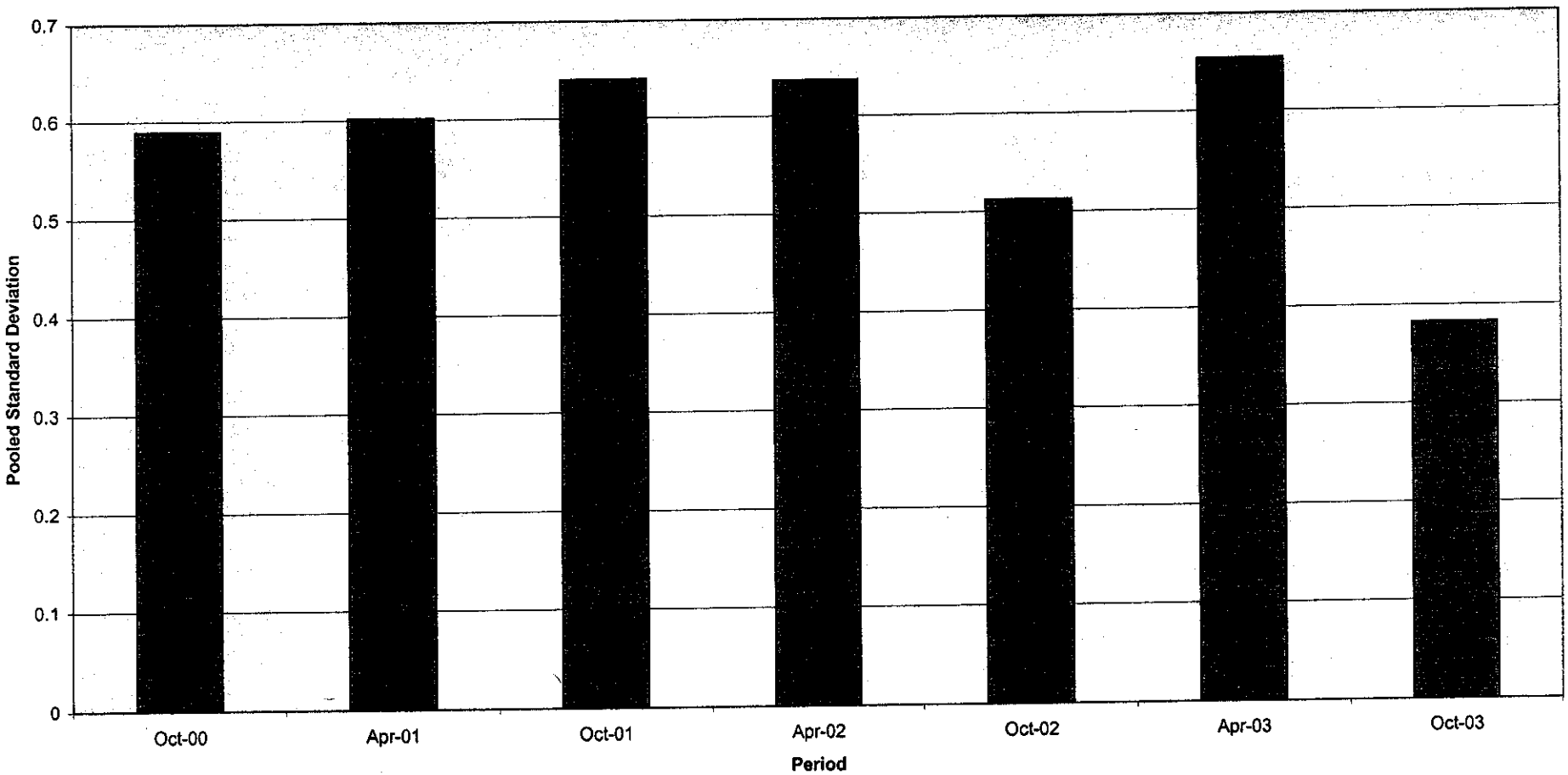


Figure 11 - Average Piston Skirt Varnish, Pooled Standard Deviation

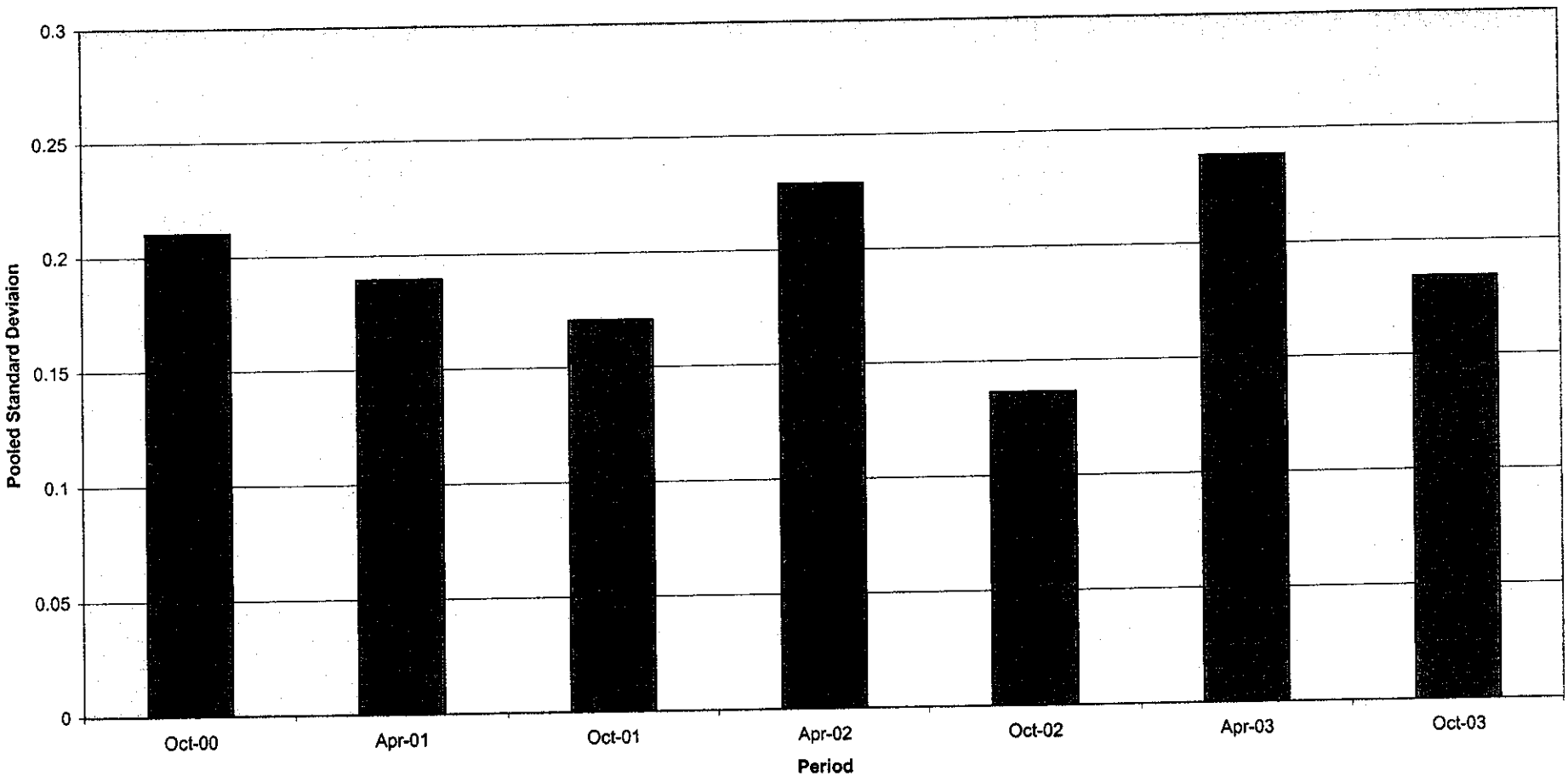


Figure 12 - Percent Viscosity Increase @ 60 Hours (Sequence IIIFHD), Pooled Standard Deviation

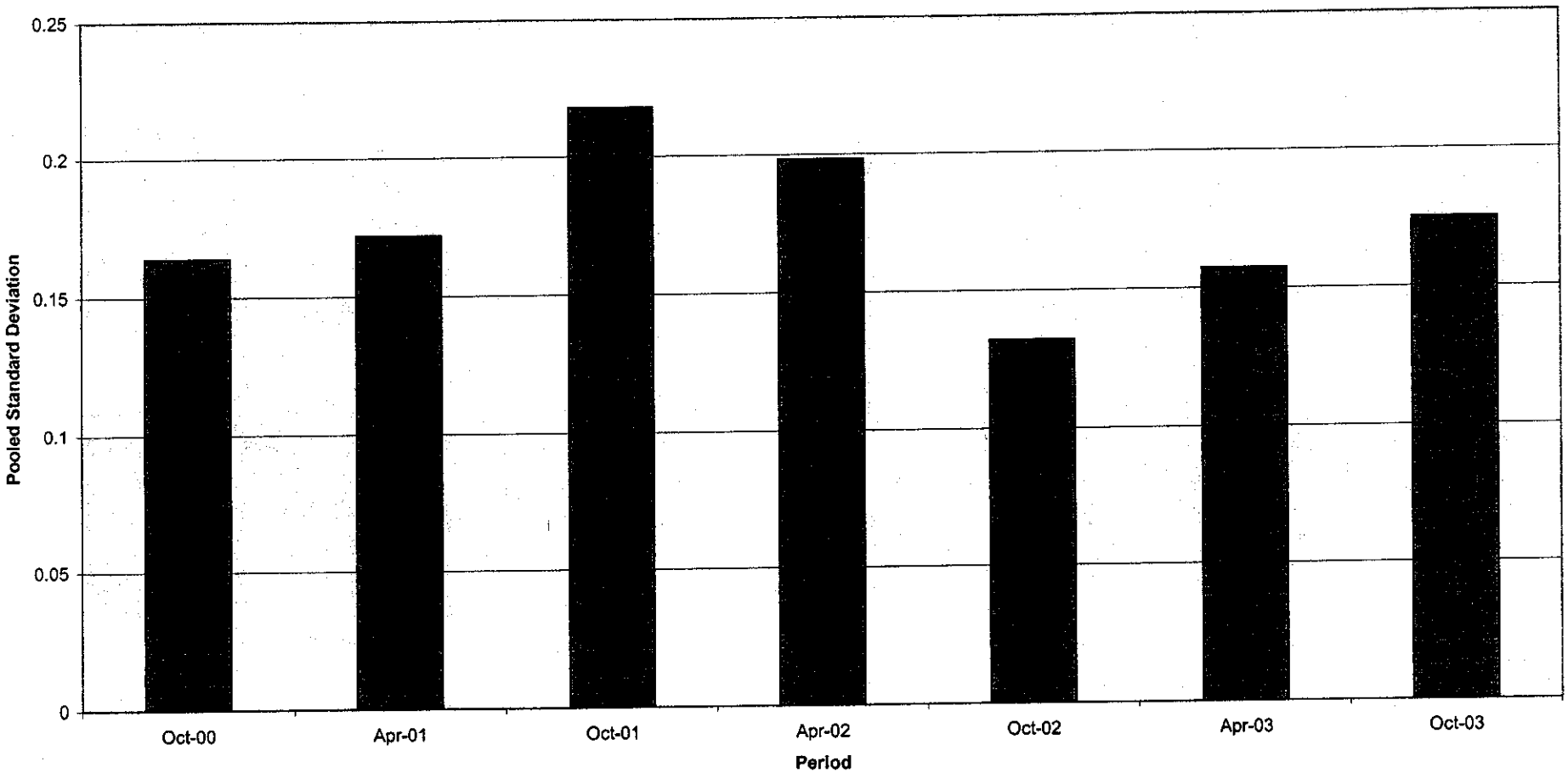


Figure 13 – Sequence IIIF Timeline

Date	Topic	Information Letter
6/10/2000	IIIF Test Released from Redevelopment	
6/10/2000	Revised Ring Sticking definitions implemented	00-2
7/25/2000	Oil Consumption as a test validity criteria dropped	00-2
8/28/2000	First occurrence of LC camshafts in LTMS data	
9/8/2000	Draft 3 of the Sequence IIIF Test Procedure released	00-1
9/27/2000	MRV & CCS Testing of used oil samples added	00-2
9/27/2000	Valve train assembly using build up oil implemented	00-2
10/4/2000	New QI U&L Values implemented	00-2
10/8/2000	First occurrence of Valve train assembly using build up oil in LTMS	00-2
12/6/2000	Oil Consumption as a test interpretability criteria added	00-3
4/25/2001	First occurrence of MB camshafts in LTMS data	
5/23/2001	Condenser Flow QI requirements dropped	01-1
5/23/2001	New oil addition at EOT dropped	01-1
5/23/2001	Condenser part number corrected	01-1
5/23/2001	Revised dipstick calibration curve implemented	01-1
5/23/2001	Revised MRV & CCS test procedures	01-1
5/23/2001	Upper limit of 8000cSt for viscosity measurements established	01-1
5/23/2001	Reexamination of Engine Speed and Condenser Coolant Out Temperature QI U&L values performed; no changes made	01-1
9/8/2001	Screened Average Cam-plus-lifter Wear (SACLW) replaces Average Cam-plus-lifter Wear (ACLW) as pass/fail parameter	01-2
9/8/2001	Valve train assembly using test oil reintroduced into IIIF test	01-2
9/12/2001	First occurrence of engine builds using test oil for valvetrain lubrication in LTMS	
11/28/2001	Sequence IIIF-HD Test Procedure Published	01-3
3/1/2002	Revised Sequence IIIF Test Procedure Published	02-1
3/15/2002	Sequence IIIFHD Test Procedure added to Revised Sequence IIIF Test Procedure. Editorial changes to IIIF Test Procedure also made and document republished	02-2
4/23/2002	Oil Filter and Oil Cooler Replacement Guidelines issued	02-3
6/1/2002	External Oil Bypass Valve System & Modified Oil Filter Adapter.	02-4
5/30/2003	New Oil Filter	03-1
6/30/2003	Revised Front Cover and Oil Filter Housing	03-1
6/30/2003	Sequence IIIG Dipstick	03-1
6/30/2003	Calibrated Flask for Initial Oil Charge	03-1
12/31/2003	New Solvent Specifications	03-1

ATTACHMENT 4

CENTRAL PARTS DISTRIBUTOR REPORT
OH Technologies, Inc.

Sequence III Surveillance Panel Meeting
Southwest Research Institute, San Antonio, Texas
October 29, 2003

1.) Rejections from 06/06/2003 to 10/29/2003:

IIIF Camshaft

Not oiled, showed signs of rust, 1 Piece
Material Replaced

Casting Void on lobe one, 1 Piece
Material Replaced

IIIG Camshaft

Bearing Journal Polish Contact w/Lobe, 1 Piece
Material Replaced

Lifters

Various visuals, 6 Pieces
Material Replaced

2.) Technical Memos Issued

None issued for period

3.) Batch Code Changes

Camshaft, IIIF	PC 9 (PE)	Introduced 3/20/03
Camshaft, IIIG	PC 9 (PE)	Introduced 10/07/03

ATTACHMENT 5

PRODUCT: **Sequence IIIF Test Fuel**

PRODUCT CODE: **HF003**

Batch No.: RJ0721LS11
TMO No.: MTS
Tank No.: 2012
Analysis Date: 10/10/2003
Shipment Date:

TEST	METHOD	UNITS	HALTERMANN Specs			RESULTS
			MIN	TARGET	MAX	
Distillation - IBP	ASTM D86	°F	75		95	88
5%		°F				114
10%		°F	120		135	127
20%		°F				147
30%		°F				171
40%		°F				198
50%		°F	200		230	218
60%		°F				230
70%		°F				240
80%		°F				259
90%		°F	305		325	318
95%		°F				335
Distillation - EP		°F			415	389
Recovery		vol %		Report		98.1
Residue		vol %		Report		1.0
Loss		vol %		Report		0.9
Gravity	ASTM D4052	°API	58.7		61.2	59.0
Density	ASTM D4052	kg/l	0.734		0.744	0.743
Reid Vapor Pressure	ASTM D323	psi	8.7		9.2	9.0
Reid Vapor Pressure	ASTM D5191	psi		Report		9.0
Carbon	ASTM D3343	wt fraction		Report		0.8665
Carbon	ASTM E191	wt fraction		Report		0.8643
Hydrogen	ASTM E191	wt fraction		Report		0.1321
Hydrogen/Carbon ratio	ASTM E191	mole/mole		Report		1.821
Oxygen	ASTM D4815	wt %			0.05	<0.05
Sulfur	ASTM D5453	ppm	3		15	4
Lead	ASTM D3237	g/gal			0.01	<0.01
Phosphorous	ASTM D3231	g/gal			0.005	<0.0008
Composition, aromatics	ASTM D1319	vol %			35.0	30.9
Composition, olefins	ASTM D1319	vol %			10.0	0.2
Composition, saturates	ASTM D1319	vol %		Report		68.9
Particulate matter	ASTM D5452	mg/l			1	0.8
Oxidation Stability	ASTM D525	minutes	240			>1000
Copper Corrosion	ASTM D130				1	1
Gum content, washed	ASTM D381	mg/100mls			5	<1
Fuel Economy Numerator/C Densit	ASTM E191		2401		2441	2434
C Factor	ASTM E191			Report		1.0036
Research Octane Number	ASTM D2699		96.0			97.2
Motor Octane Number	ASTM D2700			Report		88.0
Sensitivity			7.5			9.2
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report		18443
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report		18400
Color	VISUAL	1.75 ptb		Report		RED

ATTACHMENT 5

PRODUCT: **Sequence IIIF Test Fuel**

PRODUCT CODE: **HF003**

Batch No.:	RI2221LS11	RI1621LS10	RH2621LS11
TMO No.:	MTS	MTS	MTS
Tank No.:	2014	2012	2014
Analysis Date:	10/1/2003	9/19/2003	8/29/2003
Shipment Date:			

TEST	METHOD	UNITS	HALTERMANN Specs			RESULTS	RESULTS	RESULTS
			MIN	TARGET	MAX			
Distillation - IBP	ASTM D86	°F	75		95	91	85	89
5%		°F				119	112	115
10%		°F	120		135	131	125	128
20%		°F				152	146	151
30%		°F				176	171	175
40%		°F				201	198	200
50%		°F	200		230	220	219	219
60%		°F				236	230	230
70%		°F				240	241	241
80%		°F				261	261	261
90%		°F	305		325	319	319	317
95%		°F				336	336	334
Distillation - EP		°F			415	403	402	389
Recovery		vol %		Report		98.5	97.8	98.4
Residue		vol %		Report		1.0	1.0	1.0
Loss		vol %		Report		0.5	1.2	0.6
Gravity	ASTM D4052	°API	58.7		61.2	59.2	59.0	59.1
Density	ASTM D4052	kg/l	0.734		0.744	0.742	0.743	0.742
Reid Vapor Pressure	ASTM D323	psi	8.7		9.2	8.9	9.1	9.1
Reid Vapor Pressure	ASTM D5191	psi		Report		9.0	9.2	9.0
Carbon	ASTM D3343	wt fraction		Report		0.8659	0.8668	0.8662
Carbon	ASTM E191	wt fraction		Report		0.8642	0.8641	0.8638
Hydrogen	ASTM E191	wt fraction		Report		0.1320	0.1321	0.1324
Hydrogen/Carbon ratio	ASTM E191	mole/mole		Report		1.820	1.821	1.826
Oxygen	ASTM D4815	wt %			0.05	<0.05	<0.05	<0.05
Sulfur	ASTM D5453	ppm	3		15	4	5	6
Lead	ASTM D3237	g/gal			0.01	<0.01	<0.01	<0.01
Phosphorous	ASTM D3231	g/gal			0.005	<0.0008	<0.0008	<0.0008
Composition, aromatics	ASTM D1319	vol %			35.0	30.2	31.3	30.4
Composition, olefins	ASTM D1319	vol %			10.0	0.5	0.4	0.4
Composition, saturates	ASTM D1319	vol %		Report		69.3	68.3	69.2
Particulate matter	ASTM D5452	mg/l			1	0.8	0.8	0.7
Oxidation Stability	ASTM D525	minutes	240			>1000	>1000	>1000
Copper Corrosion	ASTM D130				1	1	1	1
Gum content, washed	ASTM D381	mg/100mls			5	<1	<1	<1
Fuel Economy Numerator/C Densit	ASTM E191		2401		2441	2432	2434	2432
C Factor	ASTM E191			Report		1.0022	1.0025	1.0018
Research Octane Number	ASTM D2699		96.0			97.2	97.4	96.9
Motor Octane Number	ASTM D2700			Report		88.0	88.4	87.6
Sensitivity			7.5			9.2	9.0	9.3
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report		18460	18438	18452
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report		18426	18426	18430
Color	VISUAL	1.75 ptb		Report		Red	Red	Red

ATTACHMENT 5

PRODUCT: **Sequence IIIF Test Fuel**

PRODUCT CODE: **HF003**

Batch No.:	RH0421LS12	RG1621LS11	RF1921LS02
TMO No.:	MTS	MTS	MTS
Tank No.:	2012	2014	2012
Analysis Date:	8/8/2003	7/23/2003	6/25/2003
Shipment Date:			

TEST	METHOD	UNITS	HALTERMANN Specs			RESULTS	RESULTS	RESULTS
			MIN	TARGET	MAX			
Distillation - IBP	ASTM D86	°F	75		95	88	94	89
5%		°F				115	120	115
10%		°F	120		135	130	132	125
20%		°F				153	152	142
30%		°F				177	174	161
40%		°F				203	200	189
50%		°F	200		230	220	219	216
60%		°F				231	230	229
70%		°F				242	243	240
80%		°F				262	260	259
90%		°F	305		325	318	314	315
95%		°F				339	334	333
Distillation - EP		°F			415	390	393	386
Recovery		vol %		Report		97.6	98.3	98.3
Residue		vol %		Report		1.0	1.0	1.0
Loss		vol %		Report		1.4	0.7	0.7
Gravity	ASTM D4052	°API	58.7		61.2	59.0	59.2	59.0
Density	ASTM D4052	kg/l	0.734		0.744	0.743	0.742	0.742
Reid Vapor Pressure	ASTM D323	psi	8.7		9.2	9.1	9.0	9.1
Reid Vapor Pressure	ASTM D5191	psi		Report		9.0	9.0	9.0
Carbon	ASTM D3343	wt fraction		Report		0.8664	0.8661	0.8667
Carbon	ASTM E191	wt fraction		Report		0.8614	0.8645	0.8664
Hydrogen	ASTM E191	wt fraction		Report		0.1337	0.1322	0.1304
Hydrogen/Carbon ratio	ASTM E191	mole/mole		Report		1.849	1.822	1.793
Oxygen	ASTM D4815	wt %			0.05	<0.05	<0.05	<0.05
Sulfur	ASTM D5453	ppm	3		15	7	7	5
Lead	ASTM D3237	g/gal			0.01	<0.01	<0.01	<0.01
Phosphorous	ASTM D3231	g/gal			0.005	<0.0008	<0.0008	<0.0008
Composition, aromatics	ASTM D1319	vol %			35.0	30.8	30.2	30.8
Composition, olefins	ASTM D1319	vol %			10.0	0.5	0.6	0.5
Composition, saturates	ASTM D1319	vol %		Report		68.7	69.2	68.7
Particulate matter	ASTM D5452	mg/l			1	0.7	0.2	0.8
Oxidation Stability	ASTM D525	minutes	240			>1000	>1000	>1000
Copper Corrosion	ASTM D130				1	1	1	1
Gum content, washed	ASTM D381	mg/100mls			5	<1	<1	<1
Fuel Economy Numerator/C Densit	ASTM E191		2401		2441	2429	2431	2439
C Factor	ASTM E191			Report		1.0004	1.0035	1.0100
Research Octane Number	ASTM D2699		96.0			96.6	96.9	96.6
Motor Octane Number	ASTM D2700			Report		87.6	87.4	88.2
Sensitivity			7.5			9.0	9.5	8.4
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report		18448	18457	18440
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report		18394	18395	18279
Color	VISUAL	1.75 ptb		Report		Red	Red	Red

ATTACHMENT 5

PRODUCT: **Sequence IIIF Test Fuel**

PRODUCT CODE: **HF003**

Batch No.:	QK1121LS10	RE2821LS10	RE1921LS10
TMO No.:	MTS	MTS	MTS
Tank No.:	2012	2012	2014
Analysis Date:	6/12/2003	6/4/2003	5/22/2003
Shipment Date:			

TEST	METHOD	UNITS	HALTERMANN Specs			RESULTS	RESULTS	RESULTS
			MIN	TARGET	MAX			
Distillation - IBP	ASTM D86	°F	75		95	86	85	87
5%		°F				116	114	115
10%		°F	120		135	129	129	127
20%		°F				153	151	149
30%		°F				178	176	174
40%		°F				204	202	200
50%		°F	200		230	220	220	219
60%		°F				132	231	230
70%		°F				242	242	241
80%		°F				264	263	262
90%		°F	305		325	321	319	319
95%		°F				336	335	336
Distillation - EP		°F			415	396	398	398
Recovery		vol %		Report		98.0	97.4	98.0
Residue		vol %		Report		1.0	1.0	1.0
Loss		vol %		Report		1.0	1.6	1.0
Gravity	ASTM D4052	°API	58.7		61.2	59.0	59.1	59.2
Density	ASTM D4052	kg/l	0.734		0.744	0.742	0.742	0.742
Reid Vapor Pressure	ASTM D323	psi	8.7		9.2	9.2	9.0	9.1
Reid Vapor Pressure	ASTM D5191	psi		Report		9.1	8.8	9.1
Carbon	ASTM D3343	wt fraction		Report		0.8652	0.8652	0.8652
Carbon	ASTM E191	wt fraction		Report		0.8629	0.8650	0.8618
Hydrogen	ASTM E191	wt fraction		Report		0.1315	0.1323	0.1330
Hydrogen/Carbon ratio	ASTM E191	mole/mole		Report		1.816	1.822	1.839
Oxygen	ASTM D4815	wt %			0.05	<0.05	<0.05	<0.05
Sulfur	ASTM D5453	ppm	3		15	6	6	6
Lead	ASTM D3237	g/gal			0.01	<0.01	<0.01	<0.01
Phosphorous	ASTM D3231	g/gal			0.005	<0.0008	<0.0008	<0.0008
Composition, aromatics	ASTM D1319	vol %			35.0	28.7	28.7	28.7
Composition, olefins	ASTM D1319	vol %			10.0	0.8	0.7	0.5
Composition, saturates	ASTM D1319	vol %		Report		70.5	70.6	70.8
Particulate matter	ASTM D5452	mg/l			1	0.2	0.2	1.0
Oxidation Stability	ASTM D525	minutes	240			>1000	>1000	>1000
Copper Corrosion	ASTM D130				1	1	1	1
Gum content, washed	ASTM D381	mg/100mls			5	<1	<1	<1
Fuel Economy Numerator/C Densit	ASTM E191		2401		2441	2435	2433	2429
C Factor	ASTM E191			Report		1.0008	1.0019	0.9993
Research Octane Number	ASTM D2699		96.0			97.2	97.0	96.6
Motor Octane Number	ASTM D2700			Report		88.0	88.0	88.0
Sensitivity			7.5			9.2	9.0	8.6
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report		18478	18466	18478
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report		18434	18467	18430
Color	VISUAL	1.75 ptb		Report		Red	Red	Red

ATTACHMENT 5

PRODUCT: **Sequence IIIF Test Fuel**

PRODUCT CODE: **HF003**

Batch No.:	RD2821LS10	RD1821LS10	RC3021LS10
TMO No.:	MTS	MTS	MTS
Tank No.:	2012	2014	2012
Analysis Date:	5/9/2003	4/25/2003	4/4/2003
Shipment Date:			

TEST	METHOD	UNITS	HALTERMANN Specs			RESULTS	RESULTS	RESULTS
			MIN	TARGET	MAX			
Distillation - IBP	ASTM D86	°F	75		95	88	85	91
5%		°F				115	112	119
10%		°F	120		135	127	125	132
20%		°F				149	146	153
30%		°F				171	170	176
40%		°F				199	198	202
50%		°F	200		230	218	218	221
60%		°F				230	230	232
70%		°F				242	241	243
80%		°F				264	263	265
90%		°F	305		325	321	320	322
95%		°F				337	337	337
Distillation - EP		°F			415	400	400	400
Recovery		vol %		Report		98.0	97.7	97.8
Residue		vol %		Report		1.0	1.0	1.0
Loss		vol %		Report		1.0	1.3	1.2
Gravity	ASTM D4052	°API	58.7		61.2	59.0	59.2	59.2
Density	ASTM D4052	kg/l	0.734		0.744	0.743	0.742	0.742
Reid Vapor Pressure	ASTM D323	psi	8.7		9.2	8.9	8.9	8.9
Reid Vapor Pressure	ASTM D5191	psi		Report		8.9	9.1	9.2
Carbon	ASTM D3343	wt fraction		Report		0.8654	0.8655	0.8657
Carbon	ASTM E191	wt fraction		Report		0.8628	0.8609	0.8605
Hydrogen	ASTM E191	wt fraction		Report		0.1318	0.1326	0.1324
Hydrogen/Carbon ratio	ASTM E191	mole/mole		Report		1.820	1.835	1.823
Oxygen	ASTM D4815	wt %			0.05	<0.05	<0.05	<0.05
Sulfur	ASTM D5453	ppm	3		15	6	9	7
Lead	ASTM D3237	g/gal			0.01	<0.01	<0.01	<0.01
Phosphorous	ASTM D3231	g/gal			0.005	<0.0008	<0.0008	<0.0008
Composition, aromatics	ASTM D1319	vol %			35.0	28.8	29.3	30.0
Composition, olefins	ASTM D1319	vol %			10.0	0.7	0.7	0.6
Composition, saturates	ASTM D1319	vol %		Report		70.5	70.0	69.4
Particulate matter	ASTM D5452	mg/l			1	1.0	0.2	0.6
Oxidation Stability	ASTM D525	minutes	240			>1000	>1000	>1000
Copper Corrosion	ASTM D130				1	1	1	1
Gum content, washed	ASTM D381	mg/100mls			5	<1	1	<1
Fuel Economy Numerator/C Densit	ASTM E191		2401		2441	2434	2429	2429
C Factor	ASTM E191			Report		1.0041	0.9969	0.9917
Research Octane Number	ASTM D2699		96.0			96.6	96.7	97.0
Motor Octane Number	ASTM D2700			Report		88.0	88.4	88.9
Sensitivity			7.5			8.6	8.3	8.1
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report		18474	18468	18467
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report		18330	18470	18618
Color	VISUAL	1.75 ptb		Report		Red		Red

ATTACHMENT 6 from

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

Memorandum: 03-108

Date: October 23, 2003

To: William M. Nahumck, Chairman, Sequence III Surveillance Panel

From: Michael T. Kasimirsky Michael T. Kasimirsky

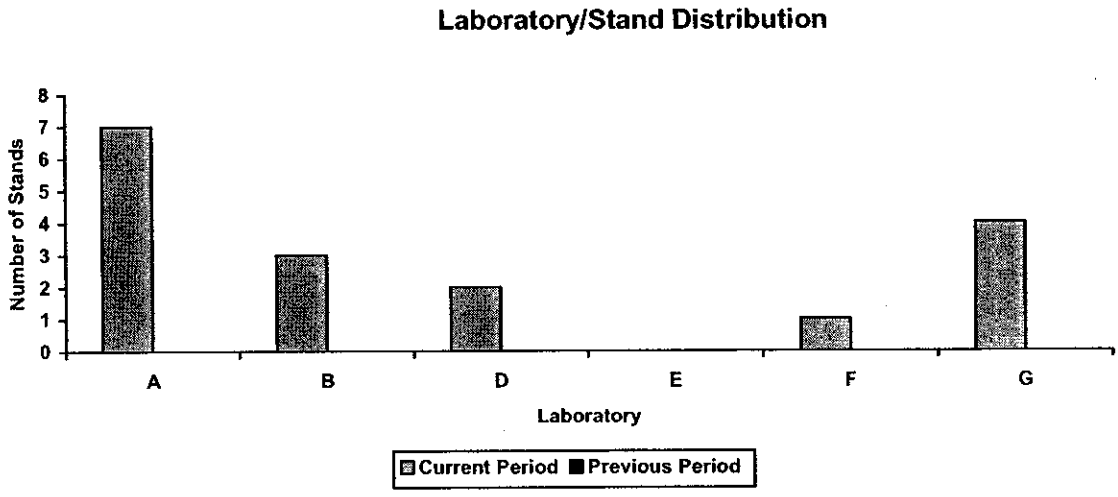
Subject: Sequence IIIG Semiannual Report: April 1, 2003 through September 30, 2003

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

Lab/Stand Distribution

	Reporting Data	Calibrated as of September 30, 2003
Number of Laboratories:	5	5
Number of Test Stands:	17	16

The following chart shows the laboratory/stand distribution:

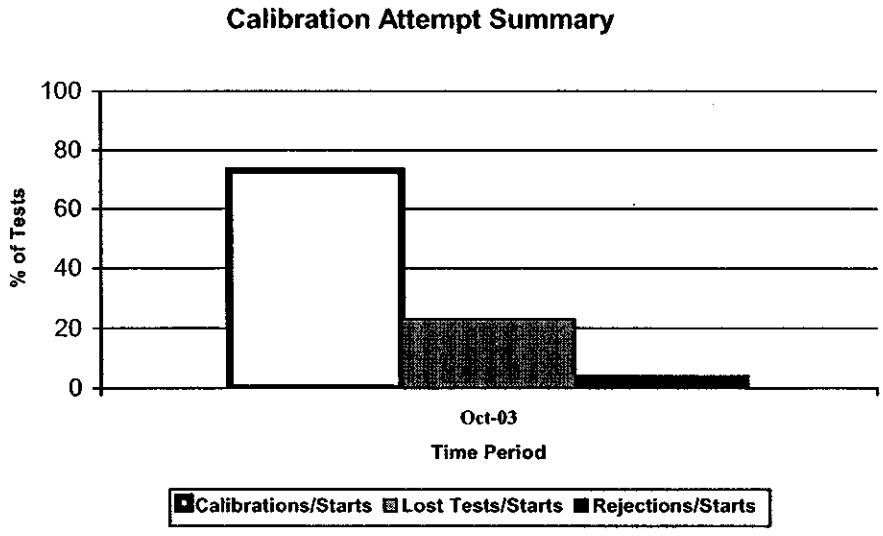


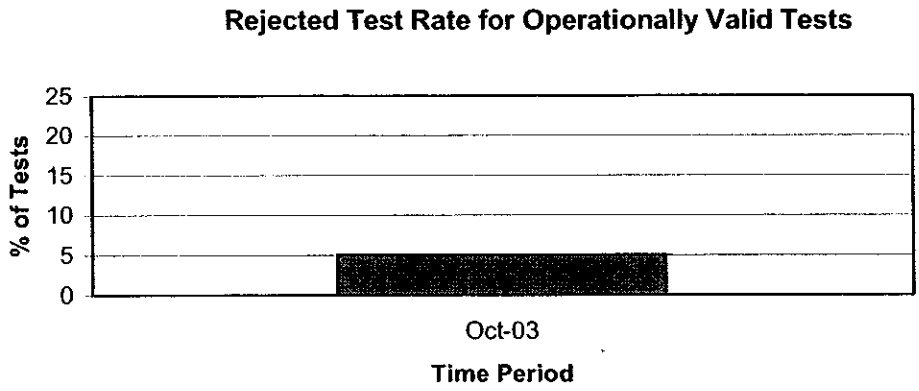
The following summarizes the status of the reference oil tests reported to the TMC:

Calibration Start Outcomes	TMC Validity Codes	No. of Tests
Acceptable Matrix Test	AO	24
Unacceptable Matrix Test	OO	1
Invalid Matrix Test	LO	3
Operationally and Statistically Acceptable	AC	17
Failed Acceptance Criteria	OC	1
Operationally Invalid (Laboratory Judgment)	LC	9
Operationally Invalid (Lab & TMC Judgment)	RC	0
Stand Failed Reference Sequence – data pulled	MC	0
Aborted	XC	1
Total		56

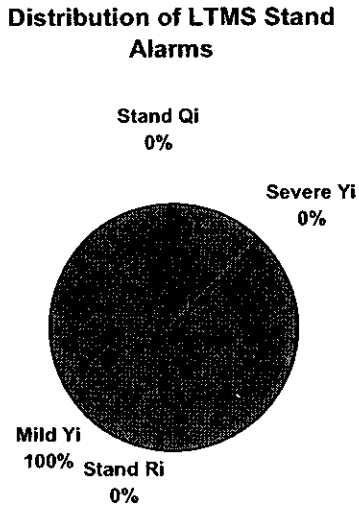
Donated & Industry Support Outcomes	TMC Validity Codes	No. of Tests
Decoded Oil Tests	NN	1
Total		1

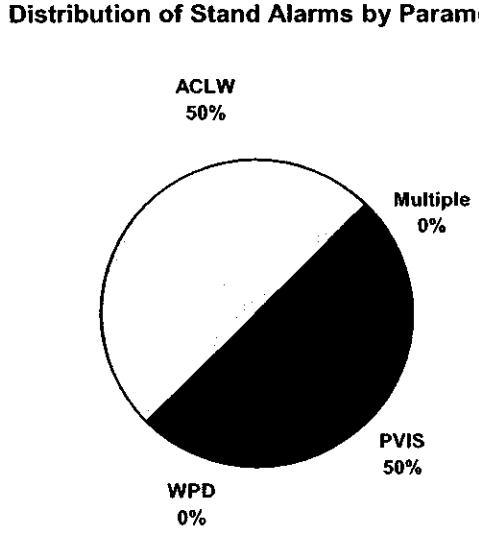
Calibrations per start, lost tests per start and rejection rates are summarized below:





There were two failing tests for the period. The following charts summarize the reasons and breakdown by parameter for the failed test:





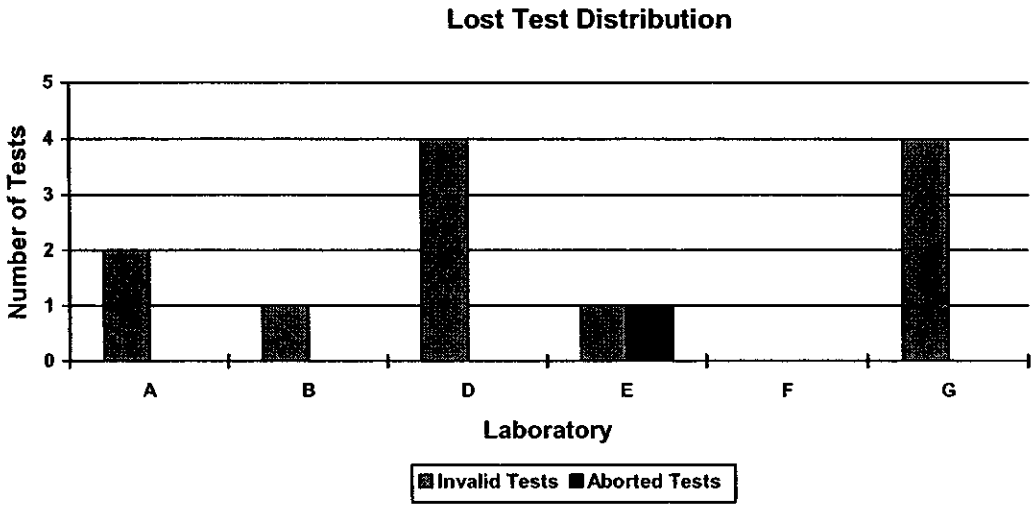
There were no LTMS Deviations written this period. There have been no deviations from the LTMS since its introduction in August of 2003.

Five Sequence IIIG lab visits were performed this period, four in conjunction with the Test Developer in preparation for running the Sequence IIIG GF-4 Matrix. No significant problems were found.

Lost Test Summary

Thirteen tests were lost this period. The reasons for the lost tests are shown in the following table:

Lab	Reason for Lost Test	Number of Tests	Breakdown of Tests (LC/RC/XC/LO)
A	Connecting Rod Bearing Failure	1	2/0/0/0
	Balance Shaft Bearing Failure	1	
B	Power Supply Failure	1	1/0/0/0
D	Wrong Honing Load	3	4/0/0/0
	5.8L Oil Charge	1	
E	Exhaust Manifold Coolant Leak	1	1/0/1/0
	Lost Oil Charge	1	
G	Oil Leak	1	3/0/0/1
	Unexplained High Oil Consumption	1	
	Bad EBP Valve – Scored Cylinder	1	
	Broken Piston Ring	1	



Information Letters

Sequence IIIG Information Letter No. 03-1, Sequence No. 1, was issued during the period on August 19, 2003, and contained the Draft Sequence IIIG Test Procedure.

Sequence IIIG Information Letter No. 03-2, Sequence No. 2, was issued during the period on September 9, 2003, and contained Revised Valve Spring Load Specifications.

Sequence IIIG Information Letter No. 03-3, Sequence No. 3, was issued during the period on September 23, 2003, and contained the Revised Test Numbering Methodology.

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 reported units
PVIS	-0.056	0.313 (df=40)	-2.6% Viscosity Increase[1]
WPD	-0.026	0.703 (df=40)	-0.02 Merits
ACLW	-0.085	0.186 (df=40)	-0.9μm[2]

[1] At the proposed GF-4 Pass Limit of 150% Viscosity Increase
[2] At the proposed GF-4 Pass Limit of 60μm

Average Δ/s Results, by Laboratory			
Laboratory	PVIS	WPD	ACLW
A	-0.26	0.05	-0.07
B	-0.64	0.22	0.04
D	-0.03	-0.02	-0.67
E	-	-	-
F	-0.60	1.11	-0.50
G	0.46	-0.41	0.00

Percent Viscosity Increase (PVIS)

The industry was within limits for severity during the period and exceeded the B1 Precision Limit for one test during the period (see Figure 1). The average Δ/s value is shown in Figure 4 and the pooled standard deviation for the period is shown in Figure 7.

Weighted Piston Deposits (WPD)

The industry was within limits for both severity and precision during the period (see Figure 2). The average Δ/s value is shown in Figure 5 and the pooled standard deviation for the period is shown in Figure 8.

Average Camshaft-plus-Lifter Wear (ACLW)

The industry was within limits for precision during the period and exceeded the EWMA Severity Mild Warning Limit for one test during the period (see Figure 1). The average Δ/s value is shown in Figure 6 and the pooled standard deviation for the period is shown in Figure 9.

QI Deviations

There were no QI Deviations written this period. There have been no QI Deviations written since the test was introduced in August of 2003.

Hardware

No hardware changes were made this period.

Reference Oils

Oil	TMC Inventory, in gallons	TMC Inventory, in tests (4 gal/test)	Laboratory Inventory, in tests	Estimated life
434	332	83	12	3+ years
435	409	102	15	3+ years
438	828	207	19	3+ years

MTK/mtk

Attachments

c: F. M. Farber, TMC
Sequence III Surveillance Panel
ftp://astmtmc.cmu.edu/docs/gas/sequenceiii/semiannualreports/IIIG-10-2003.pdf

Distribution: Electronic Mail

List of Figures

- Figures 1, 2, and 3 are EWMA severity and precision control charts and also the CUSUM Δ/s plots of PVIS, WPD, and ACLW, annotated with date lines, using the same data set as the EWMA severity and precision control charts. Transformed units are used, when appropriate.

- Figures 4, 5, and 6 are bar charts of average Δ/s, by report period, for PVIS, WPD, and ACLW.

- Figures 7, 8, and 9 are bar charts of pooled standard deviation, by report period, for PVIS, WPD, and ACLW.

- Figure 10 is the Sequence IIIG Timeline.

Figure 1

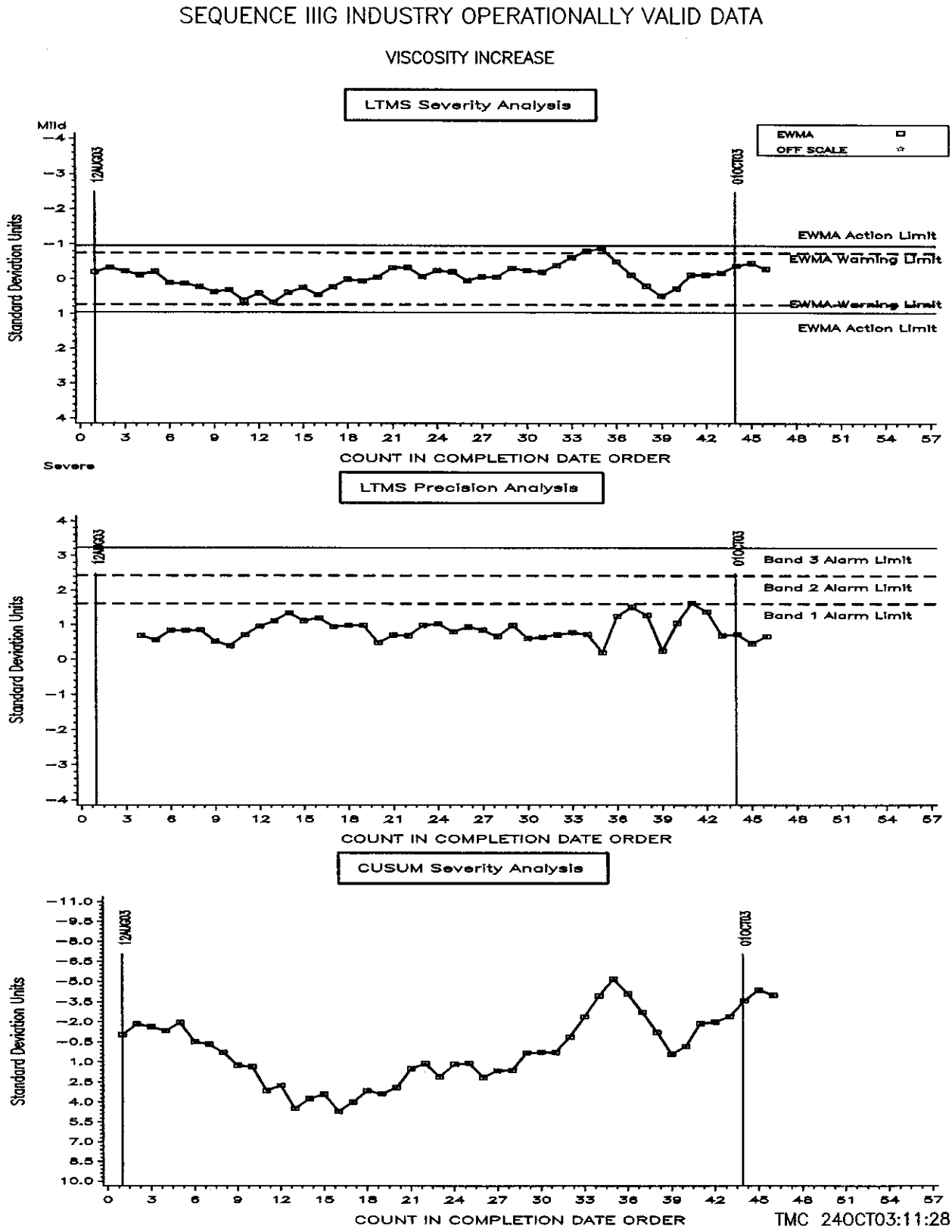

SEQUENCE IIIG INDUSTRY OPERATIONALLY VALID DATA
VISCOSITY INCREASE
LTMS Severity Analysis
Mild
Severe
Standard Deviation Units
12AUG03
01OCT03
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
Band 3 Alarm Limit
Band 2 Alarm Limit
Band 1 Alarm Limit
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
COUNT IN COMPLETION DATE ORDER
TMC 24OCT03:11:28

Figure 2

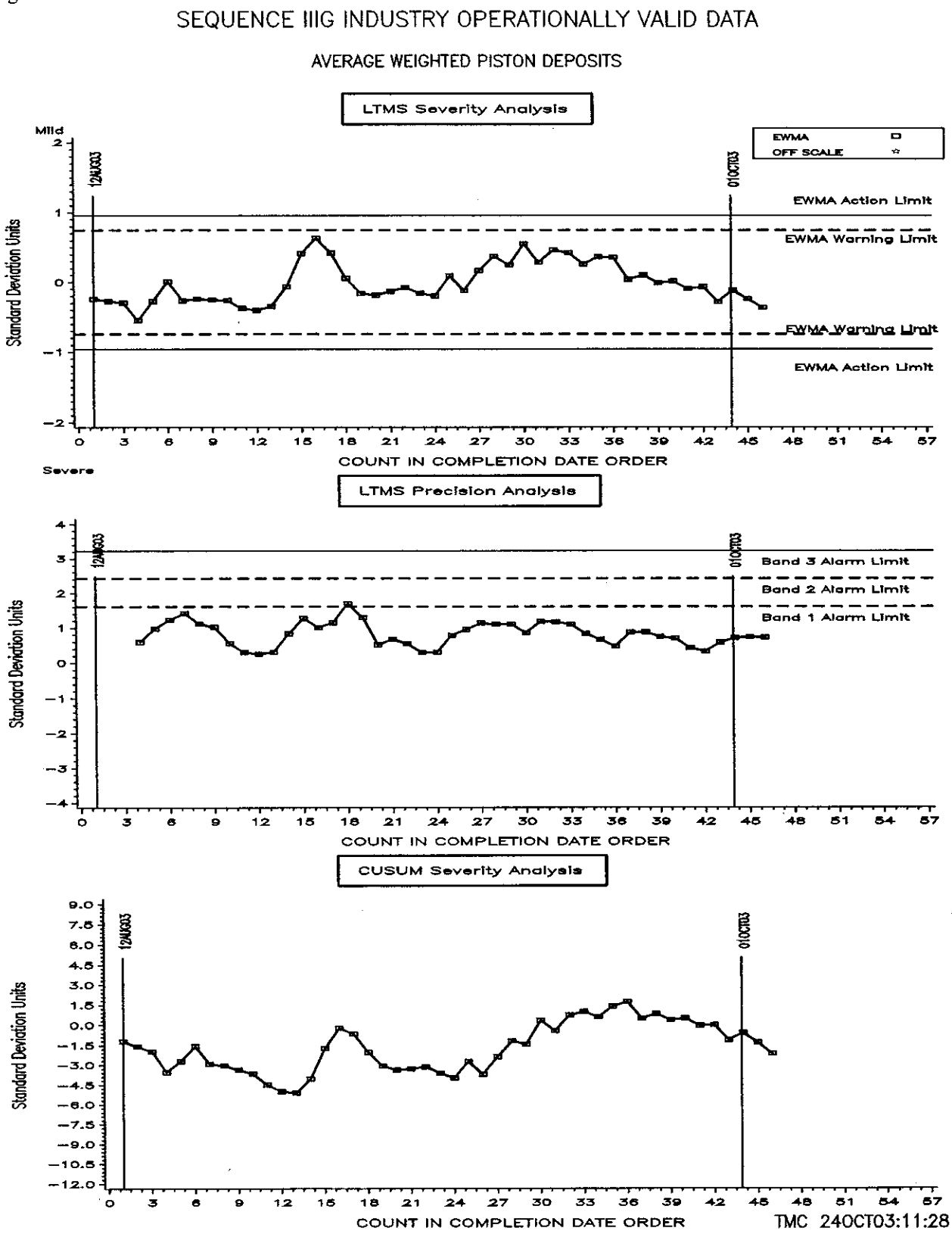

SEQUENCE IIIG INDUSTRY OPERATIONALLY VALID DATA
AVERAGE WEIGHTED PISTON DEPOSITS
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
Band 3 Alarm Limit
Band 2 Alarm Limit
Band 1 Alarm Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
CUSUM Severity Analysis
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
TMC 24OCT03:11:28

Figure 3

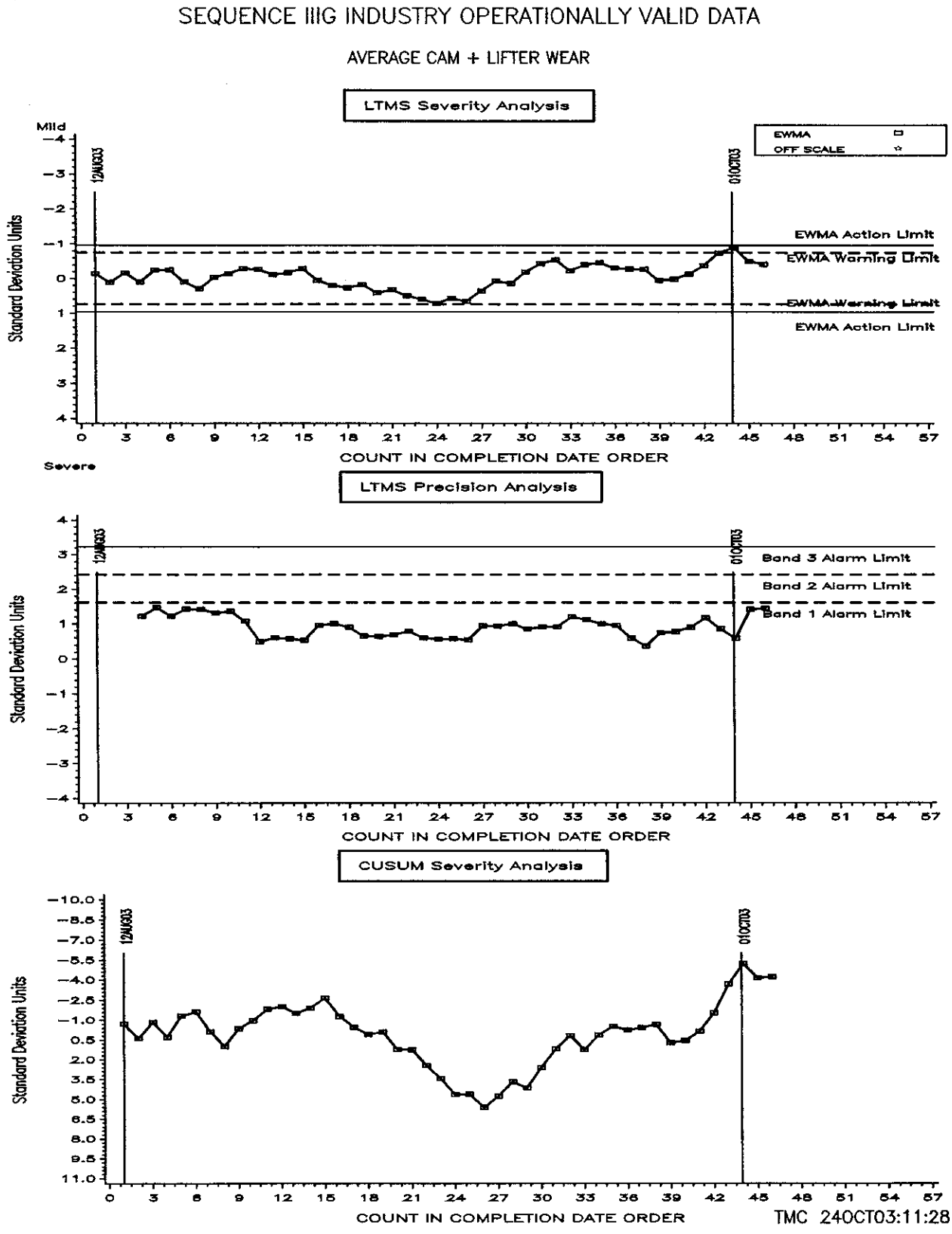

SEQUENCE IIIG INDUSTRY OPERATIONALLY VALID DATA
AVERAGE CAM + LIFTER WEAR
LTMS Severity Analysis
Mild
Severe
EWMA
OFF SCALE
12AUG03
01OCT03
EWMA Action Limit
EWMA Warning Limit
EWMA Warning Limit
EWMA Action Limit
Standard Deviation Units
COUNT IN COMPLETION DATE ORDER
LTMS Precision Analysis
Band 3 Alarm Limit
Band 2 Alarm Limit
Band 1 Alarm Limit
CUSUM Severity Analysis
TMC 24OCT03:11:28

Figure 4 - Percent Viscosity Increase, Average Delta/s

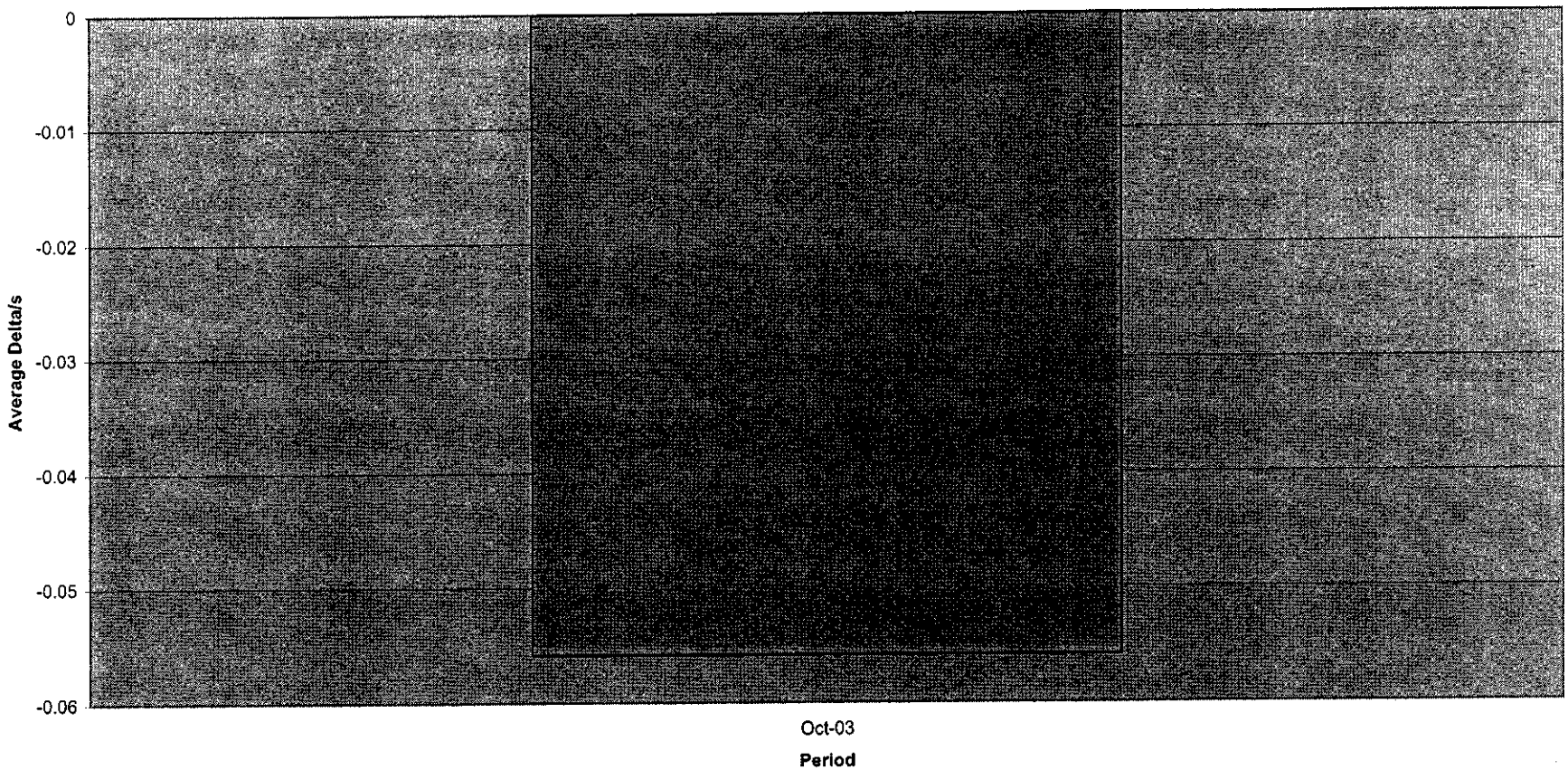


Figure 5 - Weighted Piston Deposits, Average Delta/s

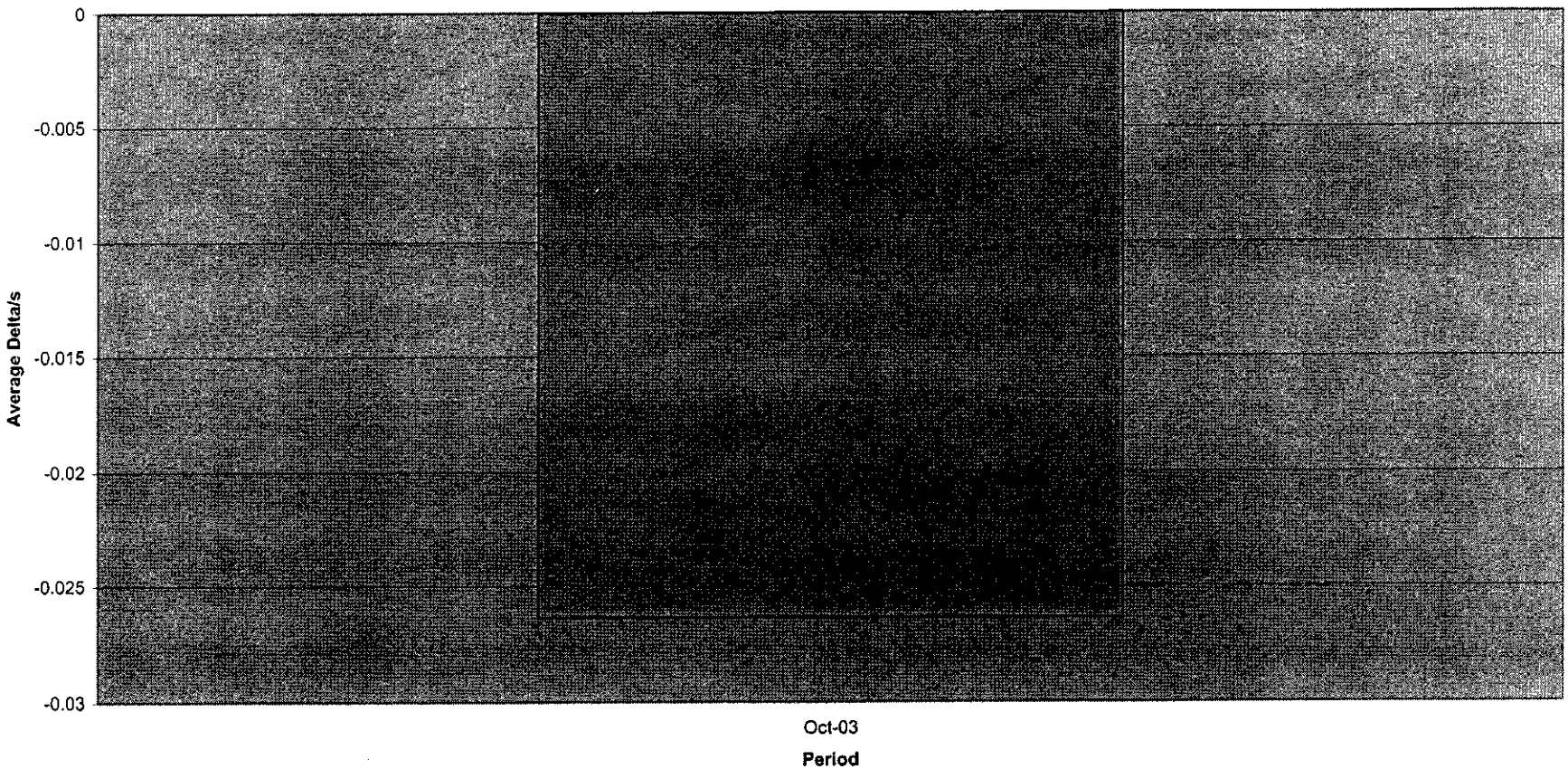


Figure 6 - Average Camshaft plus Lifter Wear, Average Delta/s

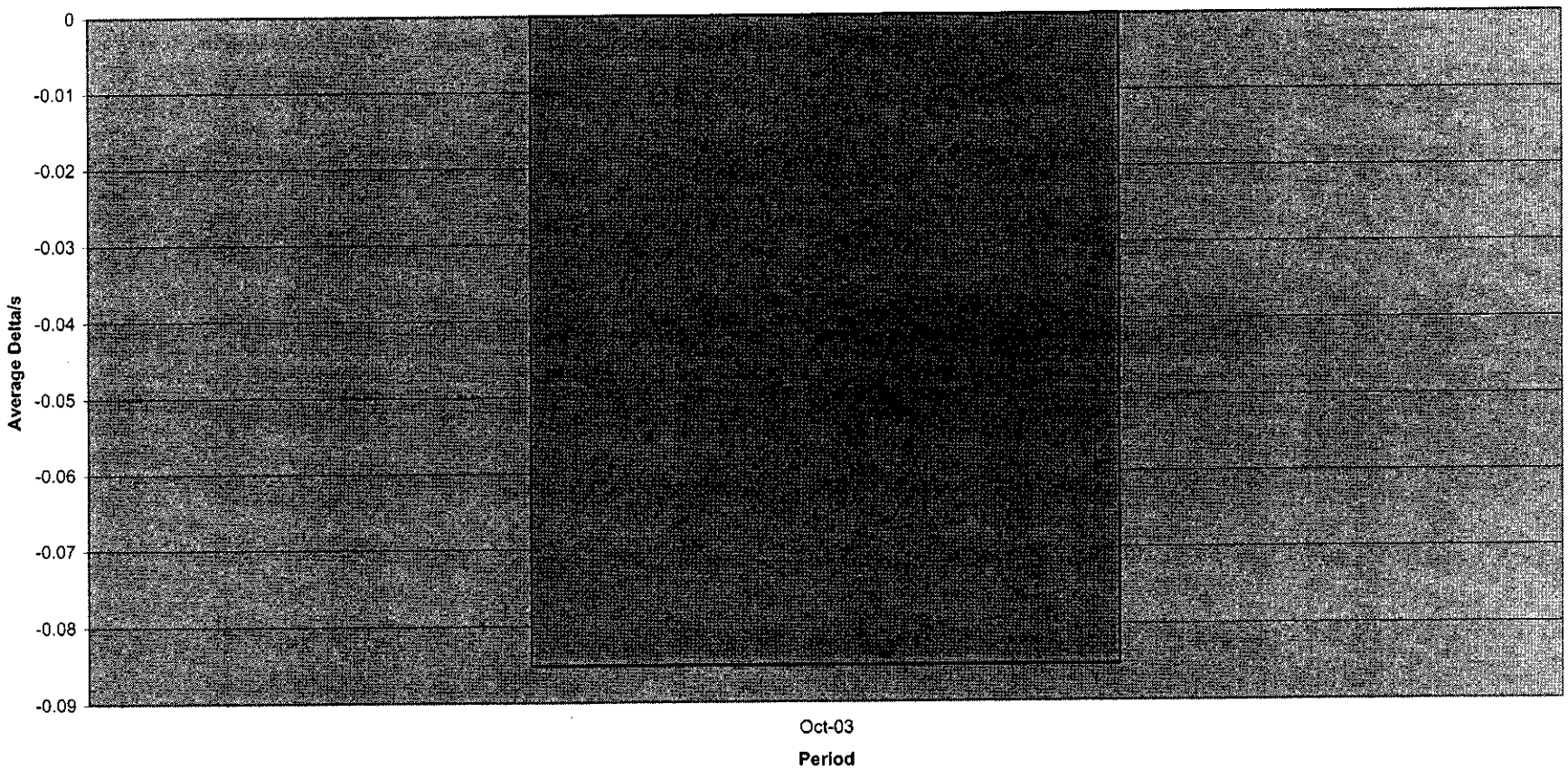


Figure 7 - Percent Viscosity Increase, Pooled Standard Deviation

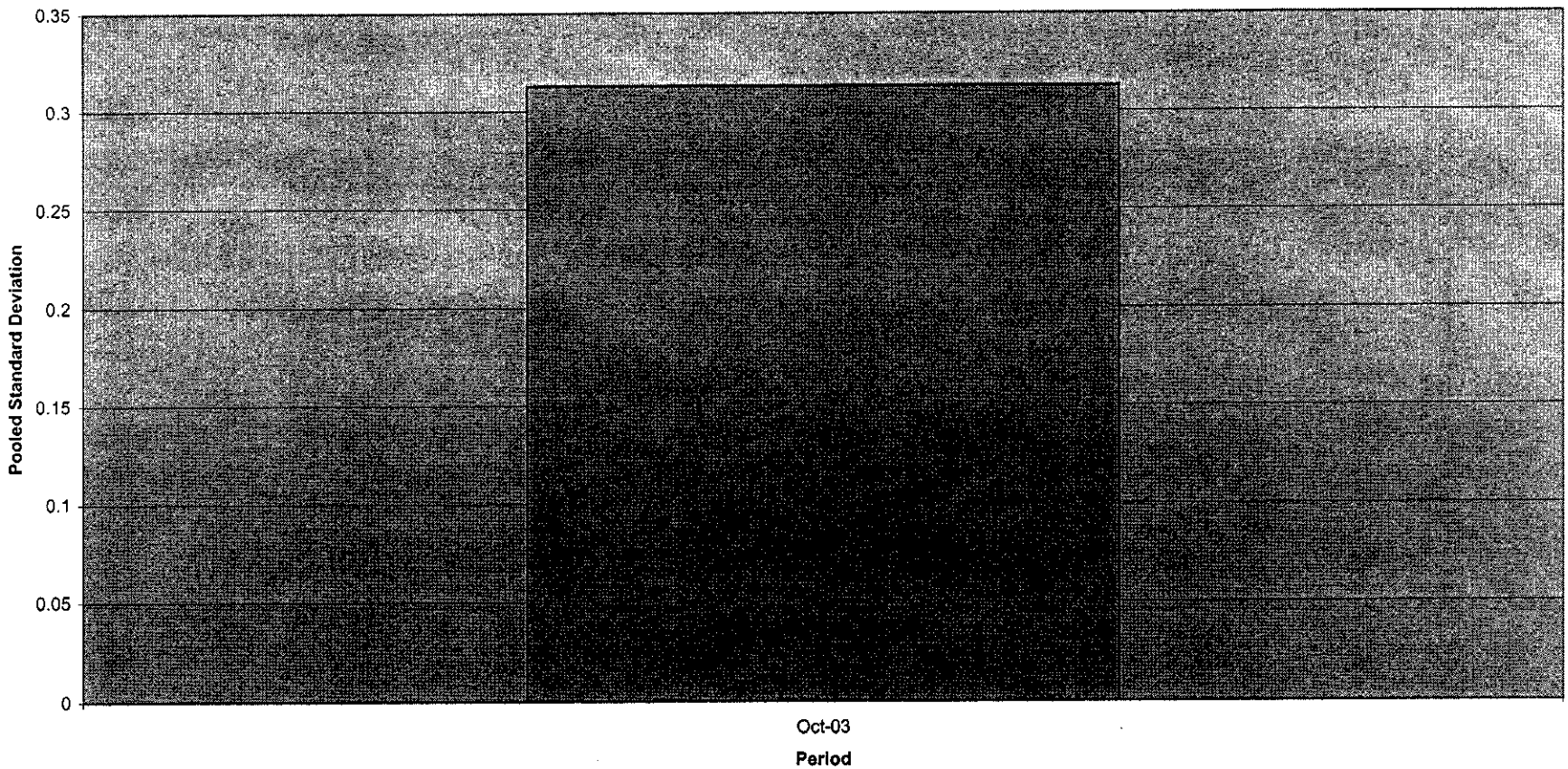


Figure 8 - Weighted Piston Deposits, Pooled Standard Deviation

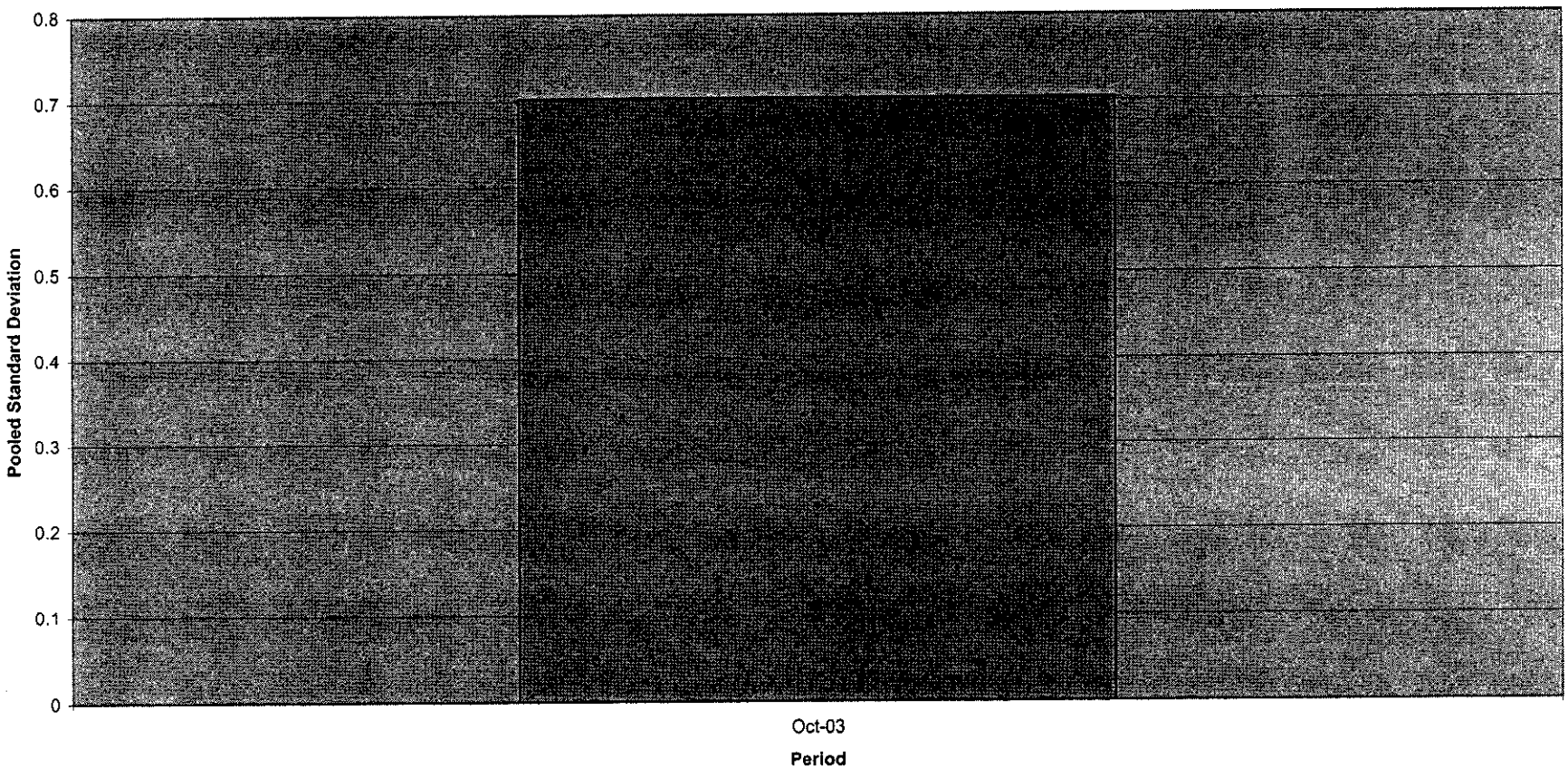


Figure 9 - Average Camshaft plus Lifter Wear, Pooled Standard Deviation

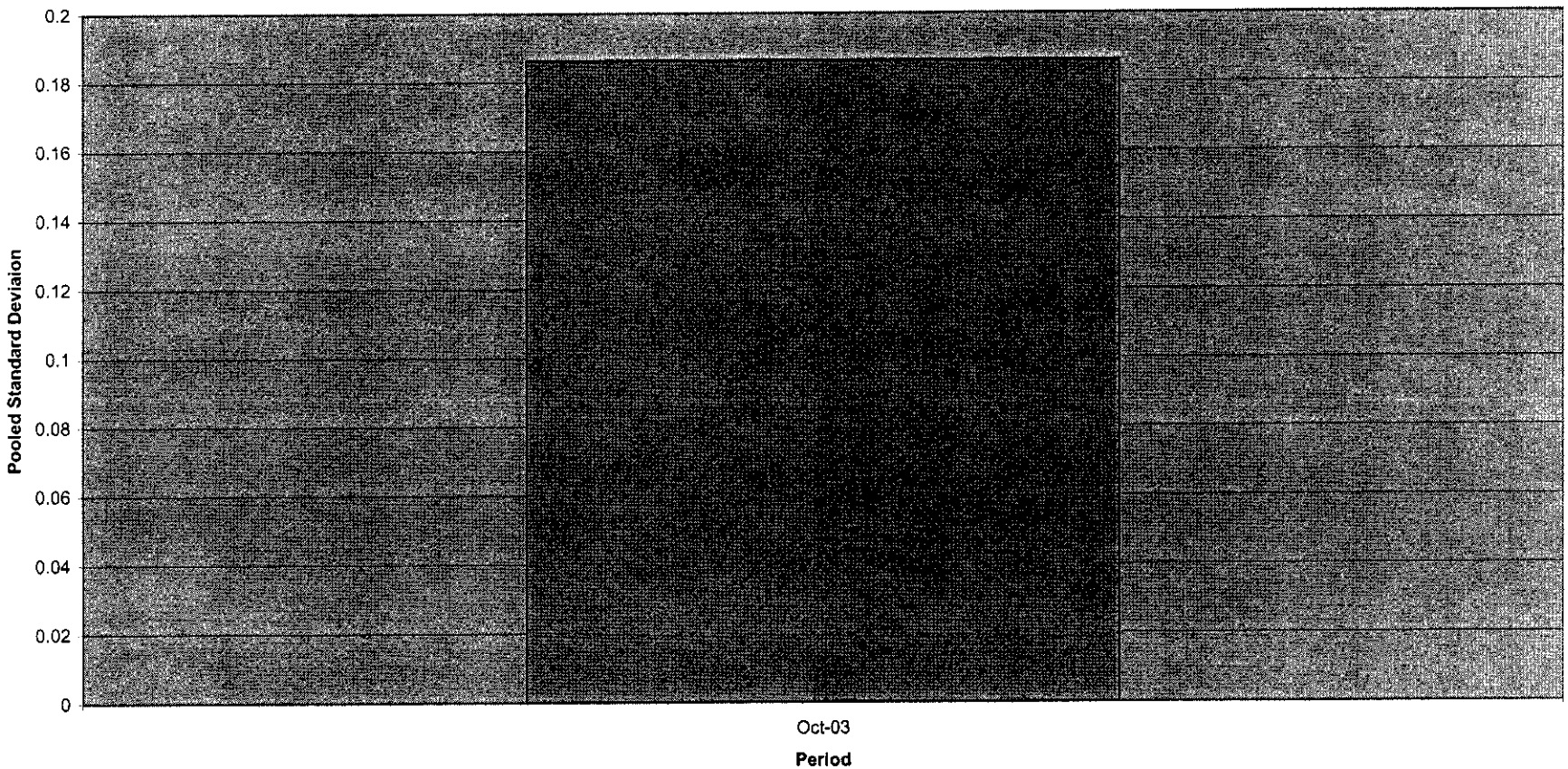


Figure 10 – Sequence IIIG Timeline

Date	Topic	Information Letter
8/19/03	Draft Sequence IIIG Test Procedure Issued	03-1
9/9/03	Revised Valve Spring Load Specifications	03-2
9/23/03	Revised Test Numbering Methodology	03-3

Lubricant Test Monitoring System (LTMS) IIIG Reference Oil Targets and Severity Adjustments

October, 2003

ATTACHMENT 7

LTMS

- LTMS is a Control Charting System that Monitors Both Bias and Precision for Both Abrupt Changes and Consistent Trends
- In Order to Work Properly with its Fullest Power, LTMS Must be Based Upon a Process that at Some Point in Time is/was in Control (No Special Cause Variation)
  - CMA/ACC Recognized this Limitation During the Development of LTMS and Stated that LTMS Targets MUST be Based upon a Homogeneous Data Set (Data Set without Special Causes)

IIIG Facts

- There is Special Cause Variation Embedded in the IIIG Data Set Used to Set Targets
  - Smooth/Rough Rings in MRV and Viscosity
  - Lab G in MRV (before 8/31), Viscosity (before 8/31) and WPD
- MRV is a Pass/Fail Parameter without Severity Adjustments
  - MRV is Highly Correlated with Viscosity Increase

IIIG LTMS Recommendations

- Eliminate the Special Cause Variation Embedded in the IIIG Data Set Used to Set Targets
  - Eliminate the Special Cause Data, or
  - Adjust the Special Cause Data *****
  - Note that Possible WPD Interaction Between Oil and Lab is not used in the WPD Correction

IIIG LTMS Recommendations

- Institute a Severity Adjustment System for MRV
  - The Problem with Severity Adjustments for MRV is Due to Yield Stress in Oil 435, so we will Eliminate MRV for Oil 435 in LTMS
  - Percent Viscosity Increase and MRV are Very Highly Correlated
  - Substitute the Yi from Viscosity Increase for MRV If and Only If Oil 435 is Run and Proceed with MRV Charts and Severity Adjustments
  - Elimination of MRV for Oil 435 Allows for the use of a More Manageable Transformation in the Form of the Natural Log

IIIG %Vis Targets

		Oil 434	Oil 435	Oil 438
All Data	u	4.711678 (111)	5.316010 (204)	4.601438 (100)
	s	0.414379 (n=15)	0.289394 (n=14)	0.217573 (n=15)
Lab G/Rough Ring Correction	u	4.493287 (89)	5.057063 (157)	4.359754 (78)
	s	0.349561 (n=15)	0.207333 (n=14)	0.135664 (n=15)
Lab G/Rough Ring Eliminated	u	4.426012 (84)	4.972537 (144)	4.421615 (83)
	s	0.236044 (n=5)	0.065484 (n=3)	0.122440 (n=6)
Pooled s for Severity Adjustments = 0.25456				

IIIG ACLW Targets

		Oil 434	Oil 435	Oil 438
All Data	u	3.475012 (32.3)	3.563939 (35.3)	2.88313 (17.9)
	s	0.187329 (n=15)	0.208155 (n=14)	0.163703 (n=15)
Pooled s for Severity Adjustments = 0.185096				

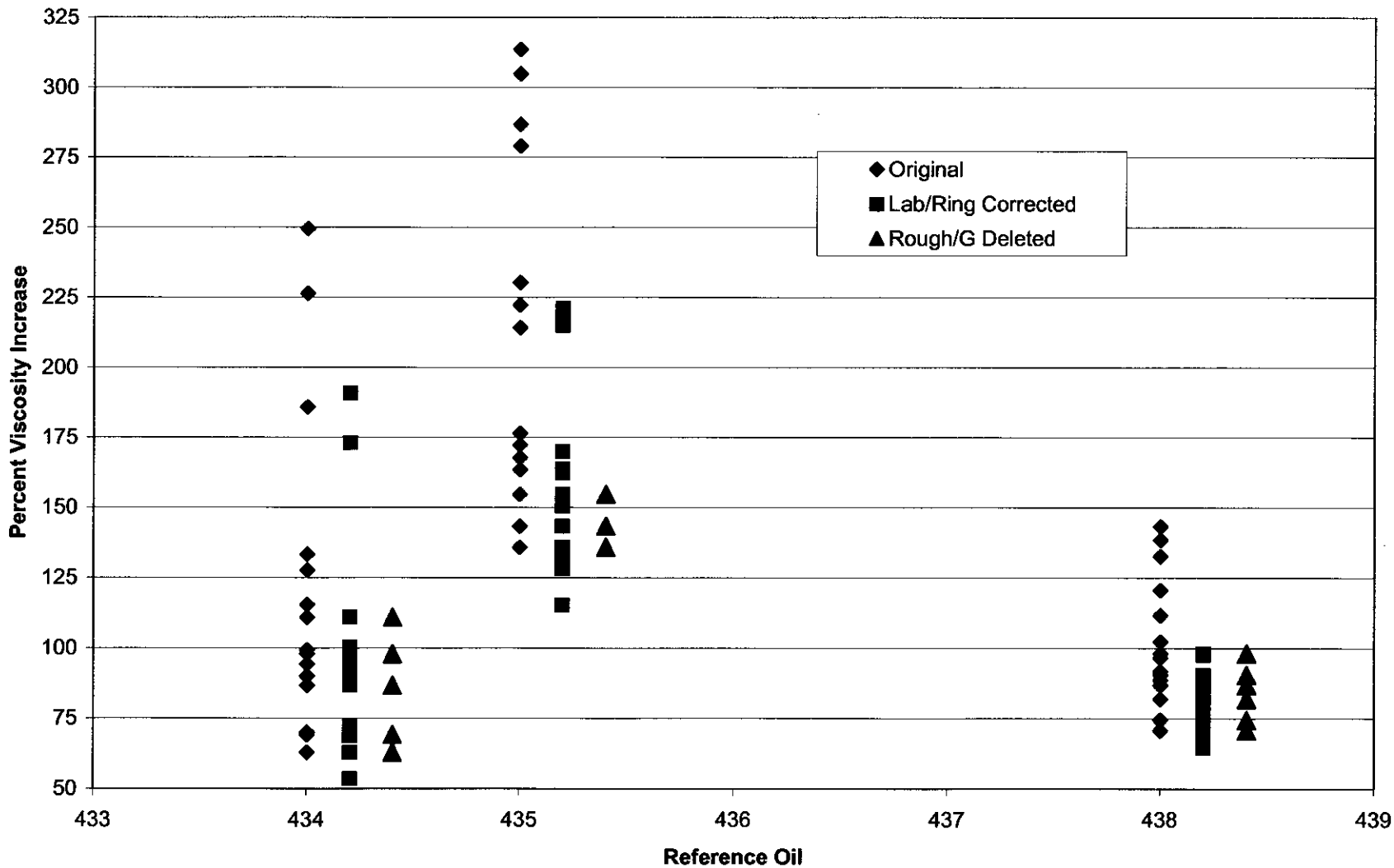
IIIG MRV Targets

		Oil 434	Oil 435	Oil 438
All Data	u	10.85378 (51,729)	NA	9.858859 (19,127)
	s	0.557453 (n=13)	NA	0.183241 (n=13)
Lab G/Rough Ring Correction	u	10.542394 (37,888)	NA	9.548770 (14,027)
	s	0.487119 (n=13)	NA	0.200081 (n=13)
Lab G/Rough Ring Eliminated	u	10.410333 (33,201)	NA	9.727633 (16,775)
	s	0.123164 (n=3)	NA	0.082641 (n=5)
Pooled s for Severity Adjustments = 0.45276				

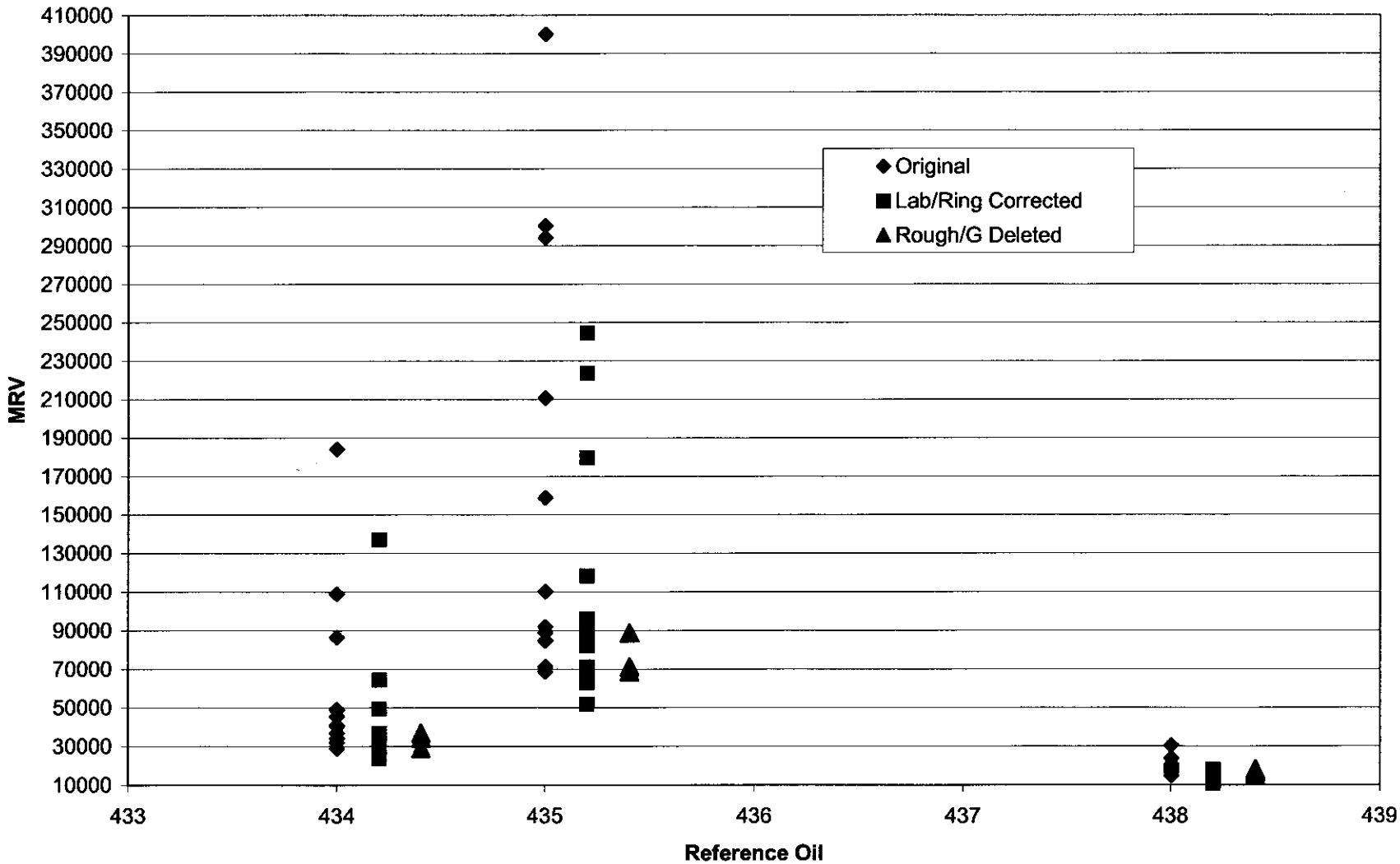
IIIG WPD Targets

		Oil 434	Oil 435	Oil 438
All Data	u	4.856	3.451	3.189
	s	1.05483 (n=15)	0.43337 (n=14)	0.39304 (n=15)
Lab G Correction	u	5.071	3.728	3.404
	s	0.81441 (n=15)	0.40713 (n=14)	0.56923 (n=15)
Lab G Eliminated	u	5.451	3.618	3.113
	s	0.67978 (n=10)	0.34574 (n=8)	0.28261 (n=10)
Pooled s for Severity Adjustments = 0.63200				

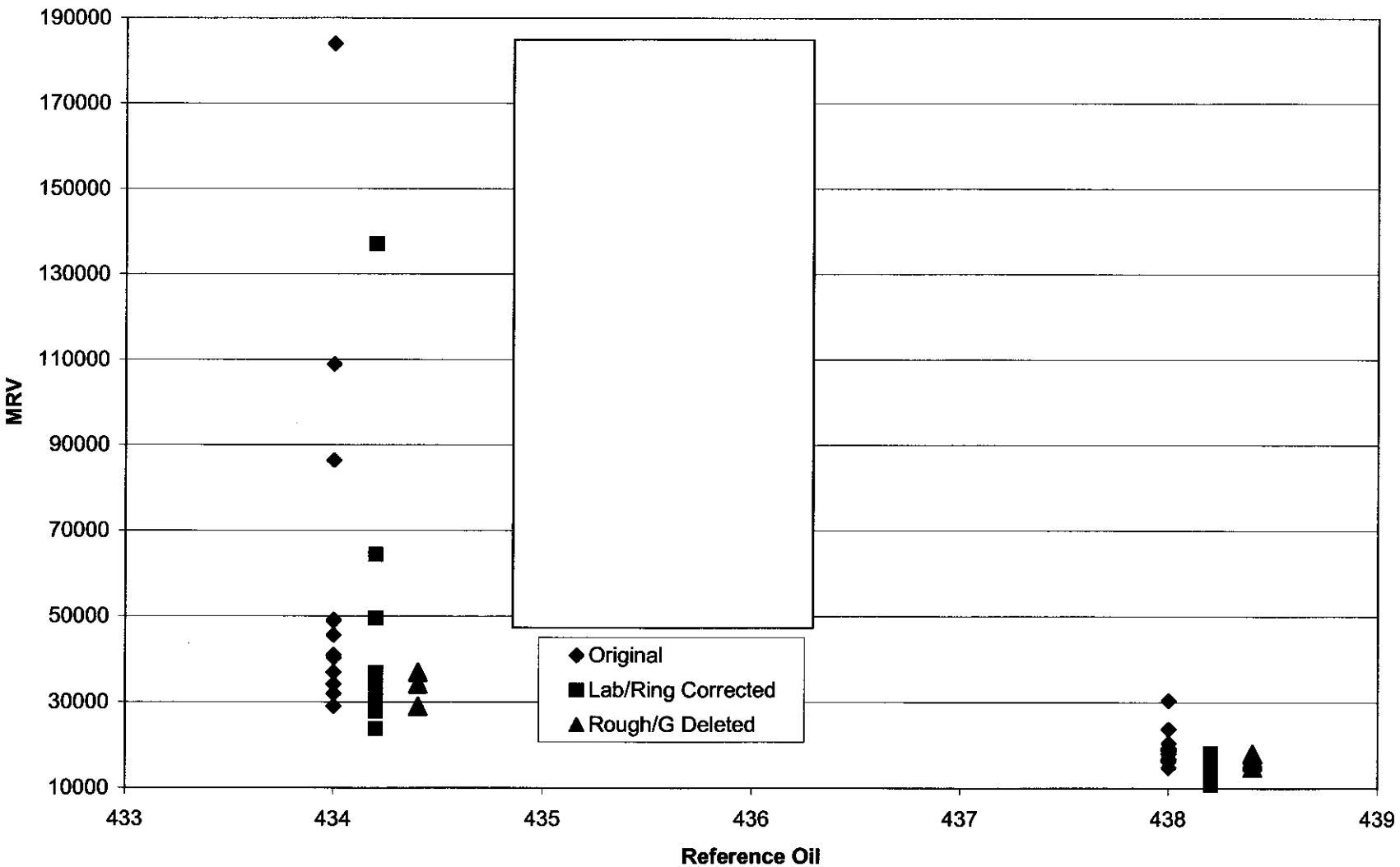
IIIG Percent Viscosity Increase by Reference Oil and Method



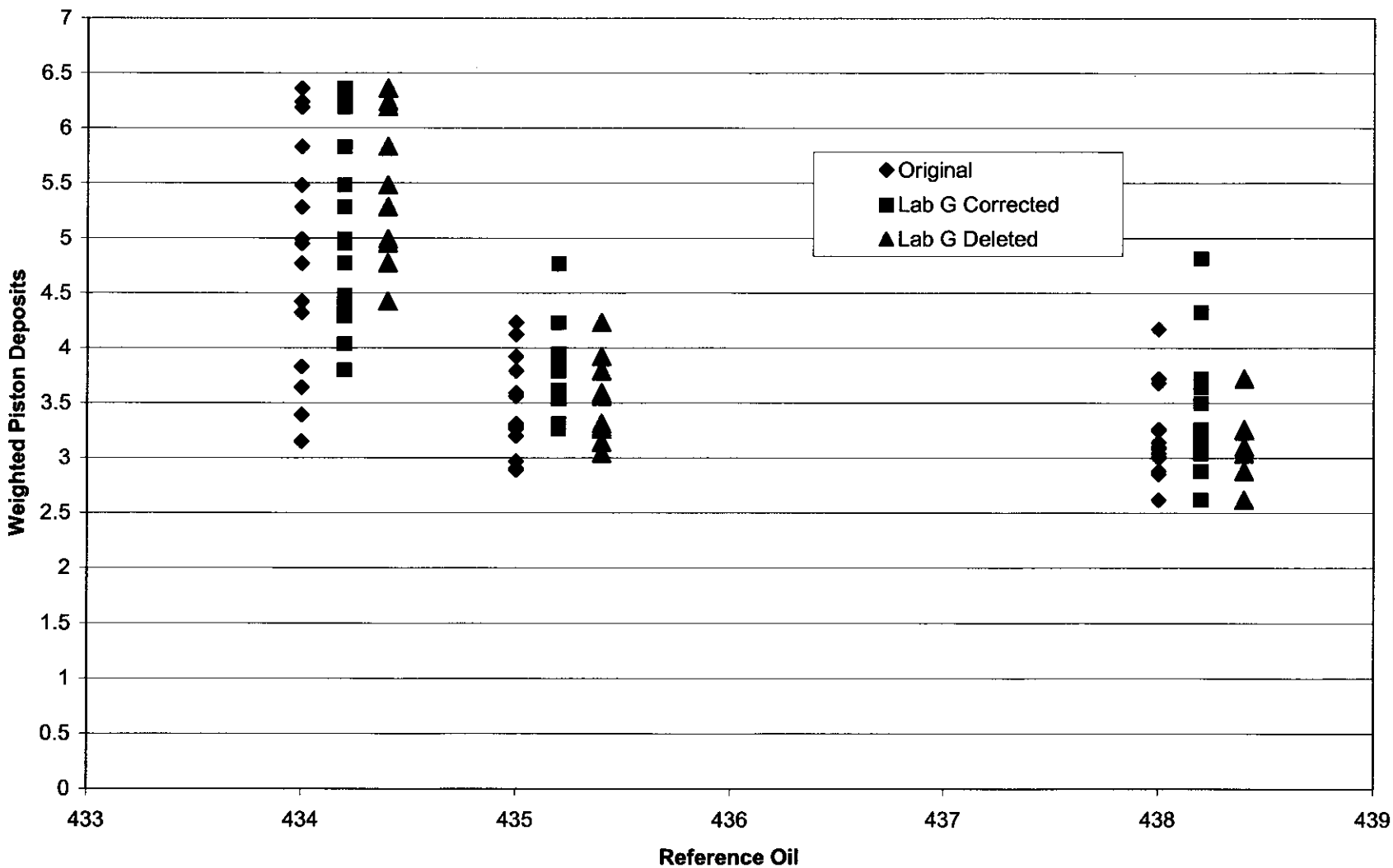
IIIG MRV by Reference Oil and Method



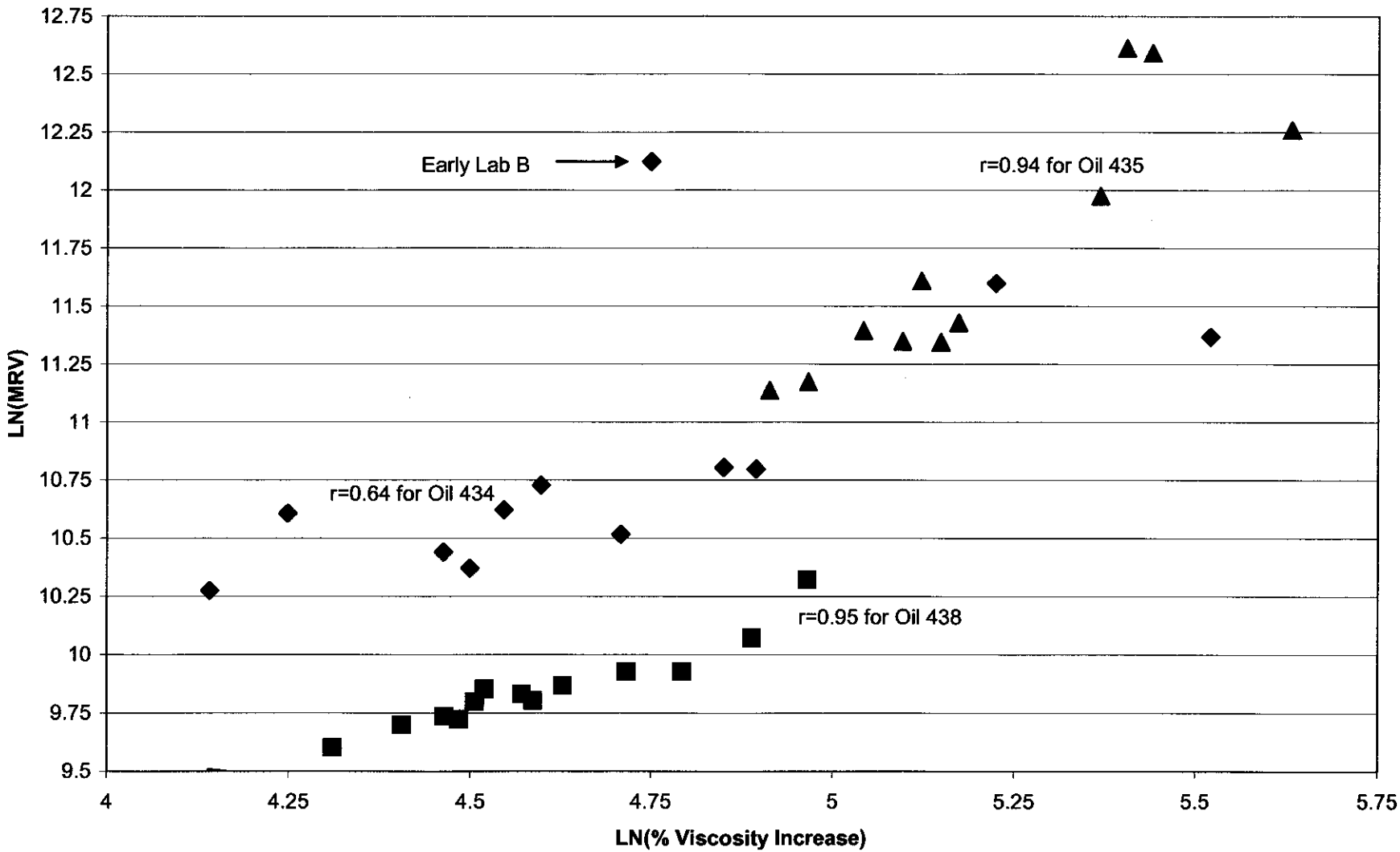
IIIG MRV by Reference Oil and Method

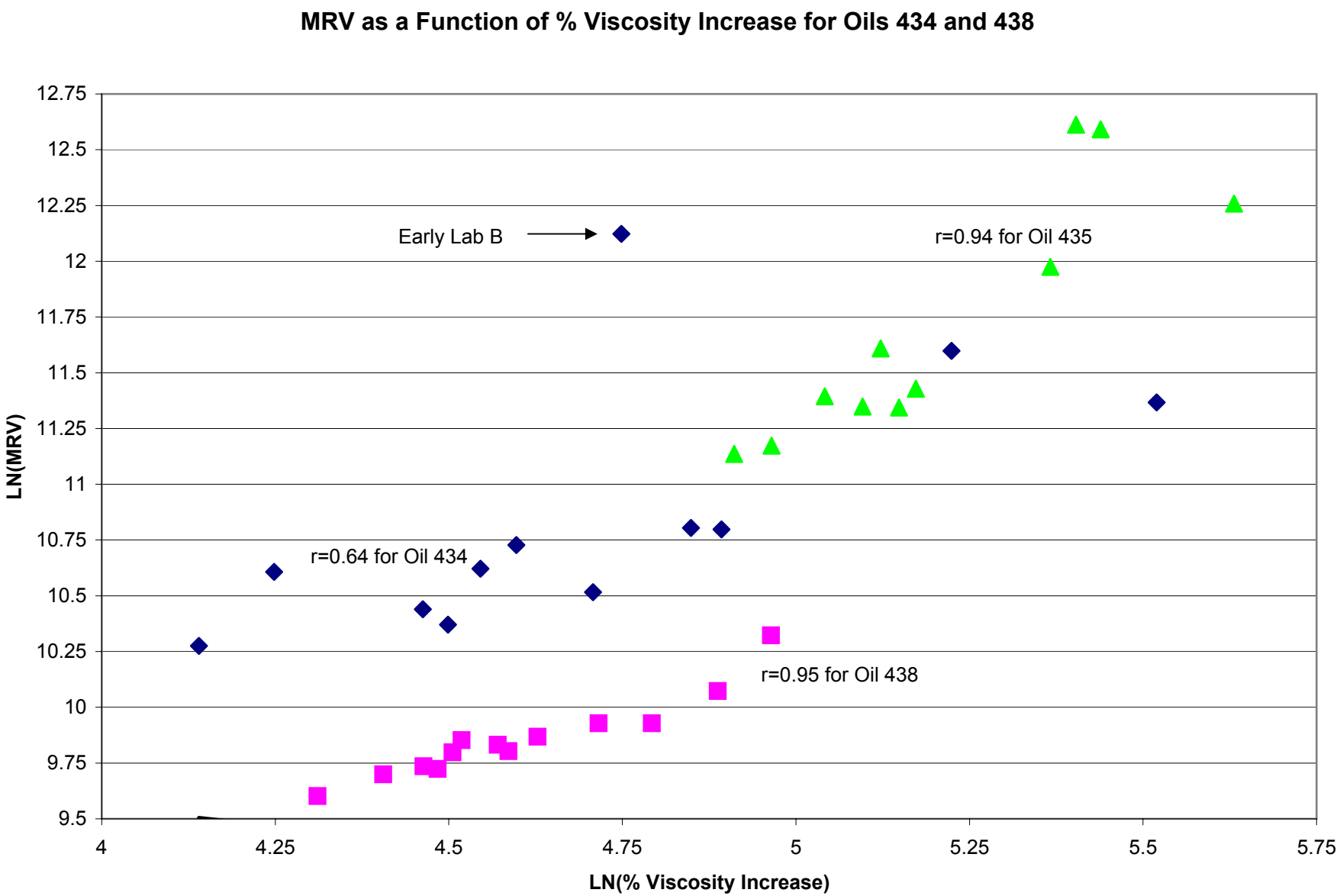


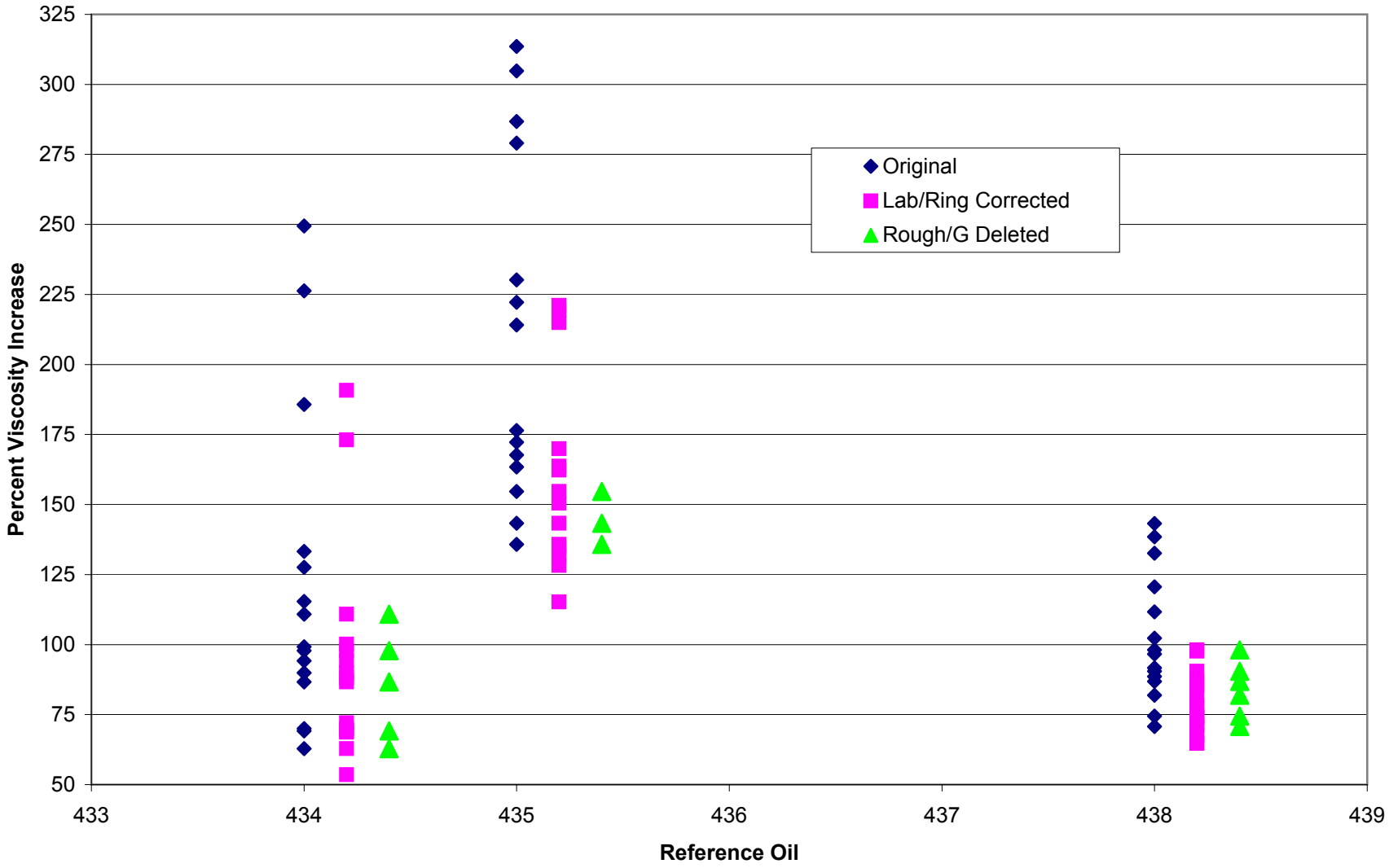
IIIG Weighted Piston Deposits by Reference Oil and Method

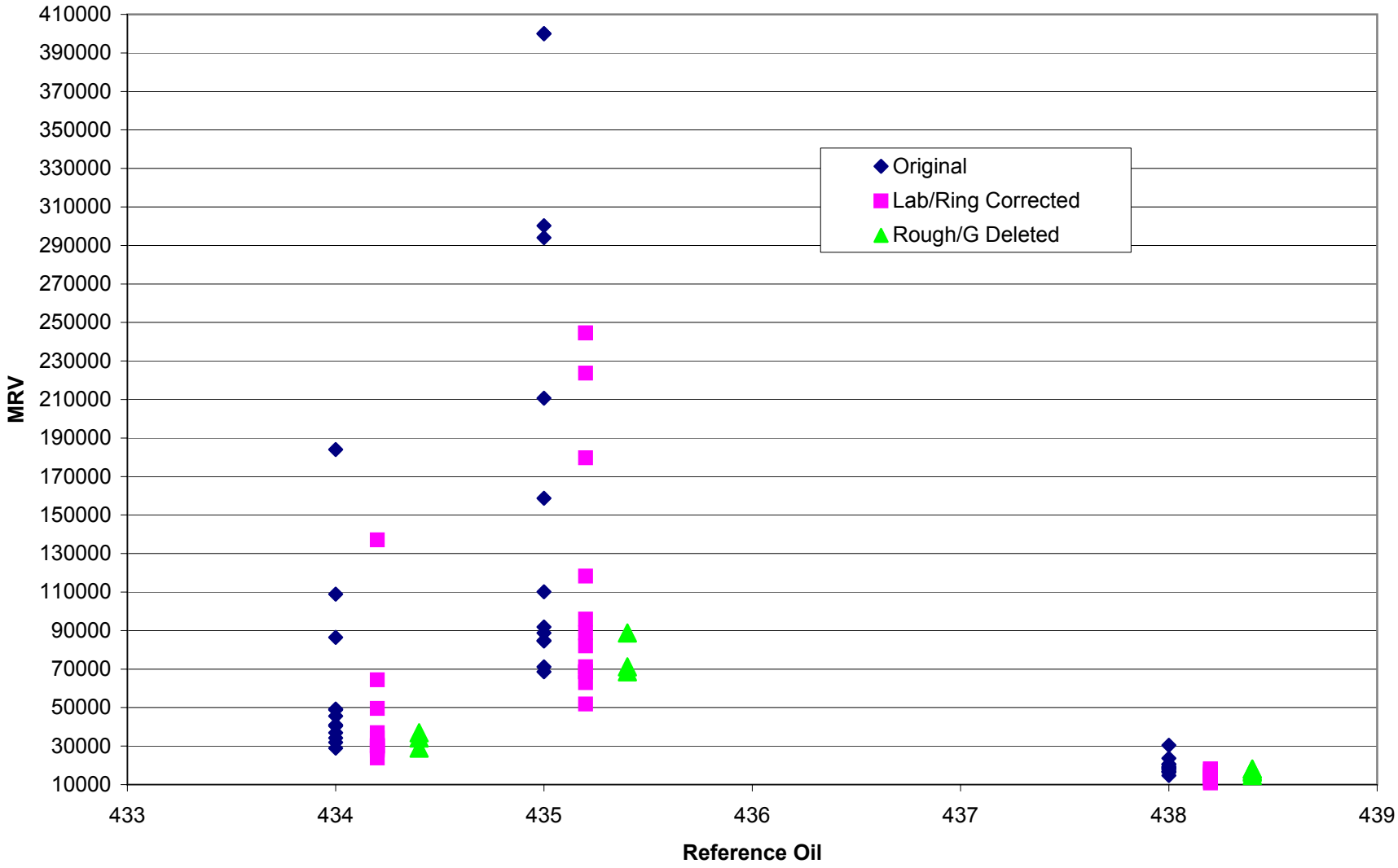


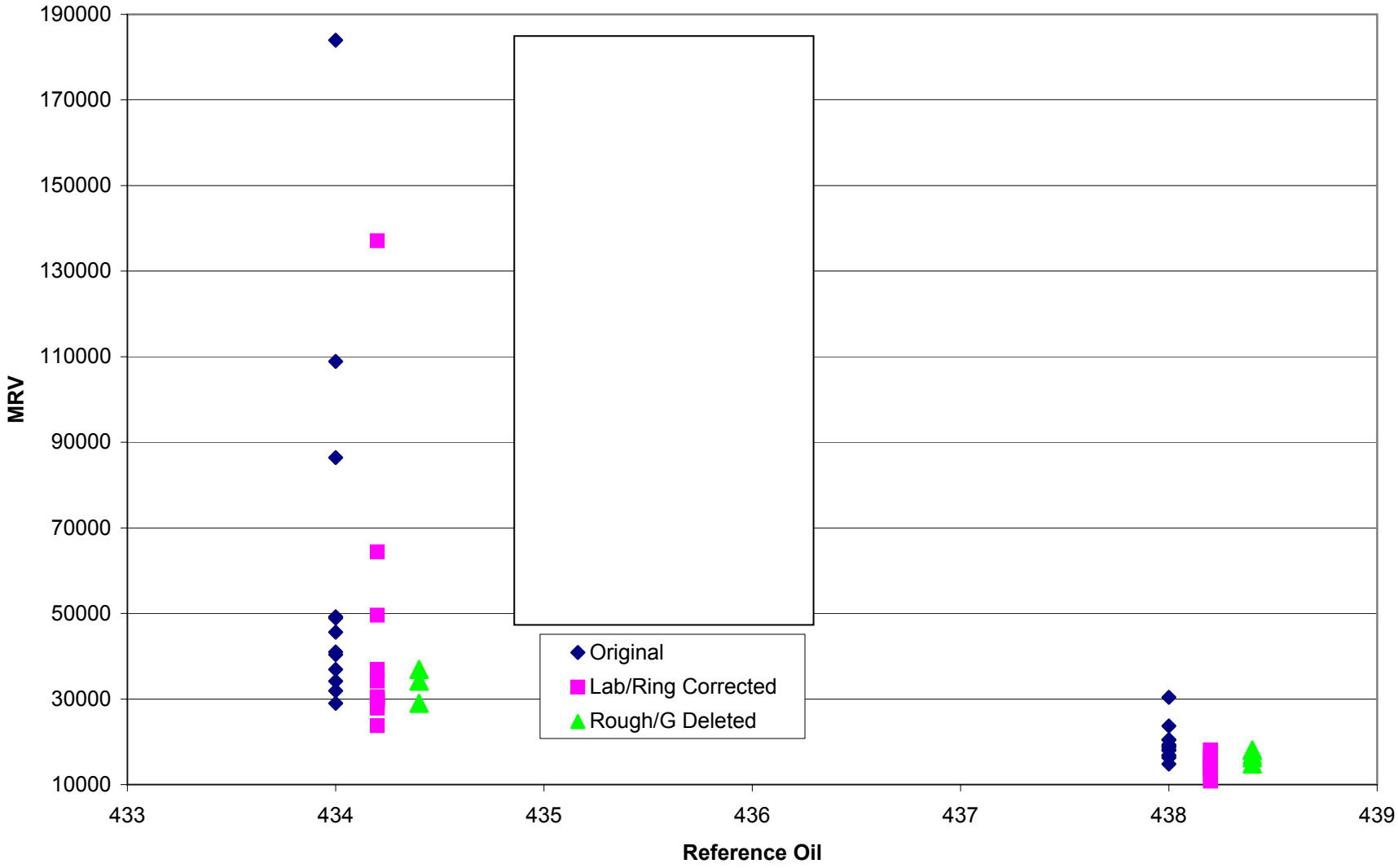
MRV as a Function of % Viscosity Increase for Oils 434 and 438

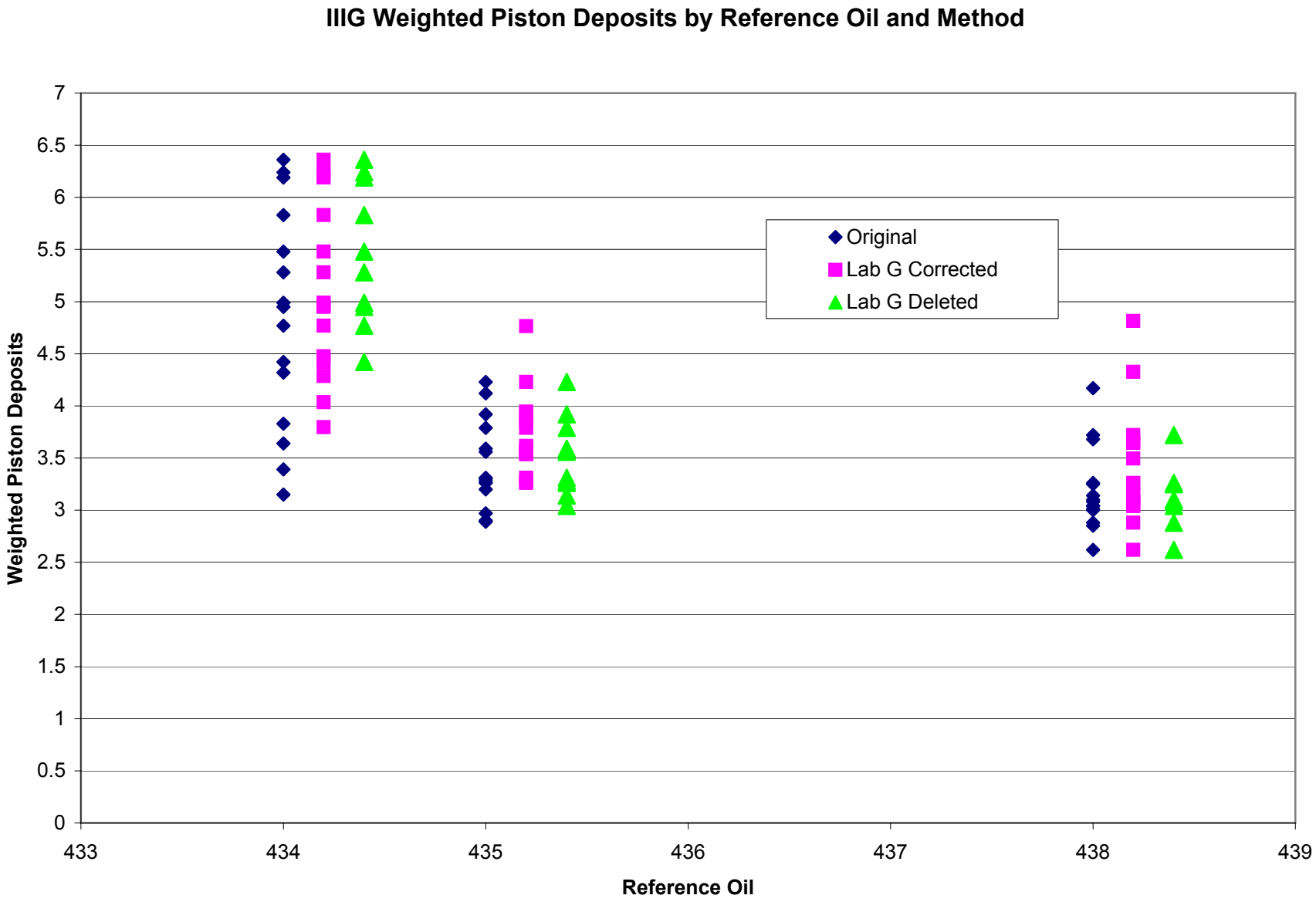



MRV as a Function of % Viscosity Increase for Oils 434 and 438
12.75
12.5
12.25
12
11.75
11.5
11.25
11
10.75
10.5
10.25
10
9.75
9.5
LN(MRV)
4
4.25
4.5
4.75
5
5.25
5.5
5.75
LN(% Viscosity Increase)
Early Lab B
r=0.94 for Oil 435
r=0.64 for Oil 434
r=0.95 for Oil 438


IIIG Percent Viscosity Increase by Reference Oil and Method
Percent Viscosity Increase
325
300
275
250
225
200
175
150
125
100
75
50
433
434
435
436
437
438
439
Reference Oil
Original
Lab/Ring Corrected
Rough/G Deleted


IIIG MRV by Reference Oil and Method
MRV
410000
390000
370000
350000
330000
310000
290000
270000
250000
230000
210000
190000
170000
150000
130000
110000
90000
70000
50000
30000
10000
433
434
435
436
437
438
439
Reference Oil
Original
Lab/Ring Corrected
Rough/G Deleted


IIIG MRV by Reference Oil and Method
MRV
190000
170000
150000
130000
110000
90000
70000
50000
30000
10000
433
434
435
436
437
438
439
Reference Oil
Original
Lab/Ring Corrected
Rough/G Deleted


IIIG Weighted Piston Deposits by Reference Oil and Method
Weighted Piston Deposits
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
433
434
435
436
437
438
439
Reference Oil
Original
Lab G Corrected
Lab G Deleted

OIL	PVIS	LNPVIS	AdjVis	LNAdjVis	ACLW	LNACLW	WPD	AdjWPD	MRV	TMRV	LN(MRV)	AdjMRV	LNAdjMRV
Oil 434	mean	4.711678		4.493287		3.475012	4.856	5.071127			10.85378		10.5423935
	std dev	0.414379		0.349561		0.187329	1.054831	0.814411			0.557453		0.48711928
Oil 435	mean	5.31601		5.057063		3.563939	3.451429	3.72802			11.89757		11.5722703
	std dev	0.289394		0.207333		0.208155	0.433374	0.407125			0.671059		0.5533406
Oil 438	mean	4.601438		4.359754		2.88313	3.189333	3.40446			9.858859		9.54876959
	std dev	0.217573		0.135664		0.163703	0.393037	0.569232			0.183241		0.20008099

Sequence IIIG A

- ILSAC/Oil agreed to a separate engine test for measuring the MRV of the used oil generated by the Sequence IIIG engine test, namely the IIIG A.
- ACC would like the Surv Panel to consider the Sequence IIIG A as a registered test with the following:
  - Test procedure/operating conditions are same as Sequence IIIG,
  - Sequence IIIG A is a registered test confirming that the test was run under standard operating conditions
  - Only rating parameter for the Sequence IIIG A is the used oil MRV.
  - The first Sequence IIIG run on a candidate oil must be dually registered as a Sequence IIIG and a Sequence IIIG A. Subsequent attempts to obtain passing MRV results would be registered as Sequence IIIG A.

ATTACHMENT 8

LUBRIZOL

Fluid technologies for a better world™

Report From:

The Sequence IIIG Oil Consumption Correction Equation Coordinating Team

October 21, 2003

Team Members

Gordon Farnsworth	Doug Deckman
Robert Stockwell	Rich Lee
Joan Evans	Ted Selby
Cliff Venier	Elisa Santos
Lew Williams	Jo Martinez
Chris Cornish	Phil Scinto

ATTACHMENT 6

Mission

Inter-industry group to evaluate whether an equation for correcting Sequence IIIG PVIS and MRV at EOT for oil consumption can be determined.

To propose an equation to industry for acceptance by the ILSAC/OIL Group and the Sequence IIIG Surveillance Panel.

Status

- The OC Team has concluded that the effort by the test sponsor, the test labs, the TMC, and the Sequence IIIG Surveillance Panel and industry stakeholders have sufficiently improved the OC precision of the Sequence IIIG to make an equation unnecessary at this time.

- The OC Team feels our efforts encouraged and facilitated the investigation into root causes of OC variation and that we made considerable progress in developing the concept of an oil consumption correction equation. To delay completion of the GF-4 specification while we complete the OC equation, in light of the improvements in the Sequence IIIG cannot be justified.

Note: At this time, we do not see a need for running the additional eight Sequence IIIG tests, so the additional funding by API and ACC will not be needed.

LUBRIZOL

The OC Team recommends that the Team summarize our work to ILSAC/OIL on 10/21/03, document our data, conclusions and further work which may need to be done in the form of a SAE paper (June, 2004) and that we stand by to take up the work again if warranted. We further recommend the following: ⇨

Recommendations

- The Surveillance Panel should closely monitor oil consumption for Sequence IIIG tests run with new size 1 through 4 rings. Is OC consistent with size 5 and 6 rings?

- The Surveillance Panel should document the lessons learned by Lab G and use that information, if appropriate, to maintain or improve Sequence IIIG precision industry-wide.

- The Surveillance Panel should consider if additional measurements and controls on cylinder honing is necessary to assure industry-wide OC precision in the Sequence IIIG.

- The Surveillance Panel should determine oil consumption validity criteria early in the Sequence IIIG test and total oil consumption interpretability.

LUBRIZOL

Report of the O&H Subpanel to the Sequence III Surveillance Panel

Presented by

Pat Lang

October 29, 2003

ATTACHMENT 10

O&H Procedural Update Recommendations

1. Change fuel pressure specification from 365 +/- 7 kPa to 365 to 390 kPa for IIIF and IIIG fuel pressure.
2. Change automatic parts washing soap solution at least every 6 months.
3. Make use of the crankshaft main bore mandrel optional.
4. Require that piston ring identification paint marks be removed with acetone and the rings cleaned with mineral spirits using a soft cloth.
5. Allow the use of Dow Corning RTV grade 3154 sealer in addition to the GM black sealer 12346193.
6. Add oil filter part number to table A2.1.

O&H Procedural Update Recommendations Continued

7. Require that labs use new main bearing bolts every test.
8. After making pre-test camshaft measurements, the camshaft must be coated with EF-411.
9. Camshaft lobes and journals must be coated with test oil before the camshaft is installed in the engine block. After camshaft installation, the test lifters must be dipped in the test oil using the double dip and rotate procedure.
10. All E.O.T. milliliters-low oil level calculations will be reported on form 5 using the E.O.T. computed oil level, low value minus 708. (236 ml is the sample not replaced and 472 ml is the new oil not added).

Note: In no cases was the wrong oil consumption ever reported

O&H Procedural Update Recommendations Continued

11. Incorporate into the procedure a listing of acceptable Process Controller Components for the fluid conditioning module into section 6.6 of the procedure.

12. Change the precision requirement for the valve train dimensional measuring equipment from 0.001mm to 0.01mm.

Rating Recommendation

All raters who rate Sequence III parts must attend a rating workshop annually. If a rater misses a scheduled workshop, they must attend alternative training within 90 days, as directed by the TMC.

Honing Recommendation

The O&H Subpanel agreed that the honing process described by PerkinElmer and discussed by the O&H Subpanel is considered a refinement, not a change, to the Sequence III test procedures.

The O&H Subpanel recommends that these refinements be incorporated into the test procedure after the following:

1. Review of honer configuration and calibration of all CV-616 honers with the portable torque meter by Sunnen.

2. New stone break-in procedure guidelines.

3. Determine if batch code information for stones, brushes, and fluid is available and useful.

4. Conduct a workshop for laboratory technician training.

5. Run a reference test in each laboratory to verify performance.

Remaining O&H Action Items

1. TMC to review if piston under crown description that is in the procedure is acceptable.
2. Phase III Round-Robin honing exercise
3. Section 11.8.5 - O&H will review precision requirements defined for all flow meters.
4. O&H Chairman & Sid Clark will determine if the volume of EF-411 and pre-test oil used for engine assembly and camshaft pre lube was previously specified.

Proposed Honing Guidelines

Presented to the Sequence IIIG Operations and Hardware Subpanel

Sid Clark

October 28, 2003

ATTACHMENT 11

Stone & Brush Shims

1. Insert the setting gage in the cylinder and adjust to snug fit.
2. Set the turret block to the standard position.
3. Place the stone assembly in the setting gage with the slide scale set at "0" .
4. Add shims as necessary to adjust to 1 to 2 on the slide scale.
5. Repeat steps 3 and 4 for the main and centering guides.
6. Place the plateau brush assembly in the setting gage with the slide scale set at "0".
7. Add shims as necessary to adjust to 3 to 4 on the slide scale.

EHU 512 Stones

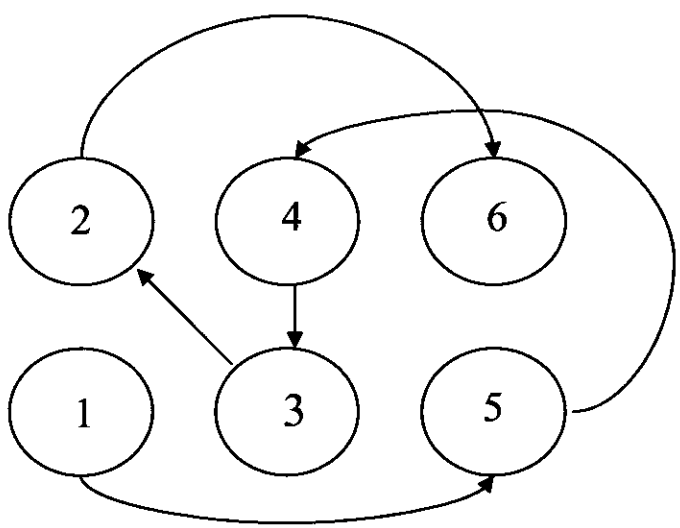
1. Insert the hone head into the cylinder and adjust the feed handle until a slight resistance is felt.
2. Adjust the feed dial to a point where it will not shut off the honer during normal operation over fifteen strokes at 25 units load.
3. Start the honer and cycle the hone head fifteen strokes at 25 units load using the micro switch on the feed dial to stop the honer so the hone head always stops at the top of the cylinder.
4. Move to the next cylinder and repeat the same switching the stone positions in the hone head between each cylinder.

Cylinder Honing Sequence

Do not hone adjacent cylinders

Honing sequence, 1, 5, 4, - 3, 2, 6

Only 15 strokes / cylinder maximum at 25 units load at any time



Chasing the Taper

1. After the initial 15 strokes in each cylinder, measure each cylinder and calculate the taper.
2. Following the honing sequence, engage the dwell 1 or 2 times during the next series of 15 strokes / each cylinder.
3. Measure each cylinder and repeat step 2 engaging the dwell as necessary to eliminate the final taper.

Do not chase taper when the cylinder size is within 0.01mm (0.0004in.) of target size

Maximum allowable taper = 0.0254mm (0.001in.)

EHU 512 Final Sizing

- Size the cylinders, 15 strokes / cylinder maximum at a time.
- Switch the stones in the hone head between each cylinder.
- Follow the honing sequence 1, 5, 4, - 3, 2, 6.
- Operate the EHU 512 stones at 25 units load.
- Stop honing with the EHU 512 stones when the cylinder size is within 0.005mm (0.0002in.) of target size.

C30-PHT-731
Plateau Hone Brush Honing

- Insert the C30-PHT-731 Brushes in the hone head.
- Follow the honing sequence.
- Set the honer on time control (45 seconds).
- Engage the honer and adjust the unit loading to 30 units.
- Do not adjust the load by rapidly releasing and re-engaging the clutch lever if the load increases above 30 units. The normal loading will increase to ~ 35 units and fall back down to 30 during the 45 seconds.
- Follow the Sequence IIIG procedure for cleaning and final assembly for test.

ATTACHMENT 12

THE ASTM SEQUENCE III SURVEILLANCE PANEL

SCOPE & OBJECTIVES

SCOPE

The Sequence III Surveillance Panel is responsible for the surveillance and continual improvement of the Sequence IIIF and IIIFHD test documented in ASTM Standard DNNNN-XX as update by the Information Letter System. The Sequence III Surveillance Panel is also responsible for the surveillance and continual improvement of the new Sequence IIIG test which will be documented as an ASTM Standard DNNNN-XX and updated by the Information Letter System. Data on test precision and laboratory versus field correlation will be solicited and evaluated at least every six (6) months for Sequence III test procedures. The Surveillance Panel is to provide continual improvement of rating techniques, test operation, test monitoring and test validation through communication with the Test Sponsor, ASTM Test Monitoring Center, Operations and Hardware Subpanel, the Central Parts Distributor, ASTM B0.01 Passenger Car Engine Oil Classification Panel, ASTM Light Duty Rating Task Force, ASTM Committee B0.01, CMA Monitoring Agency and CRC Motor Rating Methods Group. Actions to improve the process will be recommended when appropriate based on input to the Surveillance Panel from one or more of the previously stated groups. Develop updated test procedures when necessary and review the correlation with previous test procedures. This process will provide the best possible Sequence III Type Test Procedure for evaluating automotive lubricant performance with respect to the lubricant's ability to prevent oil thickening, varnish formation, oil consumption and engine wear.

OBJECTIVES	TARGET DATE
1. **Ballot the IIIF Test Method for elevation to ASTM Standard**	**December 2003**
2. **Sequence III Control System Clarification**	Oct ~~**December**~~ **2003** complete
3. **Prepare the IIIG Test Method for elevation to ASTM Standard**	**June 2004**
4. **Investigate and bring to resolution IIIG lab severity differences**	**December 2003**
5. **Introduce a IIIGA Test as part of the IIIG Test**	OCT 2003
6. MONITOR PISTON RING Change	Oct 2003
7. Investigate early oil consumption validity and EOT oil consumption interpretability	June 2004
8. Report Honing Task Force to ILSAC/OIC	~~12-17-03~~

William M. Nahumck, Chairman
Sequence IIIF Surveillance Panel

Updated November 29, 2003
Romulus, Michigan