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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Originally Issued: January 27, 2011

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Sequence III Surveillance Panel Unapproved Meeting Minutes January 19, 2011 Southwest Research Institute San Antonio, Texas

Agenda – is shown in **Attachment 1**.

1.0) Roll Call - the attendance is shown in **Attachment 2**.

2.0) Approval of minutes

2.1) The minutes from 12/16/2010 Teleconference were approved without objection.

3.0) Action Item Review

Action Items and Motions from this meeting are shown in **Attachment 3**.

3.1) Conduct a round robin to see if differences exist in phosphorus measurement for IIIGB test (09/11/2009, Glaenzer/Grundza) – this action item is still on going.

3.2) SP Chairman to draft letter to ILSAC/Oil pertaining to IIIG data generated to date using RO1010 (12/16/2010, Glaenzer) – Dave Glaenzer noted that this letter will actually go to the PCEOCP since the request originated from that group.

4.) Old Business

4.1) Review of LTMS V2 as presented to SP by Task Force – the panel took up review and discussion of LTMS V2. Through the discussion the draft was modified and the final version of the draft is shown in **Attachment 4**. Martin Chadwick provided information for the discussion, which is shown in **Attachment 5**. At the conclusion of the discussion, a motion was made to accept LTMS V2 into the Seq. IIIG as shown in the draft (Sutherland, Grundza). This motion passed 7-5-4.

Since negatives are attached to this passing motion, both LTMS revision rules and the rules for controversial Information Letters need to be followed by the panel before LTMS V2 can be implemented. The necessary steps are shown in **Attachment 3**.

4.2) Use of RO435-2 (Grundza) – Rich Grundza noted that the TMC was close to releasing 435-2 for testing. A motion to introduce 435-2 (Grundza, Altman) using 435 targets for the first six tests, was approved unanimously.

4.3) Evaluation of OHT3G-096-1 Honing Brush Samples (Labs) – test lab feedback from the sample brushes provided by OHT was positive. A motion to standardize on the OHT supplied brushes (Leverett, Seman) was approved unanimously. **Attachment 6** shows the honing brushes and **Attachment 7** shows OHT's rejection report.

4.4) Engine builder forum in Detroit (Bruce Matthews) – no update.

4.5) LTMS V2 for IIIF (Statistics Group) – no progress.

5.) New Business

5.1) Replacement for current fuel rail (Matthews) – the current IIIG fuel rail is no longer produced. Bruce Matthews has indentified a replacement (p/n 12587077) which essentially the same, that will remain in production for some time. Labs will obtain the new rail through local dealers.

5.2) Lab Calibration Period (Altman) – Following discussion a motion was approved to change the lab calibration period from 100 to 125 days. LTMS revision guidelines require a two-week waiting period, and as such, the change will be implemented on 2/2/11.

5.3 Continuous Severity Adjustments (Altman) – Ed Altman moved (Mosher second) to adopt continuous severity adjustments. Following discussion, this item was tabled to allow the LTMS V2 process to run its course.

5.4 Undersized Crankshafts (Altman) – Ed Altman noted recent crankshafts are at small end of the specification. Labs are to track crankshaft sizes.

6.) Review Scope and Objectives

6.1) The surveillance Scope & Objectives were reviewed and the revised S & O are shown in **Attachment 8**.

7.) Next Meeting

7.1) The next meeting will be a conference call to discuss LTMS V2 ballot issues; to be held in approximately three weeks.

8.) Meeting Adjourned – the meeting adjourned at 2:40 pm.

Attachment 1

Sequence III Surveillance Panel
01/19/2011
09:00-17:00 CST
Southwest Research Institute
San Antonio, Texas
Call In Number (866) 588-1857
Teleconference Passcode 2105226802

Agenda

1.0) Roll Call

2.0) Approval of minutes

- 2.1) Approve the minutes from 12/16/2010 Teleconference.

3.0) Action Item Review

- 3.1) Conduct a round robin to see if differences exist in phosphorus measurement for IIIGB test. 09/11/2009 Glaenzer/Grundza
- 3.2) SP Chairman to draft letter to ILSAC/Oil pertaining to IIIG data generated to date using RO1010. 12/16/2010 Glaenzer

4.) Old Business

- 4.1) Review of LTMS V2 as presented to SP by Task Force. All
- 4.2) Use of RO435-2. Grundza
- 4.3) Evaluation of OHT3G-096-1 Honing Brush Samples. Labs
- 4.4) Engine builder forum in Detroit. March, 2011? Bruce Matthews
- 4.5) LTMS V2 for IIIF. Statistics Group

5.) New Business

- 5.1) Replacement for current fuel rail. Matthews

6.) Review Scope and Objectives


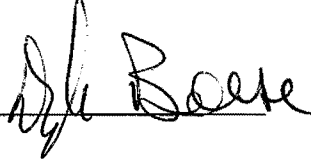
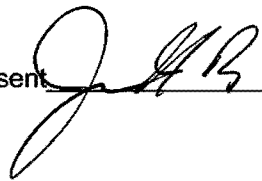

7.) Next Meeting

8.) Meeting Adjourned

Attachment 2

ASTM Sequence III Surveillance Panel (17 Voting members)

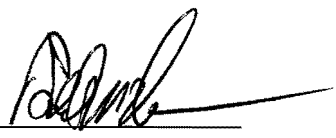
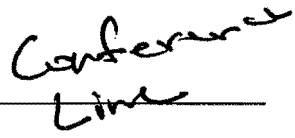

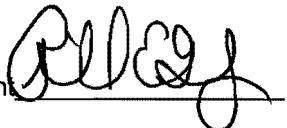
date:

Name/Address	Phone/Fax/Email	Voting Member	Signature
Ed Altman Afton Chemical Corporation P.O. Box 2158 Richmond, VA 23218-2158 USA	804-788-5279 804-788-6358 ed.altman@aftonchemical.com	Voting Member	Present 
Zack Bishop Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249-3423 USA	210-877-0223 210-690-1959 zbishop@tei-net.com	Non-Voting Member	Present _____
Doyle Boese Infineum 1900 E. Linden Avenue Linden, NJ 07036 USA	908-474-3176 908-474-3637 doyle.boese@infineum.com	Non-Voting Member	Present 
Adam Bowden OH Technologies, Inc. 9300 Progress Parkway P.O. Box 5039 Mentor, OH 44061-5039 USA	440-354-7007 440-354-7080 adbowden@ohtech.com	Non-Voting Member	Present _____
Jason Bowden OH Technologies, Inc. 9300 Progress Parkway P.O. Box 5039 Mentor, OH 44061-5039 USA	440-354-7007 440-354-7080 jhbowden@ohtech.com	Voting Member	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	Non-Voting Member	Present 
Jerome A. Brys Lubrizol Corp. 29400 Lakeland Blvd. Wickliffe, Ohio 44092 USA	440 347-2631 jerome.brys@lubrizol.com	Non-Voting Member	Present _____

Name/Address	Phone/Fax/Email		Signature
Bill Buscher III Southwest Research Institute 6220 Culebra Road P.O. Box 28510 San Antonio, TX 78228 USA	210-522-6802 210-684-7523 william.buscher@swri.org	Non-Voting Member	Present <u>WAB</u>
James Carter SOLUTIONS Haltermann Products 3520 Okemos Rd. 2296 HULETT Suite #6-170 Okemos, MI 48864 USA	517-347-3021 517-347-1024 jecarter@jhaltermann.com 517-896-0897 - CELL	Voting Member	Present <u>JRC</u>
Chris Castanien The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, OH 44092 USA	440-347-2973 440-944-8112 cca@lubrizol.com	Non-Voting Member	Present <u>CR</u>
Timothy L. Caudill Ashland Oil Inc. 22 nd & Front Streets Ashland, KY 41101 USA	606-329-1960 x5708 606-329-2044 tlcaudill@ashland.com	Voting Member	Present <u>TL</u>
Martin Chadwick Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238 USA	210-706-1543 210-684-6074 martin.chadwick@intertek.com	Non-Voting Member	Present <u>MC</u>
Jeff Clark Sequence III Secretary ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 USA	412-365-1032 412-365-1047 jac@atc-erc.org	Non-Voting Member	Present <u>JAR</u>
Sid Clark Southwest Research 50481 Peggy Lane Chesterfield, MI 48047 USA	586-873-1255 Sidney.L.Clark@sbcglobal.net	Non-Voting Member	Present _____

ASTM Sequence III Surveillance Panel (17 Voting members)


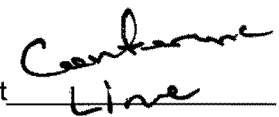

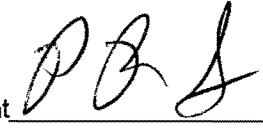
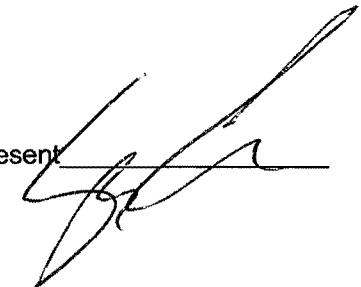
date:

Name/Address	Phone/Fax/Email		Signature
Johnny M De La Zerda Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238 USA	210-523-4621 210-523-4607 johnny.delazerda@intertek.com	Non-Voting Member	Present _____
Todd Dvorak Afton Chemical Corporation P.O. Box 2158 Richmond, VA 23218-2158 USA	804-788- 6367 804-788- 6388 todd.dvorak@aftonchemical.com	Non-Voting Member	Present 
Frank Farber ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 USA	412-365-1030 412-365-1047 fmf@astmtmc.cmu.edu	Non-Voting Member	Present _____
Gordon R. Farnsworth Infineum RR # 5 Box 211 Montrose, PA 18801 USA	570-934-2776 570-934-0141 gordon.farnsworth@infineum.com	Non-Voting Member	Present 
Joe Franklin Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238 USA	210-523-4671 210-523-4607 joe.franklin@intertek.com	Non-Voting Member	Present _____
David L. Glaenzer Afton Chemical Corporation 500 Spring Street P.O. Box 2158 Richmond, VA 23218-2158 USA	804-788-5214 804-788-6358 dave.glaenzer@aftonchemical.com Surveillance Panel Chairman	Non-Voting Member	Present 
Richard Grundza ASTM Test Monitoring Center 6555 Penn Avenue Pittsburgh, PA 15206 USA	412-365-1031 412-365-1047 reg@astmtmc.cmu.edu	Voting Member	Present 
Larry Hamilton The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, OH 44092 USA	440-347-2326 440-347-4096 ldha@lubrizol.com	Non-Voting Member	Present _____

ASTM Sequence III Surveillance Panel (17 Voting members)

date:

Name/Address	Phone/Fax/Email		Signature
Tracey King Chrysler LLC 800 Chrysler Drive CIMS 482-00-13 Auburn Hills, MI 48326-2757 USA	248-576-7500 248-576-7490 tek1@chrysler.com	Voting Member	Present <u>Conf. line</u>
Clayton Knight Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249-3423 USA	210-690-1958 210-690-1959 cknight@tei-net.com	Voting Member	Present <u>[Signature]</u>
Patrick Lang Southwest Research Institute 6220 Culebra Road P.O. Box 28510 San Antonio, TX 78228 USA	210-522-2820 210-684-7523 plang@swri.edu	Voting Member	Present <u>[Signature]</u>
Charlie Leverett Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238 USA	210-647-9422 210-523-4607 charlie.leverett@intertek.com	Voting Member	Present <u>[Signature]</u>
Josephine G. Martinez Chevron Oronite Company LLC 100 Chevron Way Richmond, CA 94802 USA	510-242-5563 510-242-3173 jogm@chevrontexaco.com	Non-Voting Member	Present _____
Bruce Matthews GM Powertrain Mail Code 483-730-472 823 Jocyn Avenue Pontiac, MI 48340 USA	248-830-9197 248-857-4441 bruce.matthews@gm.com Test Sponsor Representative	Voting Member	Present <u>Bob</u>
Timothy Miranda BP Castrol Lubricants USA 1500 Valley Road Wayne, NJ 07470 USA	973-305-3334 973-686-4039 Timothy.Miranda@bp.com	Voting Member	Present <u>Conference Line</u>

Name/Address	Phone/Fax/Email	Voting Member	Signature
Mark Mosher ExxonMobil Technology Co. Billingsport Road Paulsboro, NJ 08066 USA	856-224-2132 856-224-3628 mark.r.mosher@exxonmobil.com	Voting Member	Present 
Allison Rajakumar The Lubrizol Corporation Drop 152A 29400 Lakeland Blvd. Wickliffe, OH 44092 USA	440-347-4679 440-347-2014 Allison.Rajakumar@Lubrizol.com	Non-Voting Member	Present _____
Andrew Ritchie Infineum 1900 East Linden Avenue P.O. Box 735 Linden, NJ 07036 USA	908-474-2097 908-474-3637 Andrew.Ritchie@Infineum.com	Voting Member	Present _____
Ron Romano Ford Motor Company Diagnostic Service Center II Room 410. 1800 Fairlane Drive Allen Park, MI 48101 USA	313-845-4068 313-32-38042 rromano@ford.com	Voting Member	Present 
Jim Rutherford Chevron Oronite Company LLC 100 Chevron Way Richmond, CA 94802 USA	510-242-3410 510-242-3173 jaru@chevrontexaco.com	Non-Voting Member	Present 
Philip R. Scinto The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, OH 44092 USA	440-347-2161 440-347-9031 prs@lubrizol.com	Non-Voting Member	Present 
Greg Seman The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, OH 44092 USA	440-347-2153 440-347-4096 greg.seman@lubrizol.com	Voting Member	Present 

Attachment 3

Sequence IIIF/G Surveillance Panel
January 19, 2011
9:00AM – 5:00PM
Southwest Research Institute
San Antonio, TX

Motions and Action Items
As Recorded at the Meeting by Bill Buscher

1. Action Item – Revised IIIG LTMS 2 task force proposal to be distributed to SP members and included in meeting minutes.
2. Motion – Do not use LTMS 2 e_i limits for ACLW and set LTMS 2 Z_i limits for ACLW as follows: Level 2 Upper Limit = 2.0, Level 2 Lower Limit = N/A (no limit) and Level 1 = 0.0 (continuous severity adjustments).

Charlie Leverett / Pat Lang / Passed 5-3-7

3. Motion – Accept original IIIG LTMS 2 task force proposal for adoption of LTMS 2 into the IIIG test, with the revisions made to the original proposal in today's meeting and Jim Rutherford's editorial changes to the original proposal.

Mark Sutherland / Rich Grundza / Passed 7-5-4

4. Action Item – SP chair will send letters to all negative voters, giving them 2 weeks to submit written responses to SP on reasons for voting negative.
5. Action Item – SP chair will distribute responses to SP members to give them \approx 1 week for review.
6. Action Item – SP chair will schedule a SP conference call in \approx 3 weeks to review negative voter responses to determine if negative votes are persuasive or non-persuasive and to see if negative and waive voters change their votes to positive.

7. Motion – Approval of changes to LTMS document and changes to IIIG test procedure are both required prior to setting an implementation date.

Rich Grundza / Greg Seman / Passed 14-0-2

8. Motion – Introduce RO 435-2 using RO 435 targets and review at 6 tests.

Rich Grundza / Ed Altman / Passed 15-0-1

9. Motion – Accept OHT3G-096-1 honing brush as a standardized honing brush for the IIF and IIIG tests.

Charlie Leverett / Greg Seman / Passed 16-0-0

10. Action Item – Labs to document when OHT3G-096-1 honing brush is introduced into service.

11. Action Item – Labs to report to OHT their honing brush usage rates.

12. Action Item – Labs to purchase GM p/n 12587077 fuel rail from their local dealer parts department to last the life of the IIF and IIIG tests.

13. Motion – Revise current LTMS document to extend IIIG reference interval from 100 to 125 days. Implementation date 2/2/11.

Ed Altman / Charlie Leverett / Passed 12-0-4

14. Motion – Revise current LTMS document to implement continuous severity adjustments in the IIIG test.

Ed Altman / Mark Mosher / Tabled

15. Action Item – Labs to report findings on new crankshaft dimensions back to SP.

16. Action Item – Bruce Mathews to investigate GM Raceshop's procedures on finish machining of crankshafts and report to SP.

Attachment 4

APPENDIX F

1. Sequence IIIG LTMS Requirements (A Laboratory Based Severity Adjustment System)

TEST METHOD PORTION

The following are the specific Sequence IIIG calibration test requirements.

A. Reference Oils and Parameters

The prediction error monitoring parameters are Percent Viscosity Increase (PVIS), Weighted Piston Deposits (WPD) and Average Camshaft plus Lifter Wear (ACLW). The reference oils required for test stand and test laboratory calibration are reference oils accepted by the ASTM Sequence III Surveillance Panel. The targets for the current reference oils for each parameter are presented below.

PERCENT VISCOSITY INCREASE

Unit of Measure: LN(PVIS)

PREDICTION ERROR MONITORING and SEVERITY ADJUSTMENT PARAMETER

Reference Oil	Target
434	4.7269
435	5.1838
438	4.5706

WEIGHTED PISTON DEPOSITS

Unit of Measure: Merits

PREDICTION ERROR MONITORING and SEVERITY ADJUSTMENT PARAMETER

Reference Oil	Target
434	4.80
435	3.59
438	3.20

AVERAGE CAMSHAFT plus LIFTER WEAR

Unit of Measure: LN(ACLW)

PREDICTION ERROR MONITORING and SEVERITY ADJUSTMENT PARAMETER

Reference Oil	Target
434	3.4657
435	3.4985
438	2.8814

B. Acceptance Criteria

1. New test labs. A new lab is defined as a test lab that has never previously achieved calibration.

- a. A minimum of three (3) operationally valid reference and/or matrix tests with no level 3 ei alarms must be run on the first test stand in a new laboratory.
 - Note that industry matrix runs may be included, as well as reference runs, at the discretion of the surveillance panel.
- b. Following the necessary tests, check the status of the control charts and follow the prescribed actions.

2. Existing Test Lab

- a. On a stand rotational basis, a laboratory shall begin a reference oil test no later than 125 days following the completion of the laboratory's previous reference oil test or after no more than 25 test starts in the laboratory, whichever comes first. During periods following a failed stand calibration, invalid or aborted test, a grace period of an additional 15 days or additional starts equal to two (2) times the number of currently calibrated stands in the laboratory (as of EOT on failing stand), whichever comes first, shall be permitted from the completion date of the last acceptable calibration test. A laboratory has the option of moving to the next stand in the rotation to maintain lab calibration, independent of its action on the failing stand.
- b. If not required to begin a reference oil test sooner, due to the above requirements, a stand shall begin a reference oil test no later than 365 days following the completion of the previous reference oil test on that stand.
- c. New test stands in an existing lab, and test stands in an existing test lab that have not run an acceptable reference in the past two years, may calibrate with one test provided Level 1 limit requirement is met. Otherwise a second test is required for calibration.
- d. For an existing test stand in an existing lab run one test
- e. Following an operationally valid reference oil calibration test, check the status of the control charts and follow the prescribed actions.

3. Reference Oil Assignment

Once a test stand has been accepted into the system, the TMC will assign reference oils for continuing calibration according to the following reference oil mix:

- 100% of the scheduled calibration tests are to be conducted on reference oils 434, 435 and 438 or subsequent approved reblends, on a rotational basis with approximately equal usage rates. If possible, the same oil should not be used for successive calibration tests in the same stand.

4. Chart Status

The following are the steps that must be taken in the case of exceeding chart limits. The steps are listed in order of priority, although charts should be studied simultaneously to determine the cause(s) of a problem. In the case of multiple alarms, contact the TMC for guidance. The laboratory always has the option of removing any stand from the system.

a. Shewhart Chart of Prediction Error (e_i) for **prediction error monitoring parameters only**

- Level 3
 - Immediately conduct one additional reference test. Do not update the control charts for the lab until the follow up reference test is completed and the Excessive Influence analysis, per Section 4.c (below), has been performed.
- Level 2
 - Reduce the number of tests allowed in the calibration period to 125 days or 20 tests.
- Level 1
 - The level 1 limit applies in situations that have been pre-determined by the surveillance panel to have a potential impact on test results. These situations may include the introduction of new critical parts, fuel batches, reference oil reblends, or other test components. When these conditions have been met and a level 1 alarm is triggered, immediately conduct one additional reference test in the stand that triggered the alarm.
 - The level 1 limit also applies to a stand in an existing test lab that has skipped its sequence in the reference rotation. The stand can calibrate with one test if the level 1 limits are not exceeded. Otherwise, immediately conduct another reference test in the stand.
 - The Level 1 limit is used to judge the first reference test conducted in the stand unless otherwise dictated by the surveillance panel. Additional reference tests will be judged against the normal reference acceptance limits.

b. Reference entity EWMA of Standardized Test Result (Z_i) for **all parameters**

- Level 2
 - Immediately conduct one additional reference test either
 - in the stand that triggered the alarm, or
 - in the stand that is next due for calibration.
 - The stand that triggered the alarm is not calibrated for non-reference testing without further reference testing.

- Level 1
 - The level 1 limit applies to all reference tests that are control charted, even when other alarms have been triggered. Level 1 uses Z_i to determine the laboratory severity adjustment (SA). Calculate the laboratory SA for each parameter as follows and confirm the calculation with the TMC:

$$SA = -Z_i \times s_{SA}$$

where s_{SA} = industry approved severity adjustment standard deviation

c. Excessive influence (ExI) Analysis for **prediction error monitoring parameters only**

- The ExI analysis is performed anytime that a lab e_i level 3 alarm is triggered. As prescribed in Section 4.a, Level 3, a follow up reference test is run. The following comparisons then determine whether the value of Y_i is modified to limit its influence on LTMS. Y_{i+1} is the next completed reference in the laboratory after the level 3 alarm
 - i) If $|Y_i - Y_{i+1}| \leq e_i$ level 3 limit, then Y_i is equal to the value originally determined.
 - ii) If $Y_i > Z_{i-1}$ and $Y_i - Y_{i+1} > e_i$ level 3 limit, then let $Y_i = e_i$ level 3 limit + Z_{i-1} .
 - iii) If $Y_i \leq Z_{i-1}$ and $Y_i - Y_{i+1} < -e_i$ level 3 limit, then let $Y_i = -e_i$ level 3 limit + Z_{i-1} .
 - iv) If none of i), ii), or iii) is true, then Y_i is equal to the value originally determined.

Where: i = test that originally triggered level 3 alarm,
 $i-1$ = test prior to alarm trigger, and
 $i+1$ = test immediately following alarm trigger.

Once the proper Y_i value has been determined, update the charts. Confirm calculations with the TMC. The laboratory and the TMC maintain a record of the modification.

d. Industry EWMA of Standardized Test Result (Z_i) for **all parameters**

- Level 2
 - TMC informs the surveillance panel that the limit has been exceeded. The surveillance panel then investigates and pursues resolution of the alarm.
- Level 1
 - The TMC investigates whether severity adjustments are adequately addressing the trend, investigates the possible causes, and communicates as appropriate with industry.

DRAFT

TMC COMPENDIUM PORTION

The following are the specific Sequence IIIG calibration test requirements.

A. Reference Oils and Parameters

The prediction error monitoring parameters are Percent Viscosity Increase (PVIS), Weighted Piston Deposits (WPD and Average Camshaft plus Lifter Wear (ACLW). The reference oils required for test stand and test laboratory calibration are reference oils accepted by the ASTM Sequence III Surveillance Panel. The standard deviations for the current reference oils for each parameter are presented below.

PERCENT VISCOSITY INCREASE

Unit of Measure: LN(PVIS)

PREDICTION ERROR MONITORING and SEVERITY ADJUSTMENT PARAMETER

Reference Oil	Standard Deviation
434	0.3859
435	0.3096
438	0.1768

WEIGHTED PISTON DEPOSITS

Unit of Measure: Merits

PREDICTION ERROR MONITORING and SEVERITY ADJUSTMENT PARAMETER

Reference Oil	Standard Deviation
434	0.96
435	0.58
438	0.33

AVERAGE CAM plus LIFTER WEAR

Unit of Measure: LN(ACLW)

PREDICTION ERROR MONITORING and SEVERITY ADJUSTMENT PARAMETER

Reference Oil	Standard Deviation
434	0.1933
435	0.2342
438	0.2082

B. Acceptance Criteria

Adjustment (Z_i) and Monitoring (e_i) Charts

The constants used for the construction of the control charts for the Sequence IIIG, and the adjustment and monitoring chart limits, are shown below.

Laboratory Shewhart Limits for Prediction Error Monitoring Parameters

Shewhart Chart of Prediction Error $e_i = Y_i - Z_{i-1}$			
Limit Type	PVIS	WPD	ACLW
Level 3	2.066	2.066	
Level 2	1.734	1.734	
Level 1	1.351	1.351	

Laboratory EWMA Limits for Each Severity Adjustment Parameter

EWMA of Standardized Test Result $Z_i = \lambda(Y_i) + (1 - \lambda)Z_{i-1}$				
Limit Type	λ	PVIS	WPD	ACLW
Level 2 Upper Limit	0.2	2.0	2.0	2.0
Level 2 Lower Limit	0.2	-2.0	-1.5	N/A
Level 1	0.2	0	0	0

Severity Adjustment Standard Deviation for Each Severity Adjustment Parameter

Severity Adjustment Parameter	Severity Adjustment Standard Deviation: s_{SA}
PVIS	0.2919
WPD	0.60
ACLW	0.1903

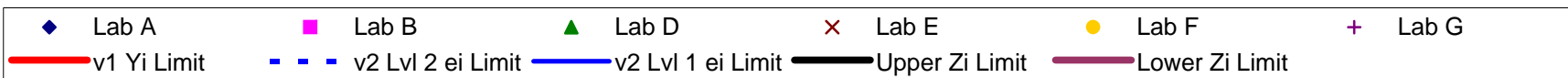
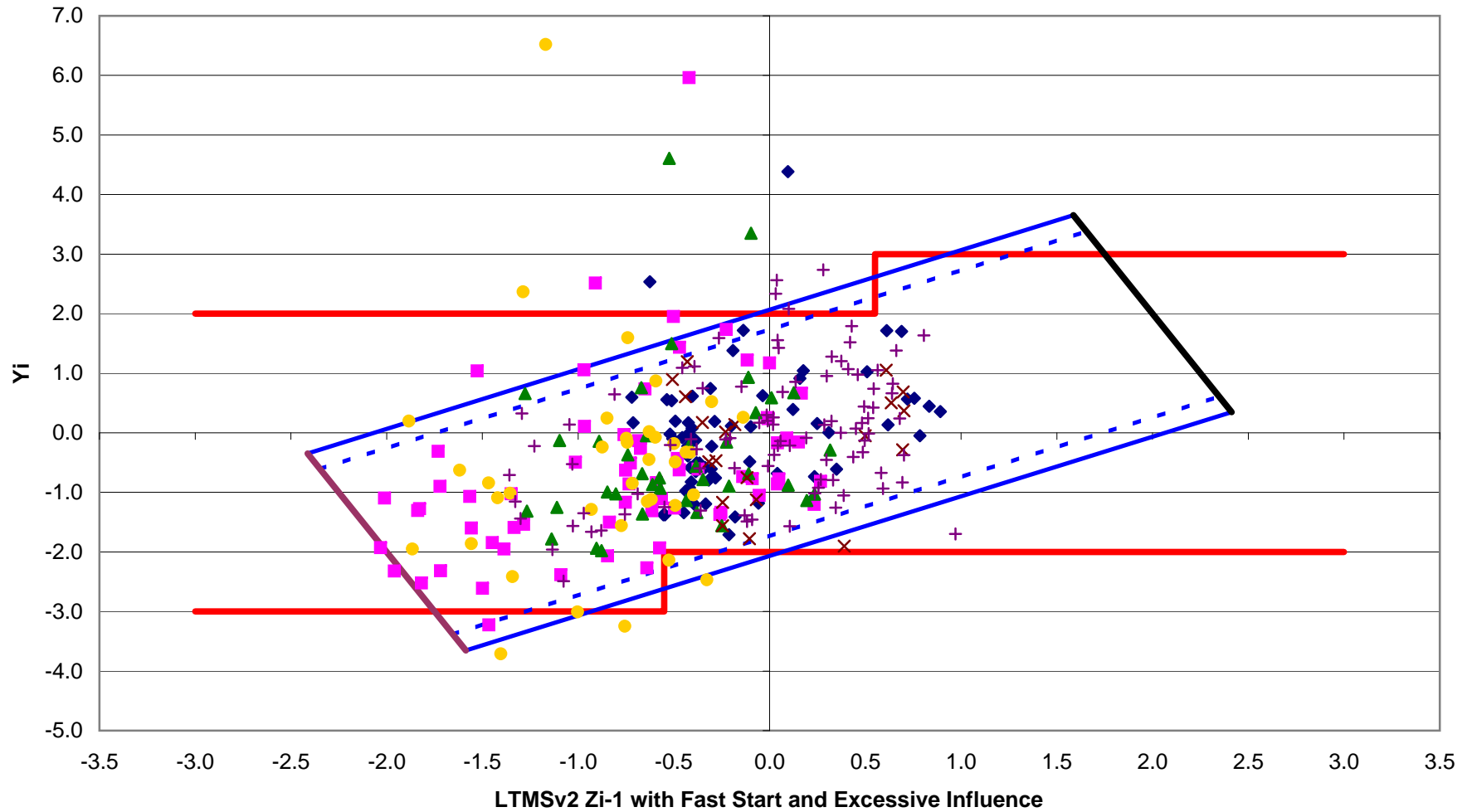
Industry EWMA Limits for Each Severity Adjustment Parameter

EWMA of Standardized Test Result $Z_i = \lambda(Y_i) + (1 - \lambda)Z_{i-1}$		
Limit Type	λ	Limit
Level 2	0.2	± 0.960
Level 1	0.2	± 0.747

Attachment 5

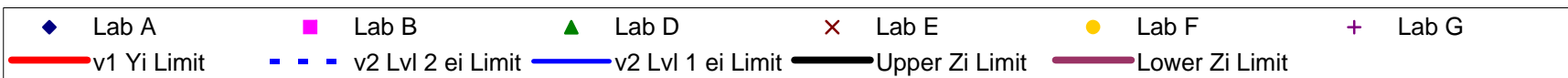
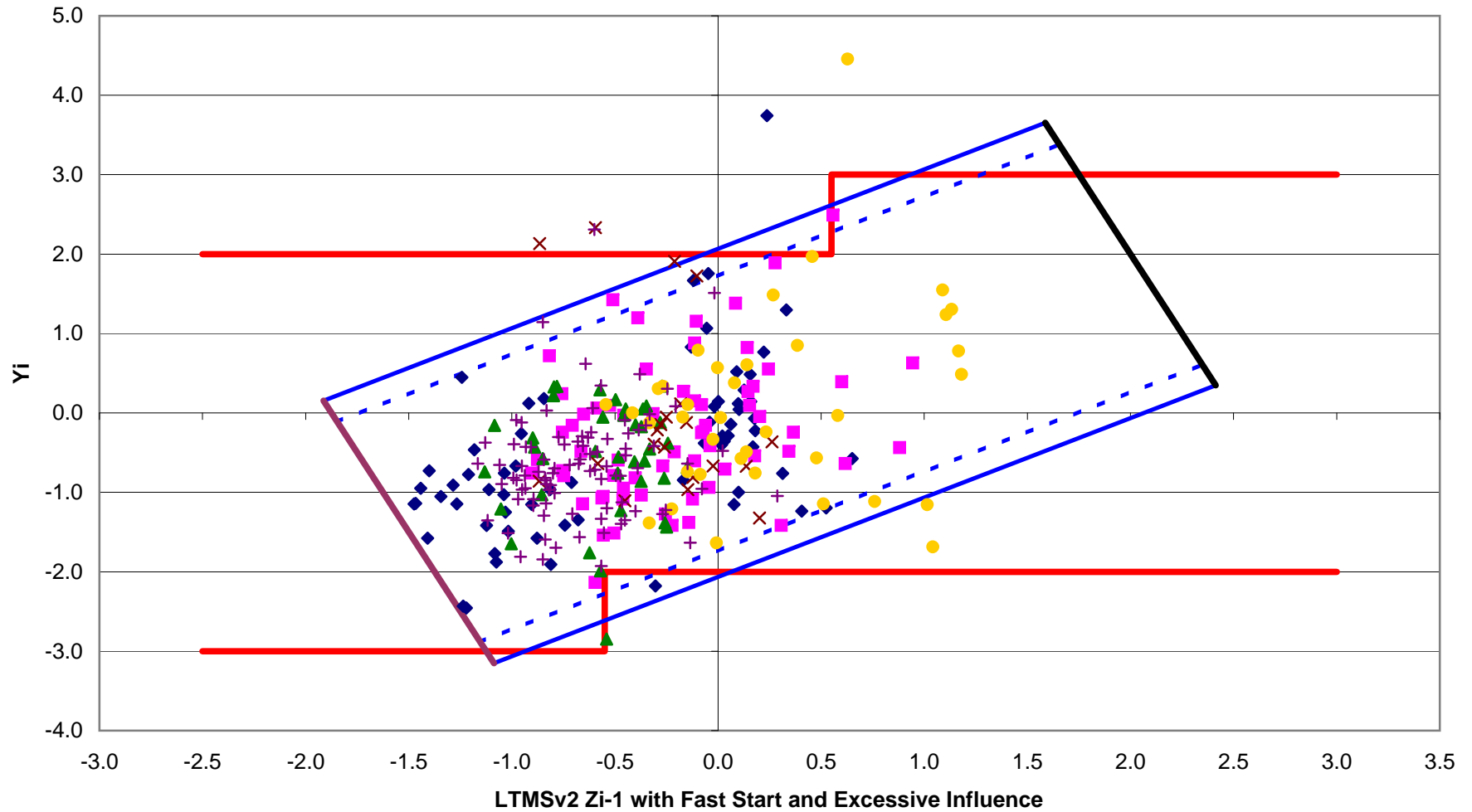
Sequence IIIG PVIS Effective Yi Limits for LTMSv2

for ei limits of 1.734 and 2.066 and Zi limits of -2.00 and +2.00



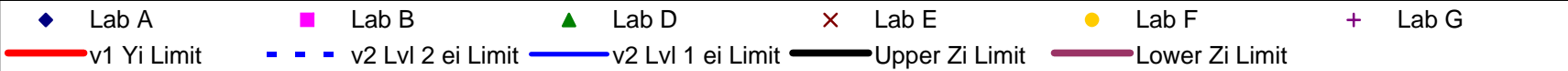
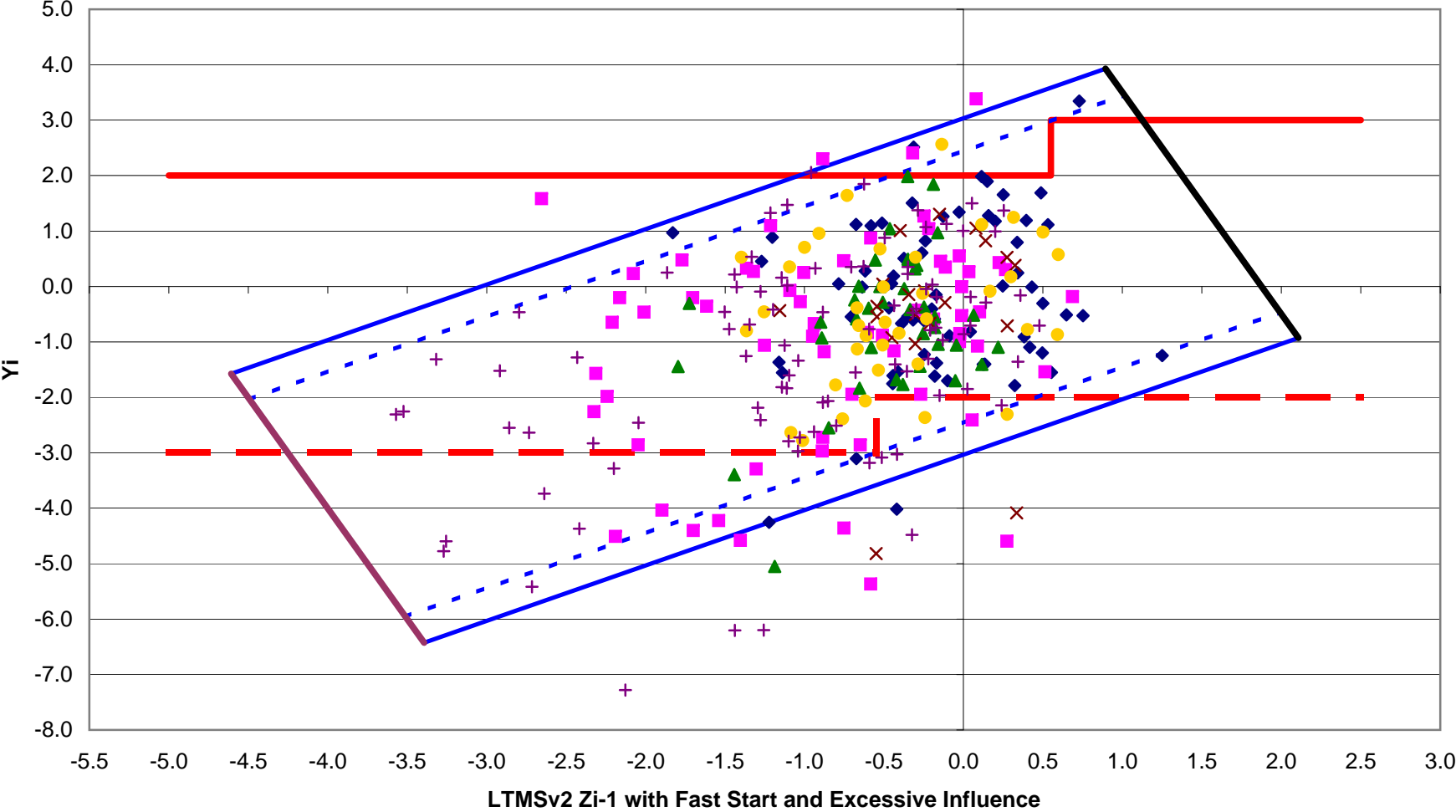
Sequence IIIG WPD Effective Yi Limits for LTMSv2

for ei limits of 1.734 and 2.066 and Zi limits of -1.50 and +2.00

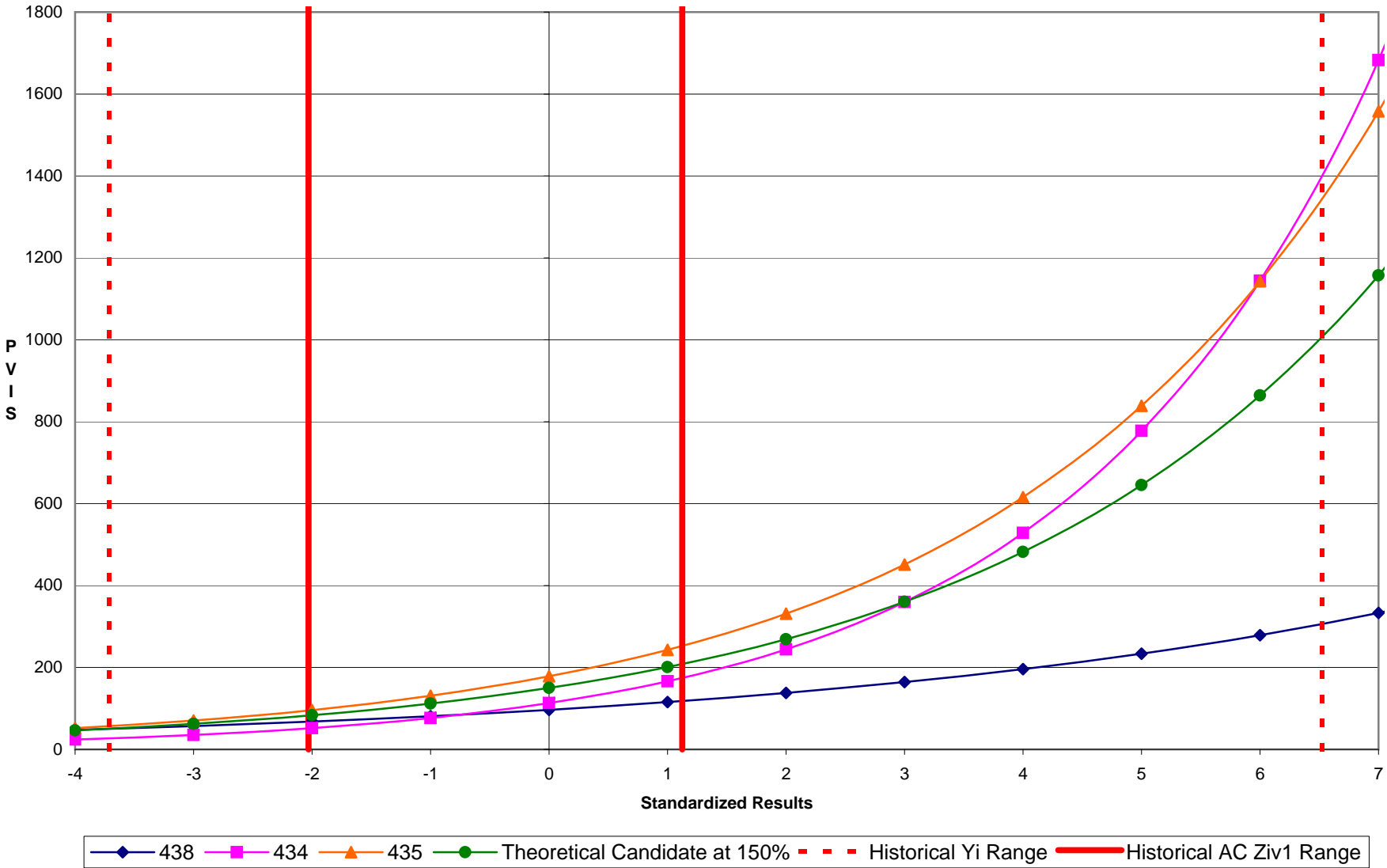


Sequence IIIG ACLW Effective Yi Limits for LTMSv2

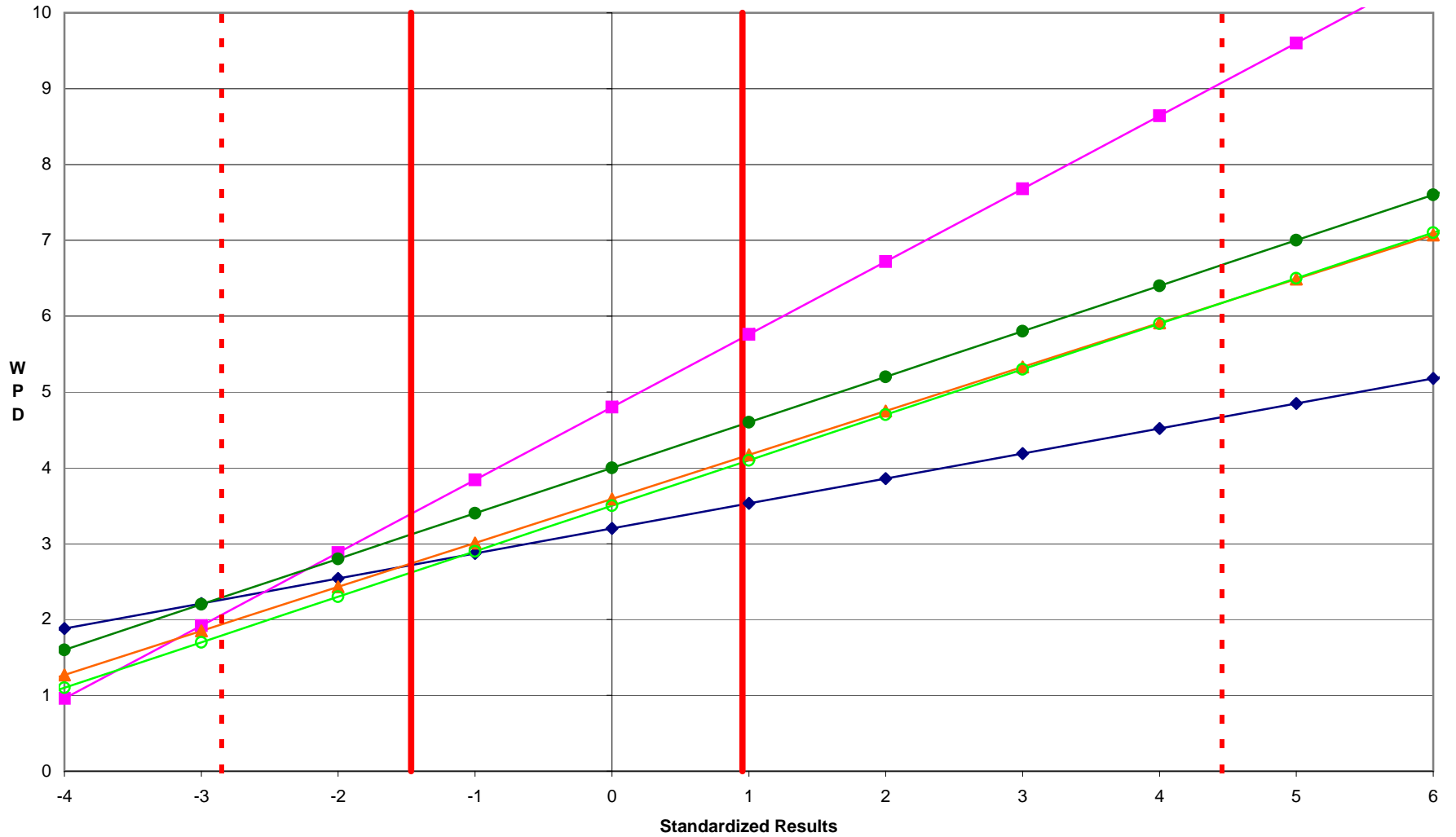
for ei limits of 2.452 and 3.034 and Zi limits of -4.00 and +1.50



Sequence IIIG PVIS Measured vs. Standardized Results

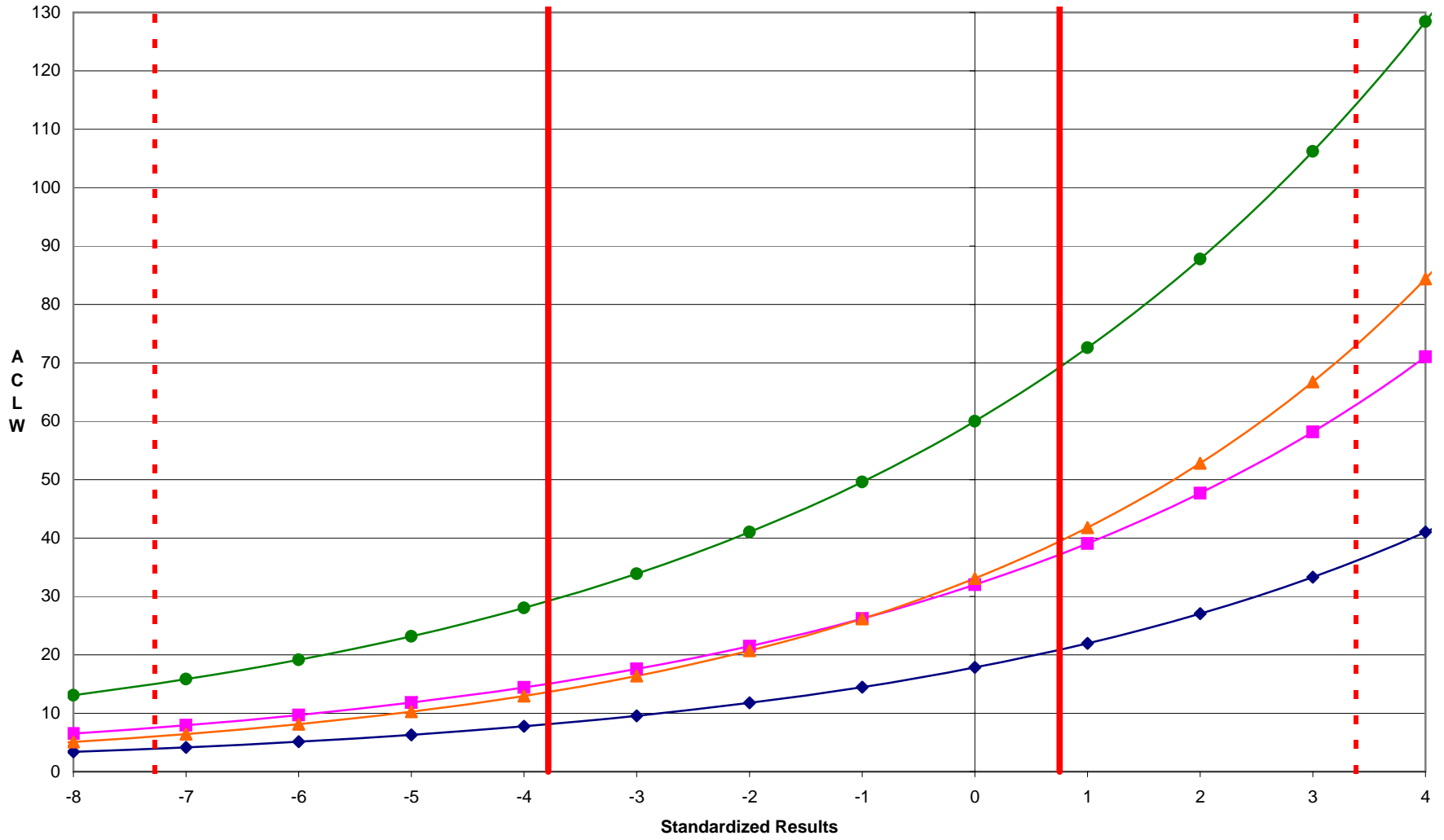


Sequence IIIG WPD Measured vs. Standardized Results



◆ 438
 ■ 434
 ▲ 435
 ● Theoretical Candidate at 4.0
 ○ Theoretical Candidate at 3.5
 | Historical Yi Range
 | Historical AC Ziv1 Range

Sequence III G ACLW Measured vs. Standardized Results



◆ 438 ■ 434 ▲ 435 ● Theoretical Candidate at 60 - - - Historical YI Range - - - Historical AC Ziv1 Range

Attachment 6

C30-PHT-731
Sunnen Honing Brush Comparison

Original Pattern



Current Pattern



SN 2 / ~170 Filaments



SN 3 / ~171 Filaments



SN 4 / ~170 Filaments



SN 5 / ~167 Filaments



SN 6 / ~171 Filaments



SN 7 / ~175 Filaments



SN 8 / ~170 Filaments



Note: Filament color enhanced. Actual color same as past material.

SN 9 / ~171 Filaments



SN 10 / ~167 Filaments



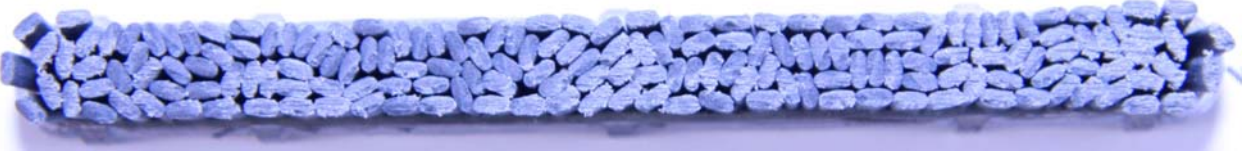
SN 11 / ~166 Filaments



SN 12 / ~164 Filaments



SN 13 / ~170 Filaments



SN 14 / ~170 Filaments



SN 15 / ~172 Filaments



Note: Filament color enhanced. Actual color same as past material.

SN 16 / ~170 Filaments



SN 17 / ~170 Filaments



SN 18 / ~167 Filaments



SN 19 / ~171 Filaments



SN 20 / ~170 Filaments



SN 21 / ~169 Filaments



SN 22 / ~173 Filaments



Note: Filament color enhanced. Actual color same as past material.

SN 23 / ~170 Filaments



SN 24 / ~171 Filaments



SN 25 / ~172 Filaments



Note: Filament color enhanced. Actual color same as past material.

Attachment 7

SEQUENCE III SURVEILLANCE PANEL

CRITICAL HARDWARE REJECTION REPORT

DATE PREPARED: 1/17/2010

REPORTING PERIOD: 5/7/2010-1/19/2011

ITEM	DESCRIPTION	REASON REJECTED	QTY	REPLACED	DATE REPLACED
OHT3F-008-8	CAMSHAFT, SPECIAL TEST, IIIG	RECALLED/THRUST DIMENSION	1	YES	7/13/2010
OHT3F-008-8	CAMSHAFT, SPECIAL TEST, IIIG	RECALLED/THRUST DIMENSION	2	YES	7/23/2010
OHT3F-008-8	CAMSHAFT, SPECIAL TEST, IIIG	RECALLED/THRUST DIMENSION	2	YES	11/9/2010
OHT3F-011-2	PLATE, CAMSHAFT THRUST	CRACKED UPON INSTALLATION	6	YES	10/5/2010
3G052-SECOND6	SECOND RING (6TH RUN), IIIG	GAP	4	YES	9/24/2010
OHT3F-053-1	PISTON, GRADE 12	SKIRT DIAMETER (UNDERSIZE)	1	YES	7/6/2010
OHT3F-055-1	PISTON, GRADE 56	SKIRT DIAMETER (UNDERSIZE)	1	YES	10/4/2010



Attachment 8

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 tests documented in ASTM Standard D6984 as update by the Information Letter System. The Sequence III Surveillance Panel is also responsible for the surveillance and continual improvement of the Sequence IIIG, IIIGA and IIIGB tests documented in ASTM Standard D7320 as updated by the Information Letter System. Data on test precision 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, the Central Parts Distributor, Fuel Supplier, ASTM B0.01 Passenger Car Engine Oil Classification Panel, ASTM Committee B0.01, ACC Monitoring Agency and ASTM Deposit/Distress Workshop. 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. This process will provide the best possible Sequence III Type Test Procedure for evaluating engine oil performance with respect to it's ability to prevent oil thickening, varnish formation, oil consumption and engine wear.

OBJECTIVES

TARGET DATE

Plan and conduct unified engine build forum

2011

Monitor industry hardware inventory

Ongoing

Determine root cause of ACLW severity shift

Ongoing

David L. Glaenzer, Chairman
Sequence III Surveillance Panel

Updated 01/19/2011
San Antonio, TX USA