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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Originally Issued: June 10, 2009
Revised: June 17, 2009
Action Item 1 Revised
Attachment 10 Added

Reply to: Frank Farber
ASTM Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206
Phone: 412-365-1030
Fax: 412-365-1047
Email: fmf@astmtmc.cmu.edu

Unapproved Minutes of the May 5, 2009 Sequence III Surveillance Panel Meeting held in Warren, MI

The meeting was called to order at 1:00 pm by Chairman Dave Glaenzer. A membership list (Attachment 1) was circulated for members & guests to sign in.

Agenda Review
Bill Buscher is Action & Motion recorder.

Sequence III Meeting Minutes
May 5, 2009
Warren, MI

The Agenda was accepted as shown on Attachment 2.

Membership Review: No Changes

Several members called in via telephone: Jo Martinez, Adam Bowden, Tim Miranda and Chris Castanien

Meeting Minute Status

The November 13, 2008 meeting minutes were approved by the surveillance panel.

Review of Action Items from Last Meeting

1. Action Item – Will look for some assistance from ILSAC chair to acquire additional reference oils meeting the Surveillance Panel's objectives (GF-5 capable oil).

No new reference oils have been offered at this time. Jim Linden has however discussed this item with a few suppliers.

2. Action Item – Labs to be sure to report all rejected parts back to OHT and GM Raceshop. Pay close attention to the camshaft thrust plate.

Ongoing.

3. Action Item – Labs to inspect cylinder heads for a casting flaw that result in port-to-port leakage. GM to supply casting identification information to the labs for the cylinder head casting batch in question. Any rejected parts should be returned to GM Raceshop.

Ongoing.

4. Action Item – GM to report to the Surveillance Panel on a semi-annual basis the remaining quantities of the GM Raceshop build-out parts.

Ongoing.

5. Motion – When a lab receives a report that a quarterly fuel sample is out of spec, they should provide an additional sample, if available, for repeat analysis.

6. Action Item – Labs to evaluate the AFR task force's proposed AFR calibration process over the next six months, or sooner, for a follow-up Surveillance Panel discussion.

Charlie Leverett requested a task force be formed to continue the discussion on AFR sensor calibration.

7. Action Item – Chairman to summarize concerns of the Sequence III Surveillance Panel for LTMS task force to consider.

Done.

8. Action Item – Surveillance Panel and LTMS task force to review Sequence III LTMS lab to lab differences at the January 2009 LTMS task force meeting.

Done.

9. Action Item – Charlie Leverett and Sid Clark will locate the Sunnen honing machine dynamometer and coordinate another honing machine load calibration round robin.

Personnel changes at Sunnen have delayed this action until after June 2009.

10. Action Item – Chairman will evaluate a honing machine load calibration procedure for inclusion into the Sequence III test procedures.

Personnel changes at Sunnen have delayed this action until after June 2009.

11. Action Item – Chairman to schedule a firm date and location for the unified engine build and report by December 1, 2008.

Greg Seaman (LZ) volunteered to lead Unified Engine Build - target date is August @LZ. Parts are being supplied by OHT. First run blocks are to be used. Build evaluation is to be done with 434-1. OHT is to supply notes on previous builds to be used as guidelines for the new build. Subsequent to this meeting, Lubrizol management determined that they could not host the UEB. As a result, no UEB has been scheduled at the time of these minutes.

12. Action Item – Todd Dvorak to analyze available EEE fuel data, from Haltermann and the labs, to see if trends can be identified and determine if further action/investigation is possible.

Todd presented information at this meeting.

13. Action Item – Labs to obtain fuel samples from their tanks just prior to switching from an old shipment/batch to a new shipment/batch of EEE fuel. Samples to be sent to Haltermann for analysis.

Ongoing.

14. Action Item – Findings and conclusions from the above action items will be reported to the test fuel task force for review.

15. Action Item – Effective, November 13, 2008, a Sequence IIIGB report is to be submitted to the TMC when a Sequence IIIG reference test is conducted.

Done.

16. Action Item – Labs to closely inspect cylinder block freeze plugs for leaks.

Done.

17. Motion – Accept the use of the aftermarket oil pan gasket, OHT p/n OHT3G-093-2, as a replacement gasket.

Done.

18. Motion – All Sequence IIIF/G tests run to completion should report all data, no matter what the reported validity is. Descriptive comments to be included for all reported invalid tests.

Ongoing.

19. Motion – Issue an information letter to include the approved Snap-on replacement torque wrench in the Sequence III test procedures.

Done, covered in Information Letter 08-3.

CPD Report

Jason Bowden presented Attachment 3 as the CPD report

GM Motorsports Report

Attachment 4. The Chairman will survey the labs to determine current part supply and usage.

IIIF/IIIG TMC Test Status

The complete TMC reports are posted to the TMC website. www.astmtmc.cmu.edu

IIIG Industry Severity Summary			
Parameter	Average Δ/s	Average Δ, in reported units	Direction
PVIS	0.181	18.4 % Viscosity Increase[1]	On Target - Severe
WPD	-0.940	-0.28 Merits	Severe
ACLW	-0.233	-3.9 µm[2]	On Target to Mild
MRV[3]	-0.565	N/A (no appropriate baseline)[4]	Mild
PHOS[5]	-0.193	N/A (no appropriate baseline)[6]	On Target

[1] At the GF-4 Pass Limit of 150% Viscosity Increase
[2] At the GF-4 Pass Limit of 60µm
[3] Sequence IIIGA Test Parameter only; Reference Oil 435 data excluded from calculations
[4] MRV does not have a specific GF-4 Pass Limit; Pass Limit is lack of Yield Stress.
[5] Sequence IIIGB Test Parameter only
[6] PHOS does not have a specific GF-4 Pass Limit, will be included in GF-5

Sequence III Meeting Minutes
May 5, 2009
Warren, MI

IIIF Industry Severity Summary			
Parameter	Average Δ/s	Average Δ, in reported units	Direction
PVIS	-0.645	105% Viscosity Increase[1]	Severe
APV	0.619	0.09 Merits	Mild
WPD	-1.317	-0.25 Merits	Severe
PV60[2]	0.813	49.3 % Viscosity Increase[3]	Severe

[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.

When Δ/s is in **RED Italic** the shift is significant!

Sequence IIIG oil 434-1 targets will need to be generated once more data is received.

ExxonMobil WPD Severity Concern Presentation
Bill Maxwell from ExxonMobil presented Attachment 5 discussing WPD severity. Pat Lang volunteered to head a WPD Task Force to investigate the WPD trend further.

Candidate Activity Reports
Reports have been posted to the ACC Monitoring Agency website (https://acc-ma.org). No report review occurred at the meeting.

Fuel Supplier Report
Jim Carter presented the latest fuel batch analysis summaries (Attachment 6).

IIIG WPD & Fuel Property Analysis Report
Todd Dvorak presented Attachment 7. No one fuel parameter stood out as having a strong overall effect on WPD. Some concern was expressed at the change in octane number. Currently, motoring octane is a monitor only parameter. Jim Carter was going to investigate and report back to the panel at the next meeting. Todd was going to procure additional fuel data from the TMC and review prior to the next meeting.

New Business

Jason Bowden presented OHT's findings in regard to "worm-holing" of Pro Tec 107 oil filter media (Attachment 8). Lubrizol has seen several tests at this point where "worm holing" has been present. Southwest Research has not seen any indication of "worm holing" in tests run to date. Every other lab indicated a handful of instances. Oil filter storage procedures do not seem to have an impact on the effect. The panel requested that laboratories identify reference tests run on Batch Code 4 oil filters (last 4 years) that exhibit signs of 'worm holing'. The TMC is to supply a spreadsheet format for reporting Δp values, ICP data, etc. (see above motion). This data is to be supplied by May 31st. Oil filters are not to be changed during a test because of indications of "worm holing".

Sequence III Meeting Minutes
May 5, 2009
Warren, MI

Sequence IIIGB Phosphorus Data Analysis

Doyle Boese presented Attachment 9. No action taken.

Sequence IIIGB ACC template

Doyle Boese presented . No action taken.

Scope & Objectives

THE ASTM SEQUENCE III SURVEILLANCE PANEL

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 D6984-05 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**
Solicit reference oils for GF-5 testing	**November 2009**
Plan and conduct unified engine build	**August 2009**
Initiate updated control and verification of AFR	**November 2009**
Investigate source of WPD severity	**Ongoing**
Monitor industry hardware inventory	**Ongoing**

David L. Glaenzer, Chairman **Updated 05/05/2009**

The meeting was adjourned at 5:48 pm.

Sequence IIIF/G Surveillance Panel
May 5, 2009
1:00PM – 5:00PM
GM Technical Center
Warren, MI

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

1. Action Item – Labs to continue evaluate the AFR task force's proposed AFR calibration process. Greg Seman will recommend a calibration period for the new AFR strategy.

2. Action Item – Chairman to follow up with Sunnen and the labs on the status of the honing machine load calibration round robin.

3. Action Item – Greg Seman to send out details for the upcoming unified engine build, which will be hosted by Lubrizol.

4. Action Item – Todd Dvorak to conduct one additional analysis on EEE fuel data and report back to the surveillance panel.

5. Action Item – Chairman to start conducting semi-annual hardware surveys to inventory hardware on-hand at the labs and at the CPDs to evaluate when the IIIF and IIIG tests will become unavailable, due to hardware unavailability.

6. Action Item – Haltermann to investigate the possibility of tightening some of the specifications for the EEE fuel.

7. Motion – Form a Sequence III WPD severity task force to investigate severe severity trends observed at the industry level for both the IIIF and IIIG tests. Pat Lang to be the chairman of the task force.

   Bill Maxwell / Pat Lang / Passed Unanimously

8. Action Item – Once 8 operationally valid reference tests are available on reference oil 434-1, a surveillance panel conference call will be scheduled to discuss the plan to move forward on setting targets.

9. Action Item – Labs to provide oil pressure delta data, viscosity data, ICP data and test hour of "worm hole" occurrence, for the applicable tests, to the TMC on reference oils, starting with tests using batch code 4 oil filters. The TMC will provide a format for reporting the data to the labs. Have all data reported by 6/1/09.

10. Action Item – OHT will contact the oil filter supplier to discuss the feasibility of providing an oil filter with 25μm synthetic filter media.

Attachment 1

ASTM Sequence III Surveillance Panel (18 Voting members) May 5, 2009

Name/Address	Phone/Fax/Email		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
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

Name/Address	Phone/Fax/Email		Signature
James Carter Haltermann Products 3520 Okemos Rd. Suite #6-176 Okemos, MI USA	517-347-3021 517-347-1024 jecarter@jhaltermann.com	Voting Member	Present
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
Timothy L. Caudill Ashland Oil Inc. 22nd & Front Streets Ashland, KY 41101 USA	606-329-1960 x5708 606-329-2044 tlcaudill@ashland.com	Voting Member	Present
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
Sid Clark Southwest Research 50481 Peggy Lane Chesterfiled, MI 48047 USA	586-873-1255 Sidney.L.Clark@sbcglobal.net	Non-Voting Member	Present
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

Name/Address	Phone/Fax/Email		Signature
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
Irwin L. Goldblatt Castrol Americas 240 Centennial Avenue Piscataway, NJ 08854-3910 USA	732-980-3606 973-686-4224 irwin.goldblatt@cnacm.com	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 RCG
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
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
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

ASTM Sequence III Surveillance Panel (18 Voting members) May 5, 2009

Name/Address	Phone/Fax/Email		Signature
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
Matt J. Snider GM Powertrain General Motors Corporation MC - 483-730-322 823 Joclyn Rd. Pontiac, MI 48090-9055 USA	248-672-3563 248-857-4441 mathew.j.snider@gm.com	Non-Voting Member	Present
Thomas Smith Valvoline P.O. Box 14000 Lexington, KY 40512-1400 USA	859-357-2766 859-357-7084 trsmith@ashland.com PCEOCP Chair	Voting Member	Present
Mark Sutherland Chevron Oronite Company LLC 4502 Centerview Drive Suite 210 San Antonio, TX 78228 USA	210-731-5621 210-731-5699 msut@chevrontexaco.com	Voting Member	Present

MIKE McMILLAN 586-877-9198 MMCMILLAN123 at COMCAST.NET
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DON SMOLENSKI 248-255-7892 donald.j.smolenski@gm.com
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Called in
Jo Martinez

Chris Castanien
Adam Bowden
Tim Miranda
Charlie Leverett

BILL L. MAXWELL 856-224-3220 BILL.L.MAXWELL@EXXONMOBIL.COM
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IRWIN GOLDBLATT 973-686-3306 irwin.goldblatt@bp.com
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Geo. Szappanos 440-347-2352 georgr-szappanos@lubrizol.com
Bob Olree 248-684-5078 olreeen@zero.net

Name/Address	Phone/Fax/Email		Signature
Ben O. Weber Southwest Research Institute 6220 Culebra Road P.O. Box 28510 San Antonio, TX 78228 USA	210-522-5911 210-684-7530 bweber@swri.edu **Sub-Committee D02.B01 Chair**	Non-Voting Member	Present
Joe Vujica The Lubrizol Corporation 29400 Lakeland Boulevard Wickliffe, OH 44092 USA	440-347-2058 440-347-4096 jsvu@lubrizol.com	Non-Voting Member	Present
Jerry Wang Chevron Oronite Company LLC 7080 Colchester Lane Ypsilanti, MI 48197	734-48- 3806 none jwdy@chevron.com	Non-Voting Member	Present
Jim Linden GM R!D 30500 Mound Rd Warren MI 48090	586-986-1888 JAMES.L.LINDEN@GM.COM	NON-VOTING	
Scott Stap GM Racing 5388 Hill 23 Drive Flint MI 48507	810-239-2672 Scott.Stap@Tgidirect.com		SS
Eric Johnson GM Powertrain Joslyn Rd Pontiac, MI	248-303-1913		SNJ
Jeff Kettman GM Racing 5388 Hill 23 Dr Flint, MI 48507	313-667-0493 jeff.kettman@gm.com		JKettman

Attachment 2

Sequence III Surveillance Panel

May 05, 2009
1:00pm
General Motors Research & Development
Warren, Michigan

1.0) Membership

1.1) Review sign in sheet for up-to-date information
1.2) Appointment of Action Item/Motion Recorder

2.0) Approval of minutes

2.1) Approval the minutes from.November 13, 2008 & February 11, 2003

3.0) Action Item Review

3.1) Action Item – 11/13/2008. Will look for some assistance from ILSAC chair to acquire additional reference oils meeting the Surveillance Panel's objectives (GF-5 capable oil). **Closed**, Jim Linden and Ron Romano representing ILSAC will carry request forward and contact oil companies.

3.2) Action Item – 11/13/2008. Labs to evaluate the AFR task force's proposed AFR calibration process over the next six months, or sooner, for a follow-up Surveillance Panel discussion. **Open**, agenda item for May, 2009 meeting.

3.3) Action Item – 11/13/2008. Chairman to summarize concerns of the Sequence III Surveillance Panel for LTMS task force to consider. **Done**, email to Dan Worcester 12/09/2008, copied SP.

3.4) Action Item – 11/13/2008. Surveillance Panel and LTMS task force to review Sequence III LTMS lab to lab differences at the January 2009 LTMS task force meeting. **Done**, nothing conclusive.

3.5) Action Item – 11/13/2008. Charlie Leverett and Sid Clark will locate the Sunnen honing machine dynamometer and coordinate another honing machine load calibration round robin. **Underway**, cutbacks at Sunnen have delayed work at some labs.

3.5) Action Item – 11/13/2008. Chairman to schedule a firm date and location for the unified engine build and report by December 1, 2008. **Open**, Chairman unable to schedule, Greg Seman has taken task.

3.6) Action Item – 11/13/2008. Todd Dvorak to analyze available EEE fuel data, from Haltermann and the labs, to see if trends can be identified and determine if further action/investigation is possible. **Underway**.

4.0) Semi-Annual Reports

4.1) Central Parts Distributor Report

4.2) GM Motorsports Report

4.3) Fuel Supplier Report

4.4) Test Monitoring Center Reports
D 6984 Sequence IIIF
D 7320 Sequence IIIG/IIIGA/IIIGB
Targets for 434-1

4.5) ACC Monitoring Agency Report

5.0) Old Business

5.1) Define mechanism for setting targets for re-blends of reference oils.

5.2) Sunnen load meter calibration frequency to be defined following review of data from last round of calibrations.

5.3) Air-to-Fuel Ratio Control

5.4) Template for Acceptance of New Tests into ACC COP, Sequence IIIGB

6.0) New Business

6.1) Lab experiences with oil filter failures as measured by differential pressure across filter.

6.2) Lab experiences with oil cooler and coolant flow requirements

7.0) Scope and Objectives

8.0) Next Meeting

9.0) Meeting Adjourned

Attachment 3

CENTRAL PARTS DISTRIBUTOR REPORT
OH Technologies, Inc.
Sequence III Surveillance Panel Meeting
GM Research, Warren, MI
May 5, 2009

1) Rejections from 11/11/08 to 5/05/09:

ITEM	DESCRIPTION	REASON REJECTED	QTY	REPLACED	DATE REPLACED
OHT3F-008-6	CAMSHAFT, SPECIAL TEST, IIIF	RUST	3	YES	2/16/2009
OHT3F-008-8	CAMSHAFT, SPECIAL TEST, IIIG	KEYWAY DEFECT	1	YES	4/3/2009
2F028-09	BUSHING, CAM, POSITIONS 1 & 4	BURR ON CHAMFERED EDGE	2	YES	4/28/2009
3F042-02	BEARING ASSY, MAIN SET, OH 101	SHIPPING DAMAGE	2	YES	4/3/2009
OHT3F-055-1	PISTON, GRADE 56	CASTING FLAW	1	YES	3/10/2009
OHT3G-085-1	COVER, FRONT	CASTING FLAW	1	YES	2/19/2009
OHT3G-088-1	COVER, REAR	MACHINING DEFECT	1	YES	4/1/2009

2) Technical Memos Issued

12/11/08
Seq. III CPD Technical Memo 15
OHT3G-057-3 Filter, Oil BATCH CODE 5-Return material to OHT for exchange.

1/06/09
Seq. III CPD Technical Memo 16
OHT3F-028-2 Bushing, Rocker Cover, One Piece Design-Remove Roll Pin

3) Batch Code Changes

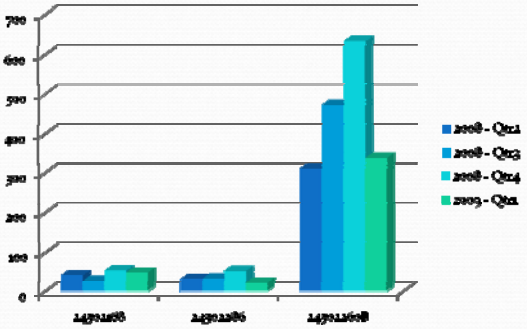
IIIF	Batch Code	Date Introduced	IIIG	Batch Code	Date Introduced
Oil Filter	BC 6	12/15/08	Oil Filter	BC 6	12/15/08
Arm, Rocker	BC 13	12/22/08	Arm, Rocker	BC 13	12/15/08
Piston Grade 56	BC 23	3/12/09	Piston Grade 56	BC 23	2/04/09
Oil Cooler Plating	081124	11/25/08	Oil Cooler Plating	081124	11/25/09
	081205	12/22/08		081205	12/15/08
	090129	2/04/09		090129	1/28/09
	090216	3/12/09		090216	3/06/09
Cam Bushing	BC 16	1/22/09	Cam Bushing	BC 16	1/16/09
Main Bearings	BC 15	3/18/09	Main Bearings	BC 15	3/12/09
Conn. Bearing	BC 17	3/31/09	Conn. Bearing	BC 17	3/31/09

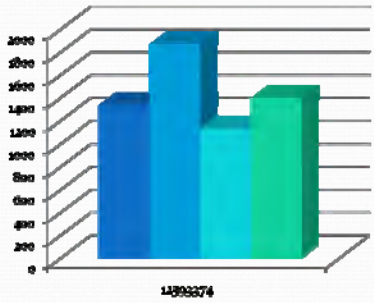
Attachment 4

Sales by Quarter

	Years	Order Date				
	2008			2009		Total
Offer ID	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	
12593374 Conn Rods	1270	1863	1126	1392	370	6021
24502168 Crankshaft	34	25	52	47	19	177
24502286 Cyl Case	26	31	51	21	18	147
24502260B Cyl Head	266	472	632	339	30	1739
Grand Total	1596	2391	1861	1799	437	8084

- 12593374 – Connecting Rods
- 24502168 – Crankshaft
- 24502286 – Cylinder Case (Block)
- 24502260B - Cylinder Head





Current Inventory

- 12593374 – Connecting Rods
  - 1608 in stock at GM Racing Warehouse
  - 24831 pcs finished in stock off site
- 24502168 – Crankshaft
  - 48 in stock at GM Racing Warehouse
  - 690 pcs finished in stock off site*
- 24502286 – Cylinder Case (Block)
  - 2 on hand at GM Racing Warehouse (9 on backorder)
  - 24 pcs expected in week of May 15th
  - 623 pcs unfinished in stock off site / 72 in process
- 24502260B - Cylinder Head
  - 10 on hand at GM Racing Warehouse*
  - 50 pcs expected in May 4th (received 5-5-09*)
  - 7638* pcs unfinished in stock off site / 190* in process

*Updated 5-8-09

ExxonMobil

Sequence III Surveillance Panel Meeting

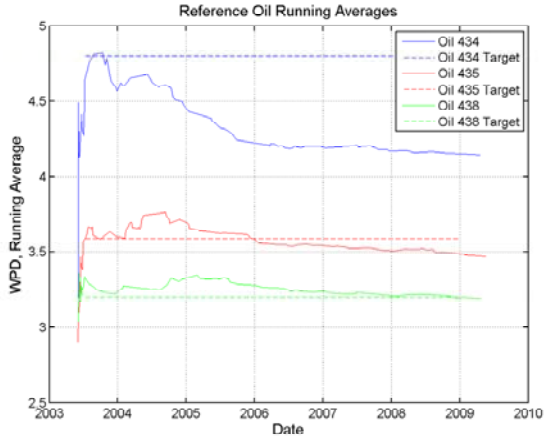
Warren, MI
May 5, 2009

Document #2009.1323

Sequence IIIG WPD Severity Concerns

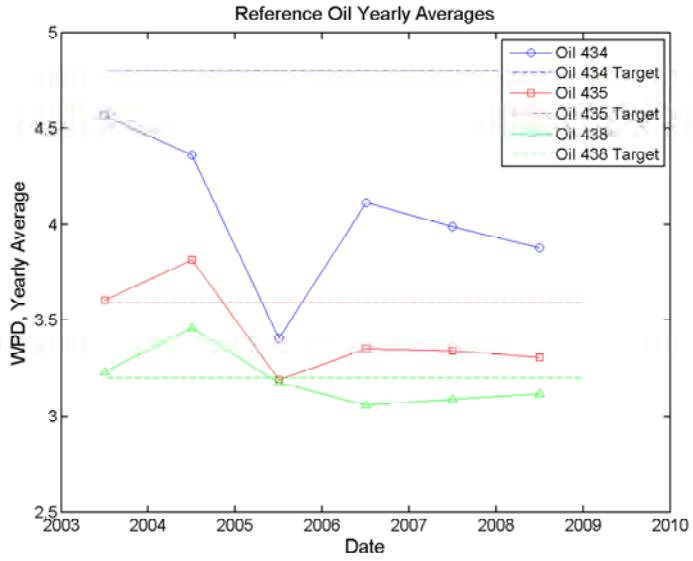
- Sequence IIIG piston cleanliness test originally developed for ILSAC GF-4 category.
- At the time of introduction, Sequence IIIG was not used to certify engine oils for any other performance specification, but has since been included in published and drafted specifications, demanding higher piston cleanliness performance
  - ILSAC GF-4: ≥ **3.5 WPD**
  - ILSAC GF-5 Draft: ≥ **4.5 WPD**
  - GM DEXOS-1: ≥ **4.5 WPD**
  - GM 4718M: ≥ **5.5 WPD**
- Current LTMS correction factors may adequately address engine oils near or below the **3.5 WPD** performance range, but the increase in use and scope of the Sequence IIIG means that the applicability of these correction factors may not be universally appropriate.

TMC Reference Oil Data

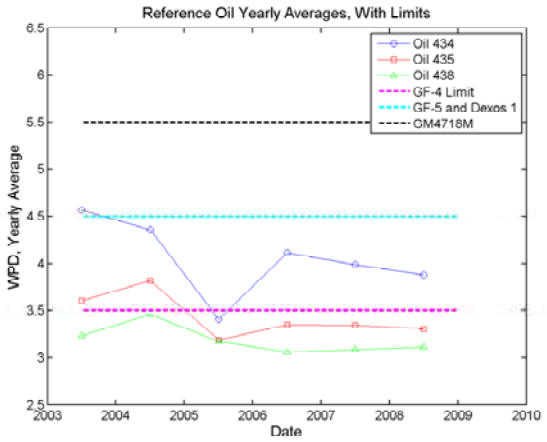


WPD of higher performing engine oils appear to respond more substantially than lower performing engine oils in response to test severity changes

TMC Reference Oil Data



TMC Reference Oil Data



Severity shifts could have more drastic effects as the Sequence IIIG is used for higher deposit performance specifications.

XOM Motion for Task Force Formation

- Given the background information provided in this presentation, ExxonMobil offers the following motion:

ExxonMobil moves for a task force to be formed within the Sequence III Surveillance Panel to investigate the potential need for a non-linear severity adjustment and/or correction factor strategy for Sequence IIIG weighted piston deposits, in parallel with the ongoing root cause investigation of the observed severity shift.

PRODUCT INFORMATION

Haltermann PRODUCTS

T (281) 457-2768 F (281) 457-1469

EEE-Lube Cert Gasoline -
Seq. III & VI -
HF0003 -

Batch No.:	XC2021LT10	XB0221LT10	WL0121LT10	XA3021LT10
TMO No.:	MTS	MTS	MTS	MTS
Tank No.:	110	T110	110	110
Date:	4/1/2009	3/2/2009	2/19/2009	1/30/2009

TEST	METHOD	UNITS	HALTERMANN Specs			RESULTS	RESULTS	RESULTS	RESULTS
			MIN	TARGET	MAX				
Distillation - IBP	ASTM D86	°C	23.9		35.0	30.4	30.1	30.8	30.2
5%		°C				42.4	44.3	45.0	44.0
10%		°C	48.9		57.2	50.3	52.2	53.1	52.0
20%		°C				62.7	64.7	65.8	64.7
30%		°C				76.5	78.2	79.1	78.0
40%		°C				94.1	93.6	93.6	93.0
50%		°C	93.3		110.0	106.2	104.7	104.3	104.0
60%		°C				112.9	111.2	110.8	110.3
70%		°C				119.8	117.6	117.4	116.8
80%		°C				132.4	128.6	128.0	127.4
90%		°C	151.7		162.8	159.6	157.1	156.3	156.1
95%		°C				167.0	166.3	165.7	166.2
Distillation - EP		°C			212.8	196.7	189.0	185.5	187.4
Recovery		vol %		Report		97.0	97.3	97.4	97.4
Residue		vol %		Report		1.0	1.1	1.1	1.1
Loss		vol %		Report		2.0	1.6	1.5	1.5
Gravity @ 60°F/60°F	ASTM D4052	°API	58.7		61.2	59.37	59.5	59.05	59.10
Density @ 15° C	ASTM D4052	kg/l	0.734		0.744	0.741	0.741	0.742	0.742
Reid Vapor Pressure	ASTM D5191	kPa	60.6		63.4	61.9	63.4	62.4	62.9
Carbon	ASTM D3343	wt fraction		Report		0.8642	0.8645	0.8647	0.8650
Carbon	ASTM E191	wt fraction		Report		0.8649	0.8614	0.8620	0.8621
Hydrogen	ASTM E191	wt fraction		Report		0.1326	0.1362	0.1361	0.1353
Hydrogen/Carbon ratio	ASTM E191	mole/mole		Report		1.826	1.884	1.881	1.870
Oxygen	ASTM D4815	wt %			0.05	<0.01	<0.01	<0.01	<0.01
Sulfur	ASTM D5453	mg/kg	3		15	3	3	4	5
Lead	ASTM D2622	wt%			2.6	<1.0	<1.0	<1.0	<2.6
Phosphorous	ASTM D3237	mg/l			1.3	<0.10	<0.10	<0.10	<0.02
Composition, aromatics	ASTM D1319	vol %	26.0		32.5	27.1	27.5	27.6	27.6
Composition, olefins	ASTM D1319	vol %			10.0	0.6	0.6	0.6	0.7
Composition, saturates	ASTM D1319	vol %		Report		72.3	72.0	71.8	71.7
Particulate matter	ASTM D5452	mg/l			1	0.8	0.5	0.6	0.6
Oxidation Stability	ASTM D525	minutes	1000			>1000	>1000	>1000	>1000
Copper Corrosion	ASTM D130				1	1a	1a	1a	1a
Gum content, washed	ASTM D381	mg/100mls			5.0	0.5	<0.5	<0.5	<0.5
Fuel Economy Numerator/C Density	ASTM E191		2401		2441	2428	2419	2423	2423
C Factor	ASTM E191			Report		1.0033	0.9982	0.9993	0.9990
Research Octane Number	ASTM D2699		96.0			97.4	97.9	98.0	97.7
Motor Octane Number	ASTM D2700			Report		89.1	89.4	89.5	89.2
Sensitivity			7.5			8.3	8.5	8.5	8.6
Net Heating Value, btu/lb	ASTM D3338	btu/lb		Report		18502	18494	18488	18488
Net Heating Value, btu/lb	ASTM D240	btu/lb		Report		18404	18442	18446	18450
Color	VISUAL	1.75 ptb		Red		Red	Red	Red	Red

IIIG WPD & Fuel Property Analysis

May 5, 2009

Todd Dvorak

Executive Summary

- **Partial Least Squares analysis suggests that the WPD test results have a stronger correlation with Oil, Lab, and Ring Batch factors than Fuel Property Parameters**
- **At the *p* = 0.10 threshold, Stepwise Regression results suggest that Lab, Oil, Fuel Age, Fuel Distillation, and MON factors have a statistically significant relationship with WPD.**

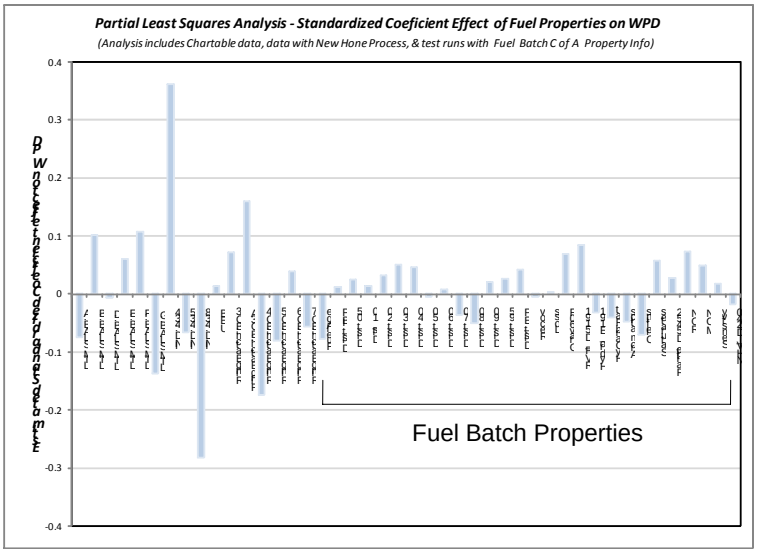
Afton CHEMICAL

A Passion for Solutions.

Analysis of WPD & Fuel Property Data

- **Data was analyzed with Partial Least Squares and Stepwise Regression analysis methods**
- **Data selected for analysis:**
  - **Chartable test runs with new honing process**
  - **IIIG WPD test runs with Certificate of Analysis (C of A) sheet for the identified fuel batch**
  - **Reference oils 434, 435, 438 (exclusively)**
  - **Tank storage: 1 lab above ground, 2nd lab - 1 of 3 tanks above ground, and others below ground. Thus, storage factor will not be included in analysis.**
- **Non fuel related parameters in analysis include Lab, Oil, and Ring Batch**
- **Fuel related parameters in analysis include fuel age, distillation, recovery, loss, gravity, RVP, aromatics, oelfins, saturates, particulates, RON, MON, sensitivity, and net heating value.**
- **Analysis summaries provided on following slides**

- **Partial Least Squares Analysis of IIIG Lab, Oil, Ring Batch, and Fuel Property Data:**
  - **PLS Summary: 3 Factors & 58.5% of the variation is accounted for in the model**
  - **Standardized coefficients suggest that Oil, Lab, and Ring Batch have a relatively larger effect on WPD as compared with fuel property parameters**



Stepwise Regression Analysis results of data (selection[1] $p = 0.10$):

- Standardized coefficients suggest that Oil & Lab have larger effect on WPD as compared with fuel property parameters
- Plots of significant fuel parameters shown on following slide.

The REG Procedure
Model: MODEL1
Dependent Variable: WPD

Number of Observations Read 174
Number of Observations Used 174

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	25.69934	3.21242	15.24	<.0001
Error	165	34.79120	0.21086		
Corrected Total	173	60.49054			

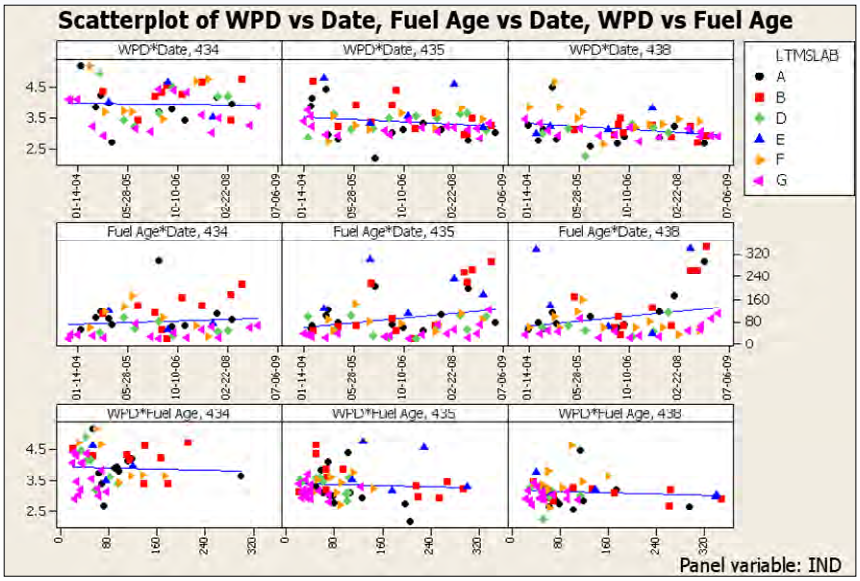
Root MSE	0.45919	R-Square	0.4248
Dependent Mean	3.47805	Adj R-Sq	0.3970
Coeff Var	13.20254		

Parameter Estimates

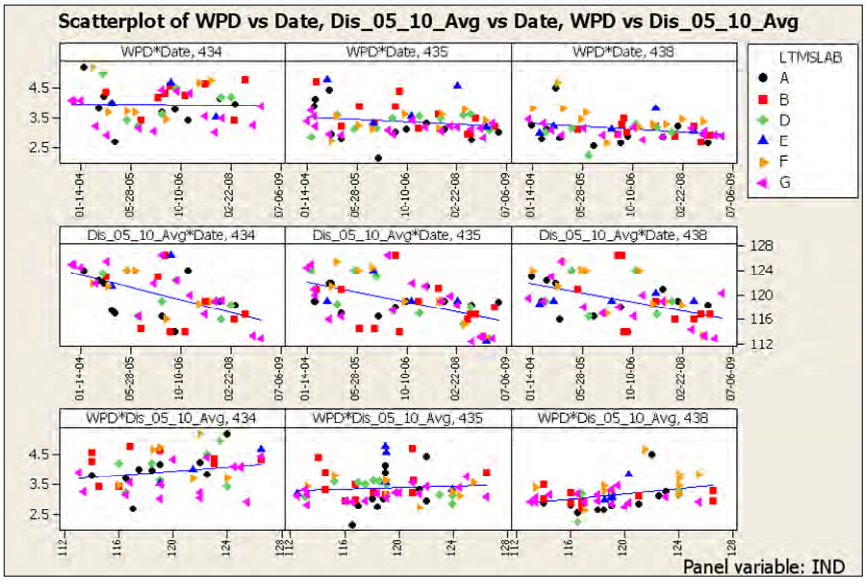
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
Intercept	1	-2.76444	7.23710	-0.38	0.7030	0
IND434	1	0.44345	0.05195	8.54	<.0001	0.59450
IND435	1	-0.10654	0.04897	-2.18	0.0310	-0.15174
LAB_F	1	0.13487	0.07002	1.93	0.0558	0.13196
LAB_G	1	-0.31702	0.06619	-4.79	<.0001	-0.35658
FuelAge	1	-0.00150	0.00057276	-2.63	0.0094	-0.17803
DIS_05_10_AVG	1	0.02733	0.00995	2.75	0.0067	0.17008
DIS_80_90_AVG	1	-0.02819	0.01253	-2.25	0.0258	-0.13823
MON	1	0.12958	0.07828	1.66	0.0998	0.10238

(Note 1: Stepwise summary with p = 0.15 Summarized in Appendix A.)

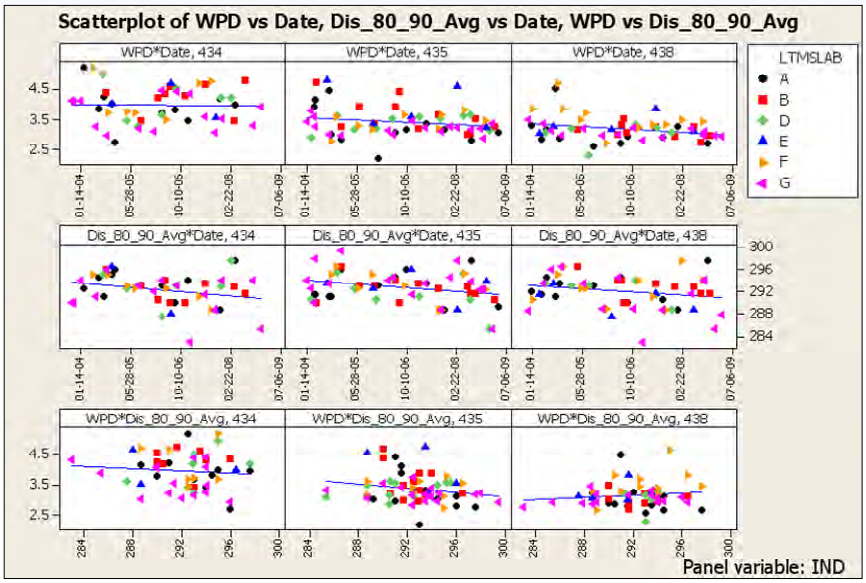
Fuel Age & WPD Plot by Reference Oil:



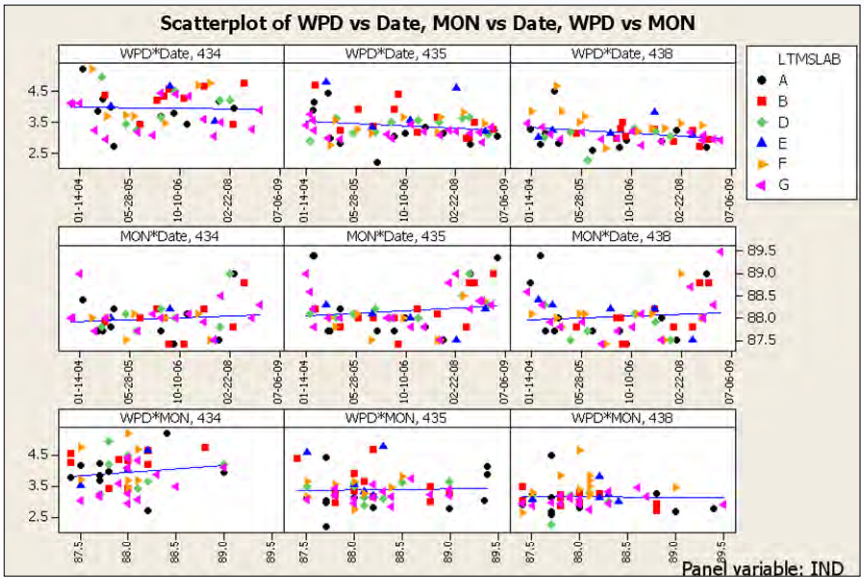
Fuel Dist_05_10_Avg & WPD Plot by Reference Oil:



Fuel Dist_80_90_Avg & WPD Plot by Reference Oil:



Fuel MON & WPD Plot by Reference Oil:



Appendix A

Stepwise Regression Analysis Results with *p* = 0.15

Stepwise Regression Analysis results of data (selection p = 0.15):

The REG Procedure
Model: MODEL1
Dependent Variable: WPD

Number of Observations Read 174
Number of Observations Used 174

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	27.10445	2.46404	11.96	<.0001
Error	162	33.38609	0.20609		
Corrected Total	173	60.49054			

Root MSE	0.45397	R-Square	0.4481
Dependent Mean	3.47805	Adj R-Sq	0.4106
Coeff Var	13.05239		

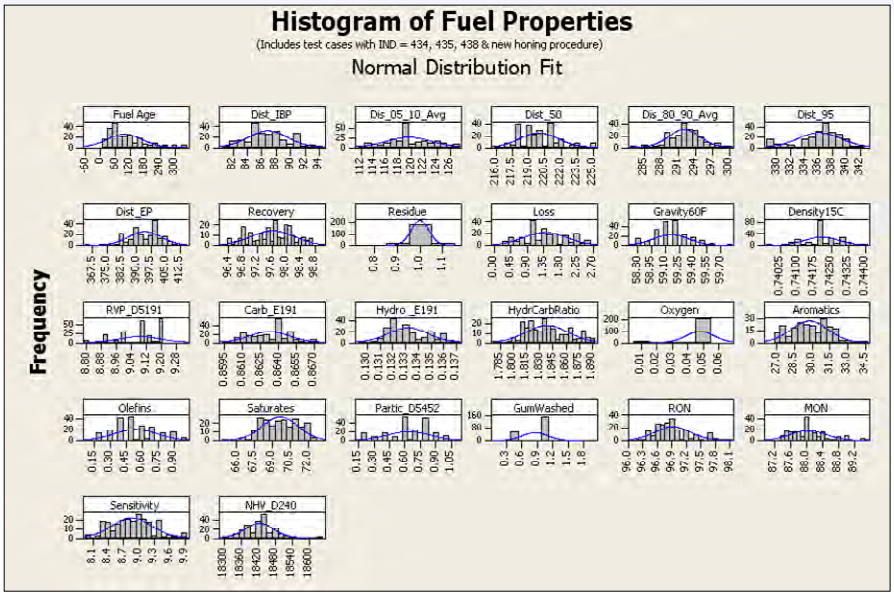
Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|	Standardized Estimate
Intercept	1	-10.83962	8.26334	-1.31	0.1915	0
IND434	1	0.44217	0.05140	8.60	<.0001	0.59278
IND435	1	-0.11319	0.04933	-2.29	0.0230	-0.16121
LAB_A	1	-0.11859	0.06948	-1.71	0.0898	-0.12196
LAB_F	1	0.19655	0.07700	2.55	0.0116	0.19231
LAB_G	1	-0.28412	0.06805	-4.18	<.0001	-0.31958
FuelAge	1	-0.00123	0.00057674	-2.14	0.0340	-0.14596
DIS_05_10_AVG	1	0.02836	0.01140	2.49	0.0139	0.17649
DIS_80_90_AVG	1	-0.03511	0.01450	-2.42	0.0166	-0.17216
Dist_EP	1	0.00766	0.00493	1.55	0.1227	0.11667
RVP_D5191	1	0.50289	0.34251	1.47	0.1440	0.09891
MON	1	0.15643	0.07948	1.97	0.0508	0.12359

Appendix B

Histogram Plots of Fuel Parameter Data

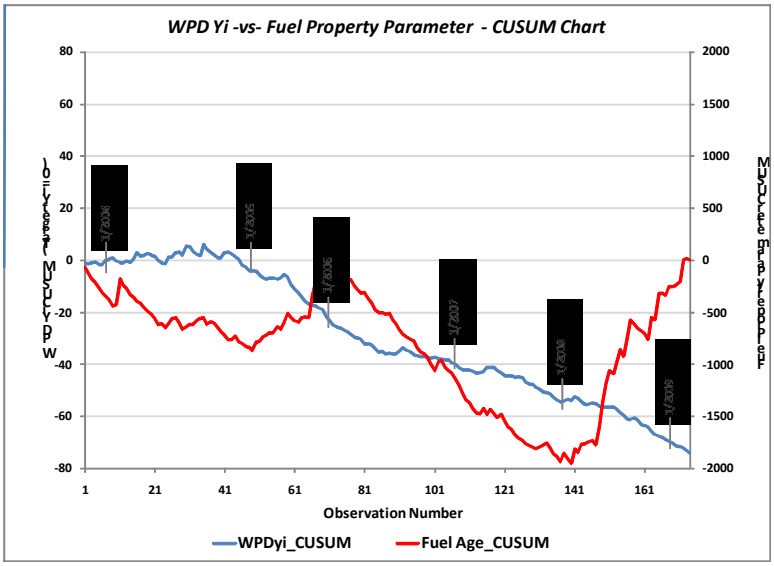
- Histogram plots of fuel parameter data:



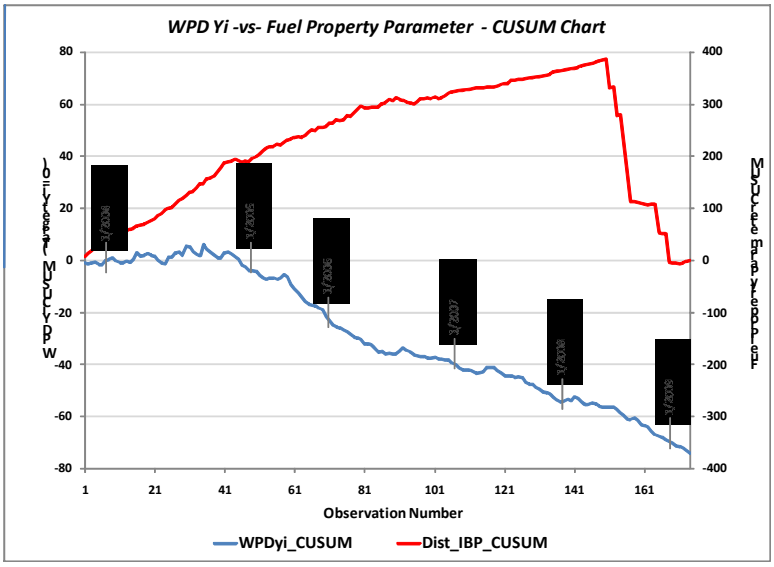
Appendix C

CUSUM Plots of $WPDY_i$ & Fuel Parameters

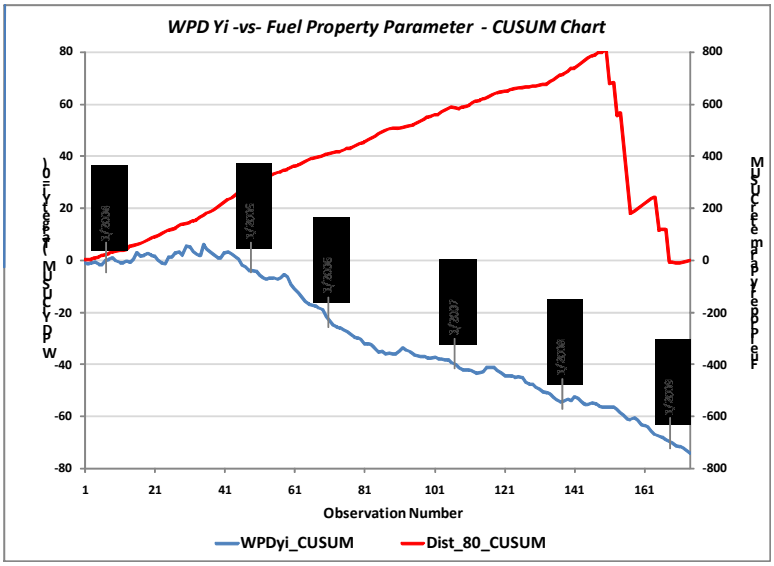
WPD Yi & Fuel Age CUSUM (Fuel Parameter Target set to mean value)



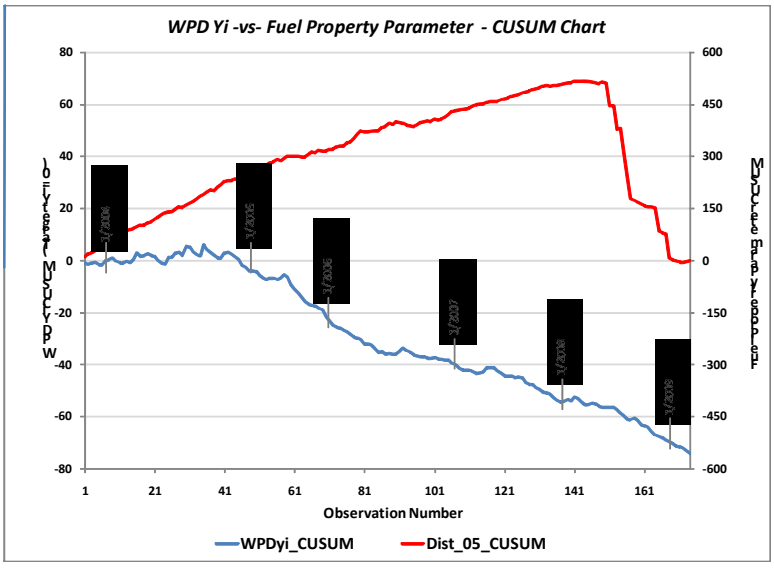
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



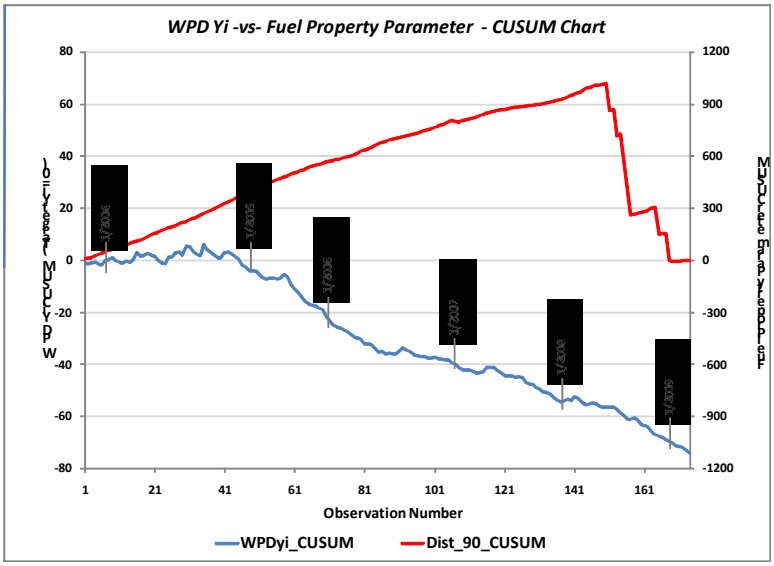
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



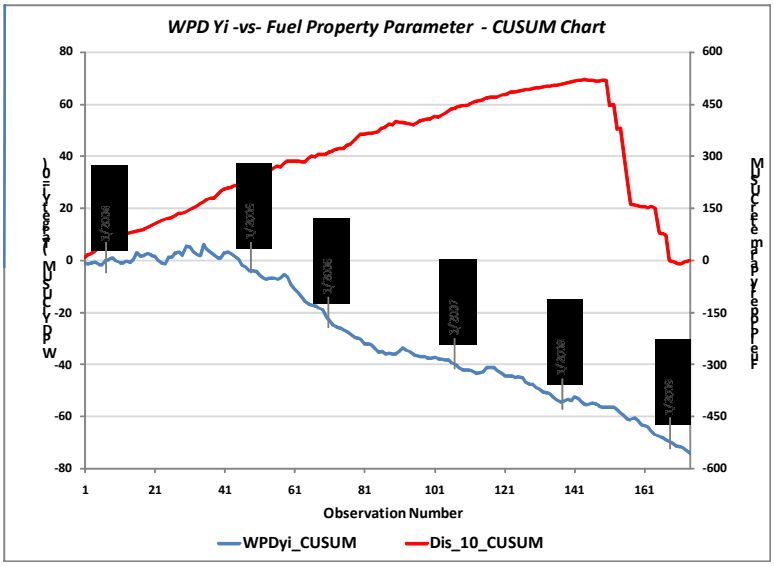
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



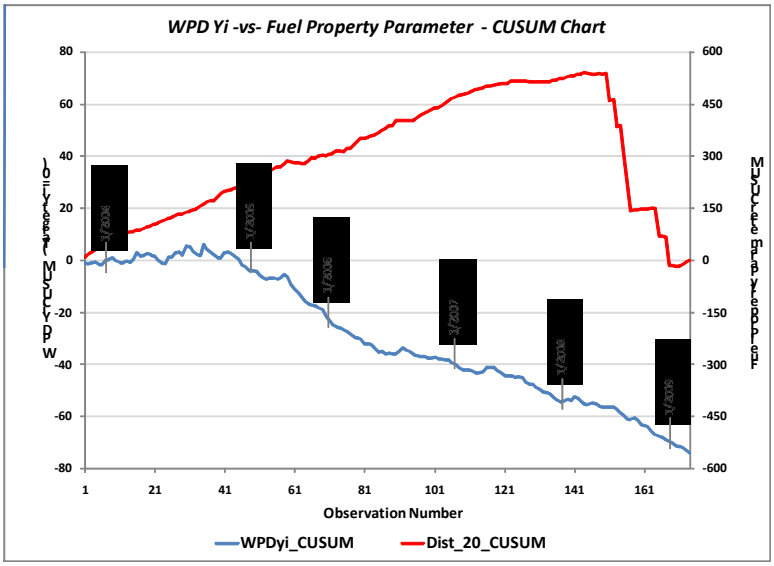
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



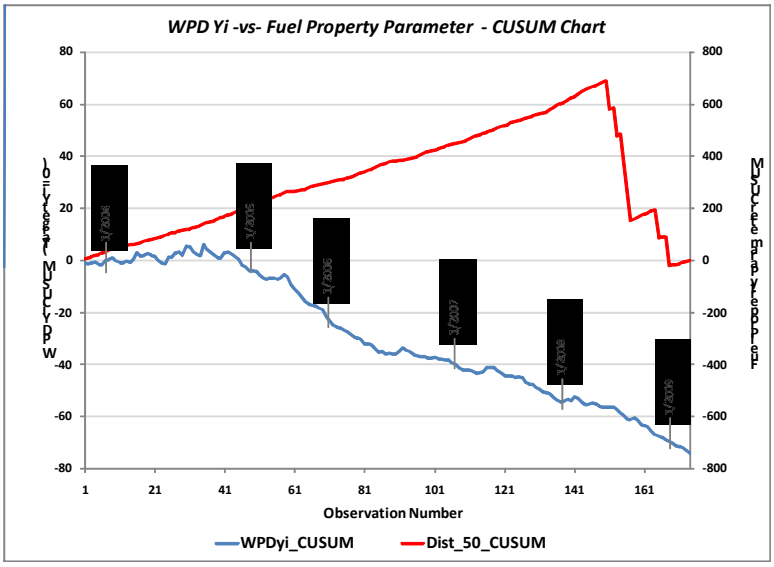
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



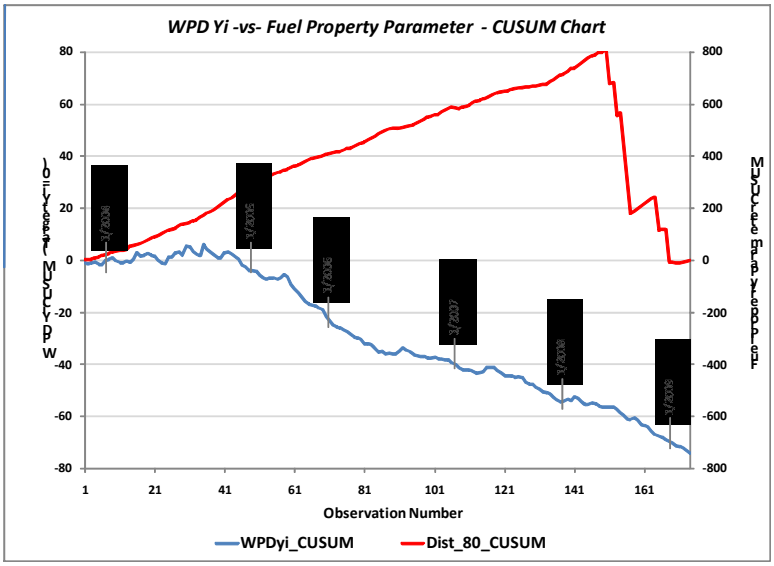
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



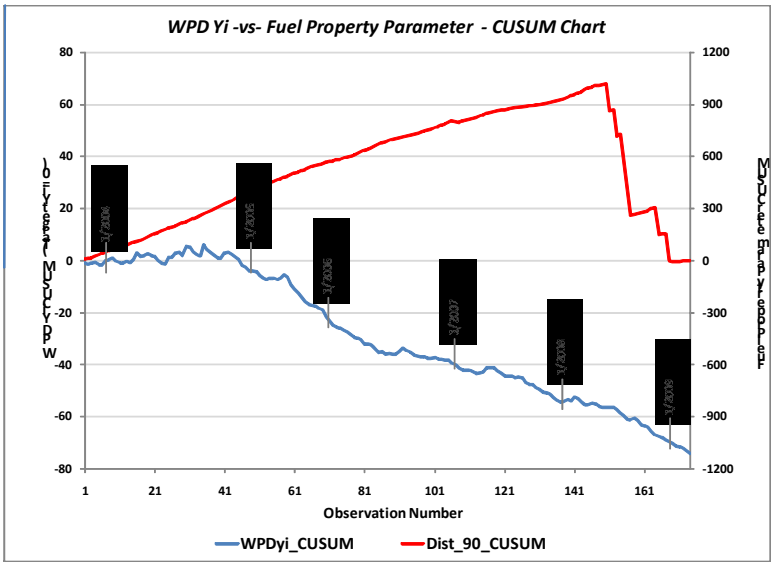
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



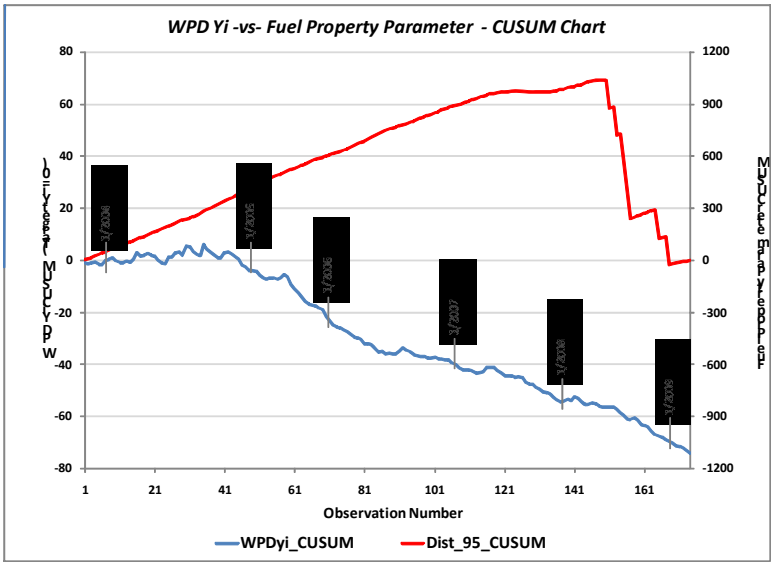
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



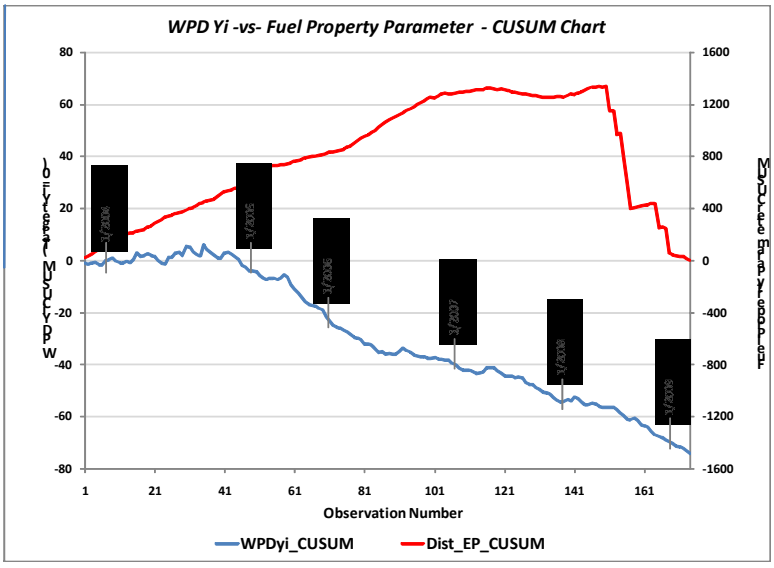
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



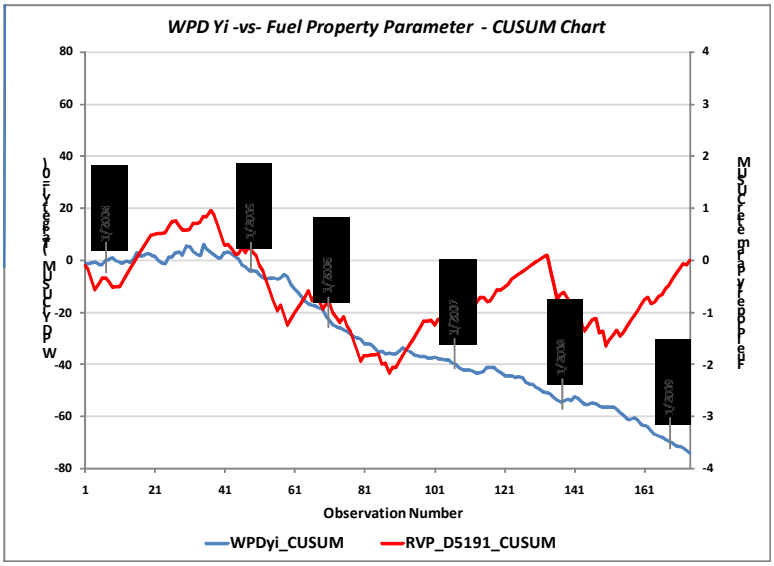
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



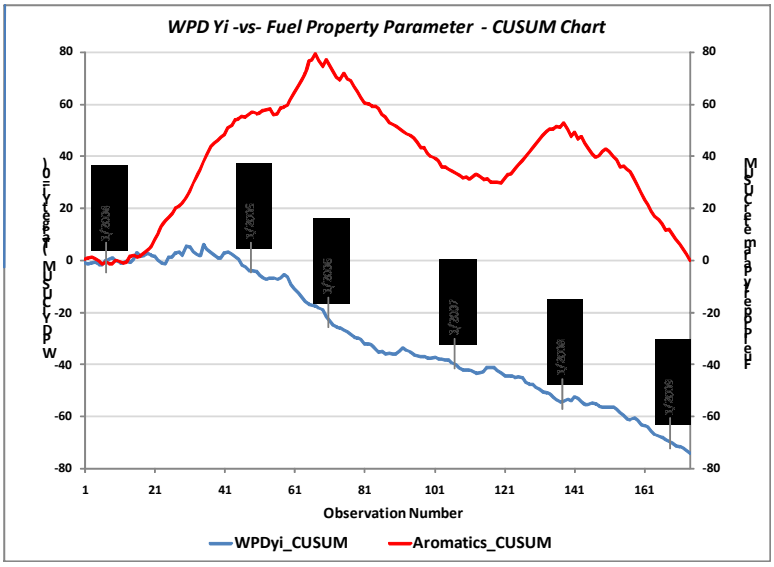
WPD Yi & Distillation CUSUM (Fuel Parameter Target set to mean value)



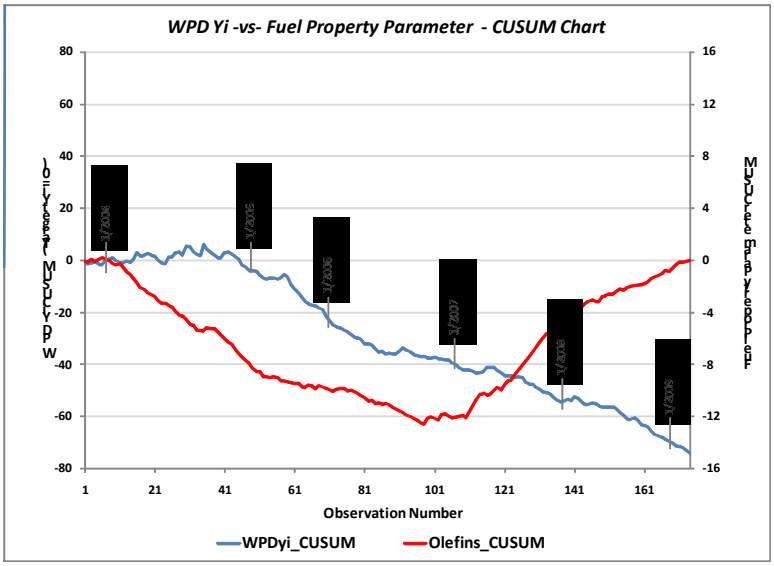
WPD Yi & RVP CUSUM (Fuel Parameter Target set to mean value)



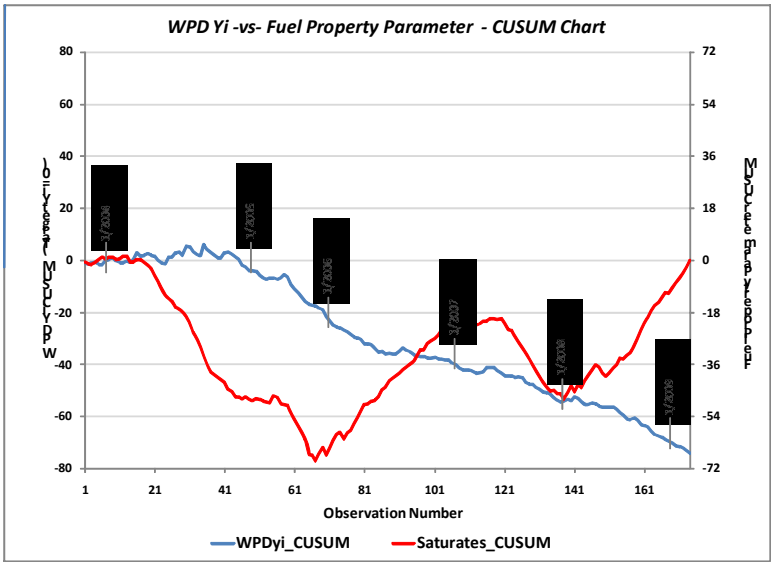
WPD Yi & Aromatics CUSUM (Fuel Parameter Target set to mean value)



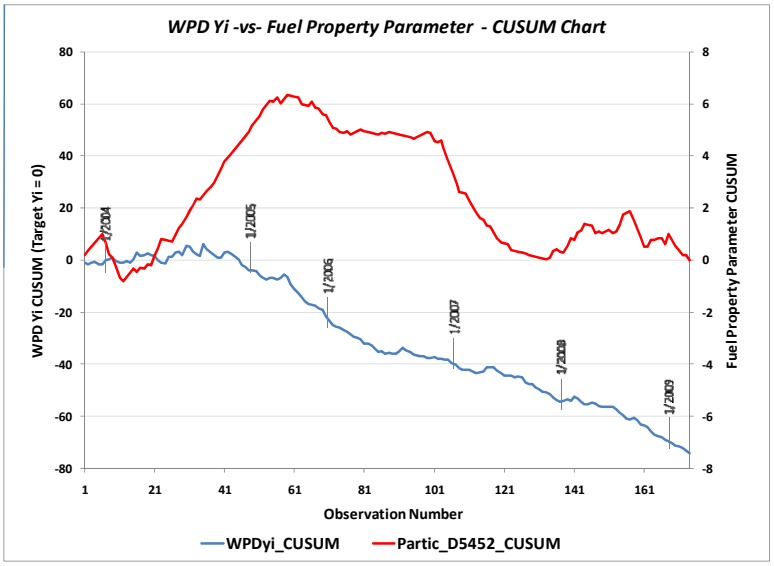
WPD Yi & Olefins CUSUM (Fuel Parameter Target set to mean value)



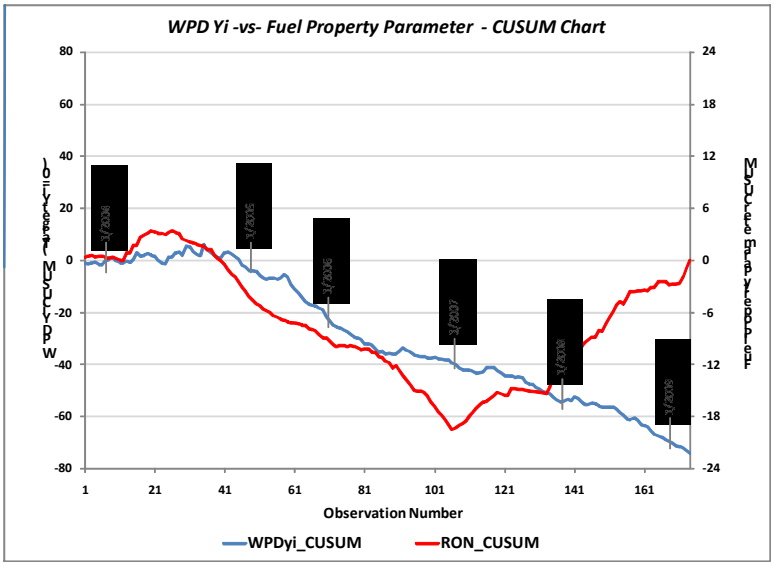
WPD Yi & Saturates CUSUM (Fuel Parameter Target set to mean value)



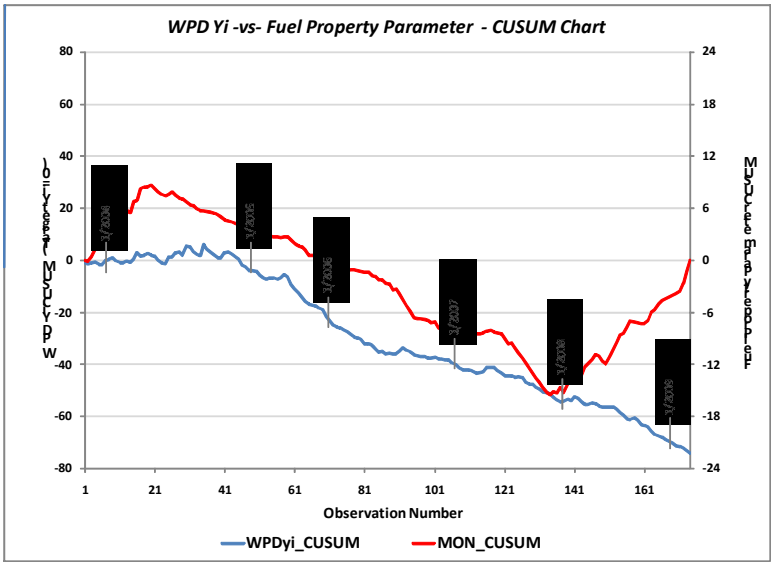
WPD Yi & Particulate CUSUM (Fuel Parameter Target set to mean value)



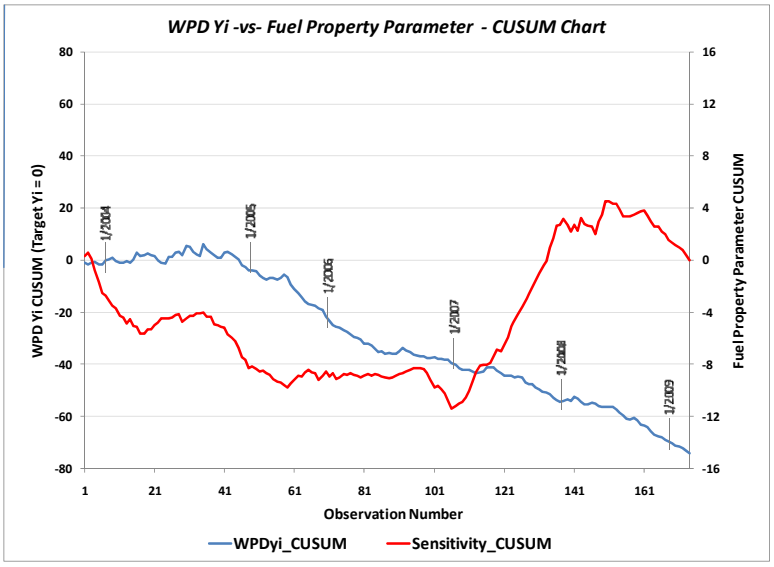
WPD Yi & RON CUSUM (Fuel Parameter Target set to mean value)



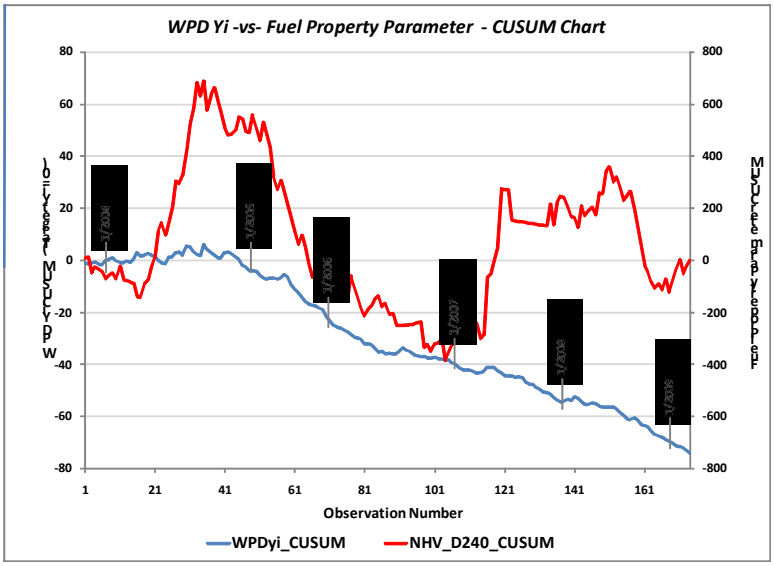
WPD Yi & MON CUSUM (Fuel Parameter Target set to mean value)



WPD Yi & Sensitivity CUSUM (Fuel Parameter Target set to mean value)



WPD Yi & NHV_240 CUSUM (Fuel Parameter Target set to mean value)



Pro Tec 107

Sequence III Surveillance Panel

GM Research and Development

May 5, 2009

OH Technologies, Inc.

Analysis Of Oil Filter Media

- **The manufacturer performed an analysis of six (6) each oil filters that were selected randomly from the Batch Code 6 shipment and 1 each filter elements from Batch Code 3 & 4.**
  - The manufacturer was provided all data that has been made available from the testing laboratories.
  - Initial inspections performed by the manufacturer determined that the oil filters met manufacturing specifications.
    - These specifications are considered proprietary by the manufacturer.

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Analysis Of Oil Filter Media

- **Material Changes**
  - The manufacturer has reviewed all changes to the media since 2000 and has not seen any significant changes that would lead to this problem.
- **Mullen Burst Test**
  - Further analysis was performed by running the Mullen Burst Test on Batch 3, 4 & 6.
    - Note: Baseline was determined using non-pleated media, cured in lab. (non-pleated material is stronger than pleated)
  - Two types of tests were run
    - Dry Samples
      - All BC 3, 4 & 6 samples showed less strength than baseline.
      - Batch Code 6 sample had average of 5 p.s.i. less strength than Batch Code 3.
    - Wet Samples- soak for 24 hours in oil @ 250° F (please note: temperature increased to get in range of 300°F as seen in the Seq. IIIG)
      - All samples showed less strength than baseline
      - Batch Code 6 sample had average of 1 p.s.i. less strength after oil soak at 250°F for 24 hrs.
  - It was determined that the media is "over-cured" compared to the baseline (new media that was cured in the lab).

Analysis Of Oil Filter Media

- **Typically manufacturers of oil filter media are concerned with filter media being "under-cured".**
  - During production, spot checks are performed with a chemical that will turn the sample material black if the element is "under-cured".
  - The curing time is determined by the chain speed and the temperature of the oven.
  - There is typically no specification for "over-cured" media during the manufacturing process because they are trying to protect against "under-cure". The only way to determine if the media is "over-cured" is to perform the Mullen Burst Test.
  - The manufacturer is gathering historical information on its production lines and will be performing Mullen Burst Tests.

Analysis Of Oil Filter Media

- **Would the "over-curing" we see on these filters typically cause any issues in the field?**
  - No. The oil filter would not typically experience the extreme temperatures, etc. as the Seq. IIIG.
  - Manufactures still do not want to be in an "over-cured" state due to lower media strength and higher than necessary manufacturing cost due to energy consumed.

Summary

- **Material Changes-** Pro Tec 107 oil filters have not had any significant changes since 2000.
- **Cure Time-** It was determined that the media is "over-cured" compared to the baseline (new media that was cured in the lab).
  - "over-cure" not a process specification
  - All other specifications are met
- **Application Specific-** The manufacturer believes that the issues we are seeing are application specific (Sequence IIIG engine operation and test conditions)
  - Cannot guarantee that we would not see "worm-holing" even with properly cured Pro Tec 107.

Seq. III Surveillance Panel Filter Options

- **Filter Options**
  - **Option 1 - Use Current Oil Filter (Pro Tec 107 - Batch Code 6)**
    - Batch Code 6 Filters are the build out of the Pro Tec 107, Made in U.S.A, oil filters.
    - OHT has enough inventory to protect the life of the GF4 & GF5 categories.
  - **Option 2 - Select New Oil Filter**
    - **Pro Tec 107(currently Made in Mexico)**
      - We have experienced issues with bypass and "worm-holing" in Seq. IIIG because these are more restrictive (i.e. less filter media).
      - Influence on Seq. III test results? Does a matrix have to be run?
    - "Off-the-shelf" oil filter that is stronger
      - We may experience a large increase in bypass events with new oil filters.
      - Influence on Seq. III test results? Does a matrix have to be run?
    - Manufacturer has agreed to design an oil filter for our application if we choose.

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Attachment 9

Sequence IIIGB Analysis

D. Boese

May 5, 2009

Summary

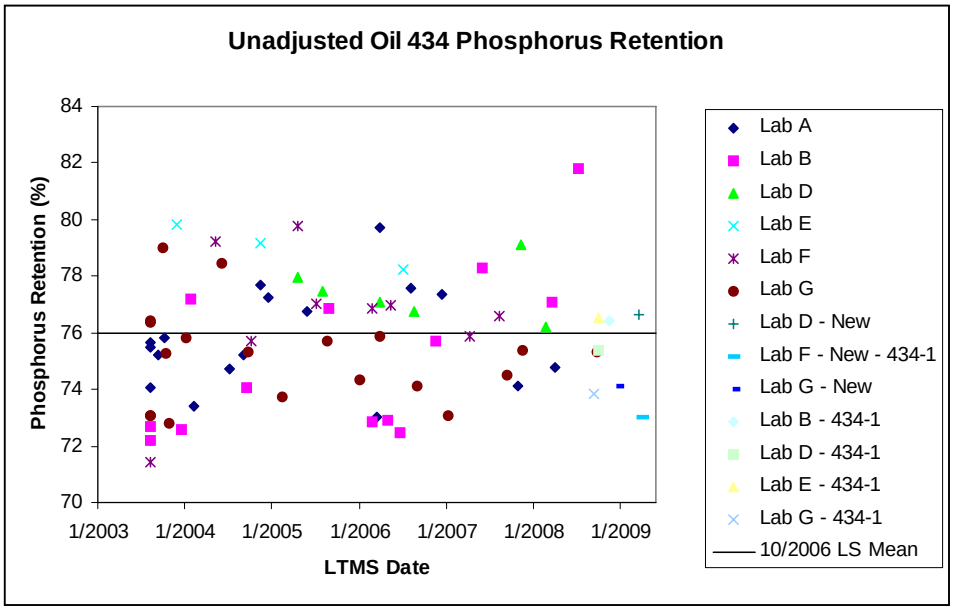
- Analysis of the Sequence IIIG reference oil data indicates that Phosphorus Retention appears to have become severe relative to that included in the initial study of Phosphorus volatility.
- On average, the reference oil Phosphorus Retention decreased 0.8% in the period of October 2006 through November 2008 relative to the period over which the initial dataset was collected (April 2003 through October 2006) and an additional 0.7% since the inception of the New procedure (November 2008).

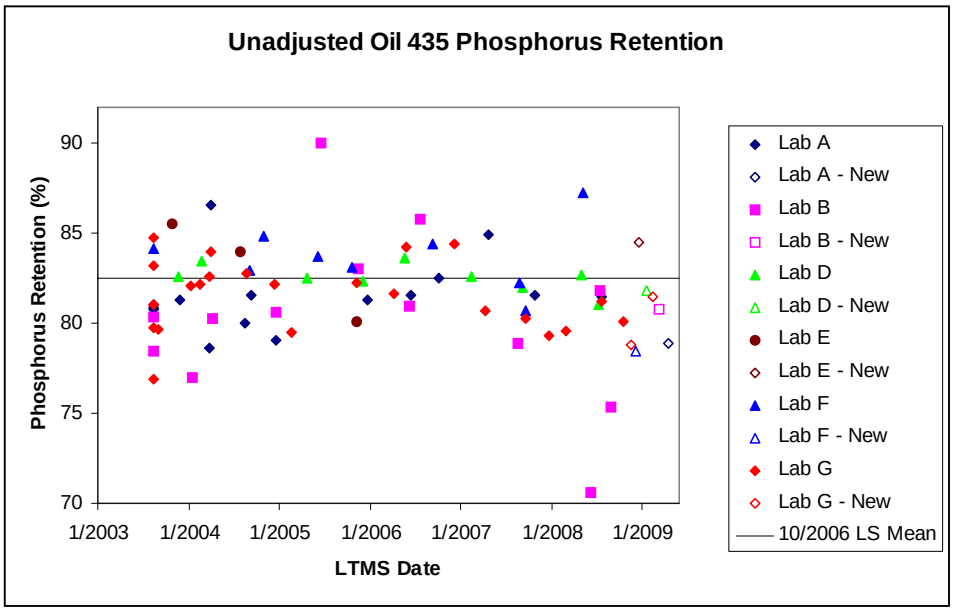
Phosphorus Retention Data

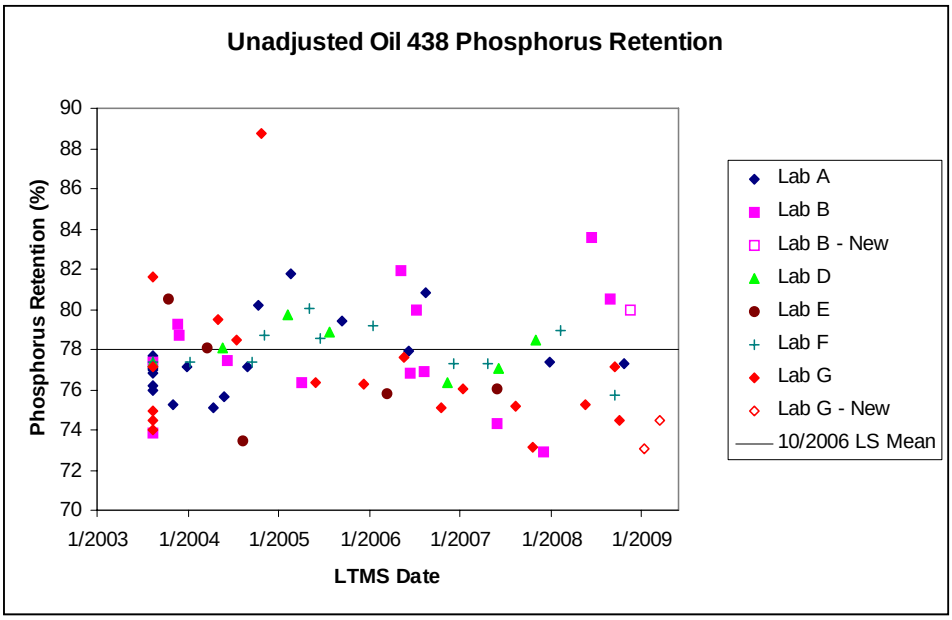
- Data was obtained from the TMC database.
- Includes:
  - 218 results using “old” measurement procedure (Old)
    - 156 through 10/8/2006 – Initial dataset
    - 62 from 10/2006 through initiation of the “new” procedure (11/6/2008)
  - 13 results using “new” measurement procedure (New)

Unadjusted Phosphorus Retention

- The plots on the following three slides are unadjusted Phosphorus Retention versus Date by Oil.
- The plots indicate that 10 of the 13 New results are below the LS Means calculated from the initial set of data (through 10/8/2006).
  - Oil 434: 2 of 3 are below the LS Mean for 434
  - Oil 435: 6 of 7 are below the LS Mean for 435
  - Oil 438: 2 of 3 are below the LS Mean for 438







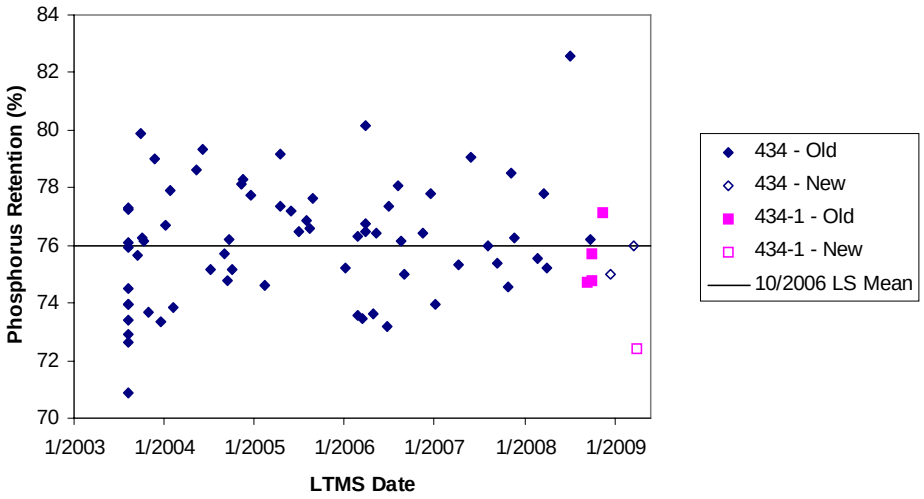
Lab Adjusted Phosphorus Retention

- Lab adjustments were determined based on regression analysis of Phosphorus Retention with predictors: Oil and Lab.
- The Lab adjustments are in the table to the right.
- The plots on the following three slides indicate that 10 of the 13 New lab adjusted Phosphorus Retention results are below the 10/2006 LS Means.

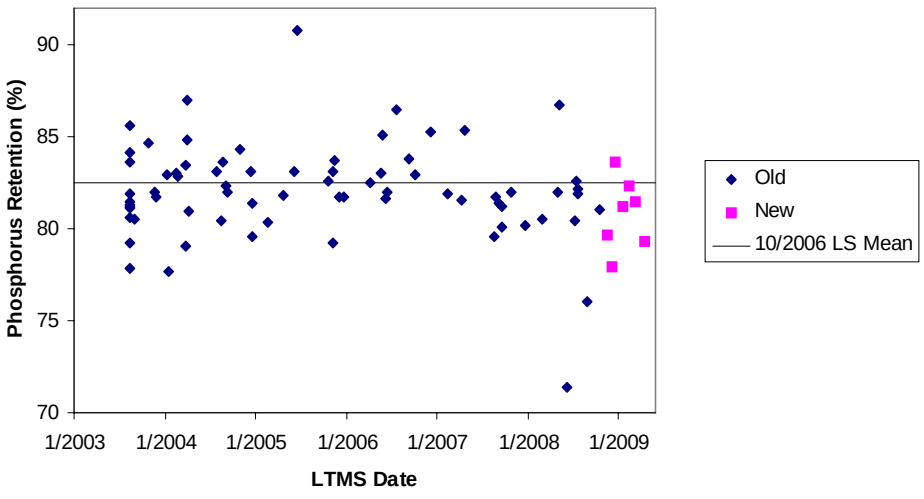
Lab Adjustments

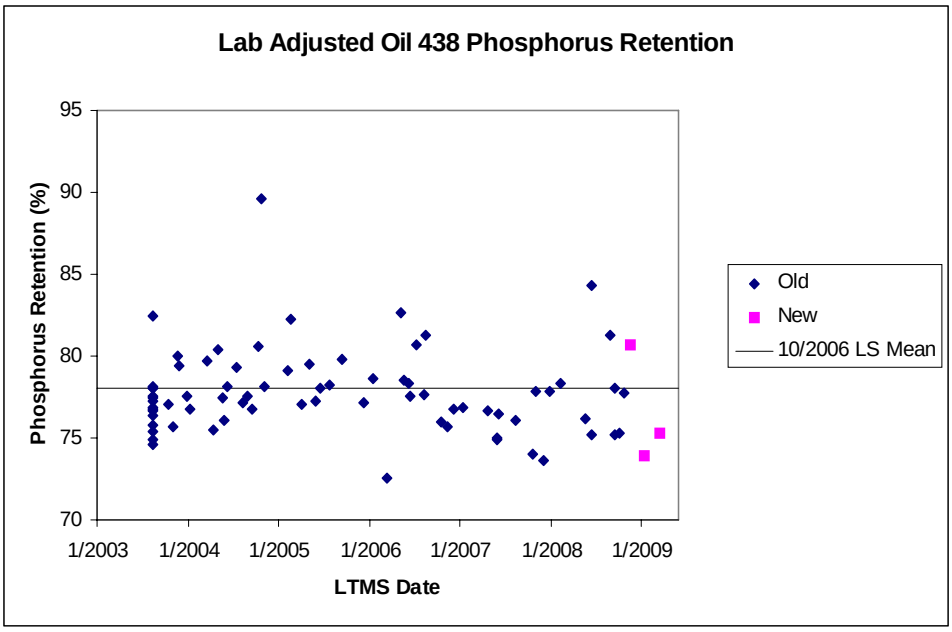
Lab	Adjustment
A	0.45
B	0.73
D	-0.62
E	-0.86
F	-0.56
G	0.88

Lab Adjusted Oil 434 Phosphorus Retention

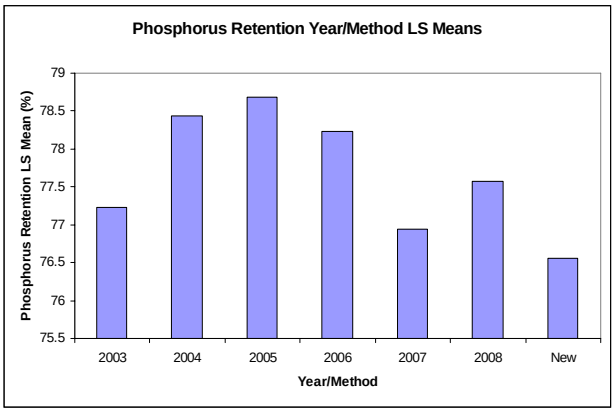


Lab Adjusted Oil 435 Phosphorus Retention



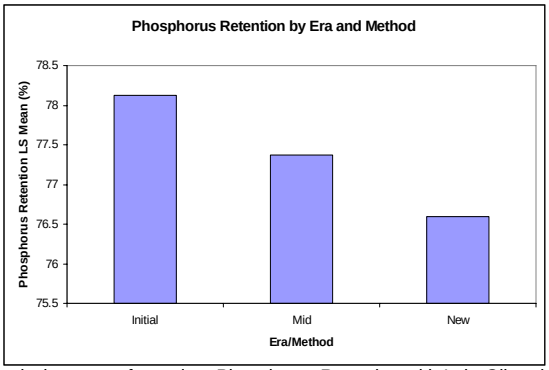


Year and Method Effects on Phosphorus Retention



- Regression analysis was performed on Phosphorus Retention with Lab, Oil and Year/Method as predictors. Results included in all numbered years are measured with the Old procedure.
- The Phosphorus Retention is directionally lower for 2007 and forward relative to 2004 through 2006.
- Utilizing Dunn-Sudak procedure, pairwise comparisons were made between New and each of the years 2003 through 2008, only the pair of 2004 and New are statistically significantly different (family-wise α = 0.1).

Era and Method Effects on Phosphorus Retention



- Regression analysis was performed on Phosphorus Retention with Lab, Oil and Era/Method as predictors.
  - Initial pertains to data through 10/8/2006.
  - Mid pertains to data since 10/8/2006 through the initiation of the New procedure.
- On average the reference oil Phosphorus Retention decreased 0.8% in the Mid period relative to the Initial period and an additional 0.7% since the inception of the New procedure.
- Via Tukeys multiple comparison procedure, the Initial and New Phosphorus Retentions are statistically significant different (family-wise $\alpha = 0.1$).

Results Measured Using Old and New Procedure

- There are results from four tests which are in the Old database as well as in the New database.
- **Apparently**, both the Old and New procedures were performed on these tests.
- The New procedure yielded higher Phosphorus Retention on three of the four tests with an average delta of 0.14% (New – Old).

ADDENDUM K1

DRAFT
TEMPLATE CHECKLIST

Purpose

The Checklist for Comparing Tests to the Template is used to assess progress in new engine test development against the Code Acceptance Criteria and Action Plans. The checklist is updated periodically during the course of test development and is provided to, and discussed with, the appropriate ASTM test development task force.

The rating scale for comparing test development to the Template is as follows:

A -Completed

B -In Progress

C -Planned

D -No Action

Test Name Sequence IIIGB Assessment Date 06/08/09

Appendix K - Template for Acceptance of New Tests

Checklist for Comparing Tests to the Template

Summary of IIIGB Issues:

1. About half of the reference tests typically used to calculate initial targets and precision have been completed to date (15) utilizing the "new procedure."
2. A technical report has been drafted and is under review.

A. Precision and Discrimination

A.1 Precision $E_p = d_p/Spp$, $E_p \geq 1.0$ for all pass/fail parameters
d_p = Smallest difference of practical importance
Spp = Pooled standard deviation at target level of performance

Parameter	Dp	Spp	Ep	Ep≥1.0
Phosphorus Retention	2.0%			

Comments:

A.2 Discrimination

For each test parameter in A.1, at least one of the oils used in proof-of-concept testing, matrix testing, or calibration testing must be statistically significantly different from at least one of the remaining oils. This difference must be in the correct direction, i.e., a poor oil should not test out as significantly better than a good oil. Significant difference may be declared with a p-value of 10% or less. Multiple comparison techniques (Tukey, Scheffe, Bonferroni, etc.) for the least-square means of the oils are preferred comparison techniques and should be stated in the analysis. Note that these least-squares means are not necessarily proposed LTMS targets.

Parameter: Phosphorus Retention

			p-value for t-test of equal means (Tukey)		
Oil	Least-Square Mean	95% Confidence Interval for Mean	vs 1	vs 2	vs 3
1					
2					
3					

Comments:

A.3 Parameter Redundancy

Each pass/fail parameter has a unique and significant purpose in terms of the engine oil performance standard. Parameter redundancy is concluded if a correlation coefficient is 0.85 or greater.

Correlation Coefficients

Comments:

Item A.3 is not applicable as the IIIGB has only one parameter (PRET), therefore, there is no redundancy amongst IIIGB parameters.

B. Severity and Precision Control Charting

Requirements

B.1 Is an LTMS for reference oil tests in place which is consistent with the ACC Code Appendix A? __B__ SP

B.2 Are appropriate data transforms applied to test results? __A__ SP

Comments:
Sequence IIIGB is included in LTMS, version 12-08 (Section 5).

C. Interpretation of Multiple Tests

Requirements

C.1 Is a suitable system in place to handle repeat tests on a candidate oil? __C_ ILSAC/Oil

Type: MTAC Tiered Limits Other

C.2 Has a method for the determination and handling of outlier results been defined? __C_ ILSAC/Oil

Comments:

D. Action Plan

D.1 Reference Oils

Do the majority of reference oils represent current technology?	__C__ SP
Are the majority of reference oils of passing or borderline pass/fail performance?	__C_ ILSAC/Oil

Comments:
Consideration is being given to replacing at least one of the current IIIG reference oils with a new reference oil.

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

Recommended Approaches

D.1.1 Is reference oil supply and distribution handled through an independent organization?	__A__ TMC
D.1.2 Is a quality control plan defined and in place?	__A__ TMC
D.1.3 Is a turnover plan defined/in place to ensure uninterrupted supply of reference oil and an orderly transition to reblends?	__A__ TMC
D.1.4 Is a process for introducing replacement reference oils defined and in place?	__A__ TMC
D.1.5 Are oils blended in a homogeneous quantity to last 5 years?	__A__ TMC

Comments:

D.2 Test Parts

Are all critical parts identified?	__A__ SP
Is a system defined/in place to maintain uniform hardware?	__A__ SP
Is there a system for engineering support and test parts supply?	__A__ SP

Recommended Approaches

D.2.1 Are critical parts distributed through a Central Parts Distributor (CPD)?	__A__ SP
D.2.2 Are critical parts serialized, and their use documented in test report?	__A__ SP
D.2.3 Are all parts used on a first in/first out basis?	__A__ SP
D.2.4 Are all rejected critical parts accounted for and returned to the CPD?	__A__ SP
D.2.5 Does the CPD make status reports to the test surveillance body at least semi-annually?	__A__ SP

D.2.6 Is there a quality control and turnover plan in place for critical test parts, including identification and measurement of key part attributes, a system for parts quality accountability, a turnover plan in place for simultaneous industry-wide use of new parts or supply sources? __A*_ SP

D.2.7 Is the CPD active in industry surveillance panel/group, and in industry sponsored test matrices? __A__ SP

Comments:

Note, Item 2.6 is not strictly being adhered to ("simultaneous industry-wide use of new parts …"), but is to the extent practical.

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

Comments:

D.3 Test Fuel

Recommended Approaches

D.3.1 Is the fuel specified and the supplier(s) identified? __A__ SP

Is a process in place to monitor fuel stability over time? __A__ SP

Are approval guidelines in place for fuel certification? __A__ SP

D.3.2 If the test fuel is treated as a critical part of the test procedure: Is an approval plan and severity monitoring plan for each fuel batch in place? __A__ SP

Is a quality control plan defined and in place to assure long term quality of the fuel? __A__ SP

Is a turnover plan defined, in place and demonstrated to ensure uninterrupted supply of fuel? __A__ SP

Comments:

D.4 Test Procedure

Recommended Approaches

D.4.1 Is a technical report published documenting, per ASTM Flow Plan: Test precision for reference oils? __B__ SP

Field correlation? __B__ SP

Test development history? __B__ SP

D.4.2 Are test preparation and operation clearly documented in a standard format, e.g., ASTM, CEC? __A__ SP

D.4.3 Are test stand configuration requirements documented and standardized? __A__ SP

D.4.4 Are milestones for precision improvements established? __C__ SP

D.4.5 Are routine engine builder workshops planned/conducted? __A__ SP

Comments:
The elements under item D.4.1 are label "?" because there is a difference in opinion on this item. Per Dave Glaenzer, the IIIGB "… is not a new test, but rather an application of data from an existing test, and as such does not require a research report." There is disagreement on that view and therefore this item is under consideration.

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

D.5 Rating and Reporting of Results

Recommended Approaches

D.5.1 Are the reported ratings from single raters (i.e. not averages from various raters)? __NA_

D.5.2 Is a suitable severity adjustment system in place? __C__ SP

D.5.3 Is each pass/fail parameter unique and have a significant purpose for judging engine oil performance? __A__ SP

D.5.4 Do all rate and report parameters judge operational validity, help in test interpretation or judge engine oil performance? __NA_

D.5.5 Are routine rater workshops conducted/planned? __NA_

Comments:
Items are Not Applicable (NA) because Phosphorus Retention is obtained through analytical analysis, not a subjective rating.

Item D.5.2 is "C" due to the lack of established targets for reference oils. The targets will be generated once a sufficient number of tests have completed.

D.6 Calibration, Monitoring and Surveillance

Recommended Approaches

D.6.1 Is a process in place for independent monitoring of severity and precision with an action plan for maintaining calibration of all laboratories? __C__ SP

D.6.2 Are stand, lab, and industry reference oil control charts of all pass/fail criteria parameters used to judge calibration status? __C__ SP

D.6.3 Does the specified calibration test interval allow no more than 15 non-reference oil tests between successful calibration tests? __?__ SP

D.6.4 Is an industry surveillance panel in place? __A__ III

Comments:
Items D.6.1 and D.6.2 are "C" due to the lack of established targets for reference oils. The targets will be generated once a sufficient number of tests have completed.

Item D.6.3 is "?" because current calibration test interval is no more than 25 non-reference oil tests between successful calibration tests within a lab.

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action

D.7 Guidelines for Read Across

Recommended Approaches

D.7.1 Is a plan defined to establish data for development of BOI and VGRA? _B_ BOI/VGRA

D.7.2 Has VGRA and BOI data been summarized and included in the technical report in D.4.1? _B_ BOI/VGRA

Comments:

RATING SCALE: A - Completed; B - In Progress; C - Planned; D - No Action