

Sequence III Surveillance Panel Meeting Minutes November 3, 2011

Agenda- Shown as attachment 2

1.0) Attendance – Shown in Attachment 1.

2.0) Approval of minutes - The minutes from 09/08/2011 were approved without objection. (G. Seman, J. Bowden).

3.0) Action Item Review

3.1) 03/17/11 - Panel member solicit oil suppliers for potential replacement reference oil for IIIF (PVIS~275%). OPEN

Chairman Dave Glaenzer repeated the request for members to consider offering a new oil. No one has come forward with an potential oil.

3.2) 08/10/11 – Form inventory Control TF. Report this call.

4.) Old Business

4.1) Replacement for Mylar tape used to polish crankshafts.

Ed Altman has found a replacement, all others will use the replacement. Usage rate is about a roll every six months. It was suggested that a group purchase might be made. All members agreed to use the current mylar. Charlie stated it was available through the local Fastenal supplier.

4.2) Parts Washer maximum hours for soap use.

This is still open as the panel is gathering data. Charlie estimated that 3 months is about 30 hours. Charlie intends to run ICP analysis to determine when it degrades beyond usefulness. Pat Lang indicated they have had it installed for one month and Southwest has accrued about 40 hours on their soap mix. He also stated that this parts cleaners is used for multiple test types.

5.) New Business

5.1) RO 435-2 results to date.

Rich Grundza reviewed his presentation (see attachment 3) regarding the seven results on 435-2. Rich expected to have ten tests on this oil by the end of the first quarter of 2012, at which time the results will be reviewed. There were no comments on the results to date.

5.2) Final UEB data.

Rich Grundza reviewed his presentation (see attachment 4) including all the pre and post test UEB results. Dave Glaenzer reminded the panel that one of the items undertaken as part of the actions from the panel was to conduct a UEB to see if this would explain and or improve variability. Considerable discussions took place with regards to variability. It was

stressed that this was a common build, except that honing of all the blocks was not done at the same time. It was also suggested that there may be other lab related items than just build influencing these results. Matt Snider asked what the variability was with regards to reference oil 1010. Rich stated that he did not have all the statistics on 1010 available to him, but review of data presented earlier, which was severity adjusted, indicated a larger range for WPD with 1010 versus 434-1. Matt Snider and Rich Grundza will look at the variability of 1010 versus UEB results to be reported on a future conference call.

5.3) Report from Inventory Control TF.

Jason presented critical component task force recommendations, as well as proposed modifications to form 12 of the report package and a listing of critical parts (see attachments 5, 6 and 7). A considerable discussion ensued regarding the grace period. Dave Glaenzer will request the ACC review the data base to see how often First in- first out is not adhered to. Matt asked how other panels address FIFO. Most test methods don't have first in-first out requirements though some of the diesels do, specific example was the T12. It was agreed to draft an information letter incorporating pages 14 and 15 from Jason's presentation (see attachment 5) which Dave will email to panel members for concurrence. Jason moved for acceptance of his report and to deem this task force as complete.

5.4) Cooling System debris.

Greg Seman discussed his presentation regarding casting sand and debris (attachment 8). Most of the debris in the system appears to be casting sand and binding agents. Greg believes much of this debris comes from the block and heads. He noted that the heads are new every test, while the block is used for six tests. Even though the block is cleaned multiple times, it still may be a source of debris and other material. This material has caused problems in Greg's lab, specifically for the flow meters, heat exchanges and valves in the system. Greg has installed a Millerleman strainer, which is cleaned every test. Jason inquired as to how much debris is collected after each test. Greg said the first time it was used, a large amount of debris was collected. After some more discussion, the panel approved a motion from Greg, seconded by Mark Mosher, to allow the use of a strainer in the system. Greg will provide filter size and other pertinent information for inclusion in the test method. The vote was 9 approve, 2 waive and no negatives.

5.5) Summary on component inventory

Dave summarized what he would present to PCEOP, included as attachment 8. It would appear that there are sufficient quantities to continue testing through 2015.

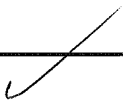
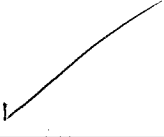
The meeting adjourned at 3:49 p.m.

(13) Voting Members present

date:

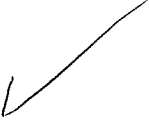

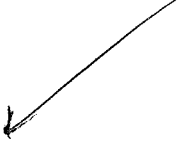
11/03/11

ASTM Sequence III Surveillance Panel (17 Voting members)

Name/Address	Phone/Fax/Email		Signature
Ed Altman Afton Chemical Corporation 500 Spring Street Richmond, VA 23219 USA	804-788-5279 804-788-6358 ed.altman@aftonchemical.com	Voting Member	Present 
Art Andrews ExxonMobil Products Research 600 Billingsport Rd. Paulsboro, NJ 08066 USA	856-224-3013 arthur.t.andrews@exxonmobil.com	Non-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 _____
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ASTM Sequence III Surveillance Panel (17 Voting members)

date:

Name/Address	Phone/Fax/Email	Non-Voting Member	Signature
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James Carter Haltermann Solutions 2296 Hulett Rd. Okemos, MI 48864 USA	517-347-3021 517-347-1024 jecarter@jhaltermann.com Cell: 517-896-0897	Voting Member	Present _____ 
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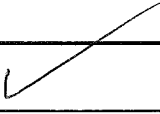
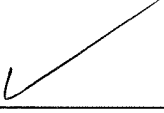
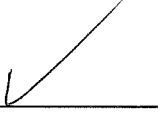
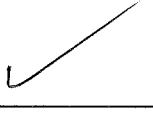
ASTM Sequence III Surveillance Panel (17 Voting members)

date:

Name/Address	Phone/Fax/Email		Signature
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 _____
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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 _____
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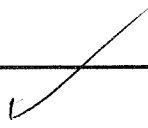



ASTM Sequence III Surveillance Panel (17 Voting members)

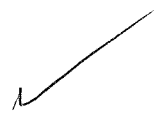
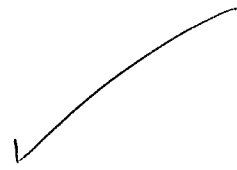

date:

Name/Address	Phone/Fax/Email	Voting Member	Signature
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ASTM Sequence III Surveillance Panel (17 Voting members)

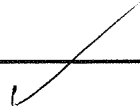


date:

Name/Address	Phone/Fax/Email		Signature
Bruce Matthews GM Powertrain Mail Code 483-730-472 823 Jocelyn Avenue Pontiac, MI 48340 USA	248-830-9197 248-857-4441 bruce.matthews@gm.com Test Sponsor Representative	Voting Member	Present 
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ASTM Sequence III Surveillance Panel (17 Voting members)

date:

Name/Address	Phone/Fax/Email		Signature
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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 _____
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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 
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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 _____
Tom Wingfield Chevron Phillips Chemical Co.	wingftm@cpchem.com	Non-Voting Member	Present _____

Andrei Patcenchi GM

John DeLozeta TAR

Scott Stepp

Sequence III Surveillance Panel

Date: 11/03/2011

Time: 14:00 EDT

Call-in Number: (866) 817-9787

Conference Code: 2158089

Agenda

1.0) Roll Call

2.0) Approval of minutes

2.1) Approve the minutes from 08/10/2011 & 09/08/2011 teleconferences.

3.0) Action Item Review

3.1) 03/17/11 – Replacement oil IIIF RO1006-2 (PVIS ~275%). OPEN

3.2) 08/10/11 – Form Inventory Control TF. Report during this call.

4.) Old Business

4.1) Replacement for Mylar tape used to polish crankshafts.

4.2) Parts Washer maximum hours for soap use.

5.) New Business

5.1) RO 435-2 results to date.

5.2) Final UEB data. ATTACHED

5.3) Report from Inventory Control TF. ATTACHED

5.4) Cooling System debris. ATTACHED

6.) Review Scope and Objectives

6.1) At next face to face meeting

7.) Next Meeting

6.1) At call of Chairman

8.) Meeting Adjourned



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Sequence IIIG 435-2 Results

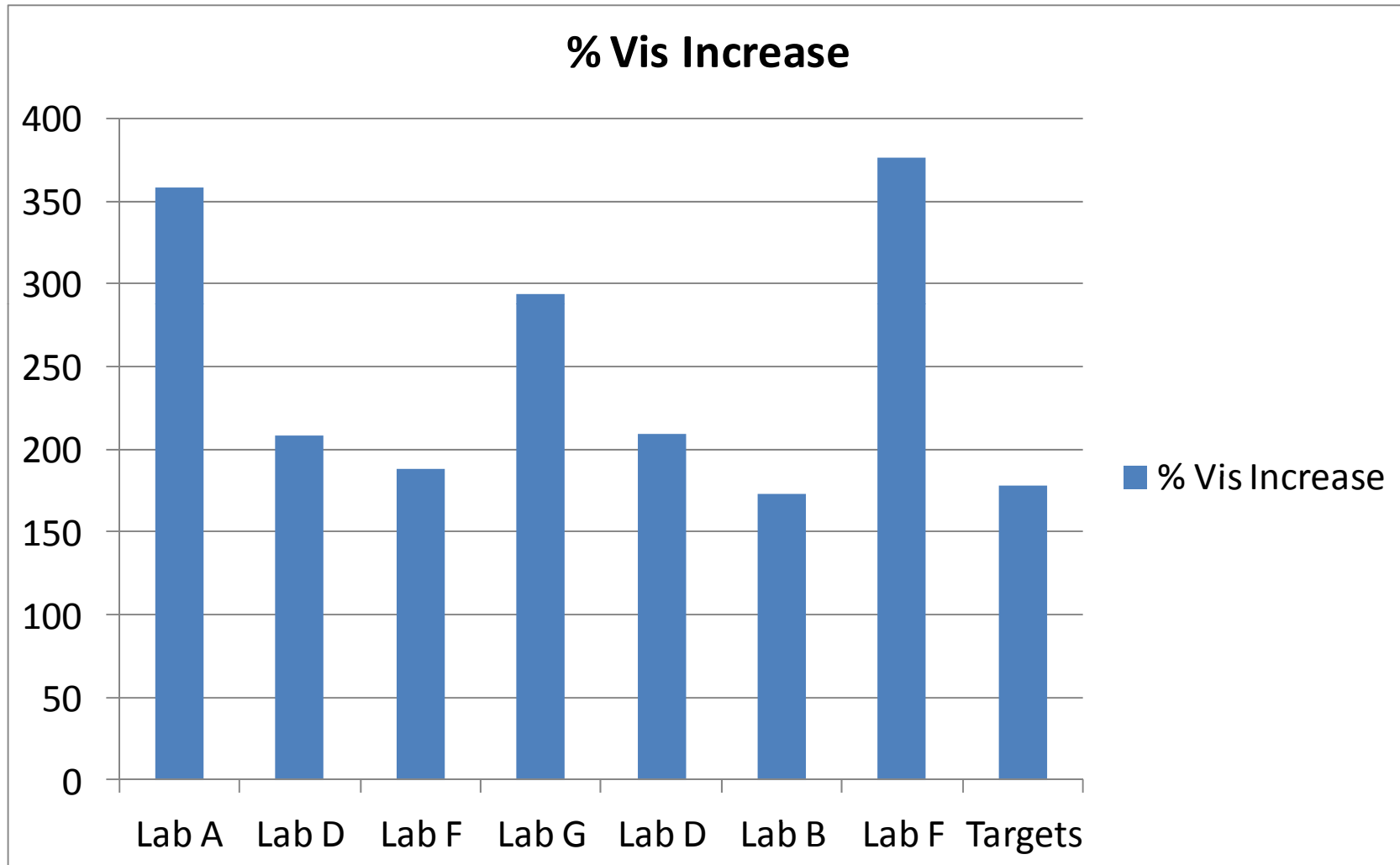
Sequence III Surveillance Panel

October 31, 2011

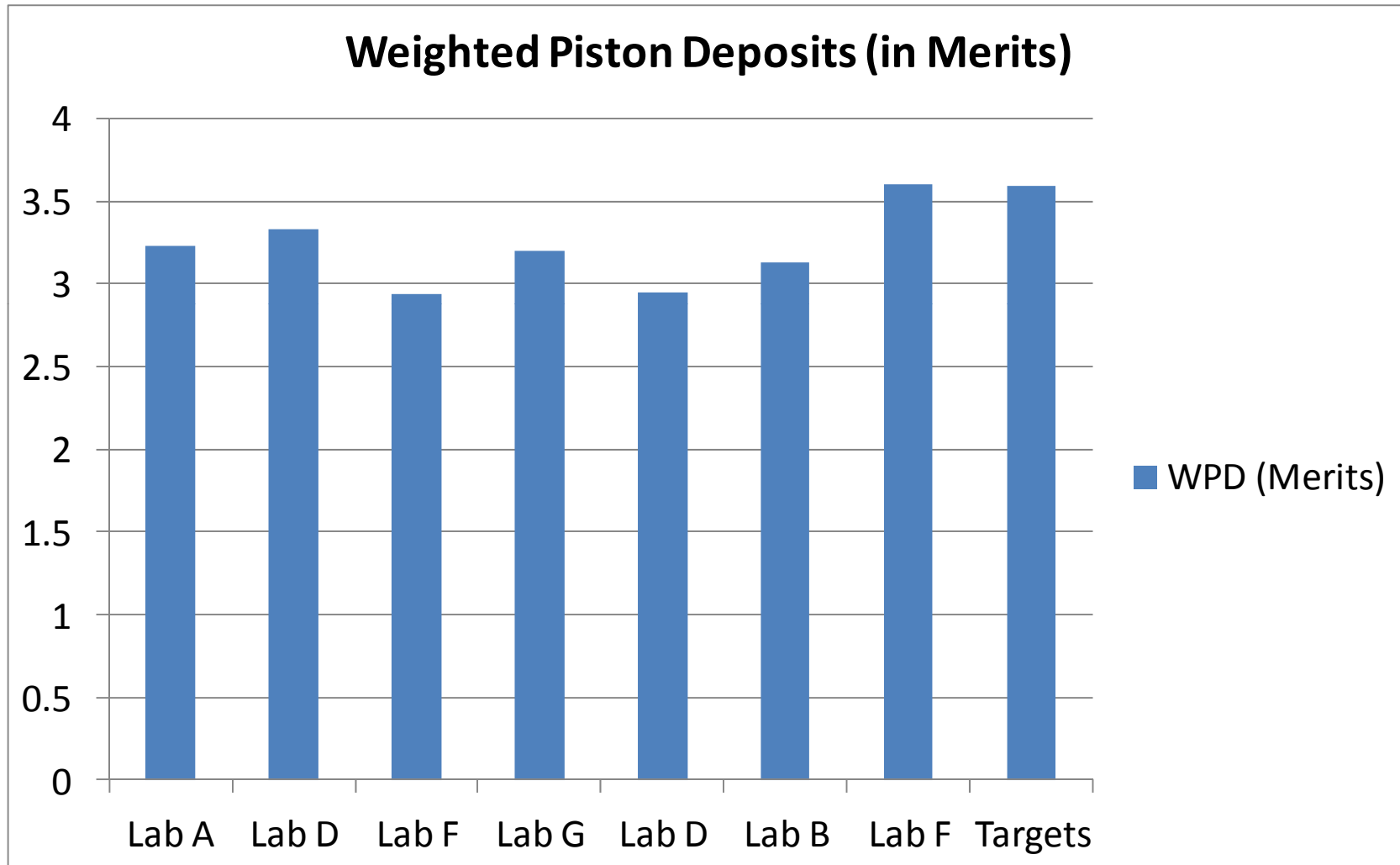
Summary of Results

- 7 tests reported from five labs
- Anticipate getting to 10 tests in the first quarter of 2012
- Summary in next few slides

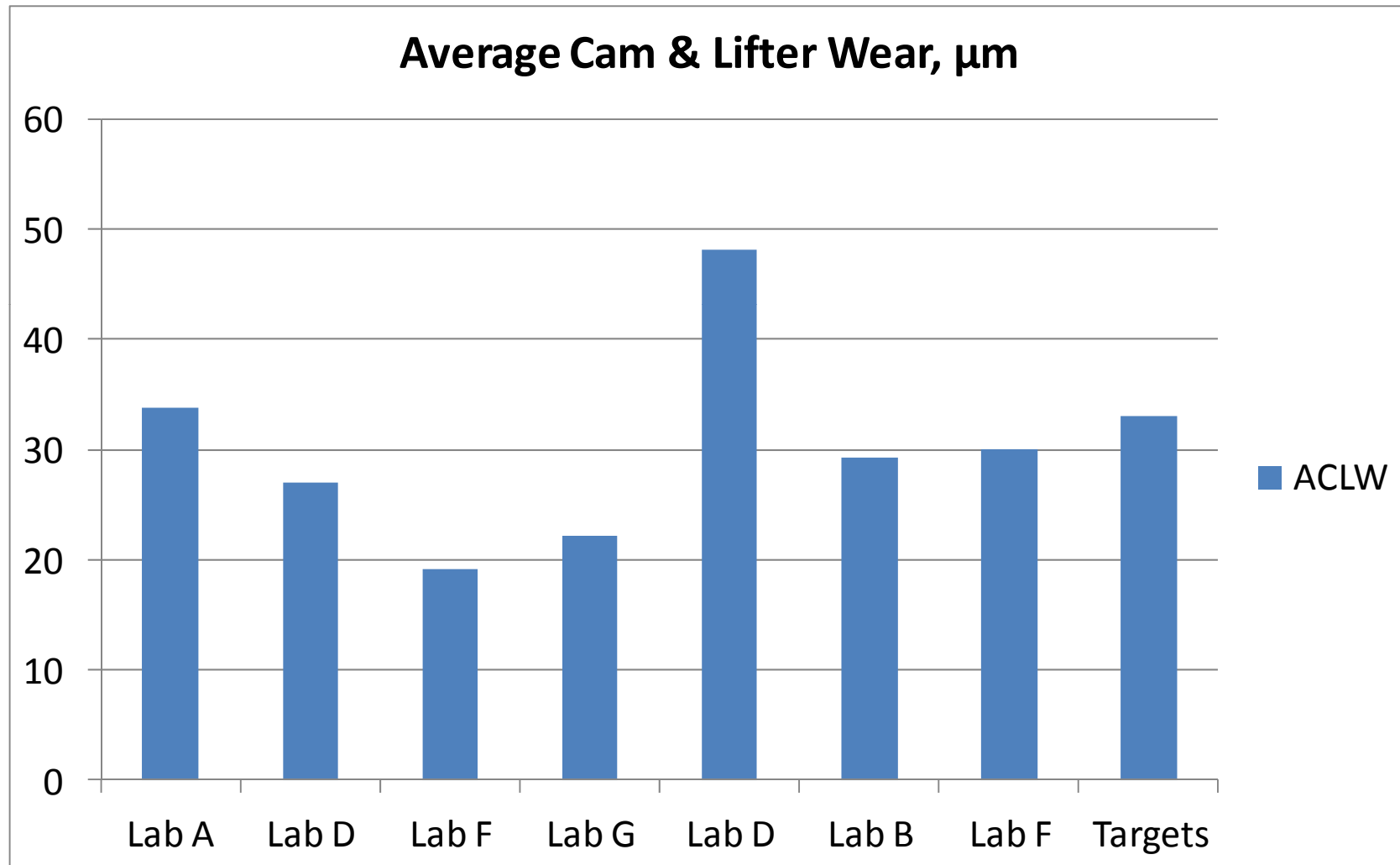
RO 435-2 Results for PVIS



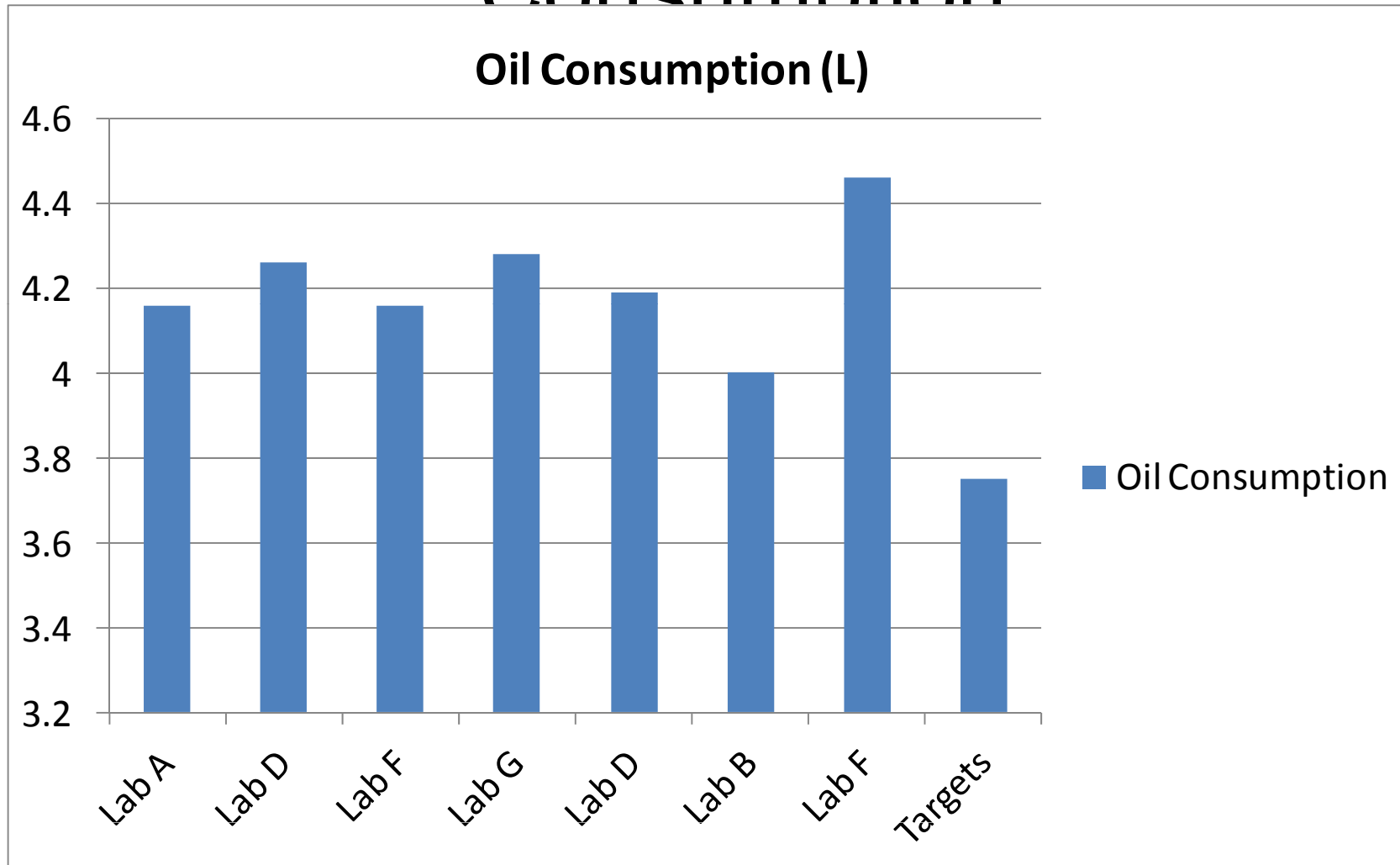
RO 435-2 Results for WPD



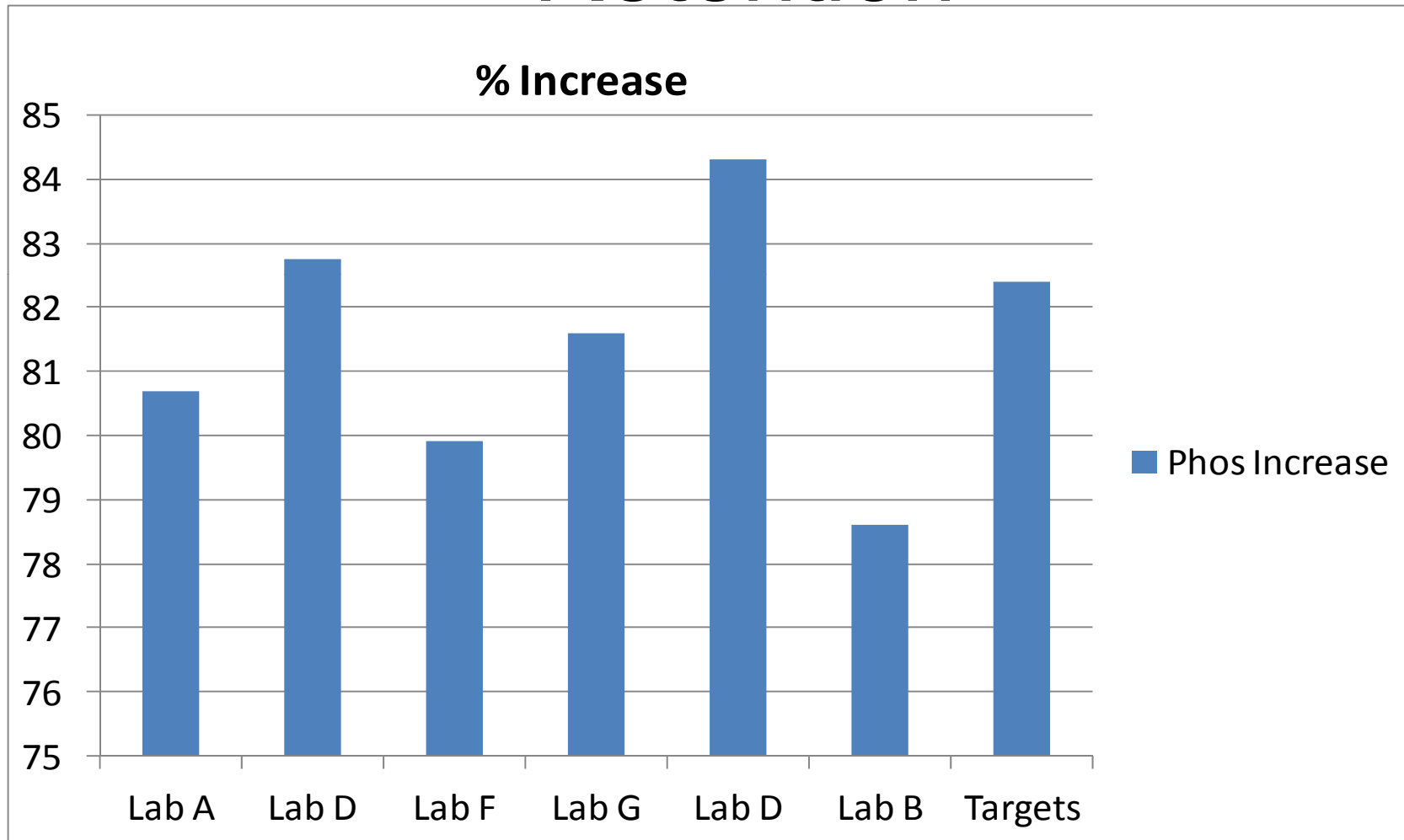
RO 435-2 Results for ACLW



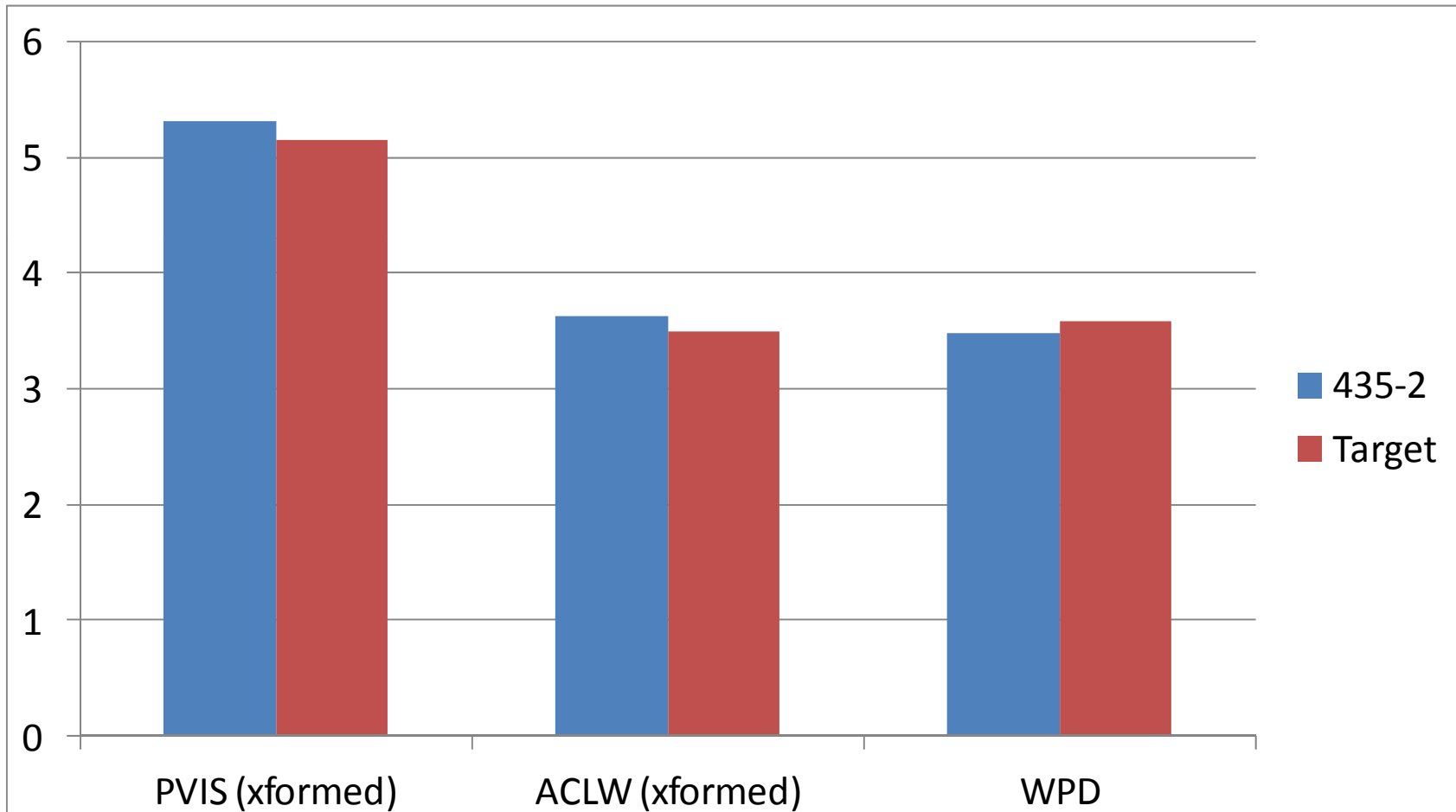
RO 435-2 Results for Oil Consumption



RO 435-2 Results for Phos Retention



Comparison of Mean Performance of 435-2 (n= 7) with 435 targets



All 435-2 results severity adjusted using candidate model, where appropriate.

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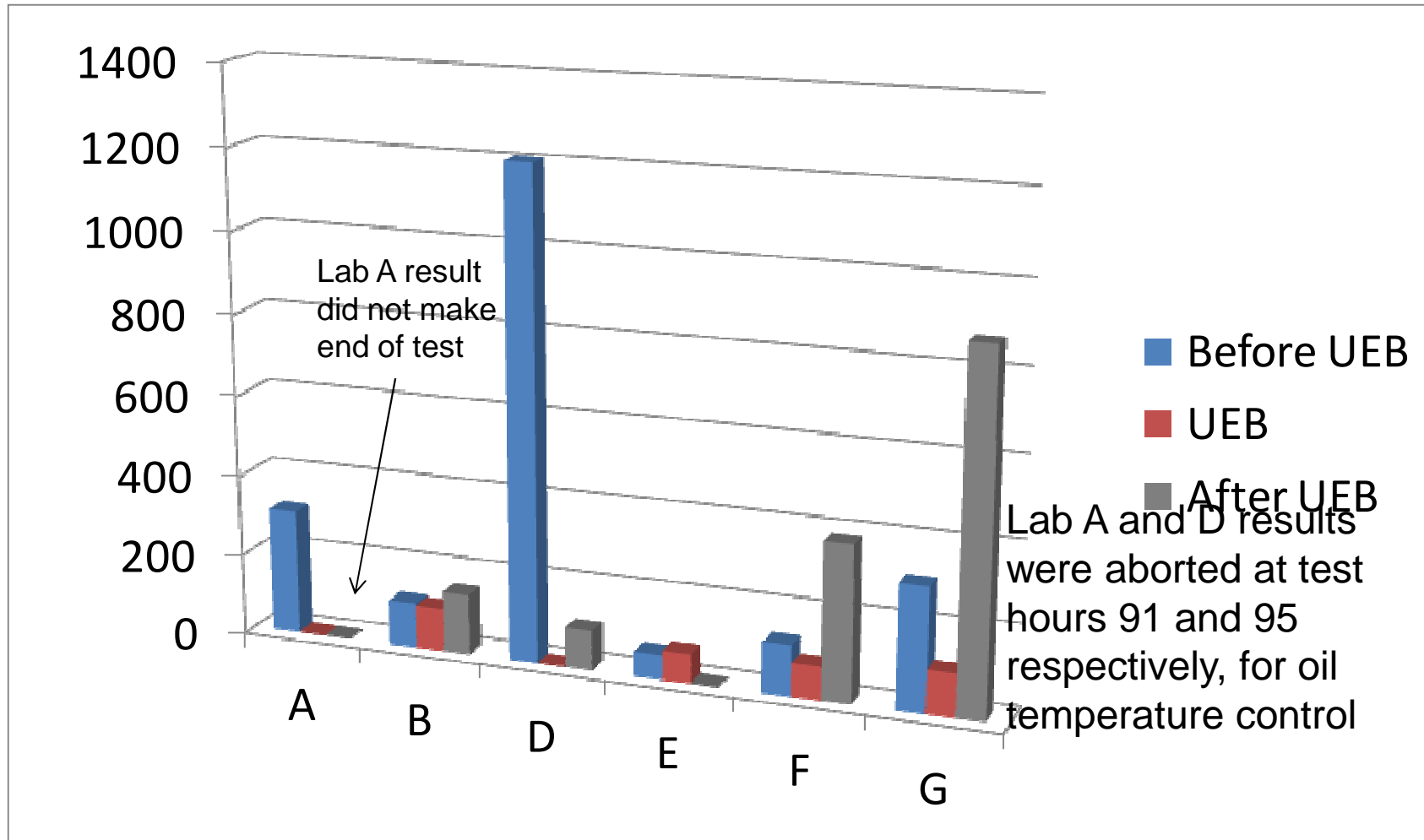
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Sequence IIIG UEB Results

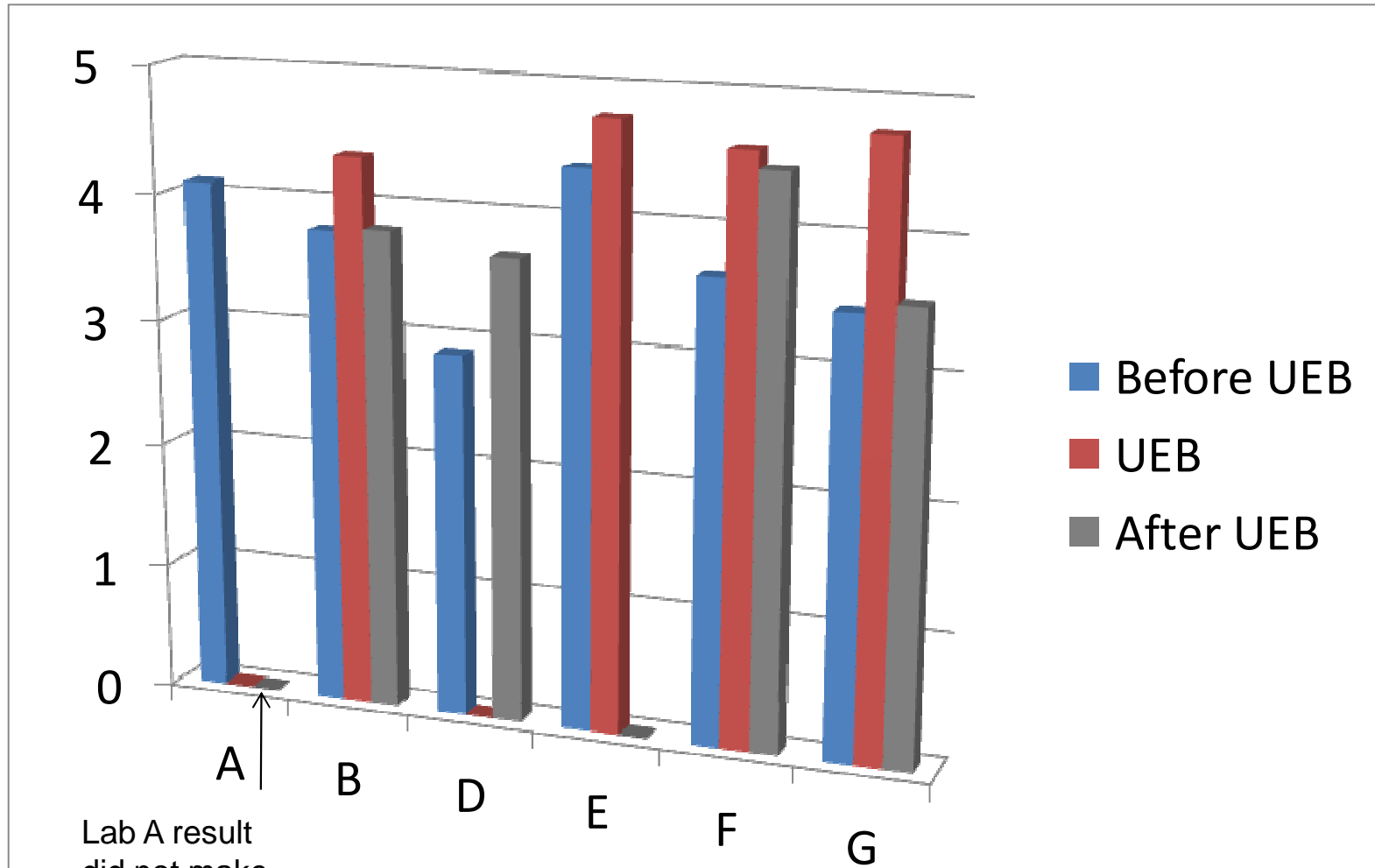
Sequence III Surveillance Panel

August 4, 2011

RO 434-1 Results for PVIS



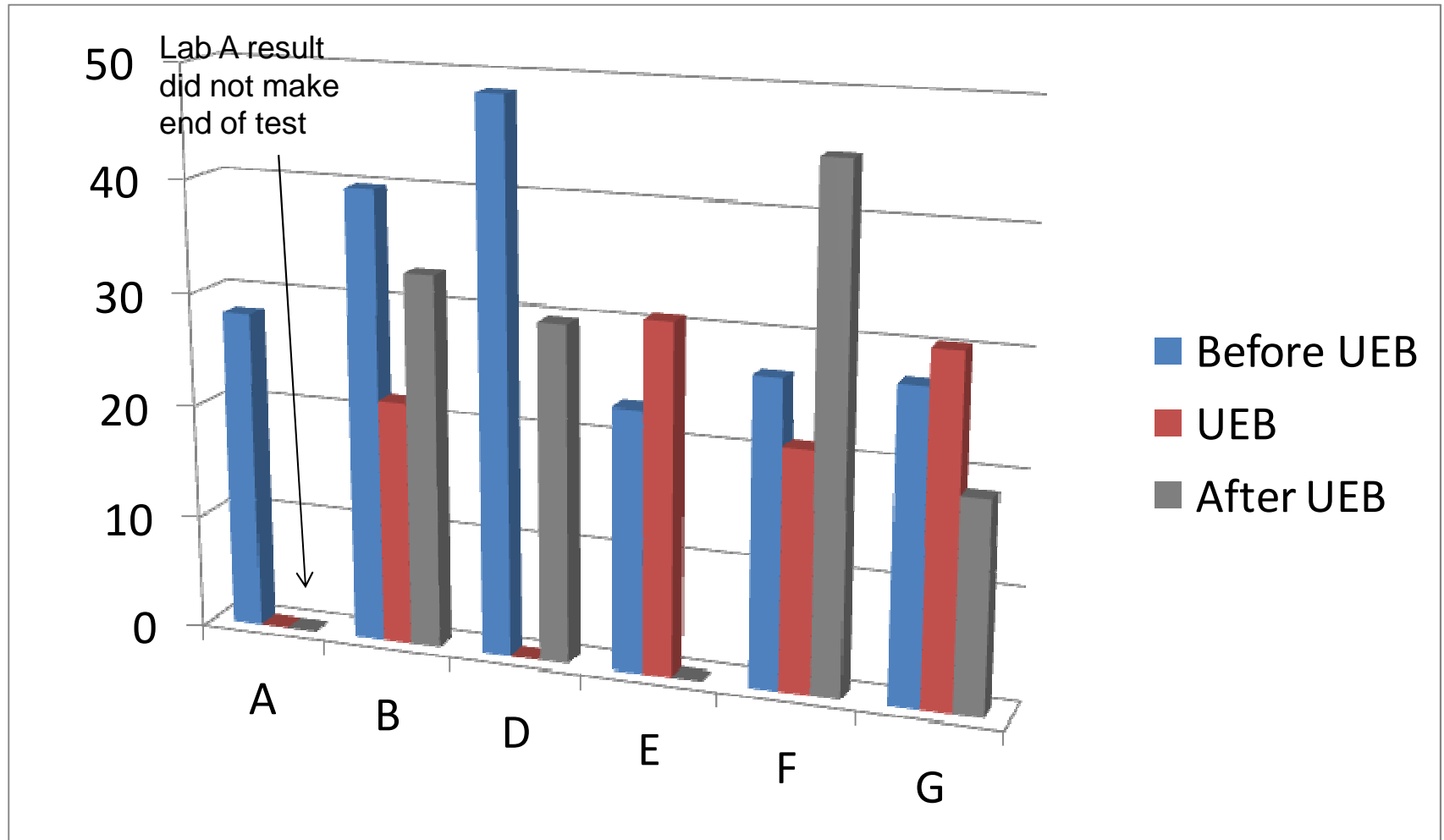
RO 434-1 Results for WPD



Lab A result
did not make

9/22/2011
end of test

RO 434-1 Results for ACLW



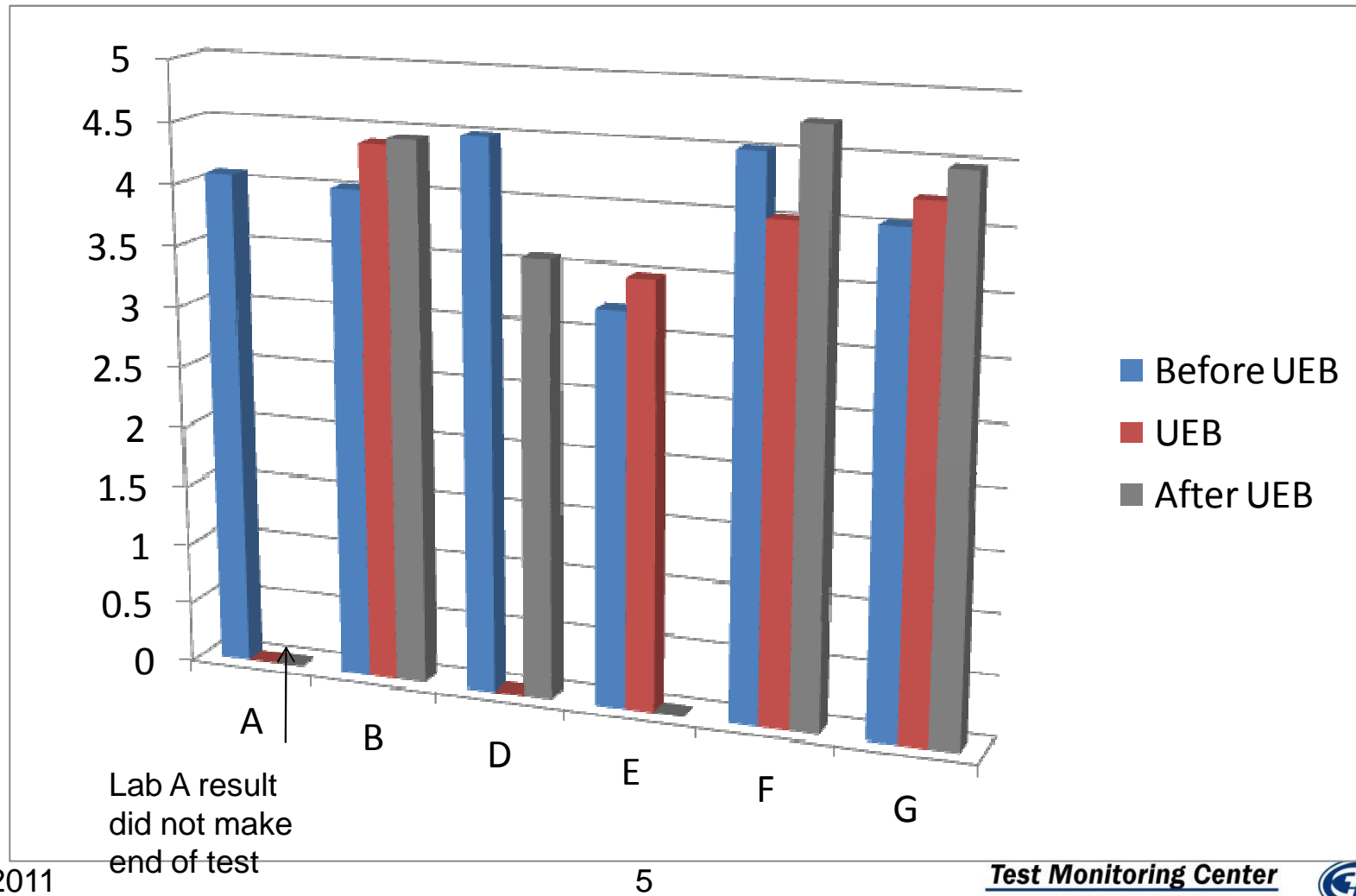
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RO 434-1 Results for Oil Consumption



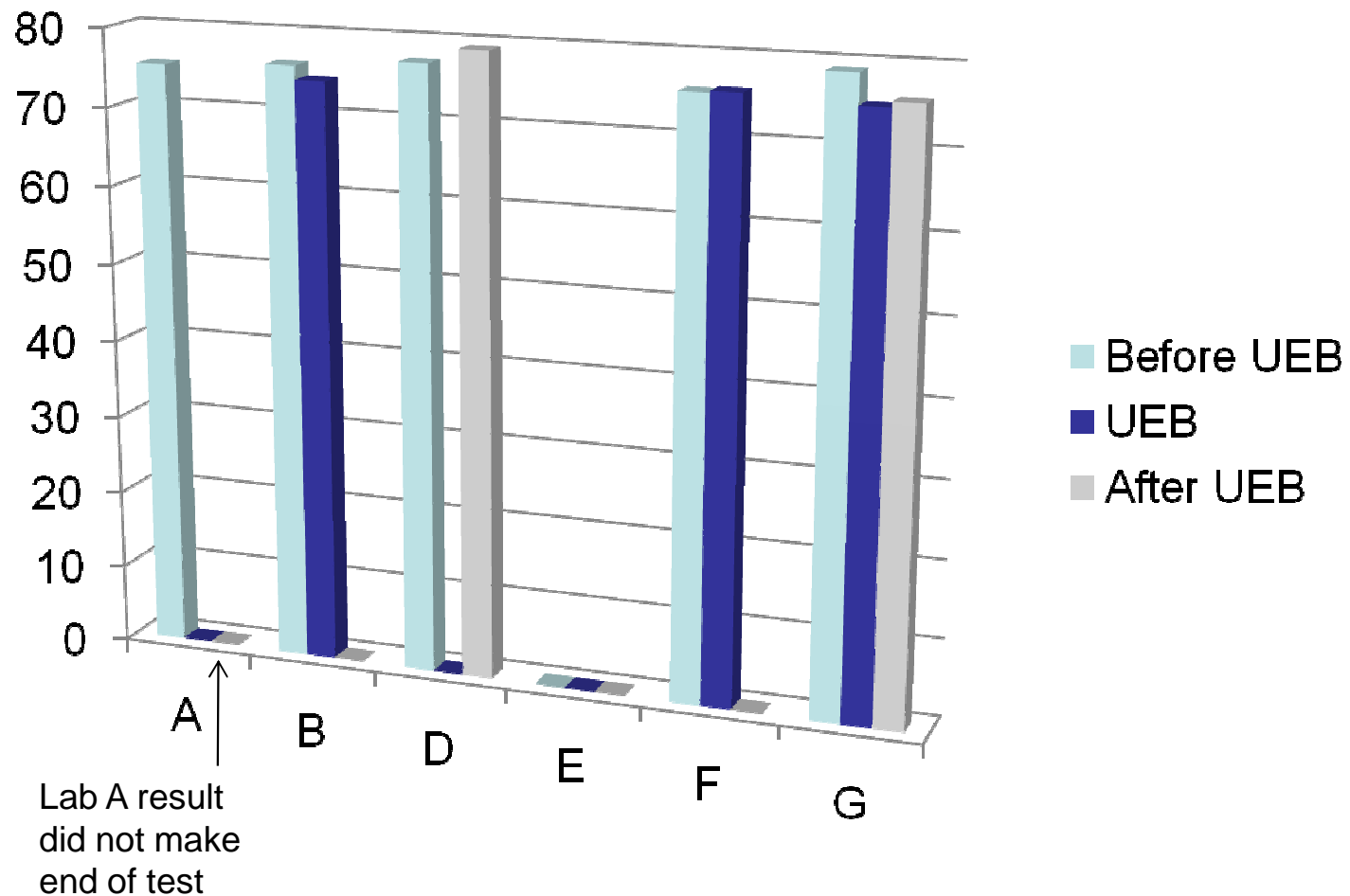
9/22/2011

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RO 434-1 Results for Phos Retention



9/22/2011

6

SEQ. III TEST HARDWARE CONTROL

A Template for Sequence III
Test Hardware Control
Procedures to be used by
Seq. III Surveillance Panel

Overview

- **Purpose of Hardware Control**
- **Planning**
- **Organization**
- **Control**
- **Feedback Information**
- **Industry Material Balance**
- **Summary**

Purpose of Hardware Control

- **Maintain and improve quality of hardware.**
- **Consistent quality of hardware between laboratories and batches.**
- **Availability.**
- **Accountability and traceability.**
- **Concurrent parts turnover within industry.**
- **Concurrent parts phase out.**
- **Ability to track and quantify industry severity and/or precision shifts as they relate to hardware.**

Planning

- Define parts by category and Supplier

- Parts Definitions (*Appendix 1*)

<u>Category</u>	<u>Supplier</u>
Critical Parts	CPD
Special Parts	CPD
Non-Production	CPD
Service parts	Test Developer / Sponsor
Test Developer / Sponsor print parts	Test Developer / Sponsor
Test Fuel	Central Fuel Supplier

- Parts usage and procurement procedures

- These procedures will be issued via information letter for inclusion in test procedure.

Control

- **Test Developer / Sponsor**
 - Select Central Parts Distributor (CPD) based on qualification criteria (**Appendix 2**)
 - Service Parts – Monitor availability of material and part number changes.
 - Test Developer / Sponsor print parts – Revise as required.
- **Surveillance Panel**
 - Receives Test developer / Sponsor report regarding any service parts issues.
 - Receives Central Parts Distributor report – Includes rejections, hardware availability, technical memos, batch changes and other hardware related issues.
 - CPD Review – Performed on a continual basis.
 - Receives Central Fuel Supplier report – Includes notification of any changes in fuel batches, after treatment rates and availability.
 - Information Letters – Issues information letter as required to modify procedure with regards to hardware.
- **Test Monitoring Center**
 - Receives hardware information page (Form 12) with serial number or batch code.
 - Analyzes and reports issues that correlate to specific hardware.
 - Audits laboratories for conformance to the test procedure.

Control

- Testing Laboratories
 - Purchase and consume parts as defined by procedure.
 - Provide Test Developer / Sponsor, Test Monitoring Center or Central Parts Distributor with rejection report immediately upon determination that material will be rejected.
- Central Parts Distributor
 - Purchase, inspect, document and distribute material per procedure (with modifications and/or specific instructions).
 - Confirms receipt of rejection as required based on input from laboratories.
 - Conducts surveys of vendors as required in order to guarantee availability.
 - Maintains critical parts database, including serial numbers or batch codes, CPD purchase order, receive date, laboratory purchase order, packing list number and inspection data as required.
 - Transfer of information as defined by accepted guidelines **(Technical and non-technical – Appendix 3)**
- Central Fuel Supplier
 - Maintain database – Including batch codes, blend date, laboratory purchase order, Certificate of Analysis and report to TMC the inspection of blend aging.
 - Keep accurate documentation of after treatment blend components.

Feedback information

- **Test Developer / Sponsor**
 - Updated service parts list furnished.
 - Advise Surveillance Panel of any parts issues.
- **Test Monitoring Center**
 - Reports on test performance versus hardware..
- **Central Parts Distributor**
 - Rejection reports summarized and reported.
 - Update service parts spreadsheet.
 - Maintain Timeline representing the introduction of batch material furnished.
 - Advise Surveillance Panel on any parts issues.
- **Central Fuel Supplier**
 - Notification to laboratories of new batch of fuel introduction.
 - Advise Surveillance Panel on specifics of blend adjustments and aging.

Industry Material Balance Plan

- CPD and Test Developer / Sponsor
 - Required to maintain a minimum six month industry inventory of critical parts.
 - Must rotate inventory by the FIFO (first in, first out) process.
 - Maintain an even balance of batches and quantities of material at the laboratories as most reasonably possible.
- Testing Laboratories
 - Must use inventory by the FIFO (first in, first out) process. (detailed Lab FIFO Procedures, Appendix 4)
 - Parts usage guidelines:

	First in First out	Maximum Single Order Quantity	Maximum in-house Inventory	Use / Rej. Required	Report Entry
Critical parts	Yes	60 days	6 months	Yes	Serial #
Non-prod. parts	Yes	N/A	6 months	Yes	N/A
Service parts	Yes	N/A	6 months	Yes	N/A

ASTM Sequence III Parts List

- See Appendix 5

Summary

- Maintain and improve quality of hardware.
- Consistent quality of hardware between laboratories and batches.
- Availability.
- Accountability and traceability.
- Concurrent parts turnover within industry.
- Concurrent parts phase out.
- Ability to track and quantify industry severity and/or precision shifts as they relate to hardware.

Parts Definitions (Appendix 1)

- **The Surveillance Panel will decide the classification of individual components based on the following definitions.**
- **Critical Parts:** Parts known to affect test severity. These parts will be identified with a serial number or a batch lot control number as supplied by the central parts distributor.
- **Service Parts:** Those remaining parts that are available through local test developer / sponsor dealer networks.
- **Non-Production Parts:** Parts no longer available except through the central parts distributor or by special order through the test developer / sponsor.
- **Special Test Parts:** Parts which do not meet all the definitions of critical parts, service parts or non-production parts, but must be obtained from the central parts distributor.

Equipment Distributor Qualifications (Appendix 2)

- The distributor must not be an oil test laboratory, a producer or user.
- The distributor shall have demonstrated previous knowledge of quality control concepts.
- In-house machine capability of the distributor is preferred, but not mandatory.
- In-house inspection capability is preferred, but not mandatory.
- The distributor will demonstrate active involvement in ASTM Panel (s) they provide parts for.
- The distributor shall have available warehousing and shipping capabilities. Split storage or warehousing capability is required to insure a constant supply of parts in the event of a natural disaster.
- The distributor must be able to demonstrate financial stability. This financial stability can be demonstrated by the ability of the distributor to stock a six month industry inventory of parts out-of-pocket.
- Distributor performance will be reviewed by the Surveillance Panel annually.
- The distributor will be chosen by the test developer based on the above guidelines.

CPD Guidelines (Appendix 3)

The CPD will act under the following guidelines with respect to information transfer:

- **Non Technical Information** – The CPD is authorized to provide a laboratory, on an as needed basis, with specific information pertaining to that laboratory's inventory / shipments and may provide overall industry inventories, both CPD in-house and shipped (i.e. batch lot codes, quantities, etc.).
- **Technical Information** – The CPD will direct any requests for technical information pertaining to Critical Parts, Non-Production Parts or CPD Special Test Parts to the test developer / sponsor. If released, test developer / sponsor will determine if the industry as a whole should receive the same information.

Lab FIFO Procedure (Appendix 4)

- **The critical hardware specified below must be consumed using this first in, first out (FIFO) procedure with regards to batch codes, pour codes and receive date.**
 - **Camshaft**
 - **Lifters**
 - **Main bearings, connecting rod bearings, camshafts bushings**
 - **Oil Filter**
 - **Oil Cooler**
 - **Pistons**
 - **Piston rings**
 - **Rocker arms**
 - **Valve springs**
 - **Valve stem seals (intake and exhaust)**

Lab FIFO Procedure (Appendix 4) con't

- **FIFO guidelines:**
 - **The order in which critical parts will be consumed is determined by the following (in order of importance):**
 - 1. Batch Code / Pour Code
 - 2. Date of Receipt at lab
 - During an engine build the lab must consume the earliest batch or pour code available.
 - If no batch information is available then critical hardware must be consumed by earliest receive date available.
 - **Recording of specified critical hardware date of receipt**
 - The laboratory will record the date (month, day, year) a critical part was received at the given lab.
 - **Ring and piston batches are engine run independent**
 - If you change to a new batch of rings or pistons for a specific engine run (Engine Run 1-6) you can not revert back to the prior batch for that specific engine run. (i.e. you may change to a new batch of rings or pistons at different intervals based on the specific engine run being built)
 - **Example:** If you change from a Batch Code 7 to a Batch Code 8 Piston on Engine Run 1, you can not consume a Batch Code 7 Piston on future Run 1 builds. You may still consume Batch Code 7 pistons on all other engine runs as long as it is the earliest available batch code.

Lab FIFO Procedure (Appendix 4) con't

- **Grace period-** Each lab will have a 90 day grace period which will begin with the first engine start (reference or candidate) of a new batch code, pour code or date of receipt where FIFO may not be possible during overlap of batch codes, pour codes and receive dates of prebuilt engines.
 - The purpose of the grace period is due to the fact that labs have engines built in advance and may have overlap with regards to batches, etc. between engines.
 - The 90 day grace period begins on the date the reference or candidate test is started.
 - After the introduction (reference or candidate test engine start) of a new batch code, pour code or date of receipt the lab will not be able to start a reference or candidate test on a prior batch code, pour code or date of receipt after 90 days.
- **TMC Reporting**
 - Lab must document and report any deviations from the FIFO procedure to the TMC. They must also provide a corrective action report to the TMC.
 - The TMC will report any deviations found during lab visits and the lab will have to provide a corrective action report to the TMC.
 - The TMC will report on a blind coded lab basis any deviations at Surv. Panel meetings.

ASTM Sequence III Parts List (Appendix 5)

SAMPLE ENTRIES

Sequence III G
Form 12
Hardware Information

Laboratory:		Oil Code:	
Test Stand No.:		Test No.:	
Laboratory Oil Code:			
Formulation / Stand Code:			

	Build Completion Date	20111025	FIFO	Oil Filter Batch Code	6
	Block Serial Number	5E10025	FIFO	Oil Cooler Batch Code (C/SP)	111026 (YYMMDD)
	Crankshaft Serial Number		FIFO	Piston Batch (Code)	26
	Camshaft Serial Number	J281107	FIFO	Piston Size (Grade)	12 <u>or</u> 34 <u>or</u> 56
FIFO	Camshaft Pour Code	PC 16	FIFO	Piston Ring Batch Code	8
	Camshaft Phosphate Batch Code	111026 (YYMMDD)	FIFO	Oil Control Ring (OC) Batch Code	15
	Cylinder Head Serial Number, Left	20H11021	FIFO	Expander Ring (EXP) Batch Code	15
	Cylinder Head Serial Number, Right	20H11022		Top Ring Gap, mils	25
	Bearing Kit Serial Number	9536		Bottom Ring Gap, mils	42
FIFO	Main Bearings (M) Batch Code	19	FIFO	Rocker Arm Batch Code	16
FIFO	Connecting Rod Bearings (CR) Batch Code	18	FIFO	Valve Springs Batch Code	10
FIFO	Camshaft Bushing (CB) Batch Code	21			
FIFO	Intake Valve Seals Batch Code	4			
FIFO	Exhaust Valve Seals Batch Code	3			
FIFO	Lifter Engine Set Number (ESET)	9130			

TABLE A2.1 Parts to be Replaced Every Test				
Part Description	Part Number	Critical	Non-Critical	FIFO
Arm, Rocker with Pivot Bearing	OHT3F-058-1	X		X
BEARING, KIT, ENGINE	OHT3F-042-3	X		X
KIT INCLUDES:				
BEARING, CONNECTING ROD, KIT, UPPER AND LOWER,	OH-106	X		X
ASSY	3F042-01	X		X
MAIN BEARING KIT, OH101 ASSY, INCLUDES:	3F042-02	X		X
BEARING, MAIN, LOWER, #1 AND 3	OH-102	X		X
Bearing, Balance Shaft Front (part of 24502388)	SKF6205-2ZNRJEM		X	
BEARING, MAIN, LOWER, #4	OH-103	X		X
BEARING, MAIN, LOWER, FLANGE, #2	OH-104	X		X
BEARING, MAIN, UPPER, FLANGE, #2	OH-105	X		X
BEARING, CAM BUSHING, POSITIONS 1 & 4	3F028-09	X		X
BEARING, CAM BUSHING, POSITIONS 2 & 3	3F028-10	X		X
Bolt, Camshaft Sp rocket	24501366		X	
Bolt, Cylinder Head, Long	25527831		X	
Bolt, Cylinder Head, Short	25533811		X	
Bolt, Flywheel	24505092		X	
Bolt, Main Cap	24503056		X	
Bolt, Main Cap, Side	24505576		X	
Bolt, Rocker Arm, Special Test	3F-058-02		X	
Bolt/Screw, Thrust Plate retainer	25519242		X	
Camshaft, Special Test, including Manganese-phosphate coating	OHT3F-008-8	X		X
Cap, Valve Spring Retainer	24502257		X	
Chain, Timing	24504668		X	
Clip, Retainer, Piston Pin	OHT3F-012-1		X	
COOLER, OIL, NICKEL PLATED, BYPASS CLOSED	OHT3F-030-2	X		X
Damper, Timing Chain (includes bolt, retaining ring)	24503893		X	
FILTER, PRO TEC	OHT3F-057-3	X		X
Gasket kit, Intake Manifold lower	89017816		X	
Gasket, Cylinder Head, left	24503802		X	
Gasket, Cylinder Head, right	24503801		X	
Gasket, Front Cover	12587003		X	
Gasket, Oil Filter Adapter	25534742		X	
Gasket, Oil Pan	OHT3G-093-1		X	
Gasket, Oil Pan	OHT3G-093-2		X	
Gasket, Oil Suction Tube	24501259 or 12581570		X	
Gasket, Rear Cover Housing	24507388		X	
Gasket, Rocker Cover	25532619		X	
Gasket, Water Outlet	24502433		X	
Gasket, Water Pump	24501565		X	
Head, Cylinder	24502260B	X		
Key, Camshaft Sprocket	24500618		X	
Key, Valve Stem Keeper	10166345		X	
Lifter, Test ACI w/Flat (25338738A)	OHT3F-029-3	X		X
PIN, PISTON WRIST, PKG. OF 6	OHT3F-014-1	X		
PISTON, TEST, RUNS 1 & 2, GRADE 12	OHT3F-053-1	X		X
PISTON, TEST, RUNS 3 & 4, GRADE 34	OHT3F-054-1	X		X
PISTON, TEST, RUNS 5 & 6, GRADE 56	OHT3F-055-1	X		X
PLATE, CAMSHAFT THRUST, .1520 in. THICKNESS	OHT3F-011-2	X		
Plug, Engine Block Core Hole	24500867		X	
Plug, Cylinder Head Cup	24502262		X	
Plug, Engine Block, Oil Gallery	3835577		X	
Plug, Ignition Spark	NGK TR-6		X	
Plunger, Oil Relief	25530949		X	
PUSHROD, SPECIAL LENGTH, PKG. OF 12	OHT3F-007-1	X		
RETAINER CLIP, PISTON PIN PKG. OF 12	OHT3F-012-1	X		
1 EA. RING, PISTON, RUN 1, ENGINE SET	OHT3G050-RUN1	X		X
1 EA. RING, PISTON, RUN 2, ENGINE SET	OHT3G050-RUN2	X		X
1 EA. RING, PISTON, RUN 3, ENGINE SET	OHT3G051-RUN3	X		X
1 EA. RING, PISTON, RUN 4, ENGINE SET	OHT3G051-RUN4	X		X
1 EA. RING, PISTON, RUN 5, ENGINE SET	OHT3G052-RUN5	X		X
1 EA. RING, PISTON, RUN 6, ENGINE SET	OHT3G052-RUN6	X		X
ROCKER ARM ASSEMBLY (Includes: 3F058-02)	OHT3F-058-1	X		X
Rod, Connecting (powdered metal)	12593374	X		
Seal, Crankshaft Front Oil (24504098)	OHT3G-092-1		X	
Seal, Crankshaft Rear Oil (25534760)	OHT3G-091-1		X	
SEAL, EXHAUST VALVE STEM	OHT3F-061-1	X		X
SEAL, INTAKE VALVE STEM	OHT3F-060-1	X		X
Spring, Oil Relief Valve	1262505		X	
SPRING, VALVE Special Test (COLOR CODE PINK)	OHT3G-059-1	X		X
Sprocket, Camshaft	24505306		X	
Valve, Exhaust (STD)	12579949		X	
Valve, Intake (STD)	12569550		X	

TABLE A2.2 Parts to be Replaced As Needed

Part Description	Part Number	Critical	Non-Critical	FIFO
ADAPTER, BLOWBY BREATHER TUBE	OHT3F-040-1		X	
ADAPTER, OIL FILTER	OHT3F-035-1		X	
Adapter, Oil Filter, with External Bypass	OHT3F-080-1		X	
Adapter, Throttle Body, Air Inlet	OHT3F-001-2		X	
Balancer, Harmonic	12563265		X	
Bearing, Balance Shaft Front (part of 24502388)	SKF6205-2ZNRJEM		X	
Block, Engine Assembly	24502286	X		
Bolt, Connecting Rod	11610158		X	
Bolt, Counter Balance Gear	24501367		X	
Bolt, Counter Balance Shaft retainer	24500055		X	
Bolt, Engine Front Cover	24504712		X	
Bolt, Harmonic Balancer	24504736		X	
Bolt, Lower Intake	9440227		X	
Bolt, Oil Filter Adapter	24504713		X	
Bolt, Oil Pan	11610052		X	
Bolt, Oil Suction Tube	24505570		X	
Bolt, Rear Cover Housing	11518075		X	
Bolt, Rocker Cover	24502164		X	
Bolt, Screw Camshaft Sensor	25526395		X	
Bolt, Screw, Oil Gearotor, Cover	25519242		X	
Bolt, Stud Type, Front Cover & Crankshaft Sensor (long)	24504718		X	
Bolt, Stud Type, Front Cover & Crankshaft Sensor (short)	24504717		X	
Bolt, Upper Intake Long	24505205		X	
Bolt, Upper Intake Short	24506498		X	
Bolt, Upper Intake, Stud	24502453		X	
BRACKET, BREATHER TUBE	OHT3F-041-1		X	
BREATHER TUBE, S.S. MATERIAL	OHT3F-075-1		X	
Bushing, Balance Shaft Rear	24503193		X	
BUSHING, ROCKER COVER	OHT3F-028-1		X	
BUSHING, ROCKER COVER	OHT3F-028-2		X	
Coil, Ignition	10472401 or 89056799		X	
CONNECTOR, MODIFIED FOR LENGTH, GM PN 24502883	OHT3F-039-2		X	
COVER, FRONT, IMPREGNATED	OHT3G-085-1		X	
COVER, Rear, crankshaft rear seal housing	OHT3G-088-1		X	
Cover, Oil Gearotor	25521935		X	
Cover, Rocker Arm Valve Cover Left Side Plastic	12590366		X	
Crankshaft	24502168	X		
DIP STICK, METRIC, EXTENDED LENGTH	OHT3G-064-1		X	
FITTING, OIL FILTER ADAPTER	OHT3F-043-1		X	
FLYWHEEL, MANUAL, MODIFIED P.N. 24503285	OHT3F-020-2	X		
GASKET, EXHAUST, END PLATE	OHT3F-009-1		X	
GASKET, EXHAUST, FLANGE, METAL	OHT3F-018-1		X	
Gasket, Manifold, Upper Intake	89017556		X	
GASKET, OIL COOLER, PKG. OF 50	OHT3F-074-1		X	
GASKET, OIL FILTER, PKG. OF 50	OHT3F-062-1		X	
Gear, Balanceshaft Drive	24504792		X	
Gear, Balanceshaft Driven	24503524		X	
Gear, Counter Balance Drive	24504792		X	
Gear, Counter Balance Shaft	24503524		X	
Grommet, Rocker Arm Valve cover bolt	25534749		X	
HARNESS, COIL PACK SEGMENT	3F022-2	X		
HARNESS, FUEL INJECTOR SEGMENT	3F022-1	X		
HARNESS, WIRING, DYNO W/OHT3F-056-1 SENSOR	OHT3F-022-1	X		
HOUSING, ASSEMBLY, BYPASS VALVE	OHT3F-084-1		X	
Injector, Fuel	17120601		X	
Key, Crankshaft	12563282		X	
Magnet, Camshaft Position Sensor	10456195		X	
MANIFOLD, CAST IRON	OHT3F-003-0		X	
MANIFOLD, EXHAUST, WATER COOLED ASSY (ONE BANK)	OHT3F-003-1		X	
ASSEMBLY INCLUDES:				
1 EA. RUNNER, EXHAUST MANIFOLD	OHT3F-004-1		X	
1 EA. PLATE, REAR, EXHAUST MANIFOLD	OHT3F-005-1		X	
1 EA. ELBOW, EXHAUST, MODIFIED	OHT3F-005A-1		X	
1 EA. PLATE, FRONT, EXHAUST MANIFOLD	OHT3F-006-1		X	
2 EA. GASKET, EXHAUST, END PLATE	OHT3F-009-1		X	
1 EA. GASKET, EXHAUST, FLANGE, METAL	OHT3F-018-1		X	
Manifold, Lower Intake	24508923		X	
Manifold Kit, Upper Intake	89017272		X	
METER, BLOWBY	RX-116169-A1 REV N		X	
Module, Coil Pack	12617924		X	
MOUNT FRONT ENGINE W/ BOLT PATTERN FOR COIL PACK	OHT3F-026-1		X	

TABLE A2.2 Parts to be Replaced As Needed

Part Description	Part Number	Critical	Non-Critical	FIFO
MOUNT, REAR ENGINE HOUSING W/AIR STARTER, MUFFLER & SHIM PACK	OHT3F-025-1		X	
ASSEMBLY INCLUDES:				
STARTER, AIR	3F025-03		X	
MUFFLER, STARTER, AIR	3F025-04		X	
SHIM PACK, STARTER, AIR	3F025-05		X	
MUFFLER, STARTER, AIR	3F025-04		X	
Nut, Throttle Body Fuel Rail Retainer	3530297		X	
Nut, Throttle body Retainer	3530297		X	
OIL FILTER HOUSING ASSEMBLY, NO BYPASS, IMPREGNATED	OHT3G-080-1		X	
OUTLET, COOLANT	OHT3F-034-1		X	
PAN, IHF TEST, NICKEL PLATED	OHT3F-073-1		X	
PCM, SPECIAL	OHT3F-021-1	X		
PCV, DUMMY	OHT3F-002-1		X	
Pin, Cylinder Head Locating	25536320		X	
Pin, Front Cover Lower	25536323		X	
Pin, Front Cover Upper	25536323		X	
PLATE, EGR BLOCKOFF	OHT3F-024-1		X	
PLATE, FRONT, EXHAUST MANIFOLD	OHT3F-006-1		X	
PLATE, REAR, EXHAUST MANIFOLD	OHT3F-005-1		X	
PLATE, WATER PUMP HOUSING	OHT3F-031-1		X	
Plug, Auto Hex, Socket, (Main Oil Gallery Block Off)	444777		X	
PLUG, DIP STICK	OHT3F-065-1		X	
PLUG, DRAIN, MODIFIED	OHT3F-063-1		X	
Pump, Oil, Gearoter Set	24505433		X	
Rail, Fuel Injector	12587077		X	
REAMER, DIP STICK AND DIP STICK HOLE PLUG	OHT3F-071-1		X	
Regulator, Fuel Pressure, on Rail	89017530 or 89060416		X	
Retainer, Counter Balance, Timing Chain Oiler	24500374		X	
Retainer, Rocker arm (replace after 6 tests)	24502278		X	
RUNNER, EXHAUST MANIFOLD	OHT3F-004-1		X	
Screen, Oil pump (w/suction pipe)	24505569		X	
Seal, Ignition Coil	1989579		X	
Seal, oil pan drain plug (o ring)	3536966		X	
Sensor, Camshaft Position	10456148		X	
Sensor, Crankshaft Position	10456161		X	
Sensor, MAF	19112543 or 19179715		X	
SENSOR, MODIFIED COOLANT TEMPERATURE	OHT3F-056-1		X	
Shaft Assembly, Counter Balance	24506557		X	
Shield, Crankshaft Position Sensor	24506440 or 12591982		X	
SHIM PACK, STARTER, AIR	3F025-05		X	
SHIM, STEEL, 0.127 mm THICK, 10 PER PKG.	OHT3F-072-005		X	
SHIM, STEEL, 0.254 mm THICK, 10 PER PKG.	OHT3F-072-010		X	
SHIM, STEEL, 0.381 mm THICK, 10 PER PKG.	OHT3F-072-015		X	
SHIM, STEEL, 0.508 mm THICK, 10 PER PKG.	OHT3F-072-020		X	
SHIM, STEEL, 0.787 mm THICK, 10 PER PKG.	OHT3F-072-031		X	
SLEEVE, VALVE STEM PROTECTORS (PKG. OF 100)	OHT3F-070-1		X	
SPROCKET, CRANKSHAFT, SPECIAL 2 PC	OHT3F-036-1		X	
STARTER, AIR	3F025-03		X	
Stud, front cover (2)	24504717		X	
Stud, front cover (2)	24504718		X	
Support, throttle body	24504697		X	
Throttle Body (2 Bolt Mass Air Flow Sensor)	24507235		X	
TOOL, CAMSHAFT BUSHING INSTALLATION	OHT3F-019-2		X	
TOOL, OIL PUMP PRIMER	OHT3F-038-1		X	
Tube, throttle body to fuel pressure regulator	24505671		X	



Sequence III Coolant Loop Debris

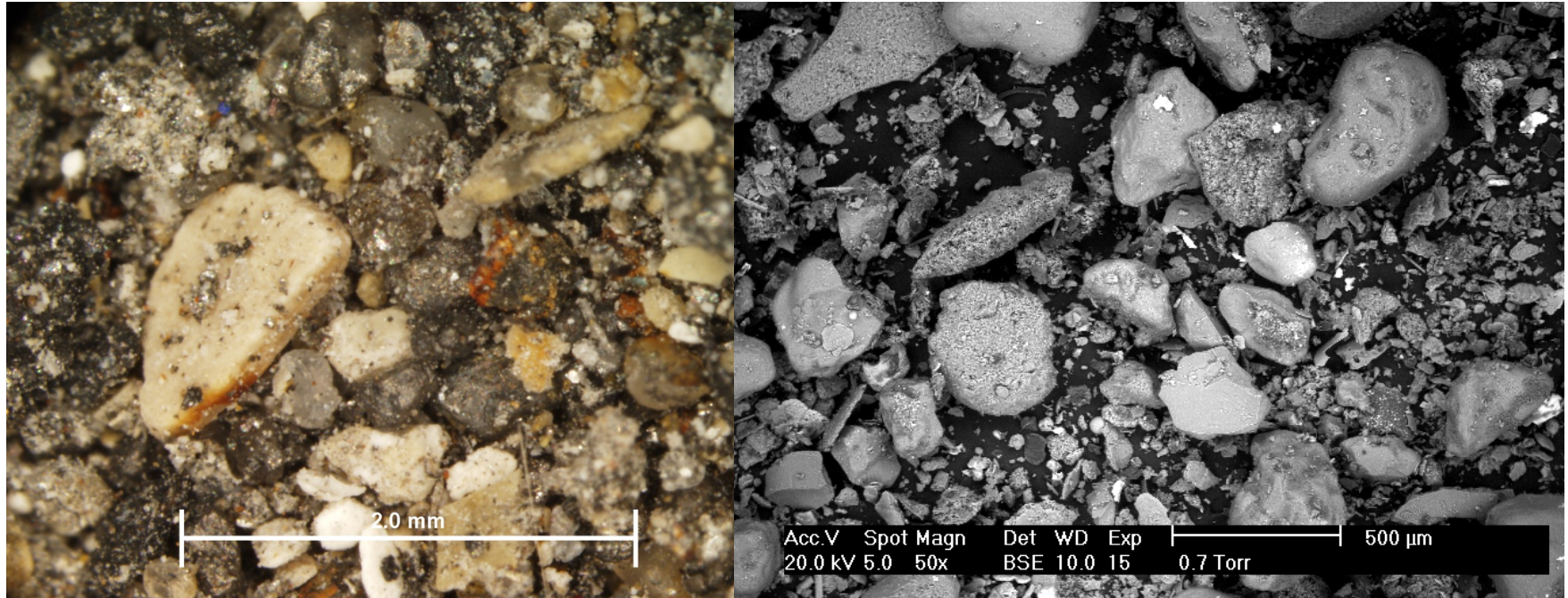
Greg Seman
03 NOV 2011

Debris Found in Main Coolant Reservoir

- Highest point of coolant system



Debris Analysis



Debris Analysis

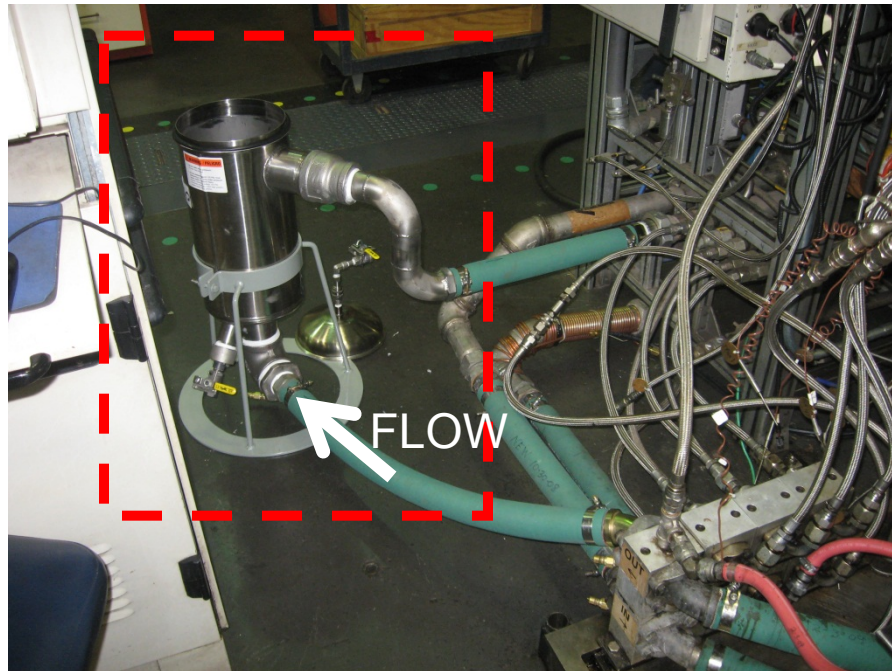
- Casting sand and binding agents from cylinder heads and block.
 - Block is used 6 times
 - Heads used once
 - Assumption was made that debris was mostly from heads
 - experiments show debris from heads and aged blocks

Problem

- Debris damages flow meters, valves, heat exchangers etc.
 - Causes more stand maintenance
- If debris collects at the highest point in the system, it is also accumulating at lower areas
 - Main H/E plugging
 - reduced coolant flow / less control

Solution; Strainers

- Must be compatible with test requirements
 - 100% Glycol
 - 160 L/min
 - 115C+



Strainer Element



Mesh size is selectable

Strainer MFG

- <http://millerleaman.com/>

Summary of Key Test Component Inventory

Sequence III Surveillance Panel

November 3, 2011

D. Glaenzer, Sequence III SP Chairman



Key Test Components

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

- Inventory at GM Racing and Test Labs

Component Inventory

- 12593374 Connecting Rods
 - GM Racing 13,363 pieces
 - Labs 833 pieces
 - Total 14,196 pieces (2366 runs)

Based on 6 pieces per run

- 24502168 Crankshaft
 - GM Racing 384 pieces
 - Labs 62 pieces
 - Total 446 pieces (2676 runs)

Based on 6 runs per crankshaft

Component Inventory (cont.)

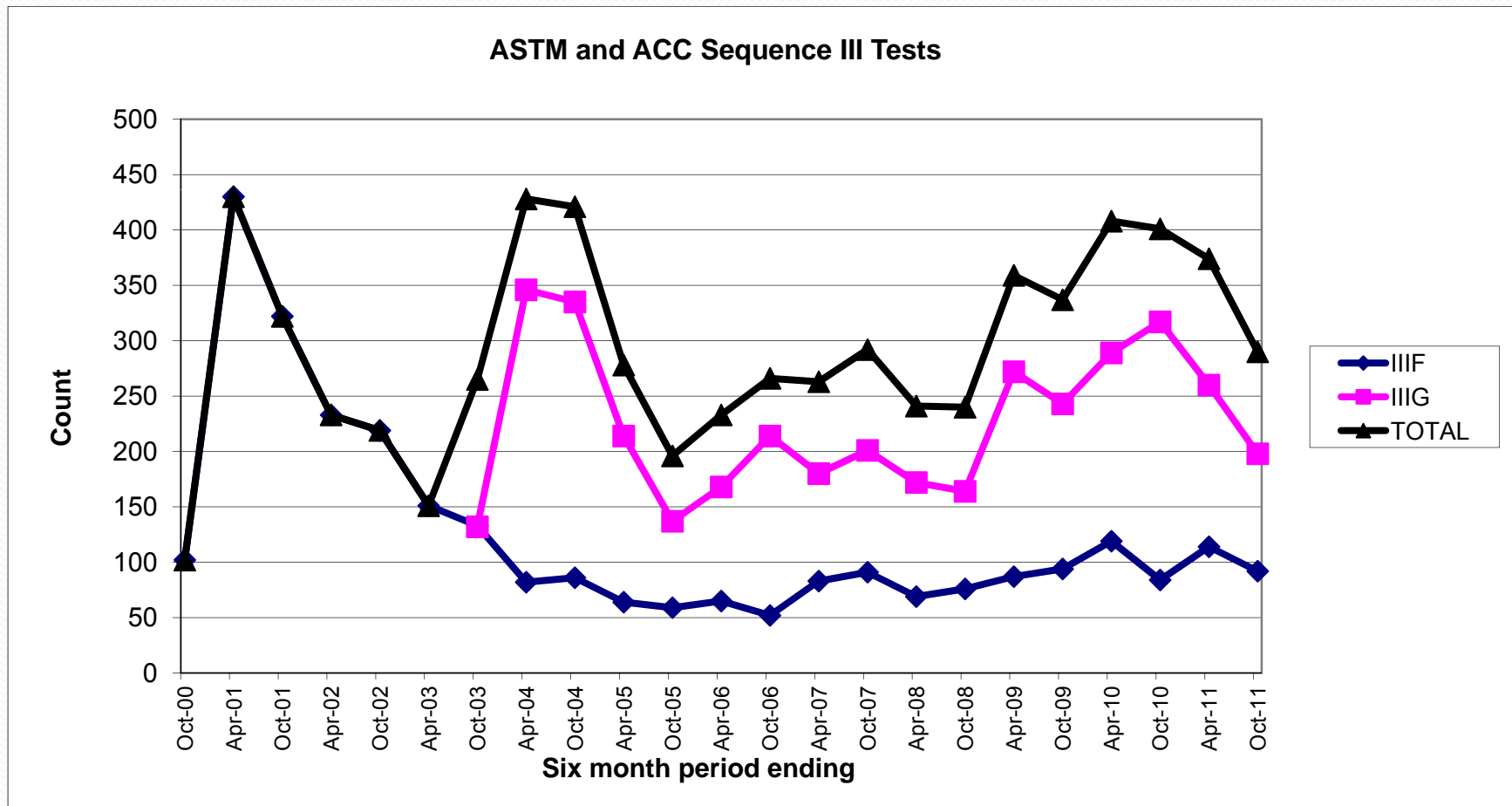
- 24502286 Cylinder Case (Block)
 - GM Racing 326 pieces
 - Labs 40 pieces
 - Total 366 pieces (2196 runs)

Based on 6 runs per block

- 24502260B Cylinder Head
 - GM Racing 3778 pieces
 - Labs 304 pieces
 - Total 4082 pieces (2041 runs)

Based on 2 heads per run

Sequence III Test Activity





Sequence III Test Longevity

With >2000 runs available, we should be OK through 2015.

Estimates

2010	1000	<u>consumed ~850 in 12 months</u>
2011	800	<u>consumed ~700 in 12 months</u>
2012	600	
2013	500	
2014	500	
2015	400	
TOTAL	3800	