

# Sequence III Surveillance Panel Teleconference Meeting Minutes

November 13, 2012

11:00 EST

## 1.0) Roll Call

Attendance is shown in Attachment 1.

## 2.0) Approval of minutes

2.1) The minutes from March 28, 2012 were approved without objection.

## 3.0) Action Item Review

### **3.1) 03/28/12 - Continue to use RO 435 targets for RO 435-2 until next review. Grundza -- Attachment 2**

Rich Grundza summarized the data shown in the attachment. After brief discussion, it was moved (**Grundza, Altmann**) to continue using RO 435 targets until 30 tests are reached and the data reviewed at that time. The motion passed without objection.

### **3.2) 03/28/12 – SwRI to review their FTIR data on RO 434 and RO 434-1 used oil samples for any differences between the two blends. SwRI to forward this data to Doyle Boese for statistical review. Lang/Boese**

SwRI has sent their data to Doyle Boese. Pat Lang reminded the group that this was an exercise to see if oxidation/nitration data is related to viscosity increase severity differences in ROs 434 and 434-1. Doyle noted that oxidation results begin to differ between the two oils at about 100 hours. The data is bimodal and using an appropriate statistical test, Doyle was unable to find a significant difference between the oils. Doyle also noted that there are timeframe differences in the data as well and he will try to account for that as he continues work on the issue. A request was put to other labs for data to assist in the study.

Bruce Matthews noted that measuring old oil samples is not of value.

### **3.3) 03/28/12 – TMC to review IIIG LTMS wording for potential improvements to Section 5. Grundza**

No action has been taken; it will remain an open action item.

## 4.0) Old Business

4.1) None

## **5.0) Semi-Annual Reports**

### **5.1) Test Sponsor Report Matthews**

Report not discussed at this meeting.

### **5.2) Test Monitoring Center Report Grundza - report is available from the TMC:**

<ftp://ftp.astmtmc.cmu.edu/docs/gas/B01SemiAnnualReports/semiannualreports/>

Rich reviewed the Seq. III highlights from the report.

- 433-1 reblend is being investigated. Currently about 1.5 years left at TMC
- 3 labs and 5 stands calibrated for IIIF
- 6 labs and 15 stands calibrated of IIIG
- highlights of activity and severity levels

### **5.3) ACC Monitoring Agency Report Clark**

The report is available from:

<http://acc-ma.org/ftproot/docs/PCMO/IIIG/SemiannualReports/>

### **5.4) Chevy Performance / Key Test component Inventory Report Stap / Gleazer**

Scott reviewed the report shown in **Attachment 3**. About 1500 tests worth are available. Bill Buscher noted a delay of 9 months for GF-6 and asked if there are enough parts to last through September 2016. Dave Glaenzer guessed that even though usage is slightly below estimates there may still may be a parts shortage in early 2016. ***ACTION ITEM: After some discussion, it was decided that labs should secure used parts (heads, blocks, and piston pins) in an effort to extended the life of test.*** Ed Altman agreed to head up an ad hoc task force to examine additional options to extend the life of the test.

### **5.5) CPD report Bowden**

Jason supplied a report for inclusion in the minutes; **Attachment 4**.

### **5.7) Fuel Supplier Report Carter**

No Report during the call. Jim Carter provided a report for the minutes. The report can be accesses from the TMC website:

<ftp://ftp.astmtmc.cmu.edu/docs/gas/sequenceiii/minutes/2012/MiscAttachments/EEE%20Lube%209-12.xlsx>

## **6.0) New Business**

### **6.1) Liquid Soap for Parts Washer use. Leverett**

The item will be discussed at the next meeting.

### **6.2) Chrysler Oxidation Test update. Tang - Attachment 5**

Haiying Tang provided an update on the test development and background.

### **6.3) Review of Sequence IIIF PVIS parameter. Szappanos - Attachment 6**

George Szappanos and Jessica Buchanan reviewed their presentation. They stated that it may be difficult to find a shift in the severe direction without a severe reference oil. Dave Glaenzer and Charlie Leverett noted that the industry has asked for a severe oil, but none have been forthcoming. Because of how oils tend to break, EOT viscosity may not show a severe shift (slide 4). Jessica noted that at EOT the oil can be in one of three places: not yet broke, currently breaking, already broke. By defining the breaking point as when the viscosity change goes negative, Jessica was able to show a change over time in when the oil breaks. Recent data seems to indicate that 433-1 is now breaking sooner than it used to. Jerry Brys noted that the concern is that when this problem showed in RO 1006, the oil was removed from the system. Seeing this now on 433-1 may indicate a test severity issue and not a problem with the oil(s). Pat Lang concurred and noted differences in blowby levels and Pat stated that he believes the test has moved severe. Bob Campbell noted that the oil breaking phenomenon can result in incorrect severity adjustments. After some further discussion, three action items were agreed to:

**ACTION: George Szappanos agreed to lead a 'O&H' type task force to investigate the matter further.**

**ACTION: Dave Glaenzer will seek statistical support to review the matter.**

**ACTION: Dave Glaenzer to notify ACC and API of this situation.**

### **6.4) Main bearings (#2 thrust bearing condition). Bowden**

Jason noted that a customer returned a #2 thrust main bearing and OHT sent it to the vendor for analysis. The vendor stated that the stains were due to oxidation of surface chemicals and were not pits. The vendor concluded that the bearings should not fail in test.

For some conrod bearings, there appears to be a 'wave' across the surface. Samples were sent to the vendor for analysis. The vendor reports that it is variation in the plating process and should not cause performance problems.

Jason asked the panel how they'd like OHT to proceed. **ACTION: Bruce Matthews has requested samples for GM to examine and will report back their findings.** After some discussion, it was decided to pick up this topic once GM reports back.

## **7.0) Review Scope and Objectives**

7.1) Updated S & O shown in Attachment 7.

## **8.0) Next Meeting**

8.1) At call of Chairman

## **9.0) Meeting Adjourned 12:40 PM**

# ATTACHMENT 1 SEQ III TELECONFERENCE

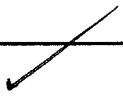




ASTM Sequence III Surveillance Panel (17 Voting members)

date: 11/13/12

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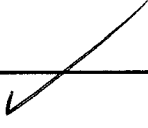

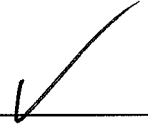


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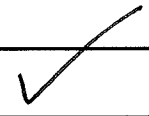
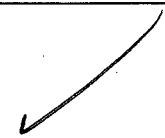


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ASTM Sequence III Surveillance Panel (17 Voting members)

date:

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ASTM Sequence III 11/13/12

Attend

RAYMOND SMART - Alton  
SCOTT STAP - GM  
KAREN HAUMANN - SWRI  
JANET BUCKINGHAM - SWRI  
GEORGE SZAPPANOS - LZ  
HAIYENG TANG - Chrysler  
JESSICA BUCHANAN - LZ

RETURN TO MINUTES



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# ***Test Monitoring Center***

<http://astmtmc.cmu.edu>

ATTACHMENT 2

## **Sequence IIIG 435-2 Results**

**Sequence III Surveillance Panel**

**November 13, 2012**

# Summary of Results

- 16 tests reported from six labs
- Summary in next few slides

# Target Values

Parameter	Mean	Standard Deviation
ACLW	3.4694	0.4539
PVIS	5.3137	0.3245
WPD	3.62	0.31
PHOS	82	1.39

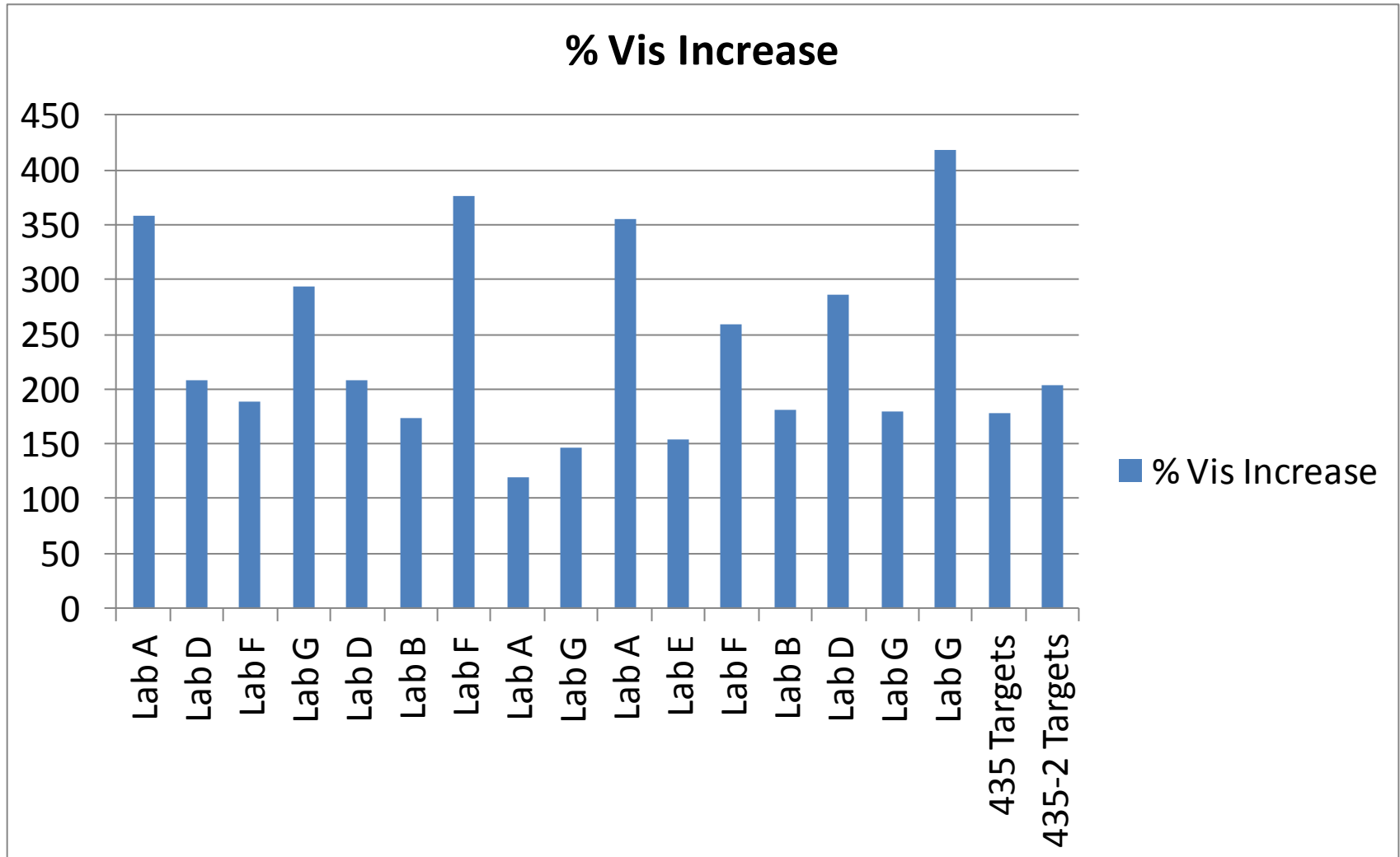
Means and standard deviations in transformed units for ACLW and PVIS

# Summary of Test Results

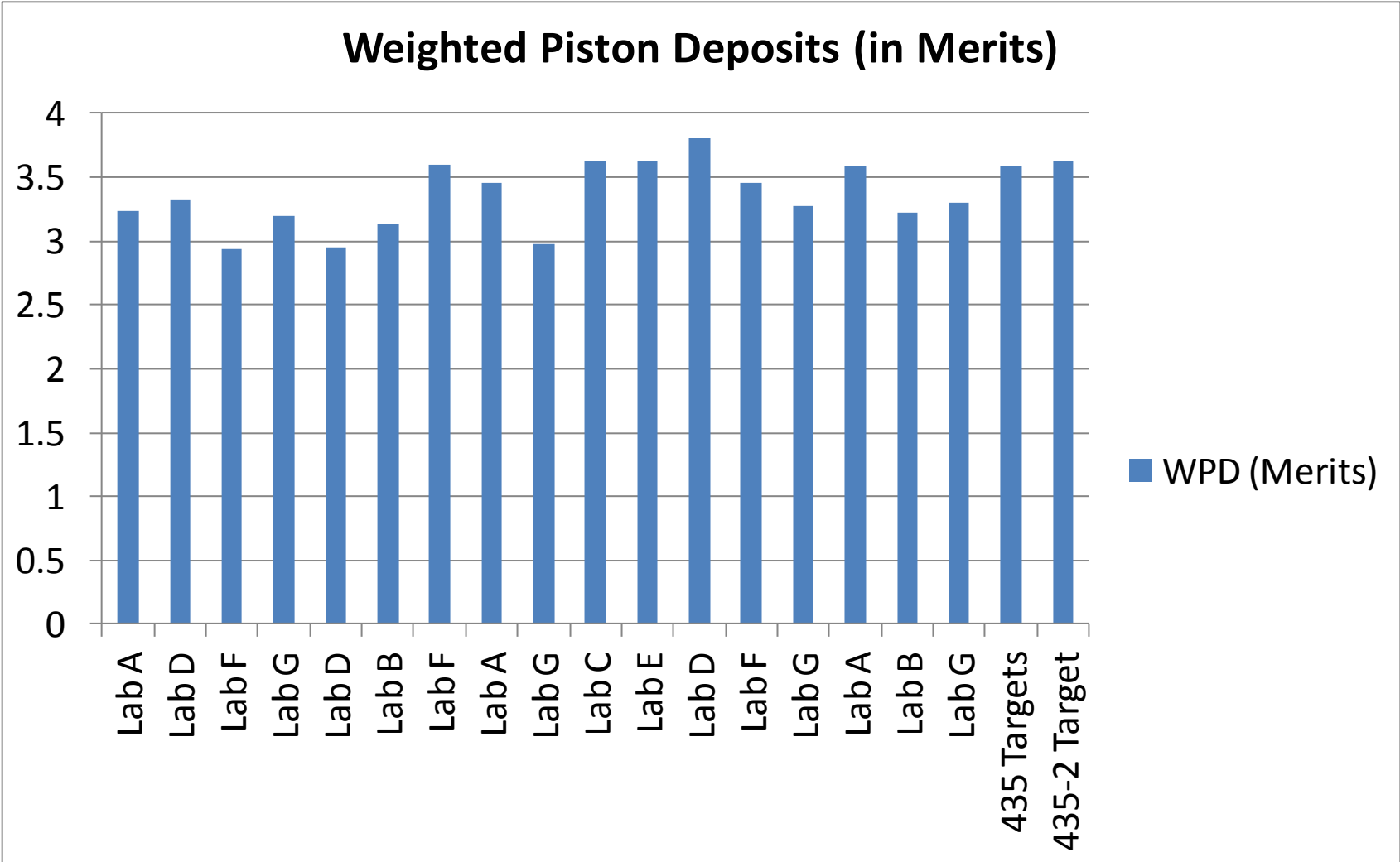
LTMSLAB	TESTKEY	PVIS	PVISTi	SA	Adjusted	ACLWti	SA	Adjusted	WPDti	SA	Adjusted
D	80559-IIIG	208.4	5.339459	0	5.339459	3.2958	0.3647	3.6605	3.33	0	3.33
A	80562-IIIG	358.4	5.88165	-0.28715	5.5945	3.5205	0.3874	3.9079	3.23	0.337	3.567
F	80561-IIIG	188.8	5.240688	0	5.240688	2.9497	0.1771	3.1268	2.94	0	2.94
G	81512-IIIG	293.7	5.682559	-0.27444	5.408121	3.1001	0.4048	3.5049	3.2	0.4164	3.6164
D	80560-IIIG	208.8	5.341377	-0.24998	5.091393	3.8754	0.1767	4.0521	2.95	0.4446	3.3946
B	80564-IIIG	173	5.153292	0	5.153292	3.6763	0.219	3.8953	3.13	0.4268	3.5568
F	82083-IIIG	376.2	5.930121	0	5.930121	3.4078	0.1908	3.5986	3.6	0.337	3.937
A	81940-IIIG	162	5.087596	-0.29715	4.790451	3.6533	0.2947	3.948	3.46	0.335	3.795
G	82617-IIIG	176.3	5.172187	-0.17878	4.993409	3.0493	0.3817	3.431	2.98	0.3734	3.3534
E	80552-IIIG	153.7	5.035003	0	5.035003	3.0865	0.1693	3.2558	3.62	0	3.62
D	80852-IIIG	286.2	5.656691	0	5.656691	2.4069	0	2.4069	3.8	0.5032	4.303
F	82084-IIIG	259.6	5.559142	-0.37931	5.179832	3.74715	0	3.74715	3.45	0	3.45
G	84613-IIIG	417.7	6.034763	-0.181521	5.853242	3.5086	0.2921	3.8007	3.27	0.4163	3.6863
A	81941-IIIG	355	5.872118	-0.378336	5.493782	2.77882	0.1993	0.297212	3.58	0.3571	3.9371
B	82079-IIIG	181.6	5.201806	0	5.201806	3.605498	0.1141	3.719598	3.22	0.4747	3.6947
G	88571-IIIG	180.3	5.194622	-0.186113	5.008509	2.5878	0.2252	2.813	3.3	0.4174	3.7174



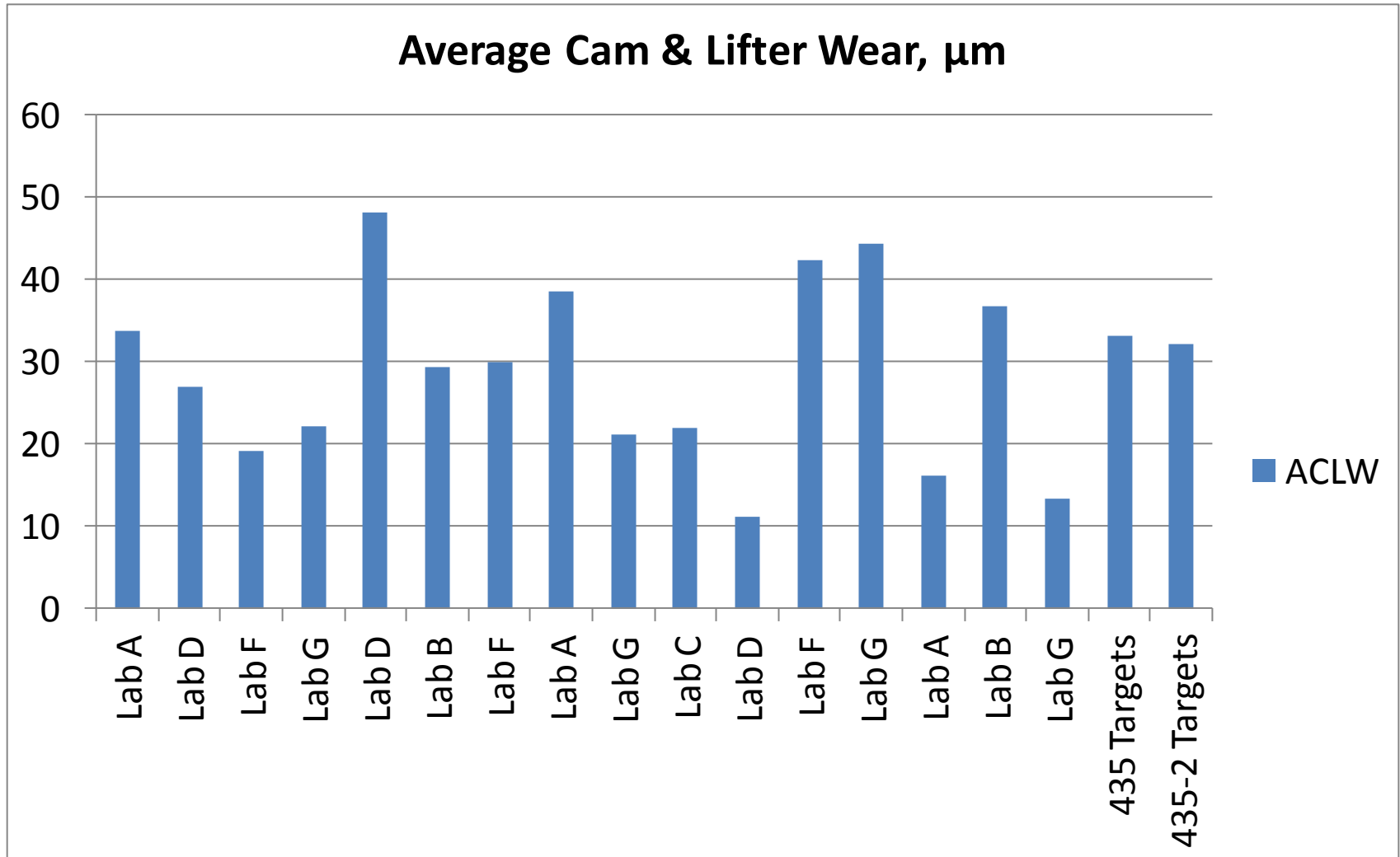
# RO 435-2 Results for PVIS



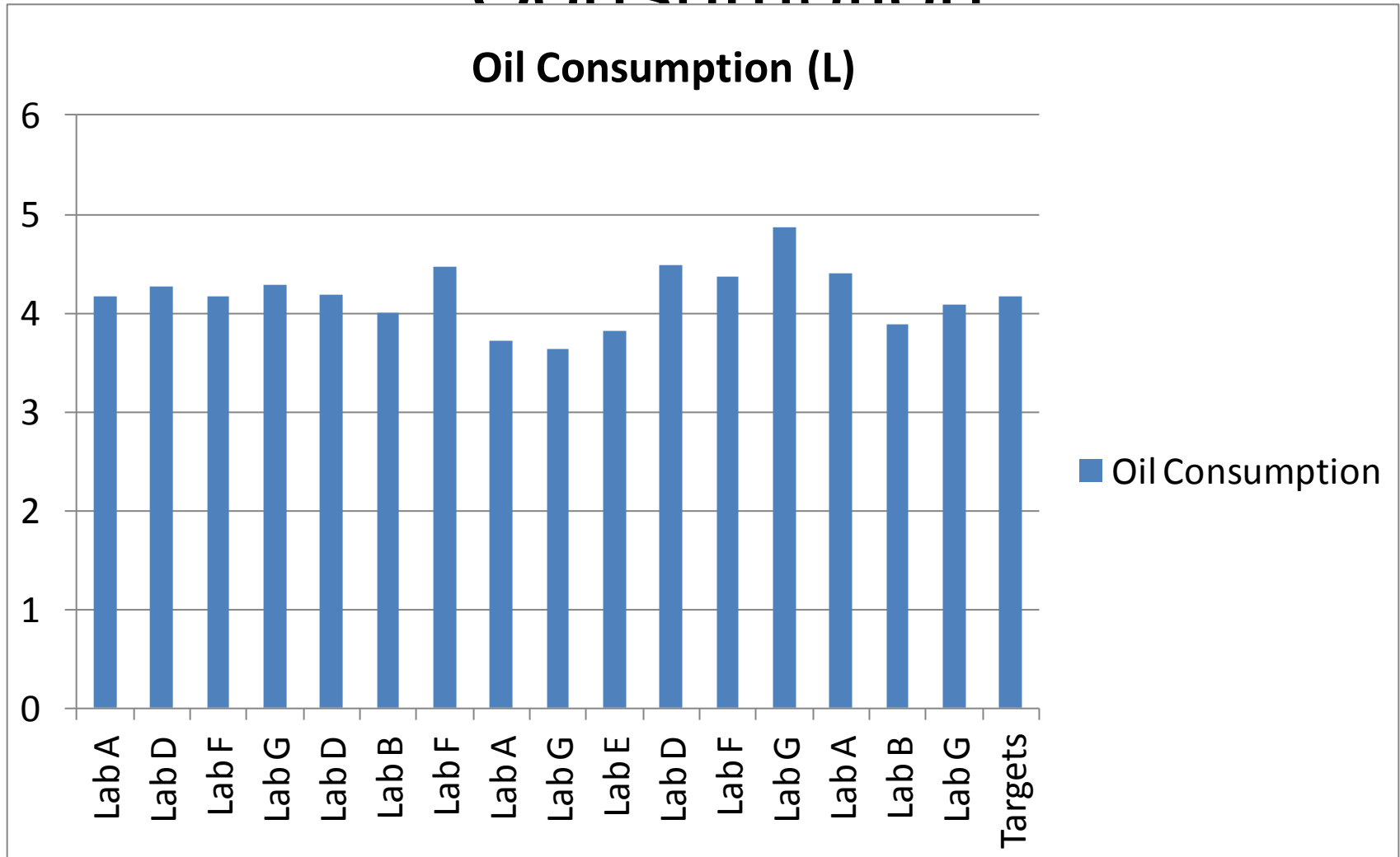
# RO 435-2 Results for WPD



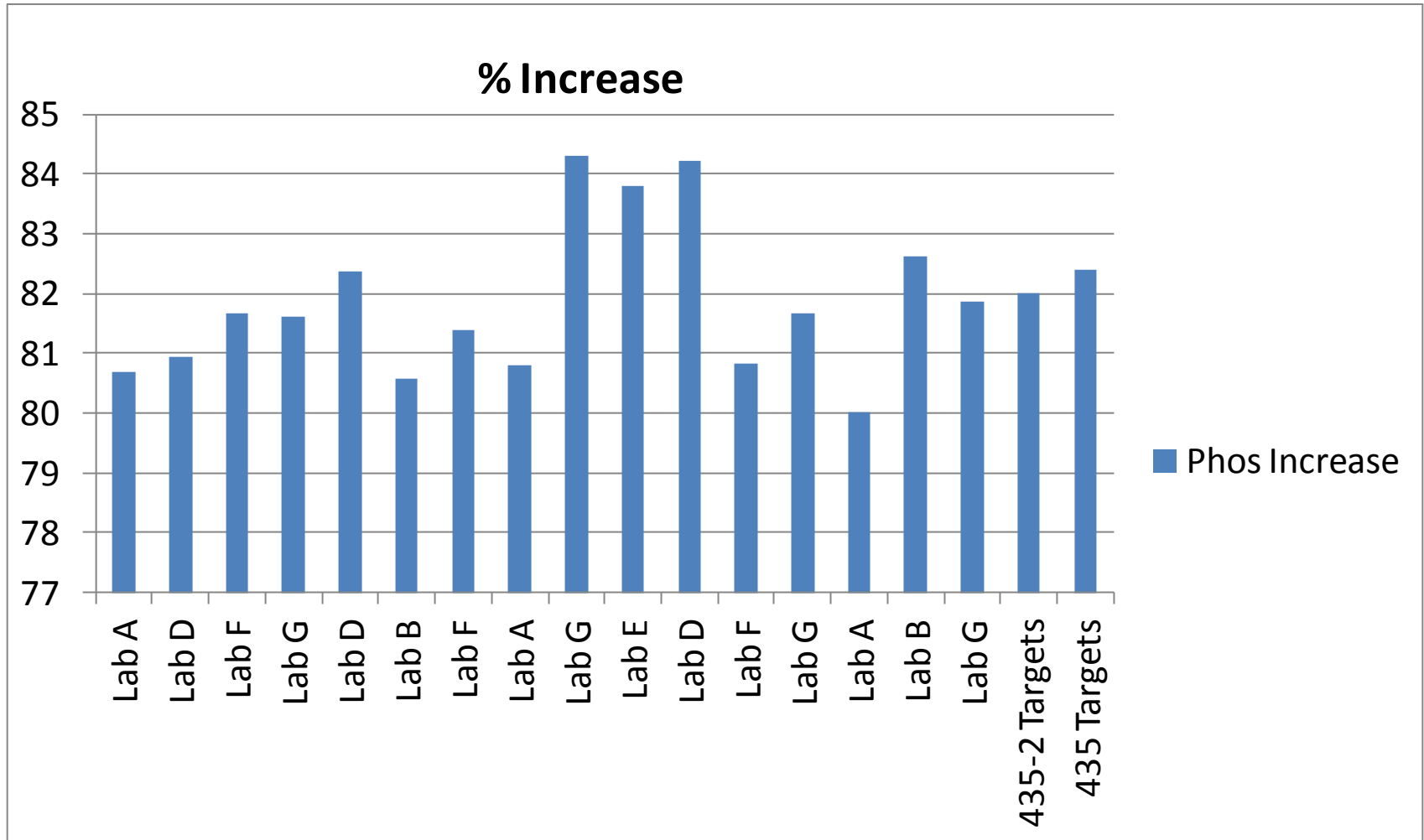
# RO 435-2 Results for ACLW



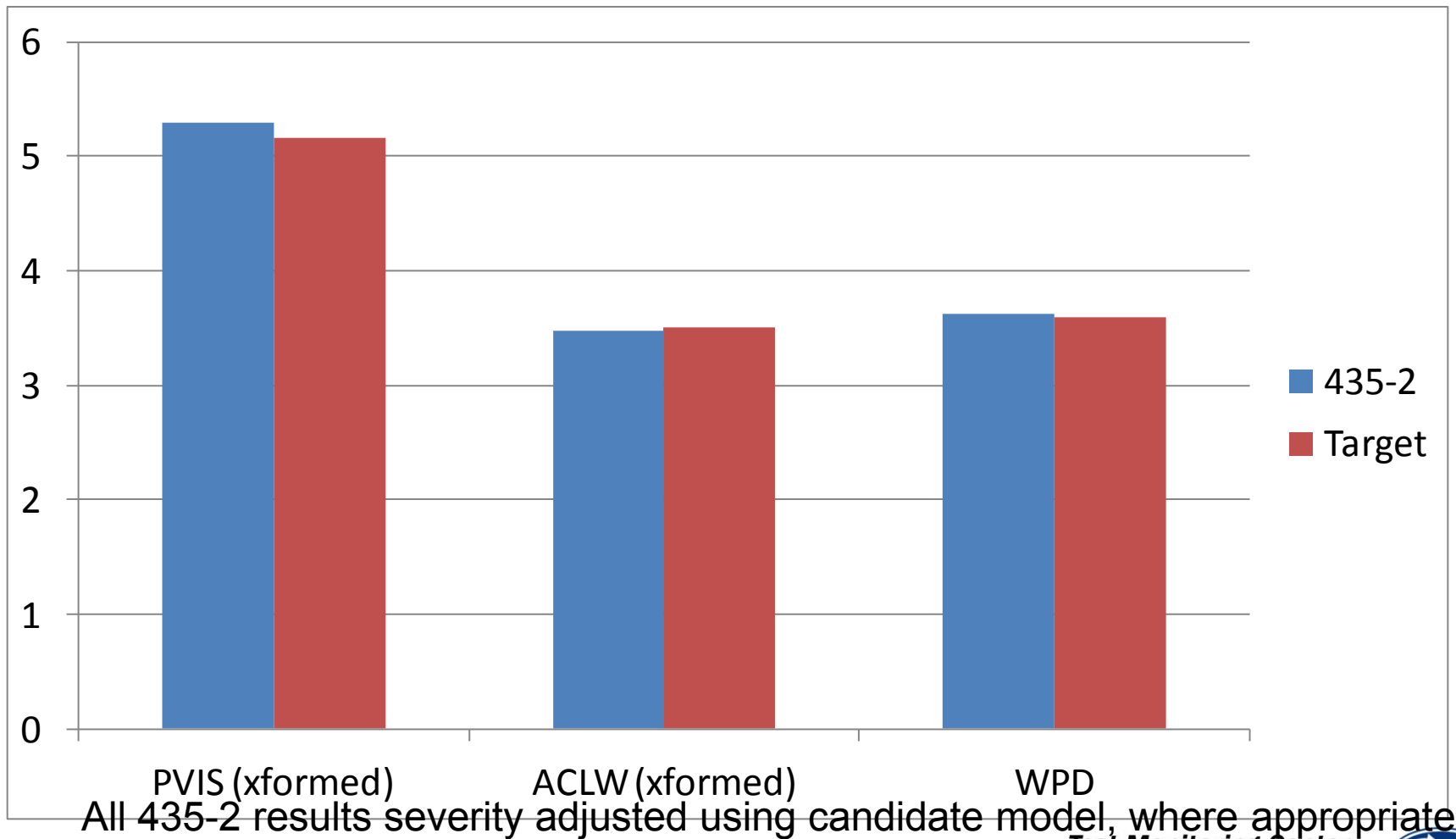
# RO 435-2 Results for Oil Consumption



# RO 435-2 Results for Phos Retention



# Comparison of Mean Performance of 435-2 (n= 16) with 435 targets



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

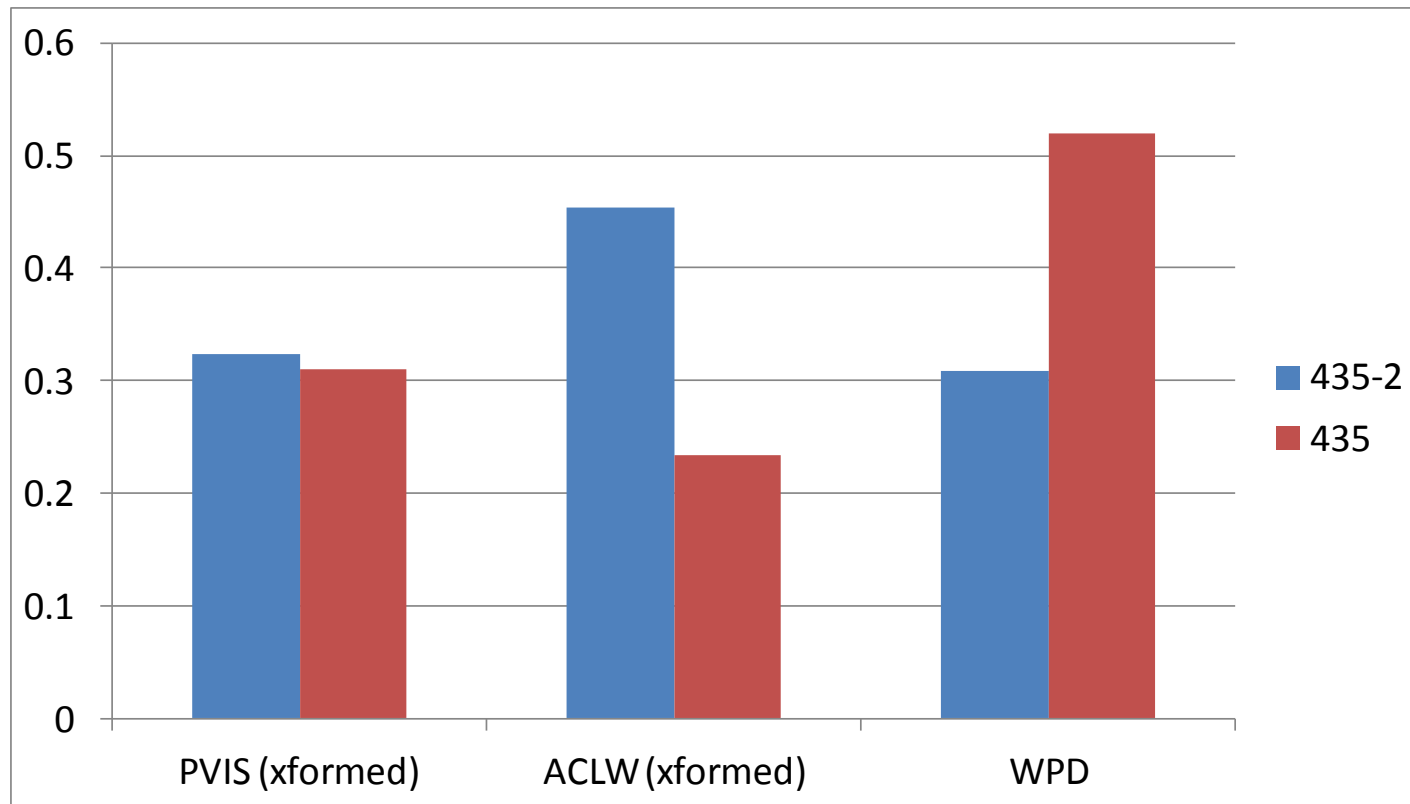
**Test Monitoring Center**

<http://astmtmc.cmu.edu>



A Program of ASTM International

# Comparison of Standard Deviations of 435-2 (n= 16) with 435 targets



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

RETURN TO MINUTES



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# Sequence III Key Test Component Inventory

David L. Glaenzer  
Sequence III Surveillance Panel Chairman  
December, 2012

# Sequence IIIF / IIIG

## Summary of Key Test Components

- 12593374 Connecting Rods
  - Chevy Performance 10,164 pieces
  - Labs 1,322 pieces
  - Total 11,486 pieces (**1914** runs)

Based on 6 pieces per run

- 24502168 Crankshaft
  - GM Performance 284 pieces
  - Labs 58 pieces
  - Total 342 pieces (**2052** runs)

Based on 6 runs per crankshaft

# Sequence IIIF / IIIG

## Summary of Key Test Components (cont.)

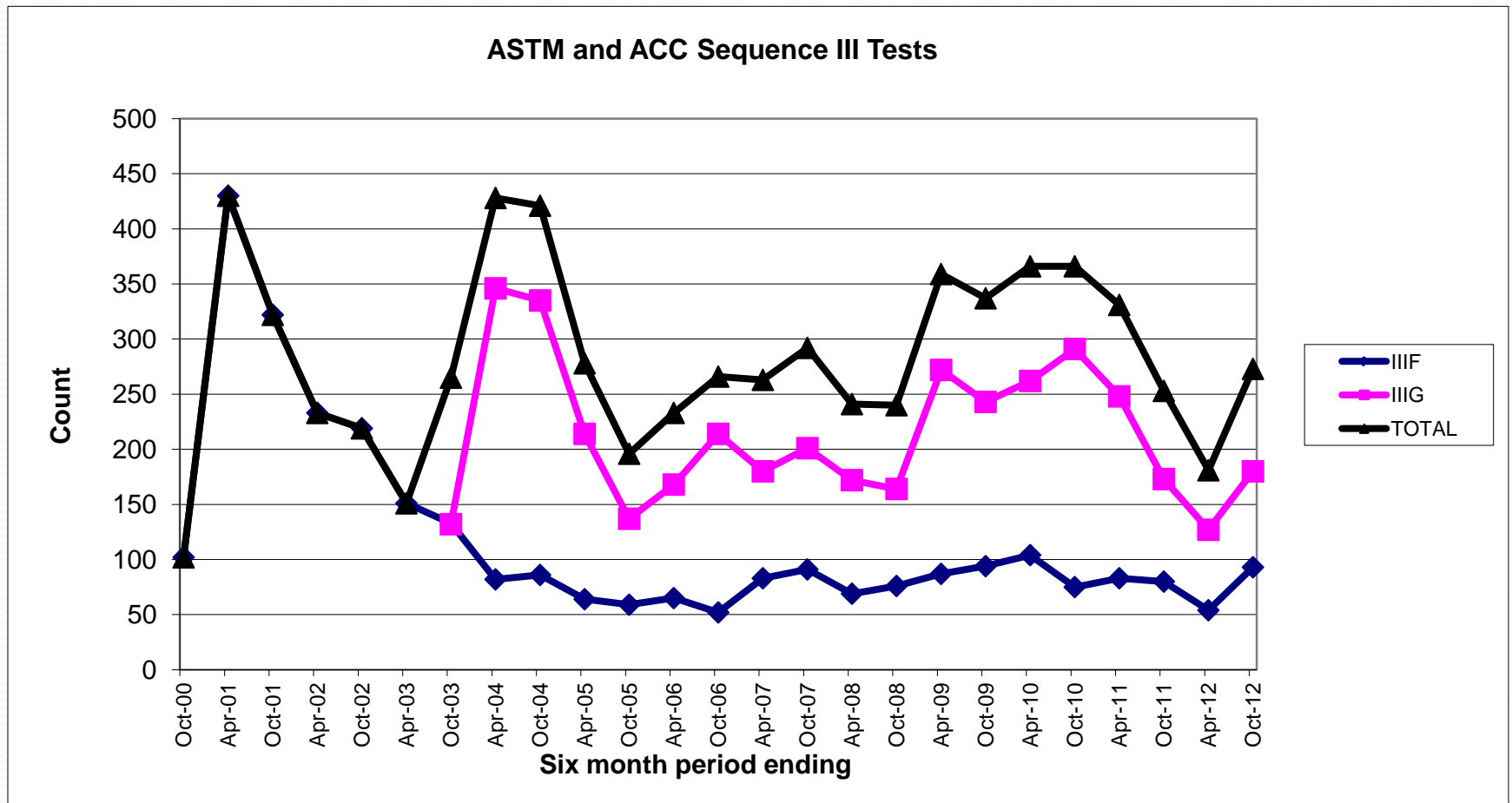
- 24502286 Cylinder Case (Block)
  - GM Performance 228 pieces
  - Labs 30 pieces
  - Total 258 pieces (**1548** runs)

Based on 6 runs per block

- 24502260B Cylinder Head
  - GM Performance 2,378 pieces
  - Labs 579 pieces
  - Total 2,957 pieces (**1478** runs)

Based on 2 heads per run

# Sequence IIIF / IIIG Test Activity



# Sequence IIIF / IIIG

## Summary of Key Test Components (cont.)

With ~1500 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	<u>consumed ~500 in last 12 months</u>
2013	500	
2014	500	
2015	400	
TOTAL	3800	

RETURN TO MINUTES





**DODGE**



**Jeep**



ATTACHMENT 5

# Chrysler Oxidation and Deposit Engine Test Development for GF-6

November 2012 Update

# Objectives



CHRYSLER GROUP LLC

- Sponsor Oxidation and Deposit engine test with Chrysler's hardware
- Develop and maintain test following ASTM and industry standardization processes
- Maintain correlation with Sequence IIIG via existing reference oils
  - Weighted Piston Deposits (WPD)
  - Kinematic Viscosity Increase
- Ensure relevance with modern vehicle performance through correlation with Chrysler's Vegas field test results



# Test Development Partners



CHRYSLER GROUP LLC

- Chrysler
- Shell
- Oronite
- Haltermann
- Southwest Research
  - Will incorporate Intertek at the earliest possible opportunity

# Engine and Stand Status



CHRYSLER GROUP LLC

- 2012 PentaStar 3.6L V6
  - 20 engines have been received by SwRI
- Target III G operating conditions
  - 100 hour test duration
  - 150°C oil temp
- Stand buildup, shakedown and mapping completed
- First full test on REO 435 started
  - Valvetrain parts premeasured for wear
  - Expect multiple test results by Dec AOAP



# Reference Oils



CHRYSLER GROUP LLC

	IIIG WPD	IIIG KV 40 °C increase,%	IIIG Wear, cam+lifter	IIIG Hot Stuck Rings	Performance
GF-5 limits	4.0	150	60	None	
REO 434	~4.8	~113	32	None	Passing
REO 435	~3.6	~178	33	None	Failing
REO 438	~3.2	~96	18	occasional	Failing
Vegas High Reference	>4.5	<100	Pass	None	Passing
Vegas Low Reference	~3.5	>100	Pass	Some in field test	Borderline

**REO 435 (failing) and Vegas High (passing) are two key reference oils**





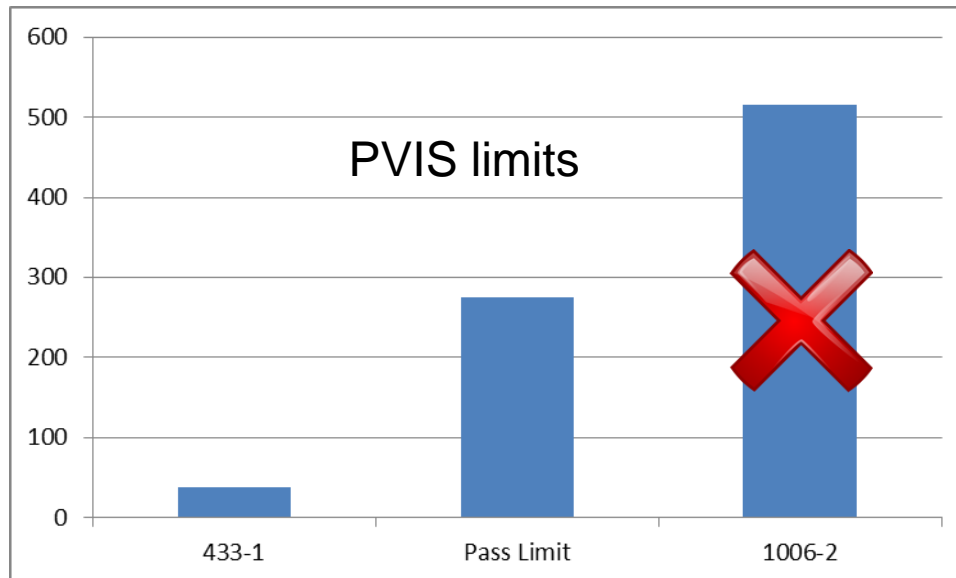
# Sequence IIF Severity

Jessica Buchanan  
George Szappanos  
Nov 12, 2012



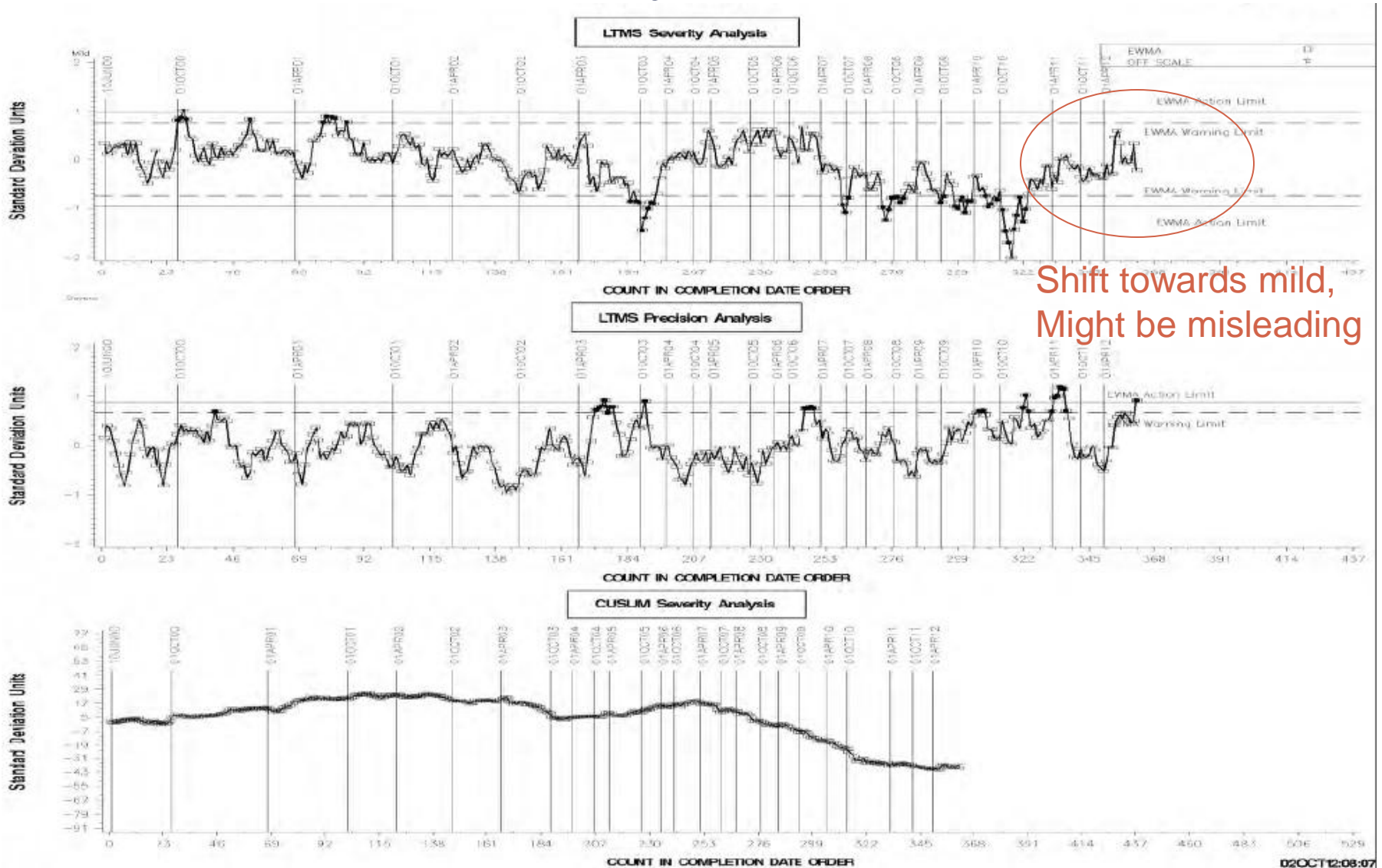
## Reference oils

- IIIF 1006 reference oil dropped (PVIS target = 515%)
  - Considered too variable by SP; removed late 2010
  - 433 left as reference oil (PVIS target = 37%)
  - There is concern that without a severe reference oil to bracket the pass/fail limit, it's difficult to determine if the test severity has shifted.



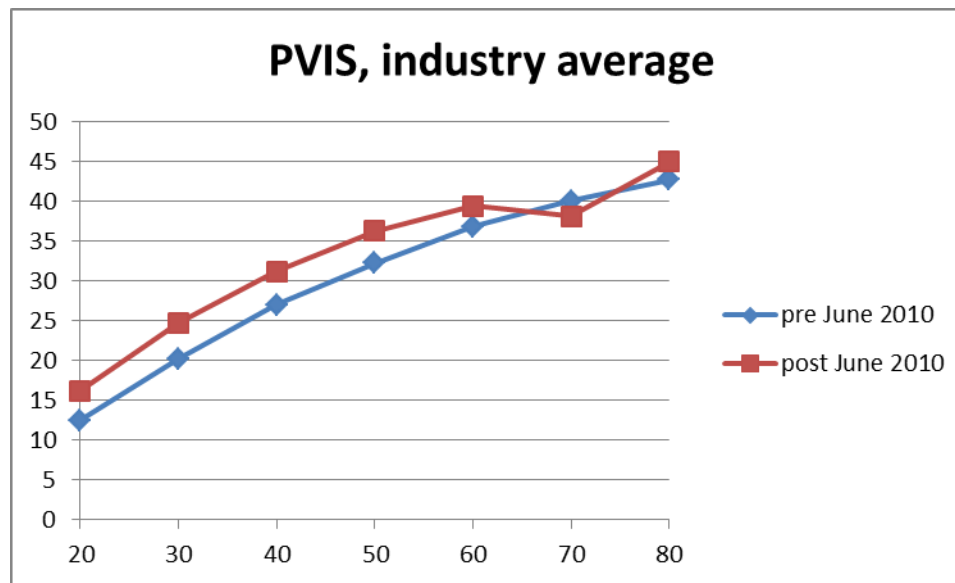


# TMC Data, PVIS severity



## RO 433 PVIS break point, industry average

- Data analyzed before and after 2010
- Note that latest data shows a 'break point' at 70 hrs
- An analysis was performed to examine the PVIS delta near EOT

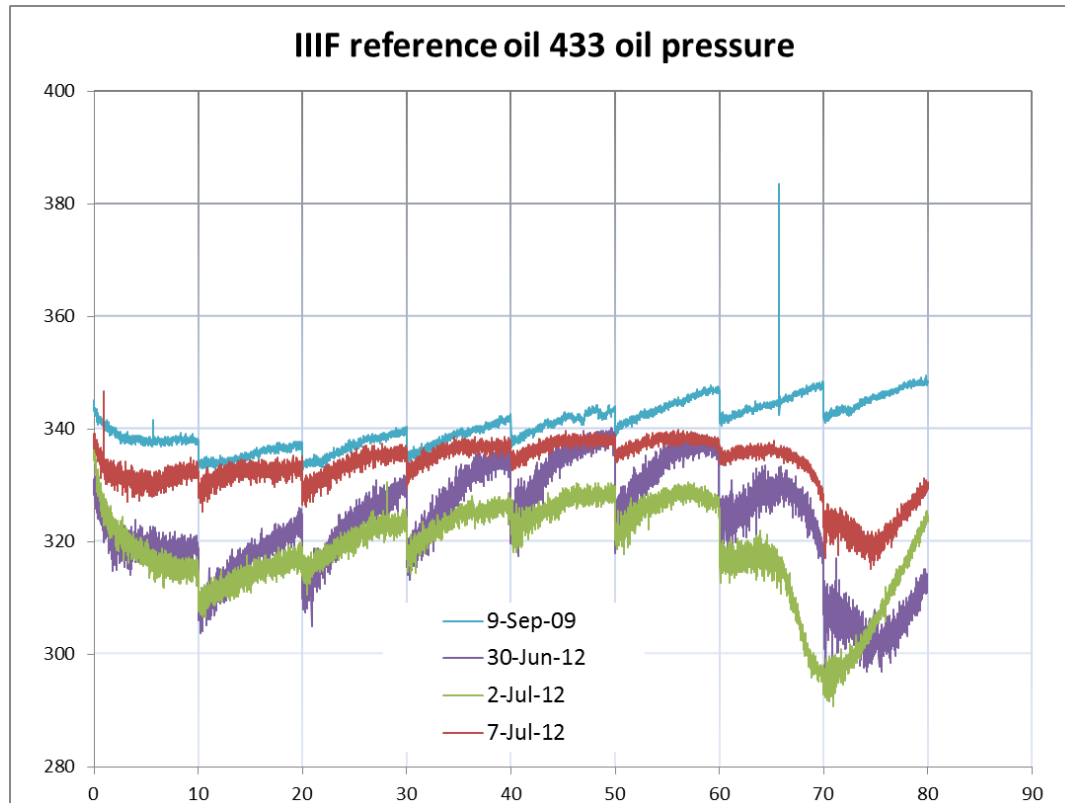


EOT viscosity increase very similar, however there appears to be evidence that severity has shifted severe.



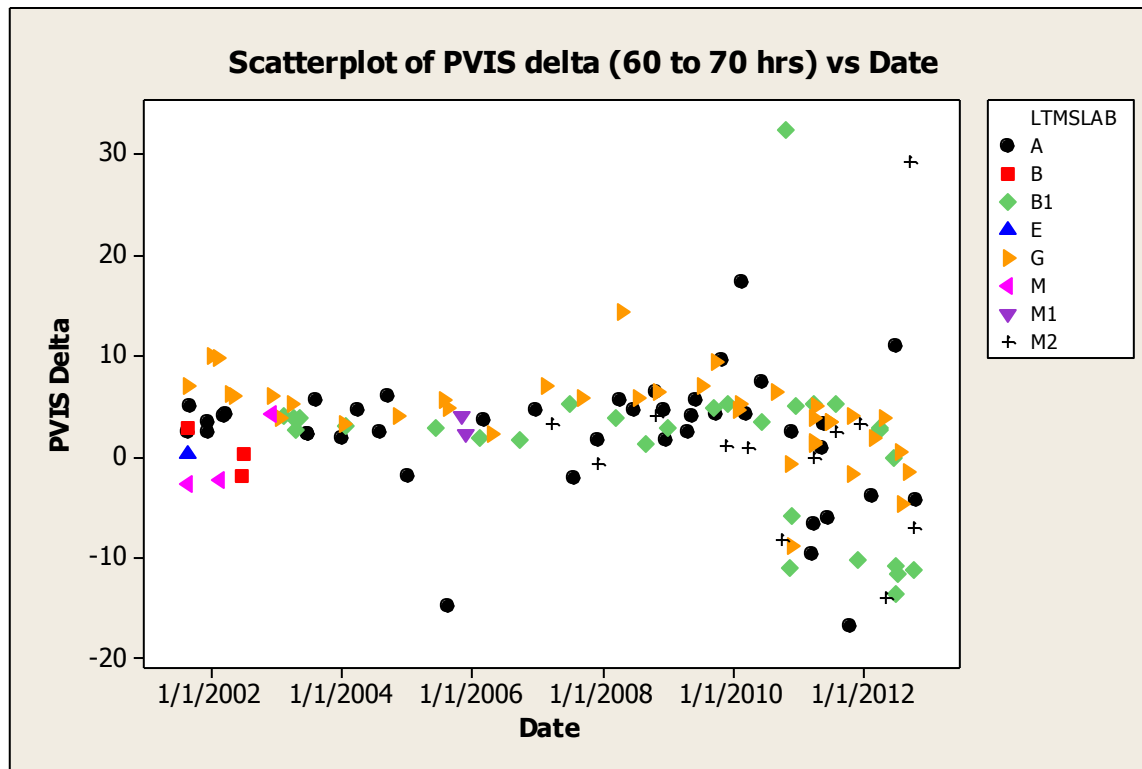
## Oil pressure break point (LZ data)

- Shows break point occurring around 70-75 hrs
- Earlier tests do not show any break point



# Reference Data from TMC for RO 433-1

- Starting in 2010, the change in PVIS from 60 to 70 hours shows a general decreasing trend
- This decrease in viscosity indicates the oil has lost oxidation control and has begun to break



# A Shift in Delta70

- A model was fit to look for evidence of a shift in severity
- The Shift was defined as 6/13/2010
- The effect of shift is significant; the interaction between lab and shift is not significant → a shift happens, and all labs experience it

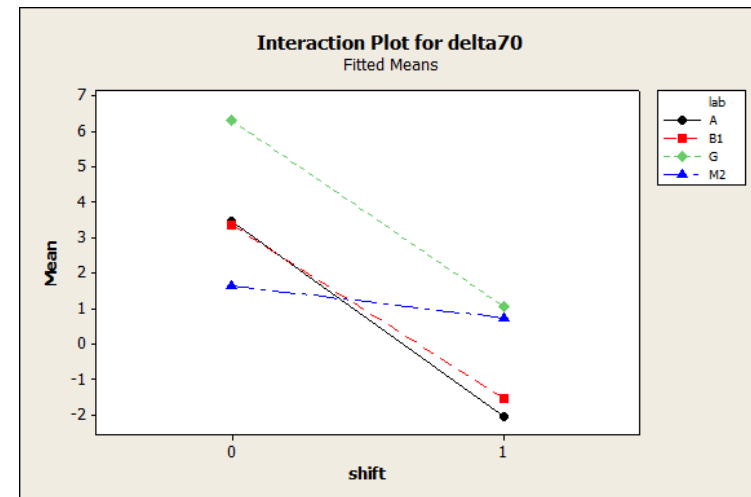
## General Linear Model: delta70 versus lab, shift

Factor	Type	Levels	Values
lab	fixed	4	A, B1, G, M2
shift	fixed	2	0, 1

Analysis of Variance for delta70, using Adjusted SS for Tests

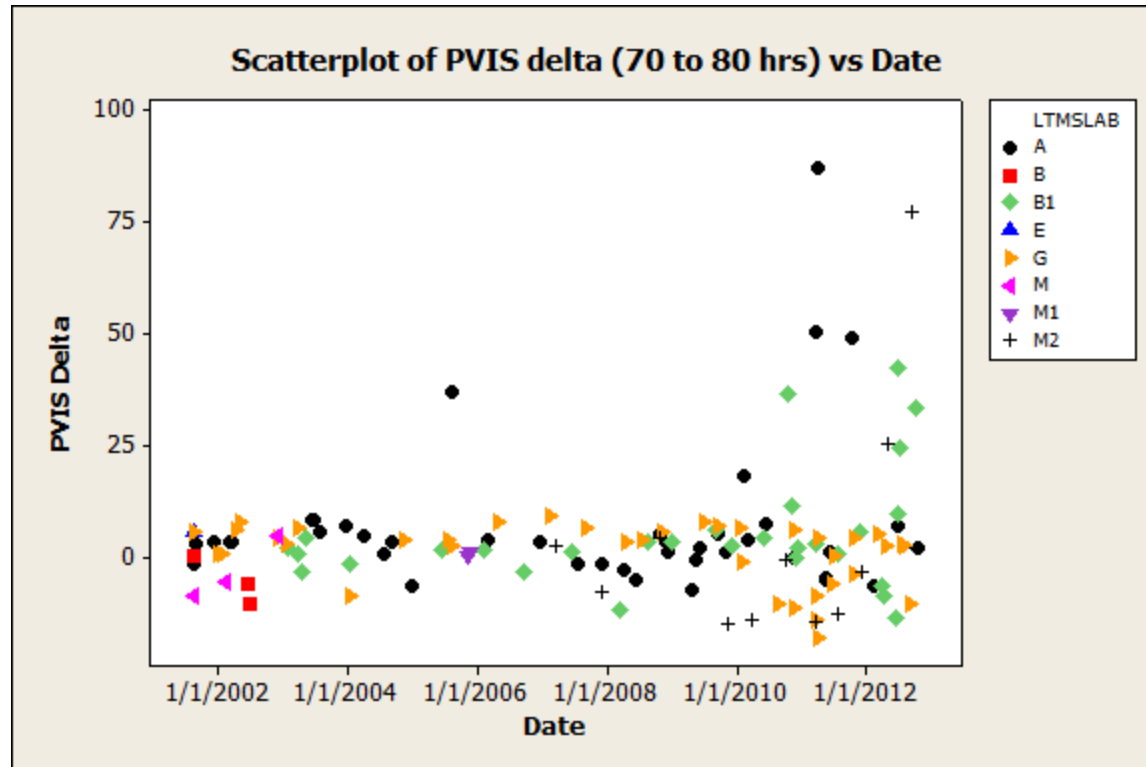
Source	DF	Seq SS	Adj SS	Adj MS	F	P
lab	3	192.98	198.29	66.10	1.54	0.207
shift	1	632.60	388.40	388.40	9.07	0.003
lab*shift	3	50.60	50.60	16.87	0.39	0.758
Error	113	4841.36	4841.36	42.84		
Total	120	5717.53				

S = 6.54552    R-Sq = 15.32%    R-Sq(adj) = 10.08%



# Reference Data from TMC for RO 433-1

- Beginning 2010, a change is also evident in the change in PVIS from 70 to 80 hours



# A Shift in Delta80

- A model was fit to look for evidence of a shift in severity
- The Shift was defined as 6/13/2010
- The interaction between lab and shift is significant → labs are experiencing a shift differently

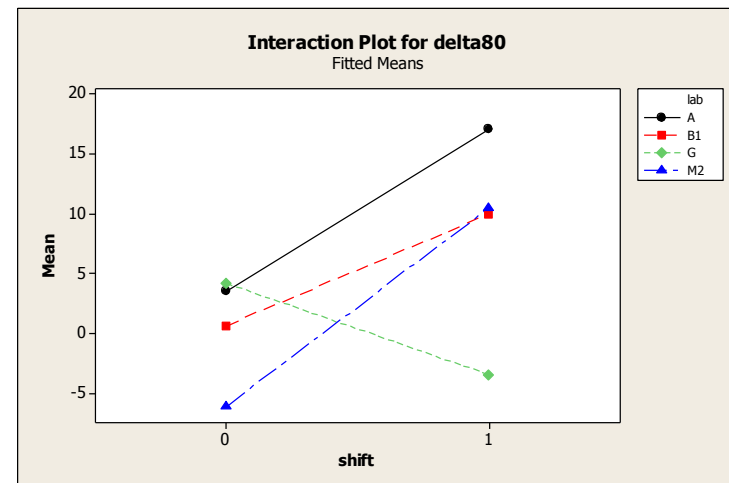
## General Linear Model: delta80 versus lab, shift

Factor	Type	Levels	Values
lab	fixed	4	A, B1, G, M2
shift	fixed	2	0, 1

Analysis of Variance for delta80, using Adjusted SS for Tests

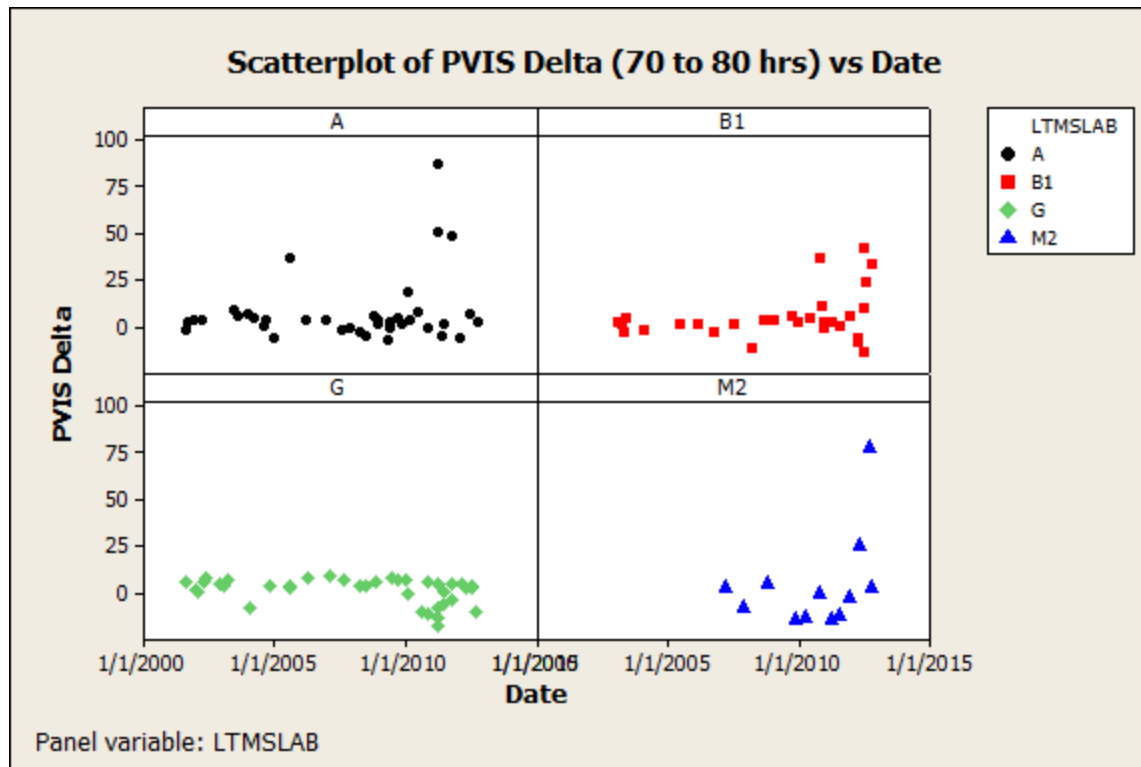
Source	DF	Seq SS	Adj SS	Adj MS	F	P
lab	3	775.4	1797.9	599.3	2.88	0.039
shift	1	868.1	1416.1	1416.1	6.80	0.010
lab*shift	3	2581.8	2581.8	860.6	4.13	0.008
Error	113	23539.8	23539.8	208.3		
Total	120	27765.0				

S = 14.4332    R-Sq = 15.22%    R-Sq(adj) = 9.97%



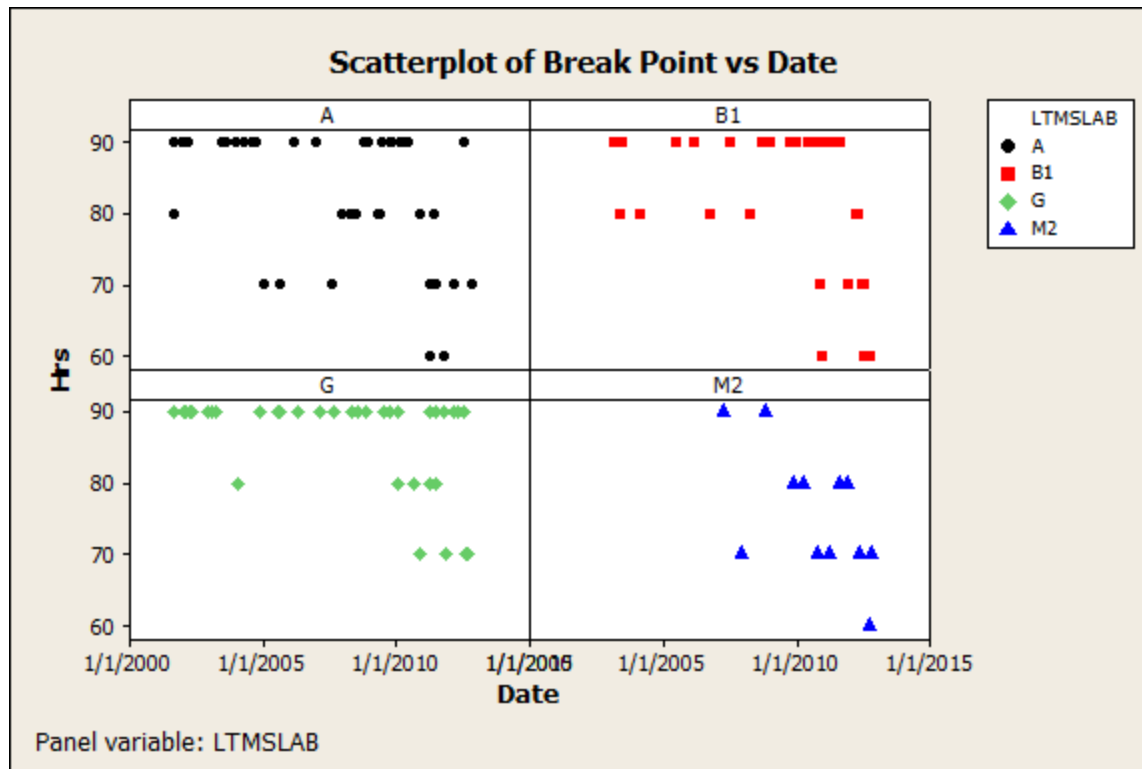
# Delta80 by Lab

- Plot of Delta80 by lab, to examine interaction
- By EOT, the RO could be at three places: not yet broke, currently breaking, or already broke
- Difficult to tell using just the EOT PVIS



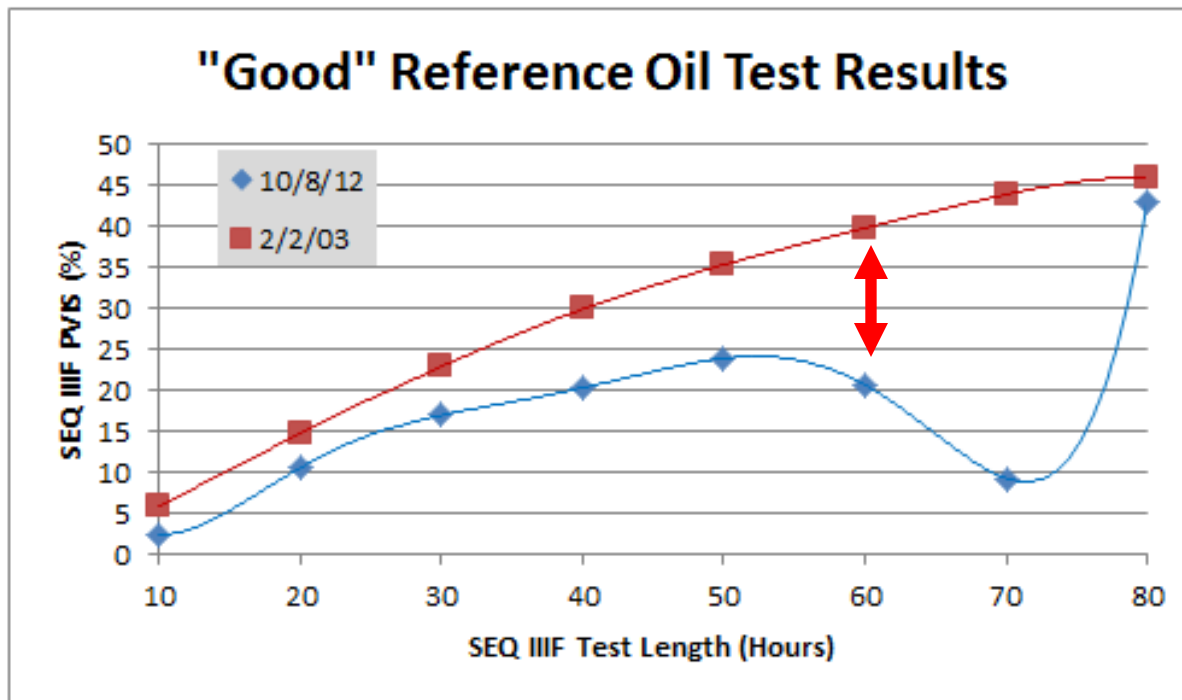
# RO 433-1 Breaking point

- Look for the time of breaking point for RO 433-1.
- Break Point = hours when viscosity change first goes negative
  - 90 hrs means did not break before EOT
- The oil is breaking sooner, even though EOT PVIS may seem mild



## Impact on IIF-HD, trending "Mild"

- Due to the dip that occurs prior to the 'break point', the 60 hour viscosity is lower than normal and results in a negative or mild severity adjustment.



RETURN TO MINUTES



ASTM SEQUENCE III SURVEILLANCE PANEL

SCOPE & OBJECTIVES

SCOPE

The Sequence III Surveillance Panel is responsible for the surveillance and continual improvement of the Sequence IIIF and IIIFHD tests documented in ASTM Standard D6984 as update by the Information Letter System. The Sequence III Surveillance Panel is also responsible for the surveillance and continual improvement of the Sequence IIIG, IIIGA and IIIGB tests documented in ASTM Standard D7320 as updated by the Information Letter System. Data on test precision will be solicited and evaluated at least every six (6) months for Sequence III test procedures. The Surveillance Panel is to provide continual improvement of rating techniques, test operation, test monitoring and test validation through communication with the Test Sponsor, ASTM Test Monitoring Center, the Central Parts Distributor, Fuel Supplier, ASTM B0.01 Passenger Car Engine Oil Classification Panel, ASTM Committee B0.01, ACC Monitoring Agency and ASTM Deposit/Distress Workshop. Actions to improve the process will be recommended when appropriate based on input to the Surveillance Panel from one or more of the previously stated groups. This process will provide the best possible Sequence III Type Test Procedure for evaluating engine oil performance with respect to its ability to prevent oil thickening, varnish formation, oil consumption and engine wear.

OBJECTIVES

TARGET DATE

Monitor industry hardware inventory

Ongoing

Sequence IIIF RO 433-1 severity investigation

06/2013

David L. Glaenzer, Chairman  
Sequence III Surveillance Panel

Updated 11/13/2012

RETURN TO MINUTES