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Committee D02 on PETROLEUM PRODUCTS AND LUBRICANTS

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Originally Issued: October 25, 2014

Reply to: Richard Grundza
ASTM Test Monitoring Center
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Unapproved Minutes of the October 21, 2014
Sequence III Surveillance Panel Meeting.

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The meeting was called to order by Chairman Glaenzer at 4:20 PM Central Time.

A list of attendees is included as attachment 1.

A copy of the Agenda is included as attachment 2.

The Sequence IIIG Build Manual has been updated to address run 7 and 8 pistons and rings. There was an action item for the Statistics Group to review the 433-2 targets once additional data were reported. Unfortunately, only one additional result has been reported so this item remains open and will be addressed when additional data is reported.

Jason Bowden of OHT indicated that there are 80 sets of 7th and 8th run sets available and OHT is working on a build out. It is expected that the build out of pistons will be complete in about a week and build out of rings should be completed early December of this year. With regards to use of the 80 sets at OHT, a motion was approved to allow OHT to ship these under normal allocations, (Motion, Charlie Leverett, Second Jason Bowden) which was approved unanimously.

Dave Glaenzer indicated that he had not completed a survey of the labs to determine the amounts of components available for testing. Projections from labs and OHT indicate hardware will begin to run out in early 2016, at which time the test will become unavailable. Dave indicated that the Sequence III tests will not make it to GF-6 and the panel may need to determine limits for IIIF/G with new oxidation tests. The panel may need to address redistribution of remaining hardware between laboratories. It was also noted that the IIIF did not approve 7th and 8th run hardware and that test may be out of hardware sooner.

The CPD report was not given at the meeting due to time constraints but is included as attachment 3.

Again, due to time constraints the TMC report was not discussed at the meeting but can be accessed via the following link:

<ftp://ftp.astmtmc.cmu.edu/docs/gas/B01SemiAnnualReports/semiannualreports/B01%20SemiAnnualReport%20-%20October%202014.pdf>

The IIIH Task Force had recommended that the Sequence IIIH test is fit for purpose. The Sequence III panel entertained a motion by Rich Grundza, seconded by Charlie Leverett, The Sequence IIIH Surveillance Panel recommends to the PCEOCP and AOAP that the IIIH test is fit for purpose. The motion failed with 4 affirmative, 8 negatives and 4 members waiving. A copy of the Chrysler report to the Sequence IIIH Task Force supporting the fit for purpose recommendation is included as attachment 4. Voting results are included as attachment 5.

A third run of stellite heads will be addressed during an upcoming conference call.

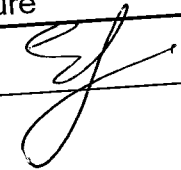
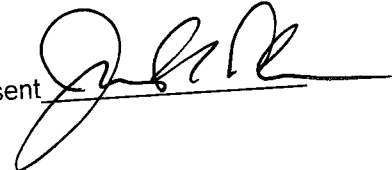
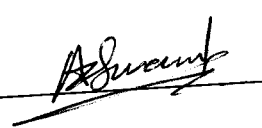
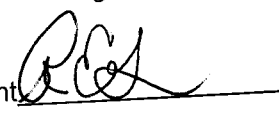
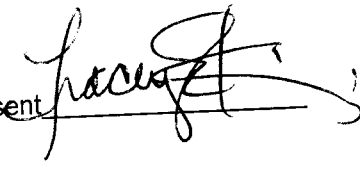

The issue regarding negative viscosity increase values impacting the slope calculation for Sequence IIIF has been addressed by Information Letter 13-3.

Review of the GMOD test was given by Robert Stockwell. Robert indicated there is still some work to do and GM is still working on prove out of hardware and intends to generate a number of data points on each stand, as Robert believed that IIIG targets were set using stands that had generated limited data. There were questions/comments regarding backwards compatibility and no testing had been conducted on reference oil 433-2. There are still some lab difference that need to be resolved. A question was asked if oil consumption was similar to IIIG and Robert noted that there is 3-4 liters of oil consumption on a test with an oil charge of 7 liters with no additional oil adds. A copy of Robert's presentation is included as attachment 6.

The meeting was adjourned at 5:15 pm.

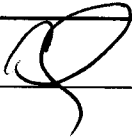
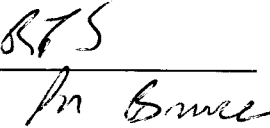

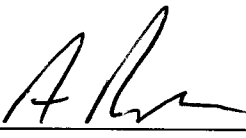

ASTM Sequence III
 Sequence III Surveillance Panel (20 Voting members)

Attachment 1
 date: 10/21/14

	Phone/Fax/Email		Signature
Altman Afton Chemical Corporation 500 Spring Street Richmond, VA 23219 USA	804-788-5279 804-788-6358 ed.altman@aftonchemical.com	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 
Timothy L. Caudill Ashland Oil Inc. 22 nd & Front Streets Ashland, KY 41101 USA	606-329-1960 x5708 606-329-2044 tlcaudill@ashland.com	Voting Member	Present  AMOL SAVANT Carrying <u>Proxy</u> for Timothy Caudill
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 
Tracey King Haltermann Solutions MI USA	947-517-4107 tking@jhaltermann.com	Voting Member	Present 
Teri Kowalski Toyota Motor North America, Inc. 1555 Woodridge Ann Arbor, MI 48105 USA	734-995-4032 734-995-9049 teri.kowalski@tema.toyota.com	Voting Member	Present _____
Patrick Lang Southwest Research Institute 6220 Culebra Road P.O. Box 28510 San Antonio, TX 78228 USA	210-522-2820 210-684-7523 plang@swri.edu	Voting Member	Present 





ASTM Sequence III Surveillance Panel (20 Voting members)

date:

Name/Address	Phone/Fax/Email	Voting Member	Signature
Charlie Leverett Intertek Automotive Research 5404 Bandera Road San Antonio, TX 78238 USA	210-647-9422 210-523-4607 charlie.leverett@intertek.com	Voting Member	Present 
Bruce Matthews GM Powertrain Mail Code 483-730-472 823 Jocyn Avenue Pontiac, MI 48340 USA	248-830-9197 248-857-4441 bruce.matthews@gm.com Test Sponsor Representative	Voting Member	Present 
Timothy Miranda BP Castrol Lubricants USA 1500 Valley Road Wayne, NJ 07470 USA	973-305-3334 973-686-4039 Timothy.Miranda@bp.com	Voting Member	Present _____
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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 
Greg Shank Volvo	301-790-5817 greg.shank@volvo.com	Voting Member	Present _____

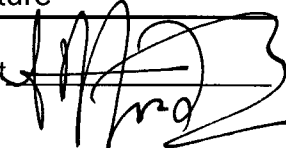


ASTM Sequence III Surveillance Panel (20 Voting members)



date:

Name/Address	Phone/Fax/Email		Signature
Kaustav Sinha, Ph.D. Chevron Oronite Co., LLC 4800 Fournace Place Bellaire, TX 77401 USA	713-432-6642 713-432-3330 LFNQ@chevron.com	Voting Member	Present <u></u>
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Haiying Tang Chrysler LLC	248-512-0593 ht146@chrysler.com	Voting Member	Present <u></u>

ASTM Sequence III Surveillance Panel (20 Voting members)

date:

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ASTM Sequence III Surveillance Panel (20 Voting members)


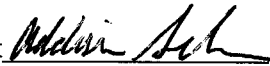

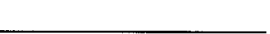
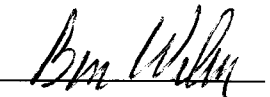

date:

Name/Address	Phone/Fax/Email	Non-Voting Member	Signature
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Mike McMillan	mmcmillan123@comcast.net	Non-Voting Member	Present <u>MLM</u>

ASTM Sequence III Surveillance Panel (20 Voting members)

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Don Smolenski GM	248-255-7892 donald.j.smolenski@gm.com	Non-Voting Member	Present	
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Jerry Wang

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Sequence III Surveillance Panel

October 21, 2014

SRI Building 209

San Antonio, TX

Call-in Number is: (888) 272-5498

Participant Passcode: 1938246

Agenda

1.0) Attendance

2.0) Approval of minutes

- 2.1) September 05, 2014 Teleconference

3.0) Action Item Review

- 3.1) Rich Grundza update build manual to include use of size 7&8 pistons. **DONE**
- 3.2) Stats Group to re-do RO 433-2 analysis with new data. **Kevin O'Malley**
- 3.3) Glaenzer to notify SP when size 7&8 pistons/rings fully available. Release of material to qualified labs? **Jason Bowden/Charlie Leverett**
- 3.4) Glaenzer to survey labs and Chevy Performance as to remaining critical parts inventory. Will be done following update of test run by ACC & TMC and reported at December, 2014 ASTM meeting. **David Glaenzer**

4.0) Old Business

- 4.1) CPD Report **Jason Bowden**
- 4.2) TMC Report **Rich Grundza**
- 4.3) Sequence IIIH Task Force report to Surveillance Panel. **Karin Haumann**

5.0) New Business

- 5.1) Third use of Stellite Seat heads. **SP discussion**
- 5.2) Surveillance Panel review of ASTM New Test Type Introduction Template
All
- 5.2) Request for help determining IIIF PVIS slope. **Jerry Brys**
- 5.3) Request has been made from AOAP for GMOD to present a detailed update to the Sequence III Surveillance Panel for information purposes. **Bruce Matthews**

6.0) Review Scope and Objectives

- 6.1) **All**

7.0) Next Meeting

- 7.1) **TBD**

**CENTRAL PARTS DISTRIBUTOR REPORT
OH Technologies, Inc.**

**Sequence III Surveillance Panel Meeting
Southwest Research Institute
San Antonio, TX
October 21, 2014**

1) Technical Memos Issued (6/01/11-3/23/12)

Technical Memo 26 (10/01/14) . Seq. III Piston Shipment

2) Rejection Report

SEQUENCE III SURVEILLANCE PANEL

CRITICAL HARDWARE REJECTION REPORT
DATE PREPARED: 10/17/14

REPORTING PERIOD: 10 Months (6/01/11 - 3/23/12)

ITEM	DESCRIPTION	REASON REJECTED	QTY	REPLACED
OHT3f-053, 054, 055-F	PISTONS	CASTING DEFECTS	4	YES
OHT3F-008-8	IIIG CAMSHAFT	PHOSPHATE VISUAL	1	YES

3) Batch Code Changes

<u>IIIF</u>	<u>Batch Code</u>	<u>Date Introduced</u>	<u>IIIG</u>	<u>Batch Code</u>	<u>Date Introduced</u>
IIIF Camshaft	PC 19	August 2014	IIIG Camshaft	PC 19	August 2014



Attachment 4

Chrysler Oxidation and Deposit Engine Test Development for GF-6

To Task Force Team
October 21, 2014



Oronite



- Objectives
- Test Procedure
- Chrysler Oxidation and Deposit Test Results
 - PVIS
 - 0W-16
 - WPD
 - Phosphorus retention
- Discussions
 - Test lengths: 90 hrs Vs. 100 hrs
 - Correlate with IIIG
- Chrysler Las Vegas Taxi Field Test
- Parts & Stand Availability
- Summary

Objectives

- Chrysler Group sponsored engine testing in the ILSAC GF-6 specification series
- Chrysler Oxidation and Deposit engine test using Chrysler's hardware - 2014MY PentaStar 3.6L V6
- Objectives
 - Develop and maintain test following ASTM and industry standard 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 Las Vegas fleet field test results
 - Desire to minimize oil volatility effect

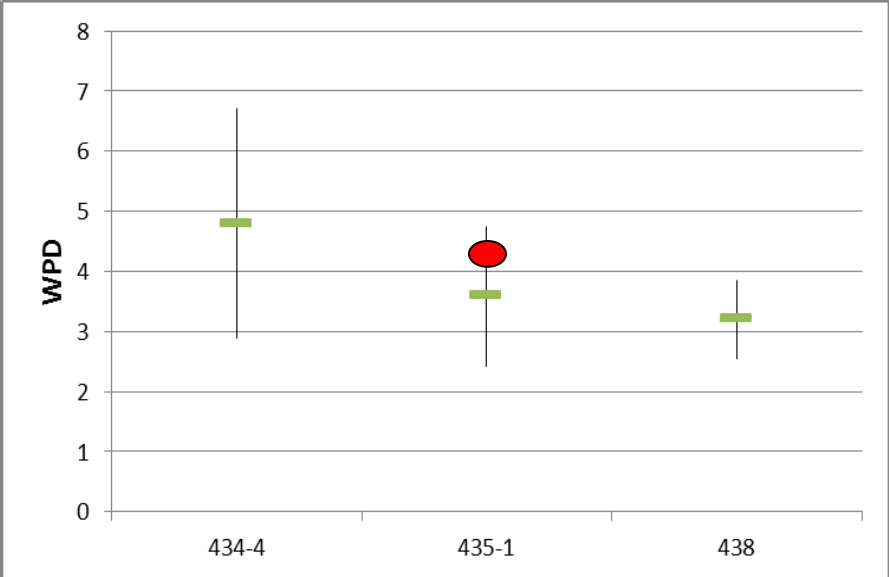
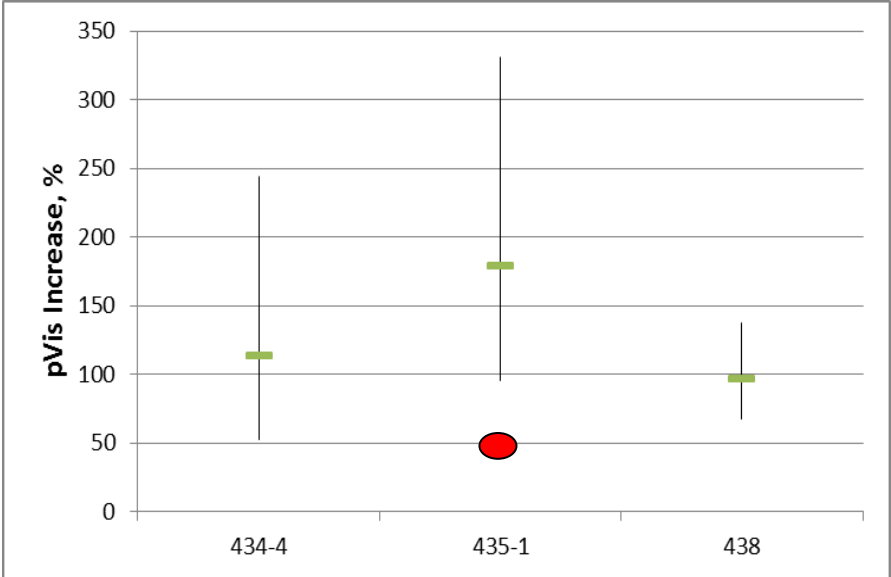
Concept Demonstration



CHRYSLER GROUP LLC

- Test Conditions (First test)
 - 3600 rpm, 250Nm, 150 °C, 100 hours, no oil add, no engine modification, 6 qt. initial oil charge
- The initial result using TMC 435 was encouraging but too mild as compared with IIIG

	% pVis Increase	WPD	Oil Consumption (pints)	Blowby, L/min.
TMC 435	44	4.35	4.5	18.5



Final Test Procedure



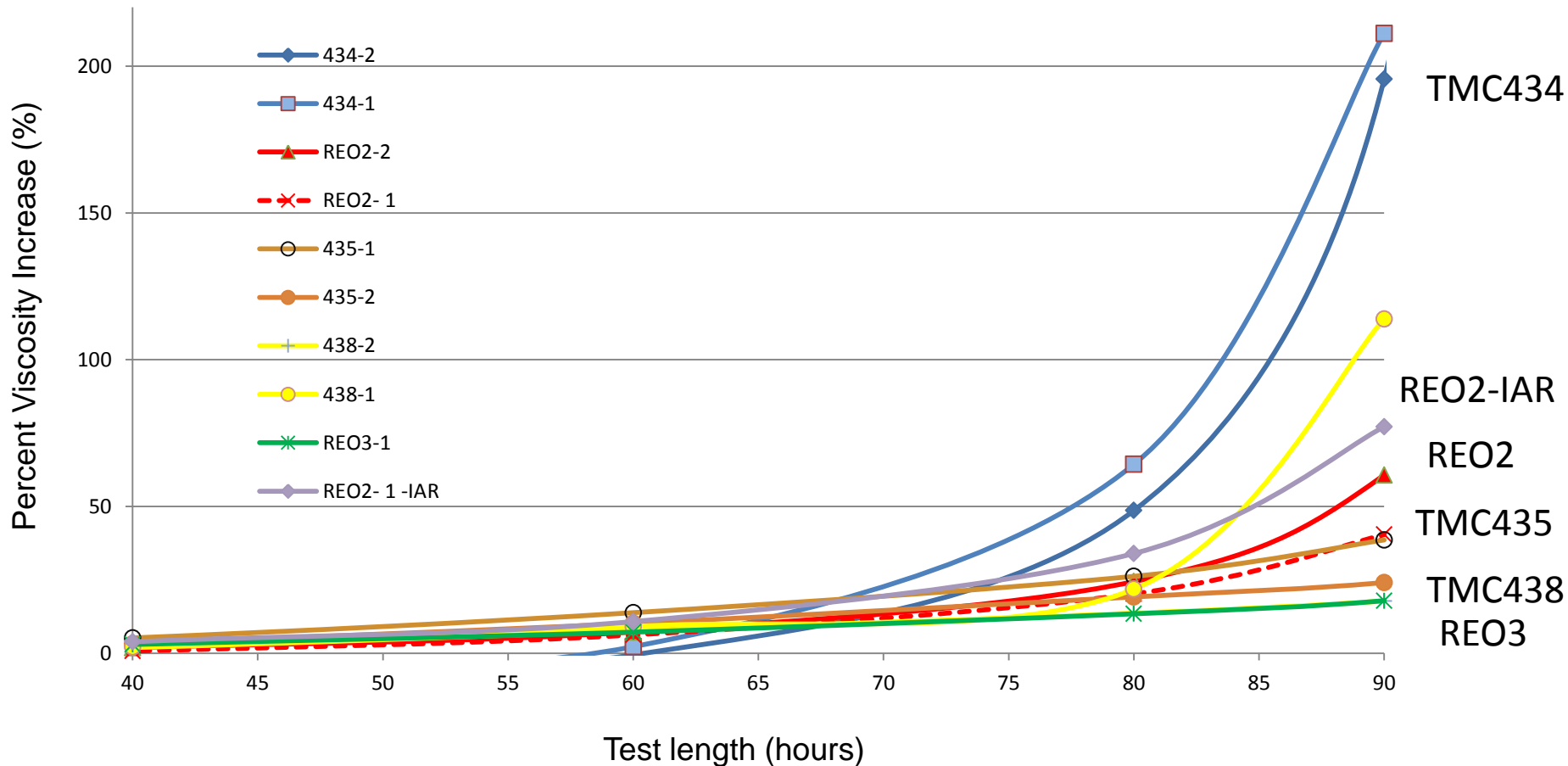
CHRYSLER GROUP LLC

- 2014MY PentaStar 3.6L V6
- Final Test Conditions: 3900 RPM; 250 Nm; 35 °C Intake Air Temp; and Ring gaps: 25/35 thousandths of an inch

Procedure	IIIF	IIIG	Chrysler
Initial Oil Charge, L	5.5	5.5	5.67
Oil Temperature, °C	150	150	150
Duration, hrs	80	100	90
Blowby, L/minute (recorded, not controlled)	20~30	17~26	25.6~32.8
Oil Consumption, L (recorded)	3.2~4.8	3.2~4.8 (reference oil data)	2.2~3.1
Total Oil Addition, oz/20 hrs	36 (18 every 10 hours)	18	6

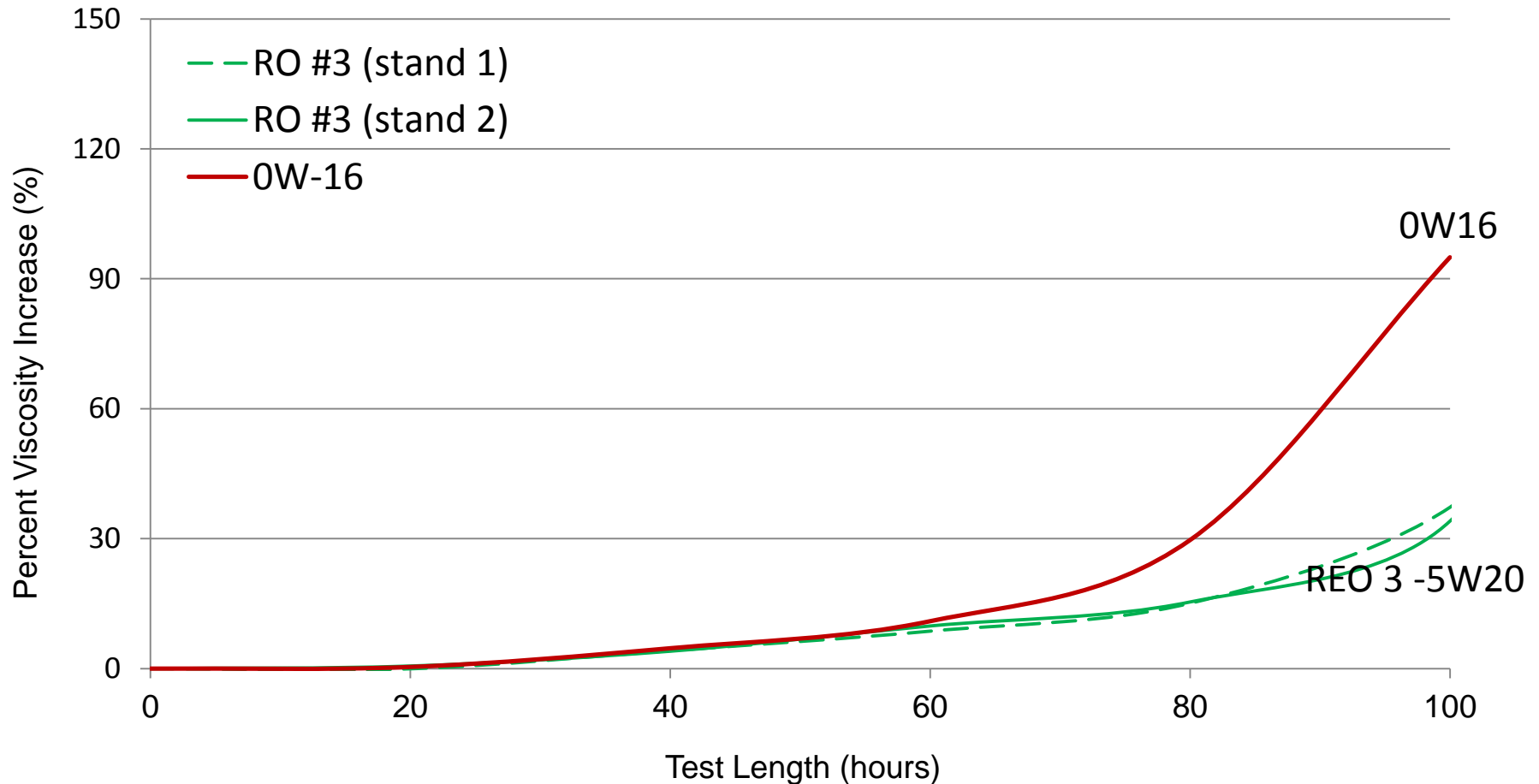
Results: Viscosity Increase

- Three TMC reference oils and two Vegas field test oils were run in duplicate with final procedure and production hardware
- Demonstrated repeatability (two stands) and discrimination on PVIS



Results: PVIS with 0W-16

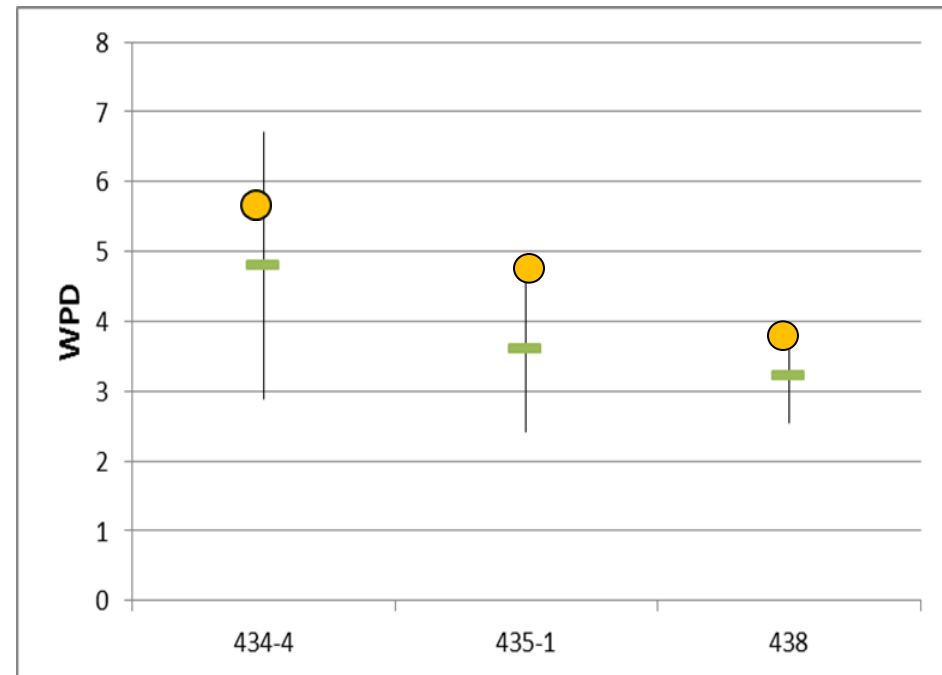
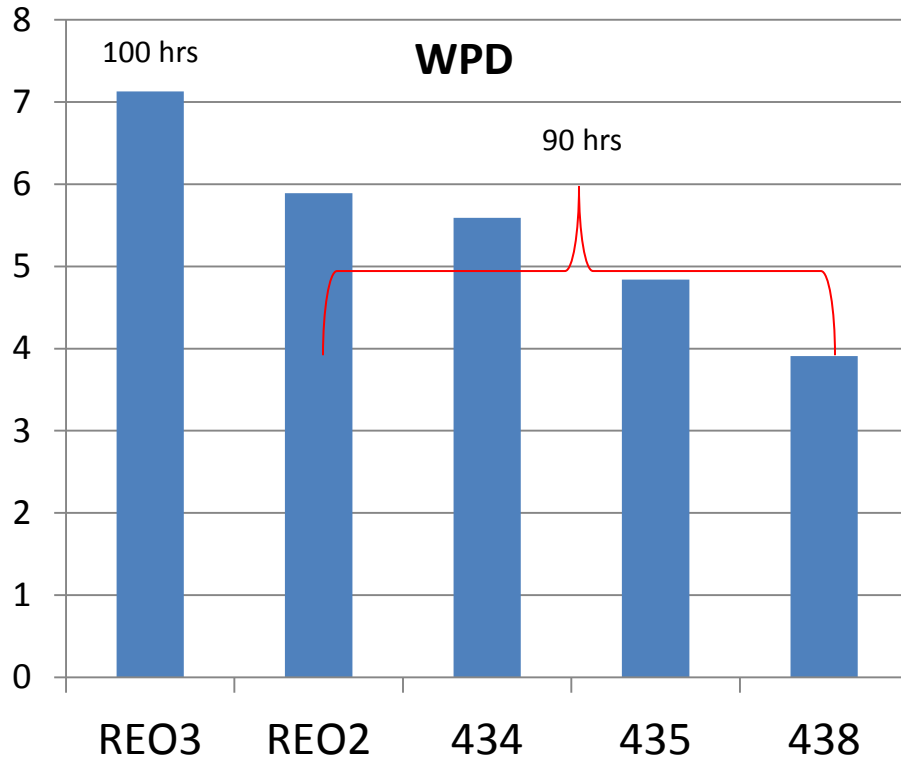
- 0w-16 engine oil was demonstrated in Chrysler Oxidation and Deposit Test



* 0W-16 and REO3 data were came from a previous, more severe, test condition (no oil add and higher blowby)

Results: Weighted Piston Deposits

- Demonstrated discrimination on WPD with three TMC reference oils, REO2 and REO3
- The WPD ranking in Chrysler Test correlate with IIIG WPD and Field Performance



● Chrysler data – final procedure

Results: Phosphorus Retention



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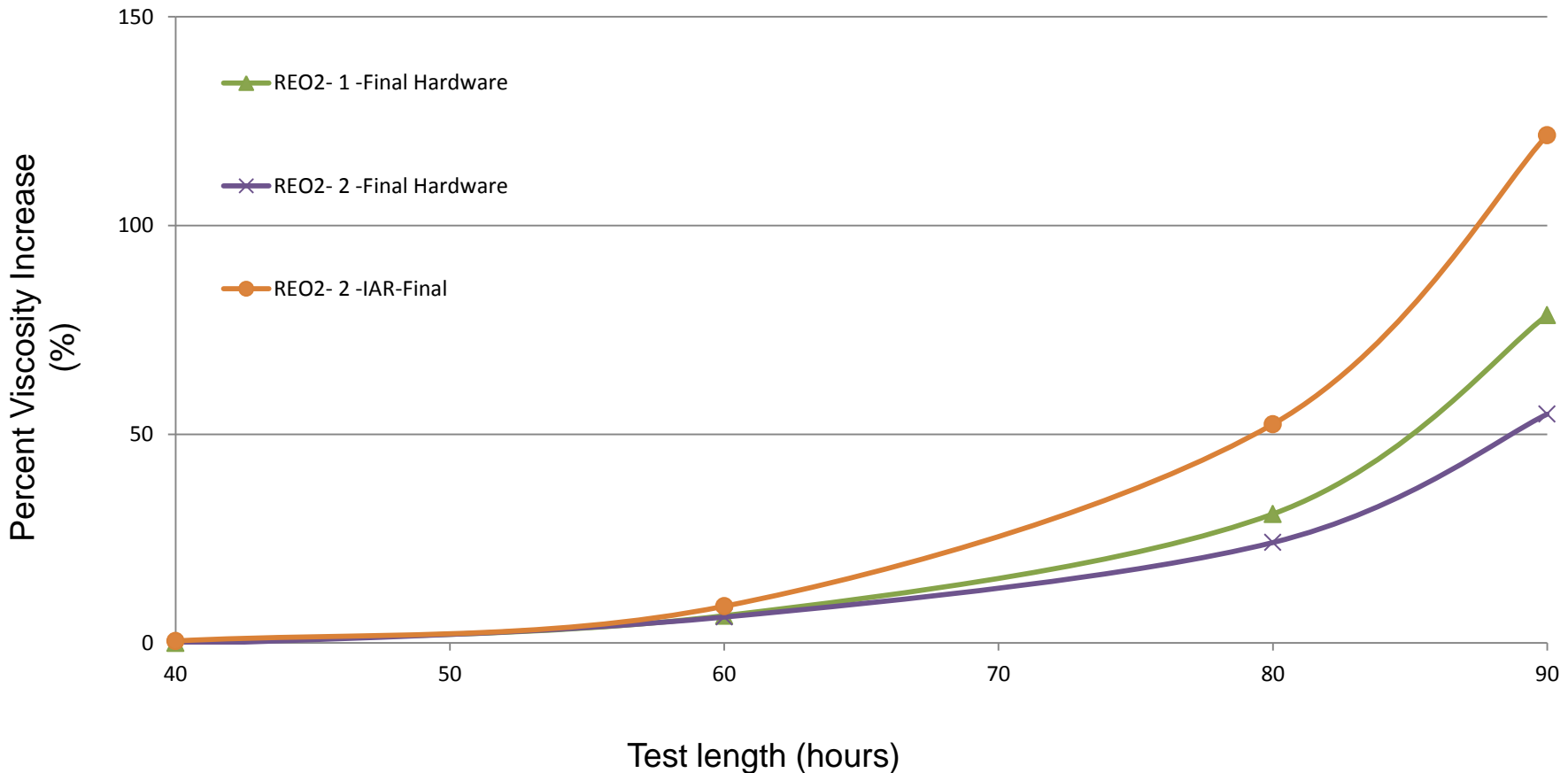
- Phosphorus results show the same ranking and a similar separation with IIIGB and good repeatability
- Chrysler test has higher numbers than IIIG likely due to reduced oil addition

Oil Types	IIIGB mean, %	Chrysler OD , %
TMC 434	76	80,79
TMC 435	82	85,85
TMC 438	78	79,80
REO2	>85	92,92
REO3	>85	88

Results: PVIS with Final Hardware

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- Verify final hardware
 - Oversized piston with cylinder hone
 - The PVIS test results with final hardware show comparable with previous results
- PVIS test results at IAR



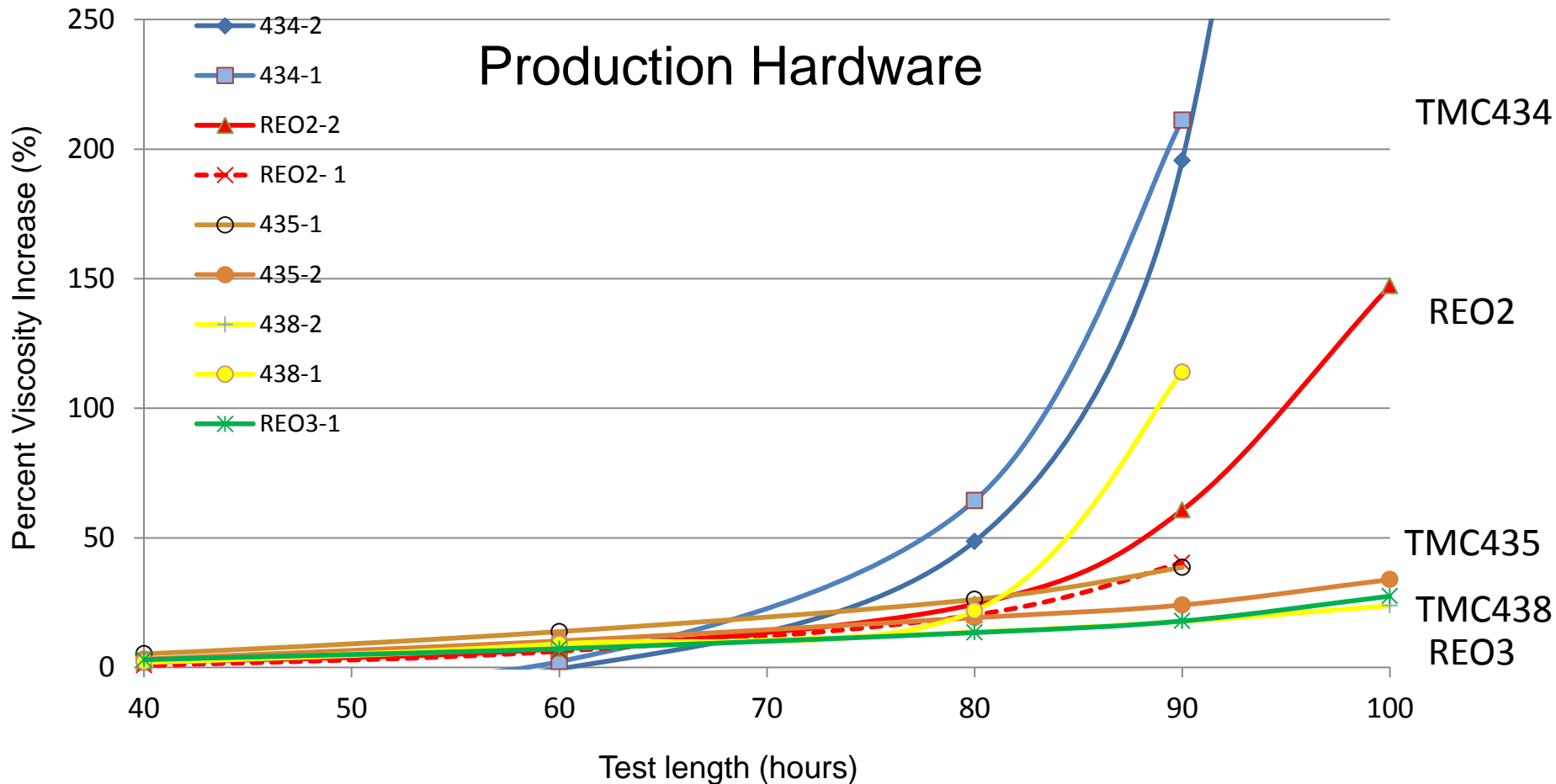
Results: WPD with Final Hardware

- Verify final hardware
 - The WPD test with final hardware shows comparable results
- IAR WPD data

REO2 with 90 hrs. running	pVis, %	WPD
Final hardware at SwRI	74.5; 54.8 (2 run)	4.76; 4.72 (2 run)
Final engine at IAR	122 (1 run)	3.63 (1 run)
Production engine at SwRI	129.5;40.4;60.7 (3 runs)	5.89 (1 run)
Production engine at IAR	77 (1 run)	4.02 (1 run)

Discussion: Test lengths

- Increased severity with additional 10 hours with less repeatability

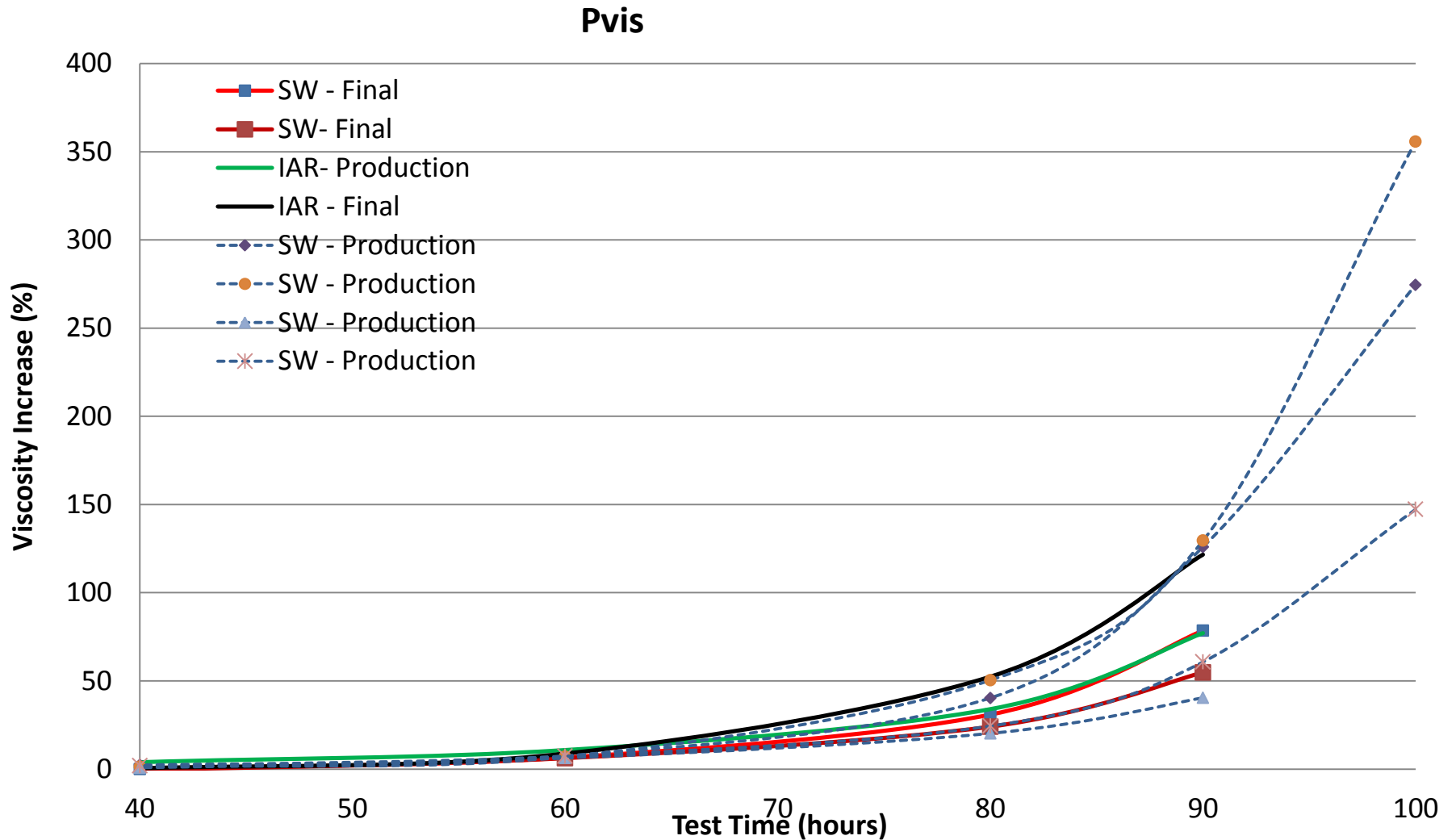


Discussion: Test Length Data REO2



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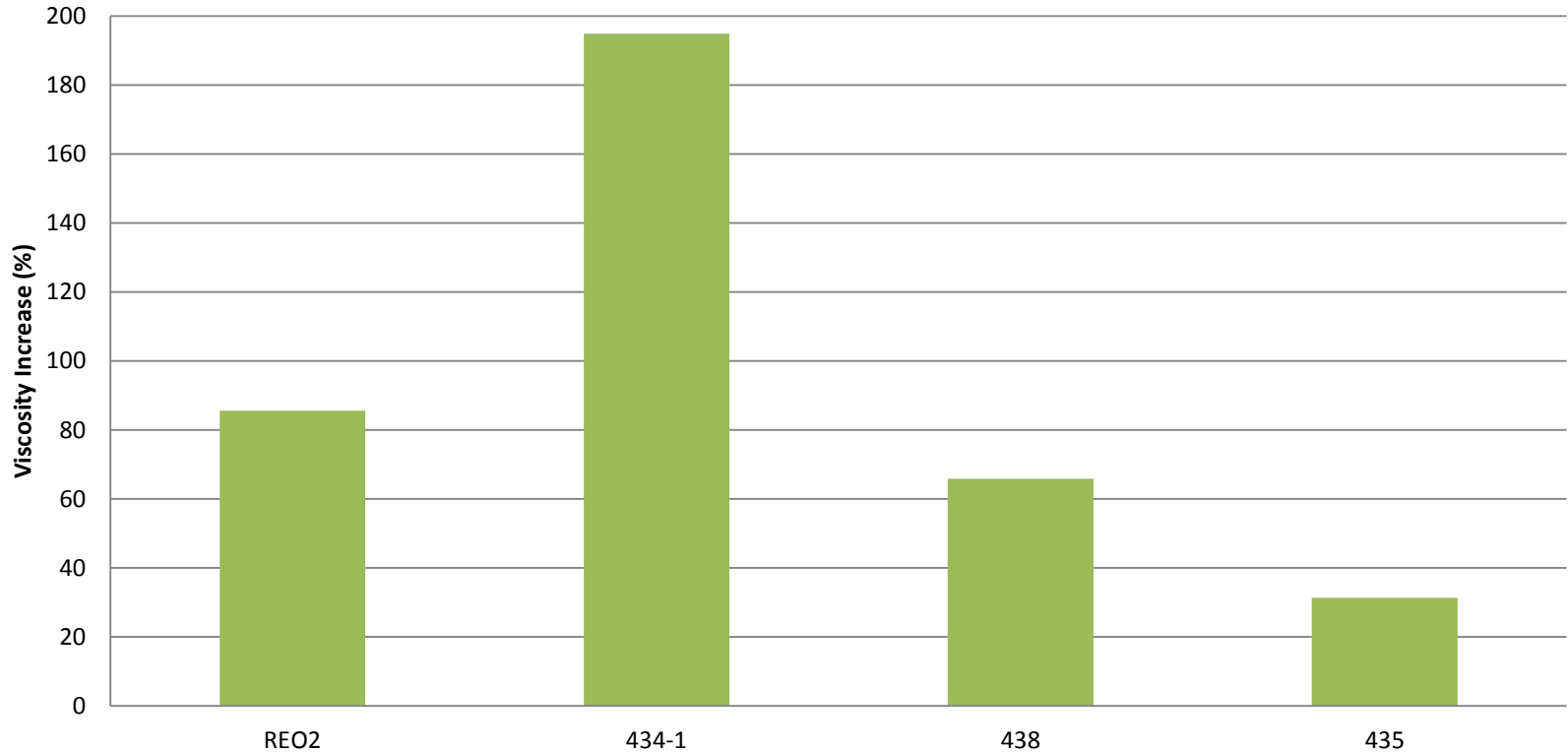
■ Increased severity with additional 10 hours with less repeatability



Discussion: Viscosity Discrimination

- Mean viscosity increase at 90 hours

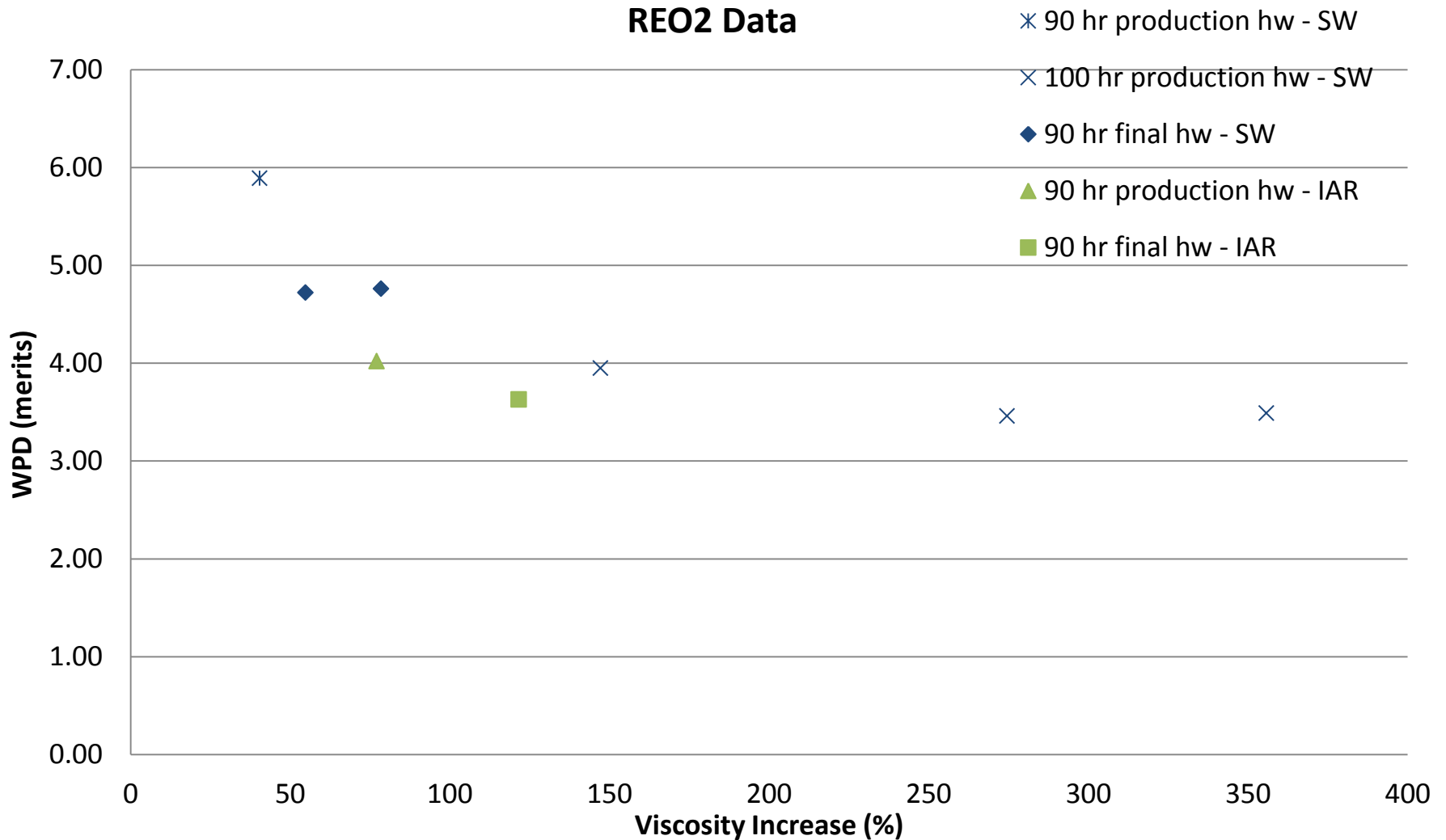
Viscosity Mean by Oil



Mean:	85.6%	194.9%	65.9%	31.4%
Standard Deviation:	35.2	13.7	68	10.3

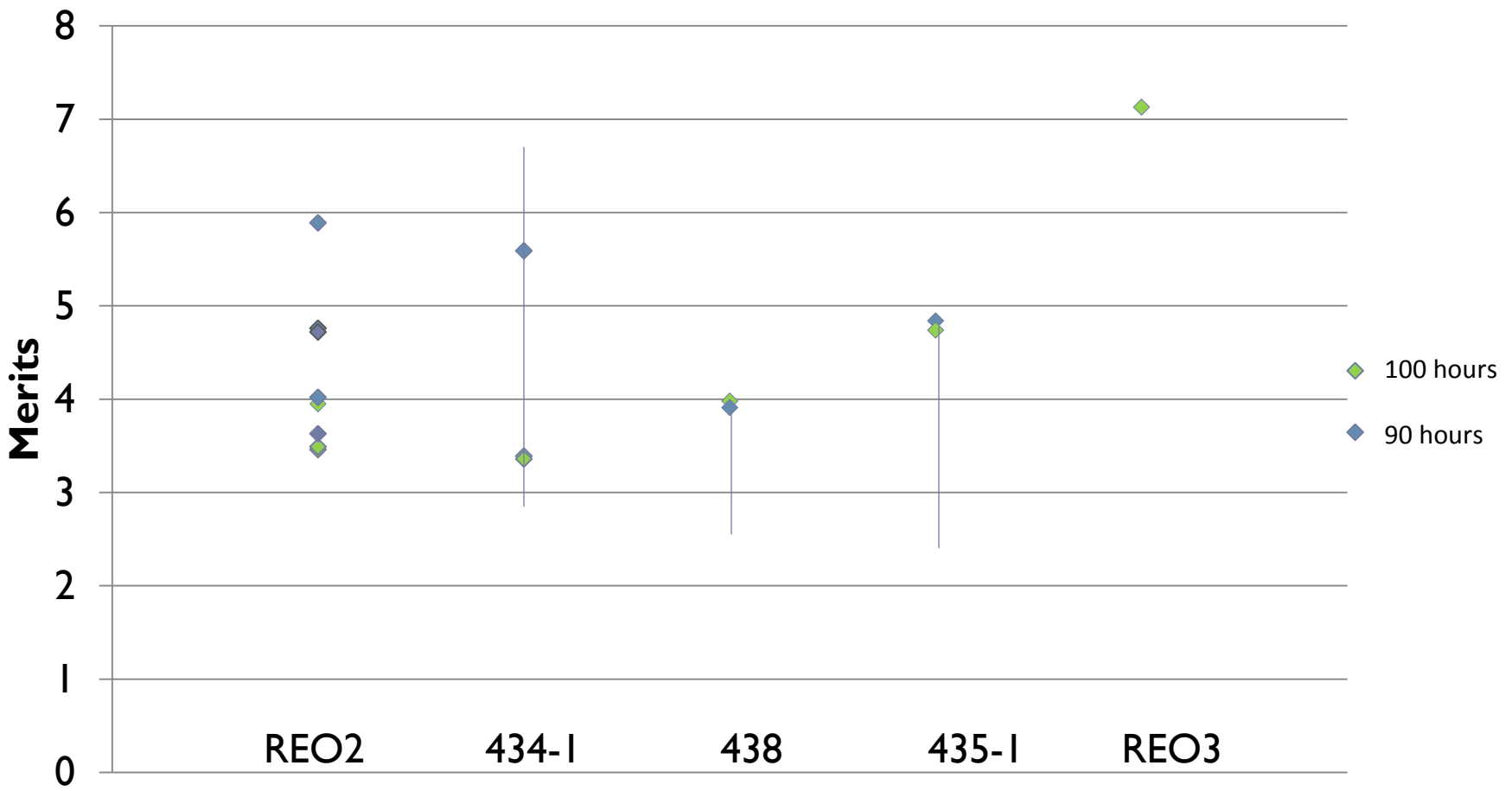
Discussion : WPD with REO2

- WPD is tied to pVis



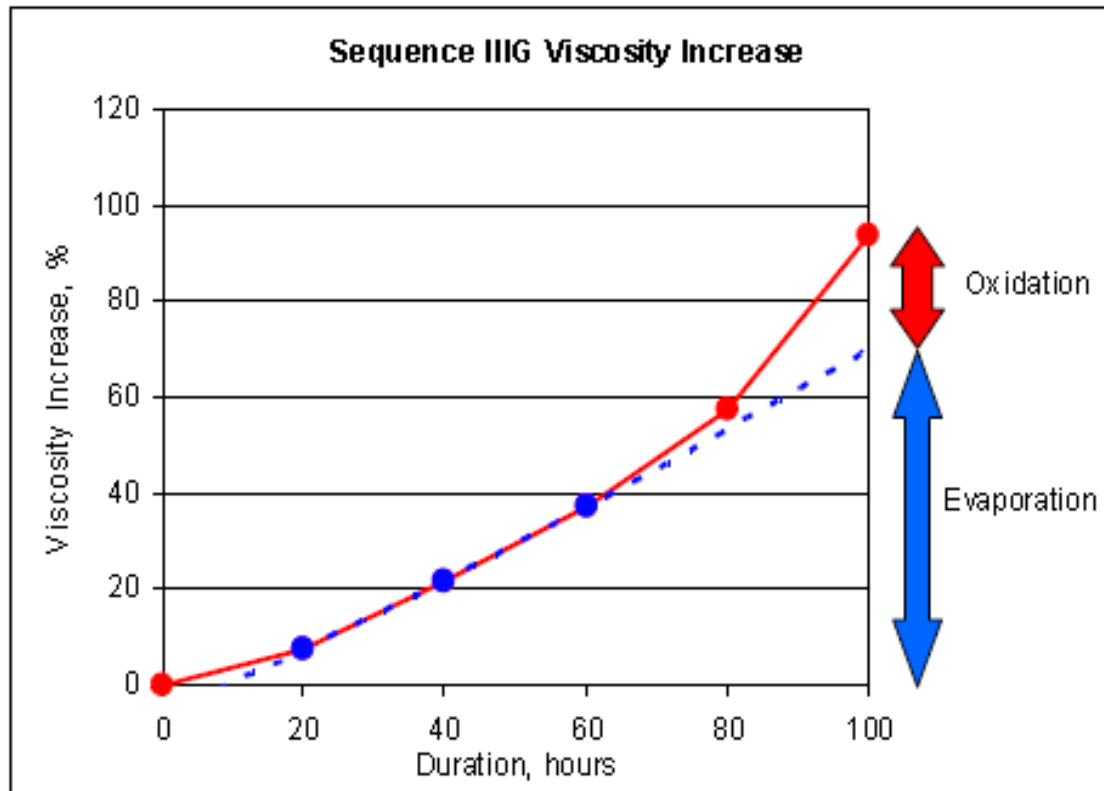
90 and 100 hour WPD data

WPD



Discussion: comparison with IIIG

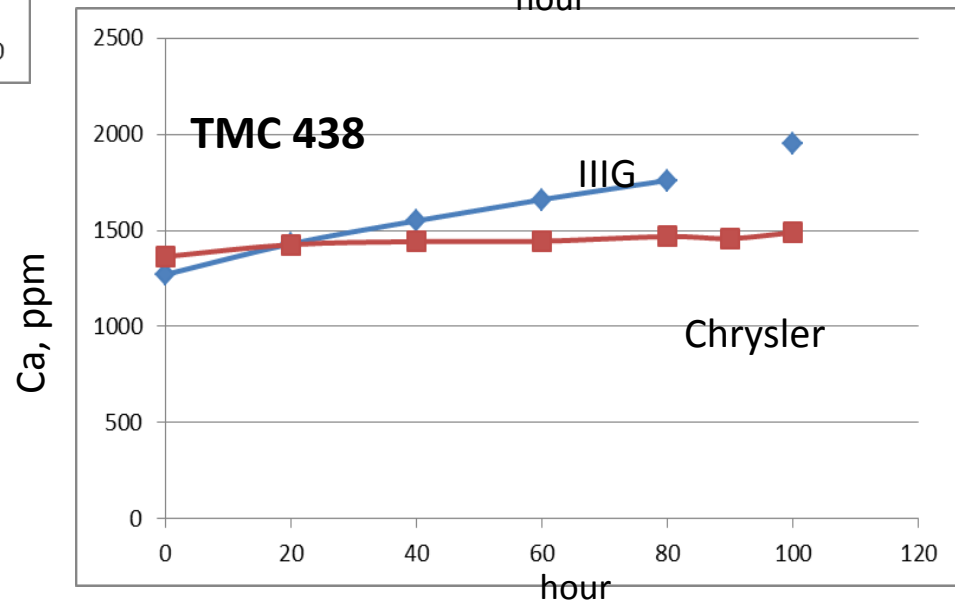
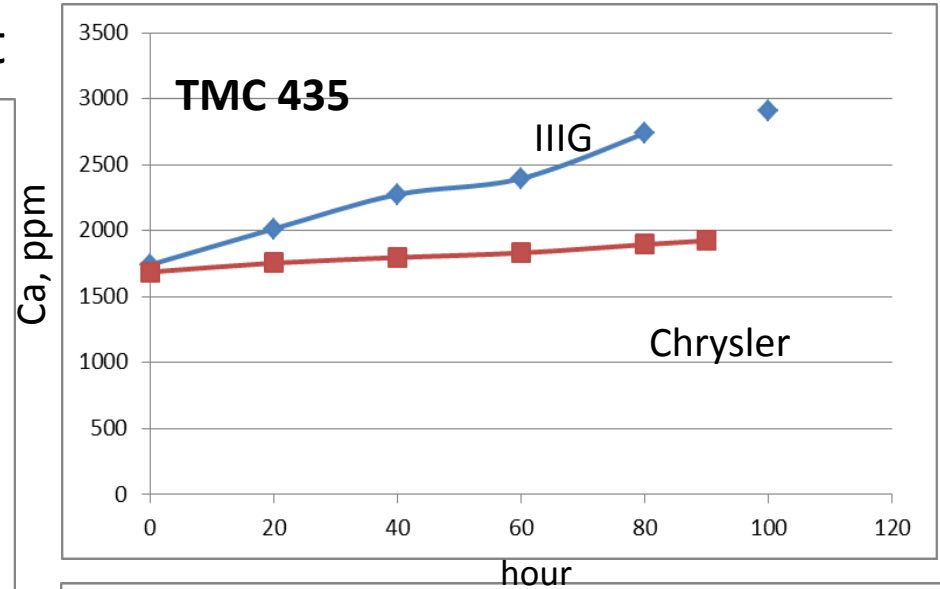
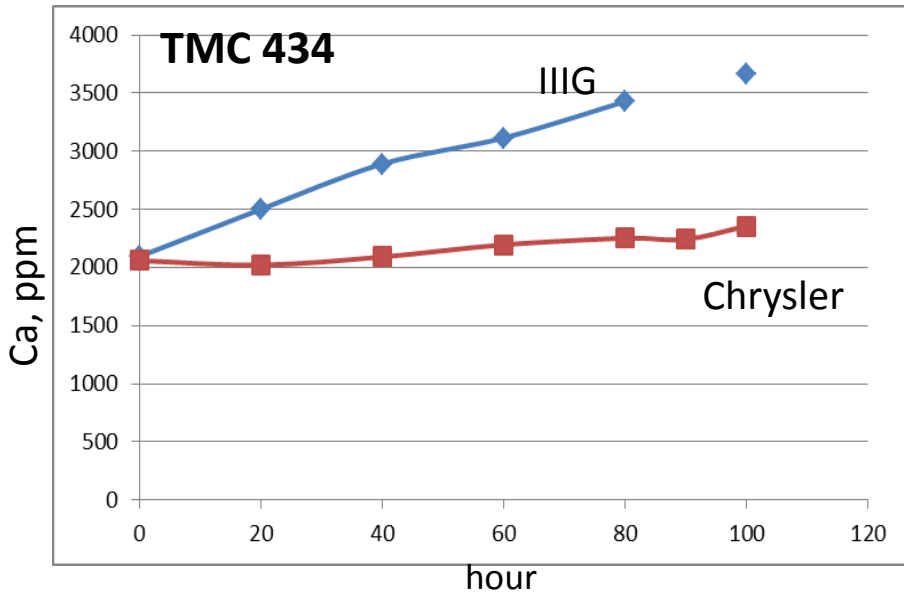
- The study in one SAE paper indicates initial viscosity increase in IIIG test is due to thickening from oil volatility
- Volatility effect could be estimated by assuming pVis increase in earlier hours is due to volatility alone and extrapolated linearly to 100 hours



* SAE 2007-01-1961 –A. Boffa and S. Hirano
Formulation Impacts on Seq IIIG Viscosity Increase

Calcium Accumulation

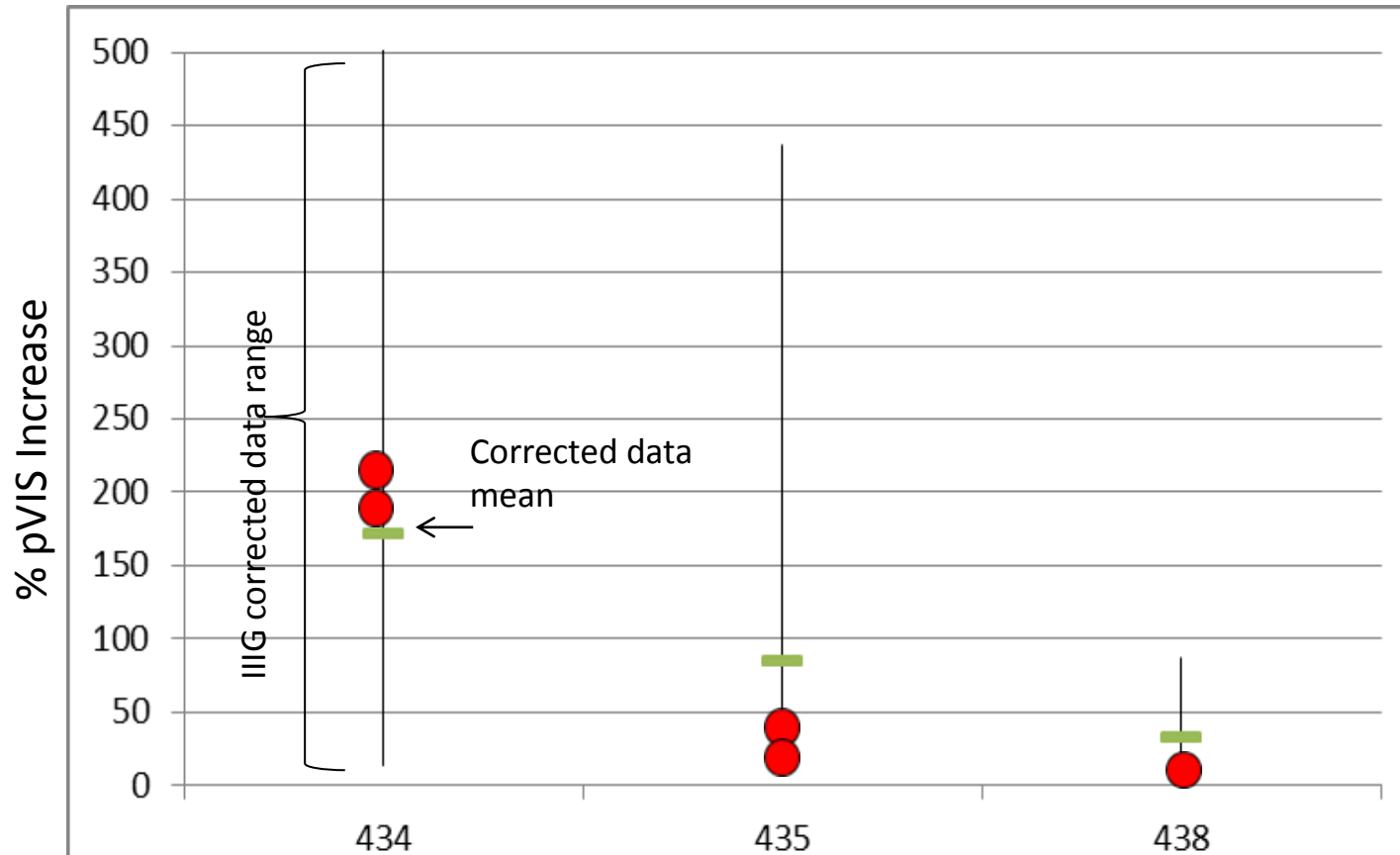
- Lower Ca accumulation indicates that Chrysler Oxidation/Deposit Test has reduced volatility effect



Discussion: Corrected PVIS

- Assuming viscosity increase in the first 40 hours comes from volatility
- Extrapolate linearly to 100 hours and subtracted from 100 hr data
- 435 worse than 434 in IIIG mainly due to volatility effect
- Chrysler test results correlate with volatility corrected pVis

● Chrysler data



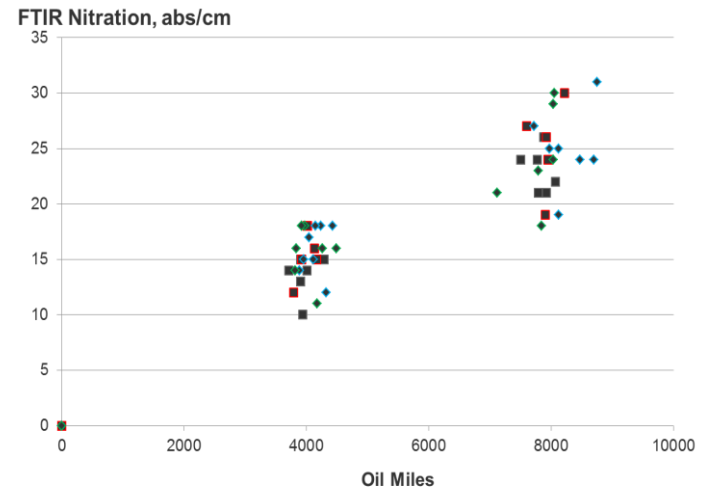
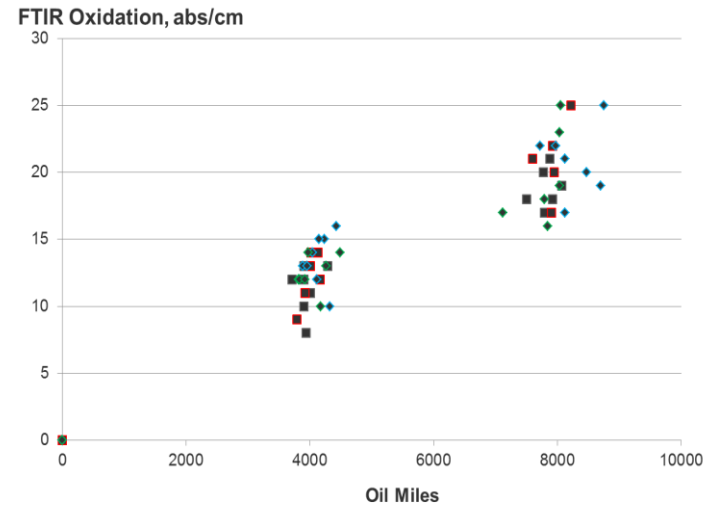
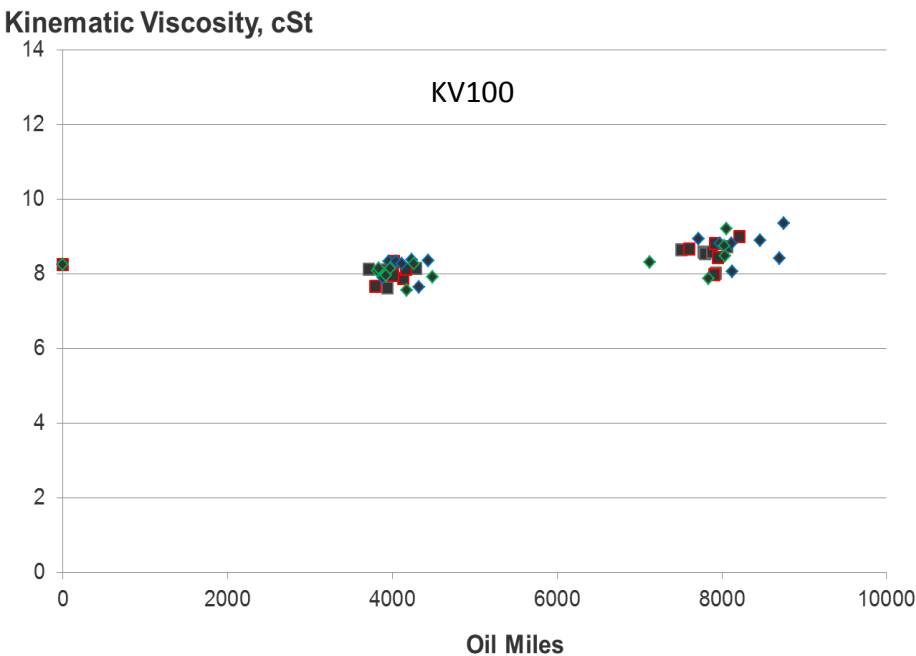
Chrysler Las Vegas Taxi Field Test

- 100,000 mile duration covering two summers
- 8000 mile oil drain interval at severe service condition
 - Some drains longer than intended
- 3.6L PentaStar in Dodge Charger
- Reduced initial charge (5 qt vs. 6 qt) experimented in PentaStar and found minimal impact



REO2 Field Performance in 3.6L V6

- Oxidation/nitration numbers and KV100 within guideline at 8000 miles
- SAE 5W20, GF-5 technology

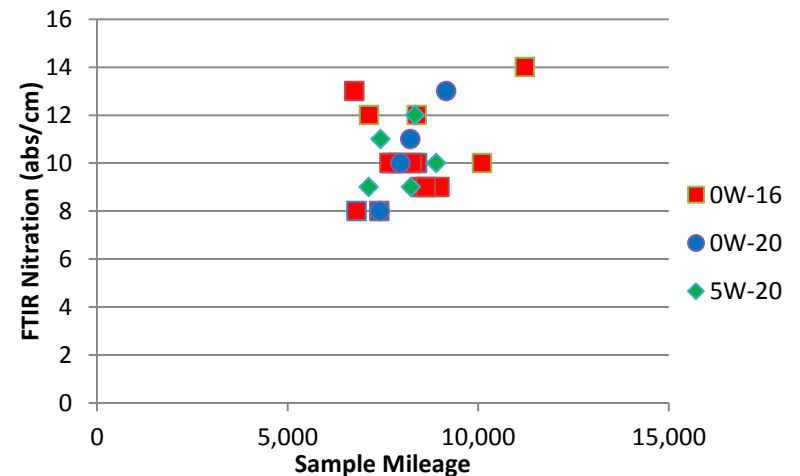
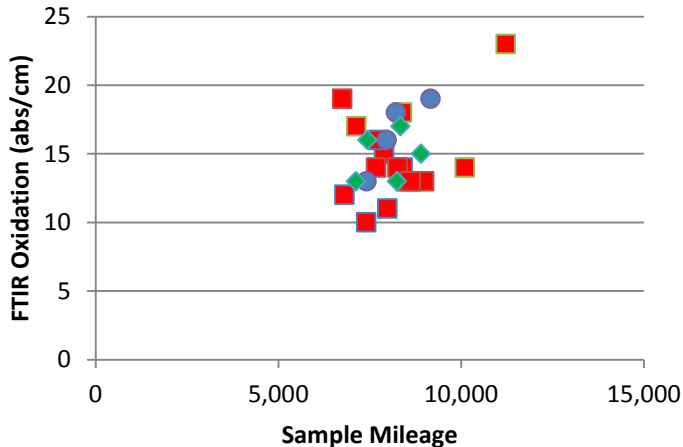
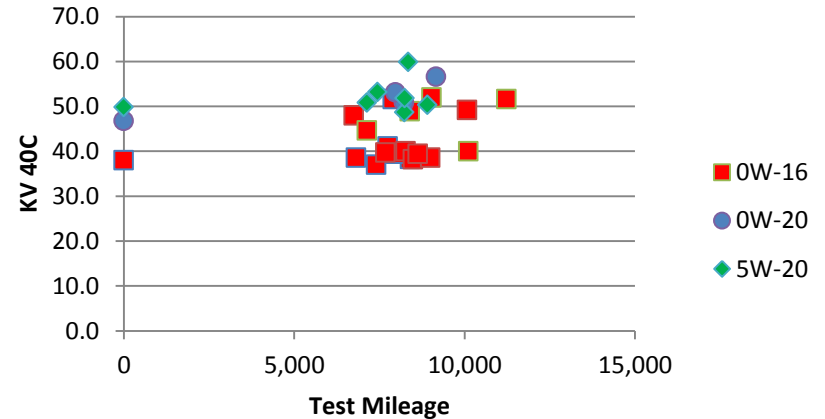
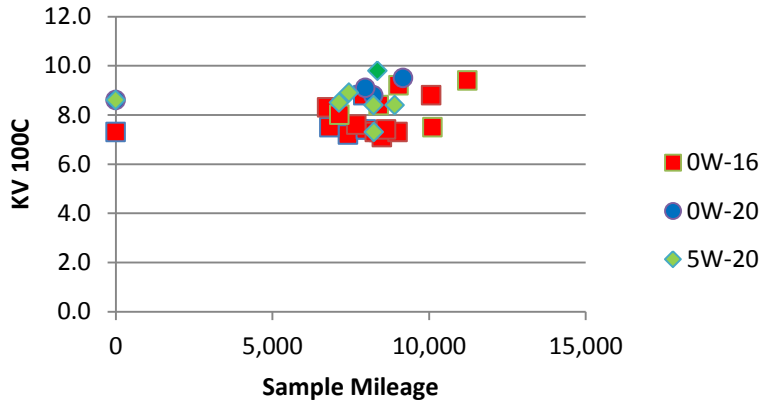


REO3 Field Performance in 3.6L V6



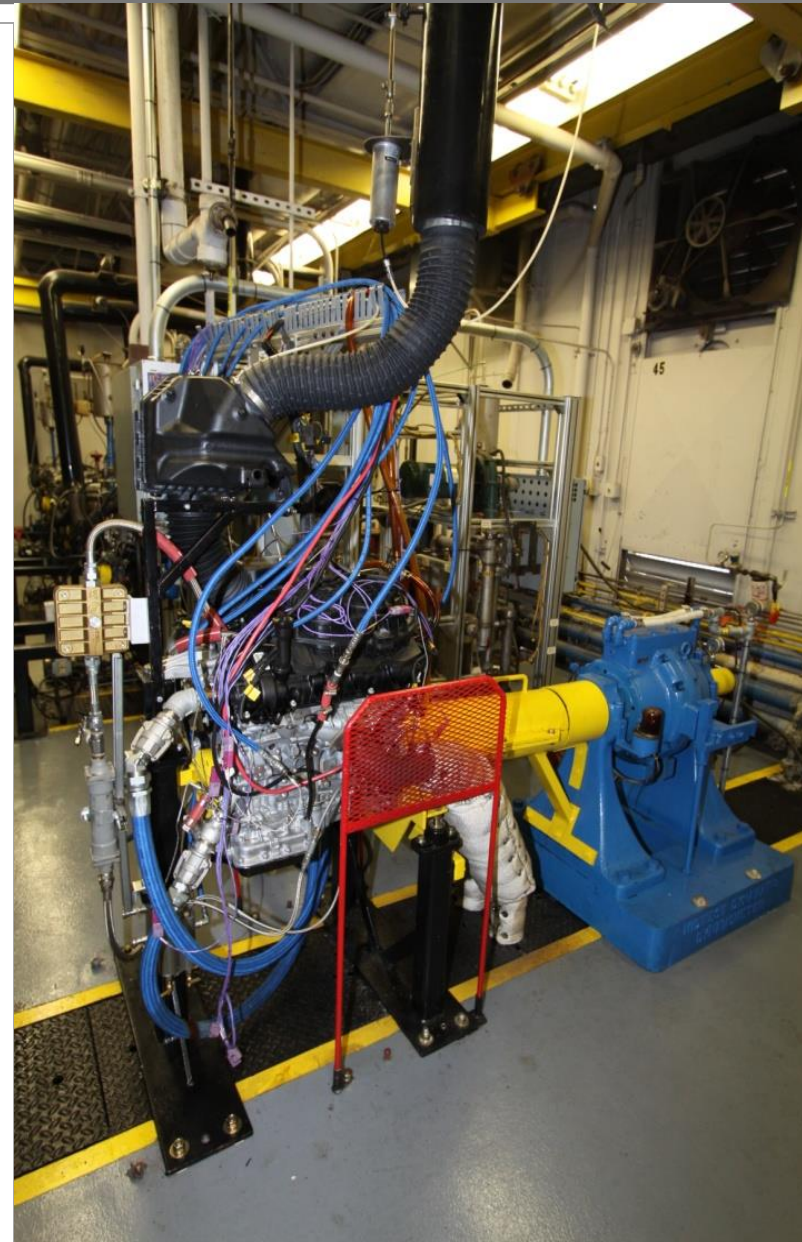
CHRYSLER GROUP LLC

- Field test : 5W-20, 0W-20, and 0W-16
- Within UOA guidelines at 8000 mile drain plus improved oxidation/ nitration and WPD results over REO2



Parts & Stand Availability

- Stand Availability
 - Four stands at SwRI available for industry testing
 - One stand set up at IAR
 - One stand set up at Afton
 - One stand set up at Lubrizol
- 75 Engines available as single order items right now
- Chrysler will supply complete engines
 - 3800 Engines planned over the life of the test
 - 800 Engines available for first year of testing
 - The compliment of 3000 engines will be available and in storage by June 2015. Will complete full test requirements for GF6
- Engines will be preserved and packaged by a 3rd Party
 - 20+ Year storage and preservation guarantee



Test Status Summary



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- Test Development is complete and all work has been transferred to the Task Force

Status	Criteria	Remark
Yes	IIIG correlation	434/435/438
Yes	Field Correlation	REO 2/3
Yes	Stand to stand repeatability	SwRI
Yes	0W16 viable	demonstrated
Yes	Final procedure and final hardware available and released	150°C, 90 hours, 6 oz oil addition every 20 hours
Yes	Long term engine supply and readiness	3800 engines to last through 2022, other parts through CPD
In progress	Lab to lab reproducibility and prove-out matrix	2 independent labs and 3 dependent labs

- Associated Changes with the Adoption of The Chrysler Test into GF-6
 - Based on improved oxidation/deposit performance in a hardware relevant to Chrysler
 - May remove MHT4 from GF-6 and Chrysler MS6395
 - Used oil available for IIIHA or ROBO update
 - Continue to support ROBO as is in GF-6
 - IIIHB applicable through the same calculation
- Reduced oil volatility effect on oil performance
 - Focus on oxidation/nitration control

Summary



CHRYSLER GROUP LLC

- The Chrysler test achieved reduced volatility and oil consumption effects but necessitates the change in data interpretation
 - Oil add is less than 1/3 of IIIG
- The Chrysler test achieved IIIG reference oil correlation after correcting for oil addition effects
- The Chrysler test achieved Vegas field test correlation to modern hardware and oil technology



Thank You!

TF Vote

Voting Members (20)

Ed Altman	Afton Chemical	No	
Jason Bowden	OH Technologies	Waive	
Tim Caudill	Ashland Oil	No	
Richard Grundza	ASTM-Test Monitoring Center	Waive	
Jeff Kettman Scott Stepp	GM Racing	No	
Tracey King	Haltermann	Yes	
Clayton Knight	Test Engineering, Inc.	Waive	
Teri Kowalski	Toyota Motor North America	—	
Patrick Lang	Southwest Research Institute	Yes	
Charlie Leverett	Intertek Automotive Research	No	
Koustav Singh Josephine Martinez	Chevron Oronite	Yes	
Bruce Matthews	GM Powertrain	No	
Timothy Miranda	BP Castrol Lubricants	—	
Mark Mosher	ExxonMobil Technology Co.	No	
Andrew Ritchie	Infineum	No	
Ron Romano	Ford Motor Company	Waive	Jim Linden proxy
Greg Shank	Volvo	—	
George Szappanos	The Lubrizol Corporation	No	
Thomas Smith	Valvoline	—	
Haiying Tang	Chrysler LLC	Yes	

4/9/4

GMOD Report to Seq. III SP

October 21, 2014

Status

- “ Completed evaluations of different engine hardware.
- “ Technology 1 Reference oil testing complete.
- “ Continuing to refine, optimize, and standardize several test stand components.
- “ Lab GMOD test stand installations are progressing
 - . 5 labs with slave engines or tests running
 - . 3 Lab test stand/lab inspections by GM/TMC completed

Recent Test Data

435-2

Test #	PVIS	WPD
A-22	252	3.8
A-24	266	4.2

1010 Reblend

Test #	PVIS	WPD
G - 19	143	4.6
G - 20	63	6.2
G - 1267	70	6.4
A - 23	394	4.5

Technology 1

Test #	PVIS	WPD
G - 21	85	5.8
A - 25	232	4.7

Above tests conducted new conditions established in July, 2014 with 100% dexcool, 115C coolant out, and 190 LPM coolant flow

A very good oil

Test #	PVIS	WPD
A - 20	21	6.8

Test Readiness for GF6

- “ Proposed reference oils: 1010, Technology 1, 435
- “ Reference oils to be supplied by TMC
- “ All test parts have been identified and supplied by OHT, CPW, and GM Dealerships
- “ Critical parts are batch coded and supplied on first-in first out basis.
- “ All CPDs will provide status reports
- “ Current IIIIG Test fuel is specified
- “ Test preparation, operation, and stand configuration is documented.
- “ Engine build workshop conducted and planned to be on an annual basis.
- “ Monitoring of severity and precision to be conducted by TMC.
- “ GMOD pistons will be made available to the Rating Workshops
- “ TMC will use reference oil control charts to judge test stand calibration status.
- “ Calibration test interval allows no more than 15 non-reference tests between successful calibration tests.
- “ GM/TMC visits to participating industry precision matrix labs are being conducted at this time
- “ Prove out tests with finalized procedure and hardware will begin in November.

Next Steps

- “ Final engine hardware testing to begin next week.
- “ Complete Lab test stand inspections by mid-November.
- “ Procedure Update – target late October
- “ After hardware and conditions finalized run tests with IIIG RO’s to determine correlation.
- “ Finalize reference oil selection
- “ Prove out testing to begin for all stands in Precision Matrix.
- “ Precision Matrix targeted for late 4th quarter 2014