

Chrysler IIIH Ad-Hoc Task Force  
Meeting Minutes  
October 21, 2014  
8:00 am Central Daylight Time  
Southwest Research Institute Building 209

There was a misunderstanding on which conference call in number was to be used for the meeting and as a result, Mr. Dave Glaenzer had to email an alternate call-in number to the Sequence III Surveillance Panel which resulted in a few people calling into the meeting late. The secretary being one of the late callers resulted in missing the introductions and therefore those parties calling into the call may not be listed, however there is an attendance list for those present attached. (Attachment #3)

Karin presented an agenda and the meeting started with Haiying Tang from Chrysler giving a presentation on IIIH Data and Test Readiness. (Attachment #1)

The presentation material outline covered:

Objectives

Test procedure

Oxidation and Deposit Test Results

PVIS

OW-16

WPD

Phosphorus Retention

Discussions

Test lengths 90 vs 100hrs.

Correlation to IIIG

Chrysler Las Vegas Taxi Field Test

Parts and Stand Availability

Summary

Discussion and questions during the presentation:

Dave Glaenzer asked if any of the data were transformed units to which Haiying replied there was no transformed data.

Jeff Betz provided an overview of parts and hardware availability as projected plans for build-out and storage for availability to the labs.

Addison Schweitzer provided an update on the status of the test stands at Intertek. Ed Altman commented on Afton's status commenting they were getting ready to run their slave engine and expressed concerns about being able to meet the lower exhaust back pressure requirements. George Szappanos commented on Lubrizol's status confirming his concerns about controlling exhaust back pressure indicating he had the same muffler IAR was using on order to see if that helped reduce system back pressure.

Haiying continued in Summary of her presentation and Charlie Leverett asked for clarification on a couple items related to the procedure being a Draft Copy, Piston Rings being lab gapped vs OHT Supplier gapped, and the fact that he wanted everyone to know that what was shown as final hardware was actually lab gapped rings.

Haiying continued showing 100 vs 90 hour development data to explain how we got to the determination to set the test length at 90 hours. Jeff commented that the test length is set at 90 hours indicating that 100 hour test length is not currently up for debate at this time. The data was shown just to explain how Chrysler got to the decision of a 90 hour test length.

The group asked about data on oils 1010, 434, and 435 oils. Discussion continued about PVIS break points related to additional oils run in preliminary testing at SwRI. Comments covered concerns about REO 435 generating passing results in the IIIH and possibly being a GF-6 quality oil.

Jerry Wang reviewed data slides in the presentation relating to oxidation data and volatility data related to Ca retention and volatility losses in the Sequence IIIG and the Chrysler Test. Jerry Wang and Andy Ritchie discussed volatility differences and if Oronite and Shell could possibly provide data results for IIIG Testing on REO2 and REO3. The group continued discussion with comments from Robert Stockwell and Bob Campbell relating to development of the Sequence IIIG test and consumer concerns about oil consumption and concerns about recent lubes group meeting concerns about making GF-6 tests backward compatible. Bob Campbell asked what would be required to go back and make reference oil 435 more severe in the Chrysler Test. Jerry expressed concerns that the scope of the development test was to create an oxidation test, not develop a correlation to the Sequence IIIG for backward compatibility. Ron Romano talked about concerns about NOAK Volatility numbers and corrected test results. Jerry tried to explain differences in blending of basestock concentrations and volatility test results.

Mike McMillan commented that he agreed with Ron Romano expressing concern that the Sequence III test has always been the linchpin test that has always been run even when there has been a baseoil interchange guideline. Mike expressed concern that although the Sequence III tests have been called oxidation tests they still had volatility effects on test results. Mike suggested that the Chrysler Test may truly be just an oxidation test.

The group again discussed the objectives of the test development and correlation to field testing for oxidation and volatility effects based on IIIG correlations. Robert Stockwell commented there were other field test correlations to the IIIG rather than the Las Vegas Taxi tests.

Jerry Wang and Ron Romano continued conversation about needed protection for the GF-6 Category with comment from Bob Campbell about needed protection to screen oils like reference oil 435 from becoming a passing oil in the GF-6 Category based on results in the Chrysler IIIH Test.

Conversation continued about the Sequence III traditionally serving the needs as an oxidation and volatility test and how the industry will move forward and still providing backward ties to the IIIG based on the Chrysler IIIH Test. Bob Campbell suggested possibly asking the TMC to provide data on the reference oils regarding volatility and other analytical data so the group might gain a better understanding the subject. It was determined that this request would have to come from the ILSAC Chair to Frank Farber at the Test Monitoring Center with the understanding the TMC would have to ask approval from the suppliers of the reference oils to share that data.

After much conversation, Haiying continued with her presentation which upon completion the group took a ten minute break.

Karin resumed the meeting with a review of the ASTM New Test Type Introduction Template (Attachment #2)

The group reviewed the document with comment from Dave Glaenzer about the design of the template and reporting processes up through the appropriate panels.

Comments from the group:

Ron Romano questioned the reference oil section regarding ILSAC Tech oils and recommended reference oils as listed in the document. Dave asked the general question about who decides what oils to include in the tests. The group discussed the oils used in Sequence III Testing and the oils recommended for use in the Chrysler IIIH. The secretary could not capture all the actual discussion about the reference oils and expected results as the conversation continued. Karin asked if this group was actually charged with the determination on what oils were to be used in the Chrysler IIIH Test. Dave Glaenzer commented the selection of the oils was yet to be determined based on performance. Jason Bowden brought up concerns about the current data being generated on lab gapped piston rings. After much discussion, Karin moved on to item #3 in the check list discussing protocol of reference oil blending, storage, and distribution.

Moving on to critical test parts and hardware:

Andy Ritchie recommended listing all critical parts for the test encouraging the group to pay close attention to quantifying all parts used. The group discussed this with the understanding the test would be using production run engine assemblies stored for the life of the test.

Addison Schweitzer and Charlie Leverett questioned additional storage of engine bearings and part number changes experienced when ordering replacement bearings through the dealership network. Jeff Betz explained the sequencing of the last two alpha characters in the Chrysler Part number architecture. Jeff went into further detail on engine production for the test explaining how the engines would be produced and stored understanding there are no plans to change any components in the Pentastar engine between now and the final build out. Jason suggested possibly providing this information to the TMC for future tracking of part number changes.

Jeff explained that the engines will be produced in ~ 1000 piece lots/mo. coming from the same plant off the same line for all components within that plant.

Jason provided an update about OHT supplied development materials with the understanding OHT would order large enough quantities to cover a reference period once the Matrix starts. Current materials in stock at OHT should cover prove-out and precision matrix testing. Jason indicated there would be a twelve to fourteen week lead time for additional materials once the prove-out runs are completed.

Karin explained supply of cylinder heads through IMTS starting with Seed Materials, and eventually becoming self-sustaining through the supply of new cylinder heads being sent to IMTS through the pull off core return cycle of new heads from the actual test engines cycled through the labs. Karin went on to explain there are sufficient materials available through IMTS to meet demands for testing virtually due to all materials required for processing being either on the shelf at IMTS or currently available through Chrysler as needed to supplement the program until the core-return program is in full operation.

Karin discussed current hardware serialization and critical part documentation as currently recorded in the Draft version of the Engine Build Documentation. The group discussed additional requirements for

parts tracking understanding there may be additional requirements for tracking on items like bearings as identified by the tracking numbers on each engine. After much discussion, the secretary believes the group agreed the requirements for critical parts tracking will be met. Karin commented that any additional requirements for parts tracking would be compliant and test engines will be consumed under first in – first out guidelines.

Karin continued working through the list covering Critical Parts Supplier requirements, Test Fuel Supply, Test Operation Procedures, Documentations and ASTM requirements for Research Reports. The group agreed there may be some items still under consideration regarding test stand set up, build manual documentation, and draft procedures.

Charlie Leverett commented there was still a need for additional test type specific workshops for honing and test engine build. The group discussed the Chrysler workshop with the understanding there may be a need to have an additional honing workshop and possibly a rating type workshop for lab technicians.

Jason, with support from Rich Grundza, commented on the content of the New Test Type Introduction Template being the templet that all test types will use for GF-6 and the fact that some of the questions might be premature as the development group may not have all the data required to make some of these determinations. Dave commented that he felt this document was designed as a broad overview of what might be required for a new test introduction.

George Szappanos asked if there would be a rating workshop before running the precision matrix. Rich commented on the rating workshops conducted by the TMC being strictly conducted for industry rater calibrations. Rich indicated the contact person for rater workshops is Mike Kasimirsky and he would carry the message back to Mike that there may be a need for a test specific workshop for the Chrysler IIIH. The group agreed the Rating Task Force may need to be reactivated and the request will need to come from the Sequence III Surveillance Panel. Regardless how it is handled the group agreed this needs to be resolved before the Precision Matrix is run and Dave needs to initiate the request.

The group discussed the process for moving the Chrysler IIIH forward from a Task Force to a Surveillance Panel. The secretary did not attempt to capture this discussion as there were too many comments pertaining to what panel through what organization actually made that decision.

Final review of the templet covered test prove-out and lab visits. Karin reported two San Antonio labs have been reviewed and plans are in place to visit Lubrizol and Afton in November.

Additional questions pertained to prove-out testing and discussions again turned to lab gapped vs supplier gapped piston rings. Bob Campbell suggested the comments in the templet reflect that there are these differences in the prove-out data to date. The group again ventured into discussions about the differences in gapping at the labs with Jeff Betz questioning whether it isn't possibly better to gap the rings to the actual bore rather than having the plus or minus variables as introduced by running supplier gapped piston rings. Pat Lang went into a detailed explanation of how the Sequence III tests decided to change from lab gapped to supplier gapped piston rings, explaining how subtle differences in how a technician de-burrs the gap edges of the piston ring contributed to major effects on actual blowby flow rates in actual testing. The group continued discussion with suggestions the group try to introduce as much consistency in ring gapping as possible.

Karin explained to the group that Chrysler desired to bring the question to a vote as to the readiness of the test being fit for purpose and recommended for matrix testing through the AOAP. The group discussed reasoning for the request with comment from Jerry Wang and Jeff Betz explaining the need for this approval in order to schedule production of the engines starting in January 2015. The group expressed major concerns about making this decision solely based on existing data. Jeff Betz asked if the IIH Test would be in GF-6 if it was in the Precision Matrix. The response from the group was that running the matrix did not necessarily guarantee the test would be accepted for GF-6. Conversation continued with many comments and Dave Glaenzer asking how we might list what requirements might be needed to move forward. Ron Romano suggested putting a list together to see what's needed to be done within the next two months to bring the test forward. Members continued discussion with support from Andy Ritchie, Bob Campbell, Jerry Wang, and Ron Romano recommending calling the question and making a list of requirements needed to move forward.

The group decided to break for lunch and reconvene to decide on wording of a motion.

Upon re-convening, the group decided upon the wording for a motion to vote on whether the test would be recommended to the Passenger Car Engine Oil Classification Panel (PCEOC) and the Auto Oil Advisory Panel (AOAP) as fit for purpose.

Motion:

The Sequence IIH Task Force recommends to the Passenger Car Engine Oil Classification Panel (PCEOC) and the Auto Oil Advisory Panel (AOAP) that the IIH Test is fit for purpose.

Motion was made by Jeff Betz / seconded by Jeff Hsu

The motion failed with the voting results

6 approve

4 disapprove

2 waives

After the vote the panel went around the table allowing each individual representative of each party that disapproved or waived on the vote to discuss their reasons for their negative. During this discussion the group put together a list of items that need to be addressed by the IIH Task Force / Development Group.

- 1) Backward compatibility with Sequence IIIF/IIIG.
- 2) Volatility concerns.
- 3) Reproducibility.
- 4) Final Hardware usage.
- 5) Test Length
- 6) Engine Honing and Test Specific Engine Build Workshops
- 7) Rating Workshop
- 8) Operational data review
- 9) Exhaust backpressure
- 10) Matrix Oil Selection (Category Reference Oil Selection)
- 11) Final Engine Build Procedure
- 12) Operating Conditions. Engine Ramping, Combustion Airflow, Exhaust Backpressure

After compiling the aforementioned list, the group discussed the desire to continue working through the list under the IIIH Task Force and cut the planned Surveillance Panel Meeting portion of the scheduled daily events short, assuring they would take enough time to allow Mr. Robert Stockwell time for an GMOD update at the end of the day.

The group again took a short break.

After re-convening, Pat Lang reviewed each item and the group discussed actions required to address each issue;

1) Backward Compatibility / Volatility:

- Group requested Ron Romano request TMC to provide distillation and NOAK Volatility data for all IIIG reference oils, along with Oil 1010.
- Provide assurance a poor quality NOAK Oil will fail the Chrysler IIIH by correcting the data as necessary to Sequence IIIG. (Additional Test Requirements, possibly using ROBO Test data)
- Come up with some means of adding the volatility aspect of the IIIG back into the Chrysler IIIH.

2) Prove-out work:

- Future prove-out runs need to be on supplier cut ring gaps, OHT Pistons, and Lab honed engines.

The group discussed SwRI data run on lab honed blocks with in-house gapped piston rings and changes between piston cooling jet targeting differences between model year 2013 and 2014 piston cooling jet design. Jeff Betz and Jason Bowden ventured into a lengthy discussion on piston ring gapping with comment from Charlie Leverett, Ed Altman, and George Szappanos.

3) Rating and Honing Workshop:

- Labs expressed the desire to have a test specific IIIH rating workshop.

Bob Campbell went into great detail explaining how the Heavy Duty side uses solvent to clean pistons rather than wiping the pistons prior to rating. Karin explained the Task Force views this as an open action item. Bob Campbell recommended this group continue investigation looking into possibly specifying alternate cleaning methods for the Chrysler Pistons. Again, after lengthy discussion between group members, Karin will take this issue on as a new action item.

- Karin will contact TMC asking assistance to coordinate a test specific IIIH rating workshop.

The group discussed honing issues with comments from Charlie Leverett and Ed Altman expressing concerns that contrary to initial belief that the honing using the SV-10 would be similar to another test; labs are finding the minimal stock removal in the Chrysler engine Block may require different type operations and therefore would like to have a test specific workshop.

Discussion continued focused on honing and possibly having a test specific honing workshop in conjunction with a test specific engine build workshop.

- Karin will work with the labs to schedule a test specific honing and engine build workshop.

4) Test Length:

The group discussed severity of the test related to test length 90 vs 100 hours. The general focus from a couple labs was to run additional testing looking at 90 hour results plus an additional 10 hours running to compare results. Discussion focused on disassembling the engine at 90 hours and re-assembling the engine to run the additional 10 hours to 100 for a comparison on WPD. The group discussed the pros and cons related to disassembly and reassembly of the test engines. Ed Altman suggested there may not be an adverse effect on WPD when a lab turns the engine around within the same day. Comments focused on concerns about using new RTV gasket sealers and possible effects on viscosity with general agreement it would not necessarily have an adverse effect on the WPD for comparison purposes. In the end, the general feeling was the labs should have the option to disassemble, rate, and reassemble the engine to run an additional 10 hours if desired.

5) Prove-out run data:

The group discussed sending prove-out data to the TMC for further analysis;

- Operational
- OBDII Type

The TMC would compare data results reviewing individual lab set point capabilities.

The group also expressed concern to have a clearly defined operational test schedule like that used in the Sequence III showing ramp times for test start and shutdown processes.

The group discussed the selection of oils for the prove-out and Matrix testing with some explanation of the ILSAC selection of the GF-6 Technology Oils selected for the Precision Matrix for the Sequence III Category. There was some discussion about the use of Reference Oils 1010, 433, and possibly 438 for tie-back to the IIIF and field data. The group decided that decision would not be made at today's meeting. Jim Linden commented that he didn't think Ron Romano as head of ILSAC would care about a tie-back to the Sequence IIIF. Afton and Valvoline expressed concerns about establishing a tie-back to IIIF – IIIG – and the Chrysler IIIF or possibly another potential oxidation test.

6) Test Reproducibility:

George Szappanos expressed concern over preliminary testing at Lubrizol and the reproducibility of the test work at Lubrizol. George continued saying he felt the group was working towards reducing the variability by the recent activities focused on lab visits and procedural refinements. Rich Grundza commented he felt we didn't have enough data to compare test results for reproducibility and repeatability due to the small number of repeat test data.

Discussion continued focused on hardware availability and when labs might start future tests. George indicated he would like to start his next test after the Lubrizol Lab Review scheduled for

early November. Jim Linden asked what the group was using as criterion for comparisons at the present time for prove-out data. Karin and Jim discussed the plan to compare results to SwRI data which lead to the final test and hardware configurations. Discussion continued talking about QI and upper and lower limit establishment with Rich commenting those data would come out of matrix type testing. The group again discussed how the Chrysler Test might be compared to the IIIG for tie-back to Volatility. Kaustav Sinha explained how the data was used to compare IIIG Volatility data to the Chrysler during development; however he indicated no work has been done to attempt using the Chrysler data to predict how an oil might perform in a IIIG test.

Karin moved on covering the last items for discussion, being exhaust back pressure and the desire to move the control up from 3 kPa. Labs expressed concerns about providing control capability data and possibly making changes to the specification.

The group decided there was no further action required in the form of a motion to decide the test would be declared fit for purpose if the aforementioned list were addressed. The group agreed it was understood the task force would be addressing these issues and address the concerns about declaring the test fit for purpose at an upcoming meeting.

The group discussed part number changes and assurances the parts to support the final configuration on the build out engines would be available to support testing.

The group switched to Sequence III Surveillance Panel discussions.

Final meeting adjournment 5:02pm Central time.

#### Action Items:

- 1) Ron Romano (ILSAC Chair) will submit a request to the Test Monitoring Center for the release of Distillation and NOAK data from the suppliers of IIIG Reference Oils 435 and 434.
- 2) The IIIG Task Force will create a list of critical and special test parts and test stand components for the Chrysler IIIG Test.
- 3) Dave Glaenzer will request the Test Monitoring Center to set up a Rating Task Force Meeting to discuss specific parts rating issues for the Chrysler IIIG Test.
- 4) Karin will work with the labs to schedule a test specific honing and engine build workshop.
- 5) The group will design a Prove-out schedule that will allow disassembly at 90 hours with the option to reassemble the engine using the same test components and oil to run an additional 10 hour to 100 total hours.

This is a compilation from notes recorded during the call, with comments from member participants during the Draft Review. Certain subjects may not necessarily be in exact order; however, they are believed to represent an accurate account of the call. If anyone feels changes or additional content may be necessary, please contact Sid Clark @ 586-873-1255 or [Sidney.Clark@swri.org](mailto:Sidney.Clark@swri.org)

Thanks, Sid





Attachment #1

# 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



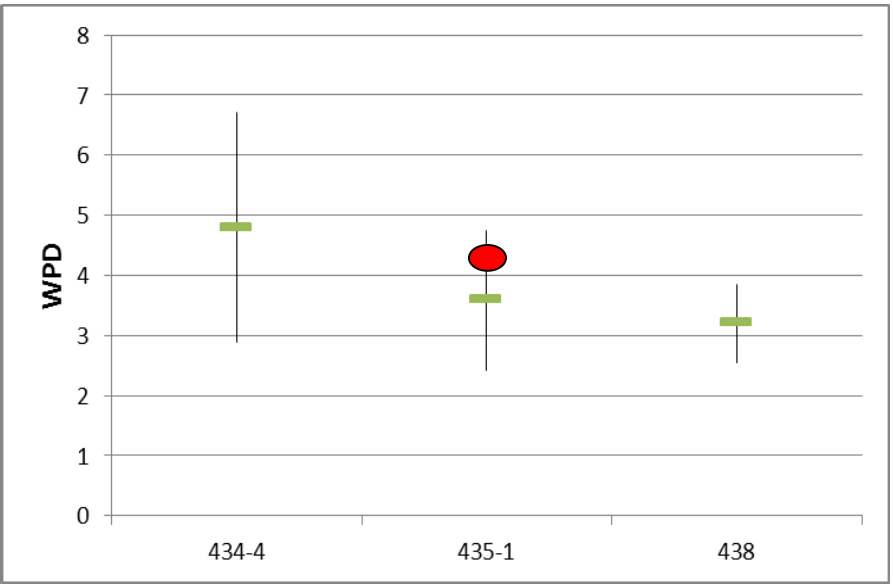
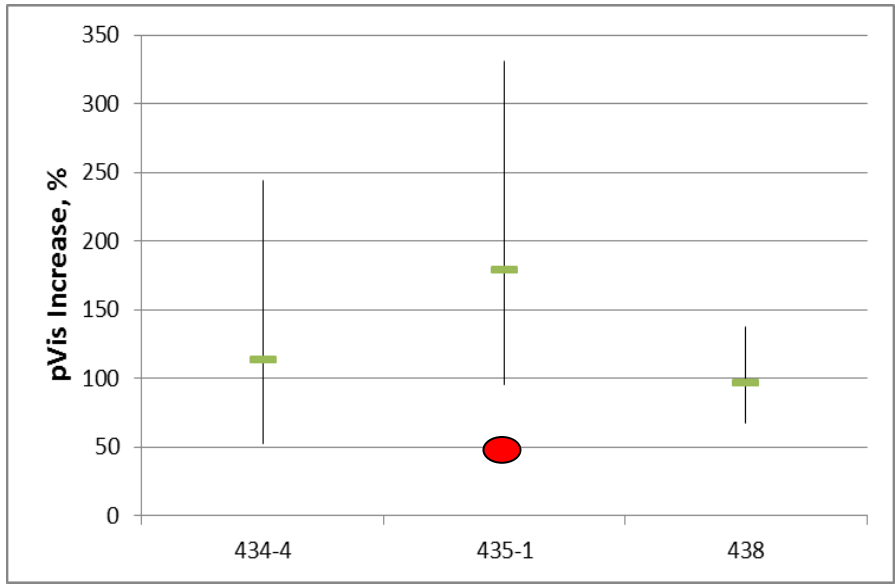
CHRYSLER GROUP LLC

- 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

- 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



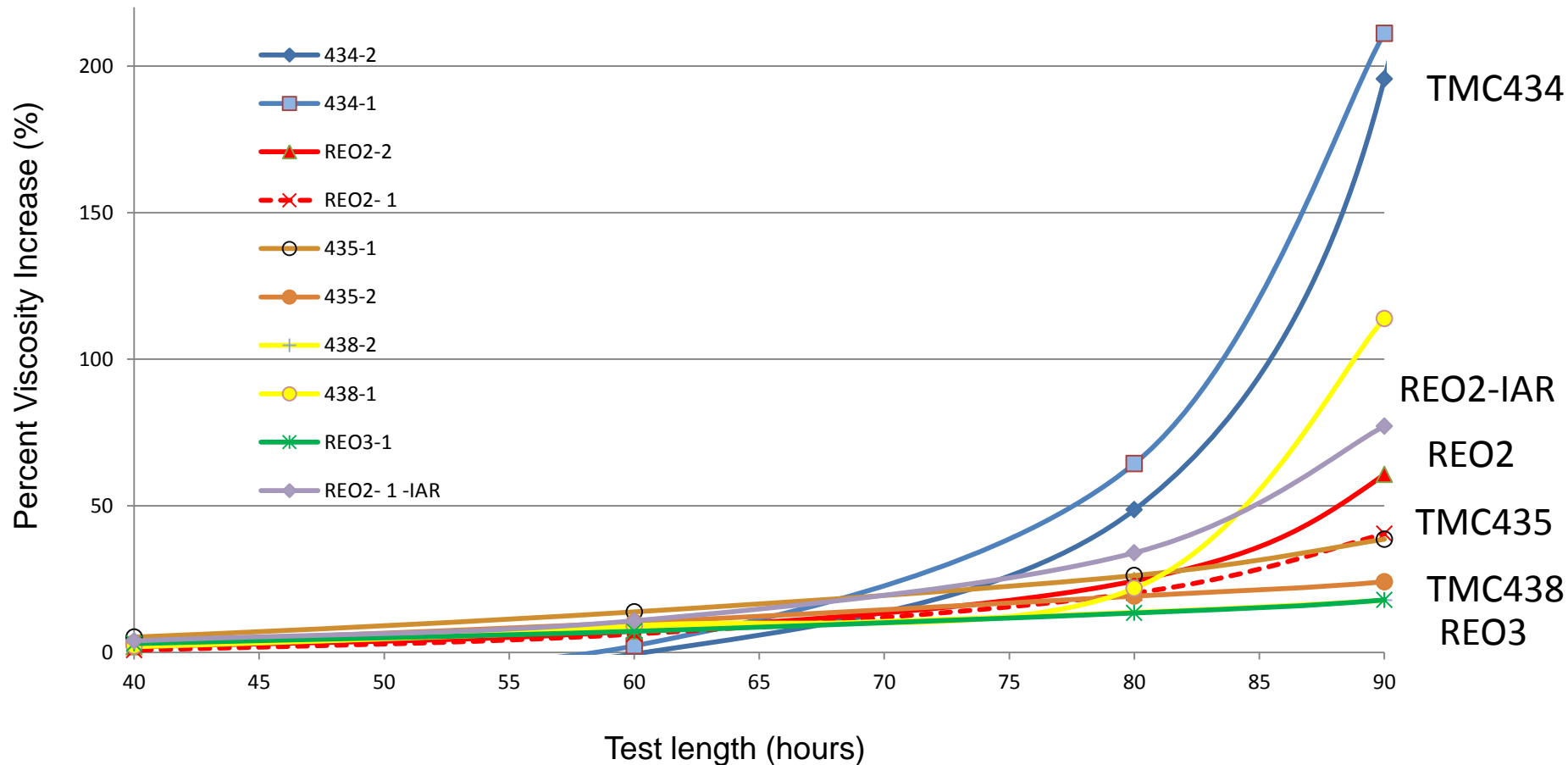
CHRYSLER GROUP LLC

- 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

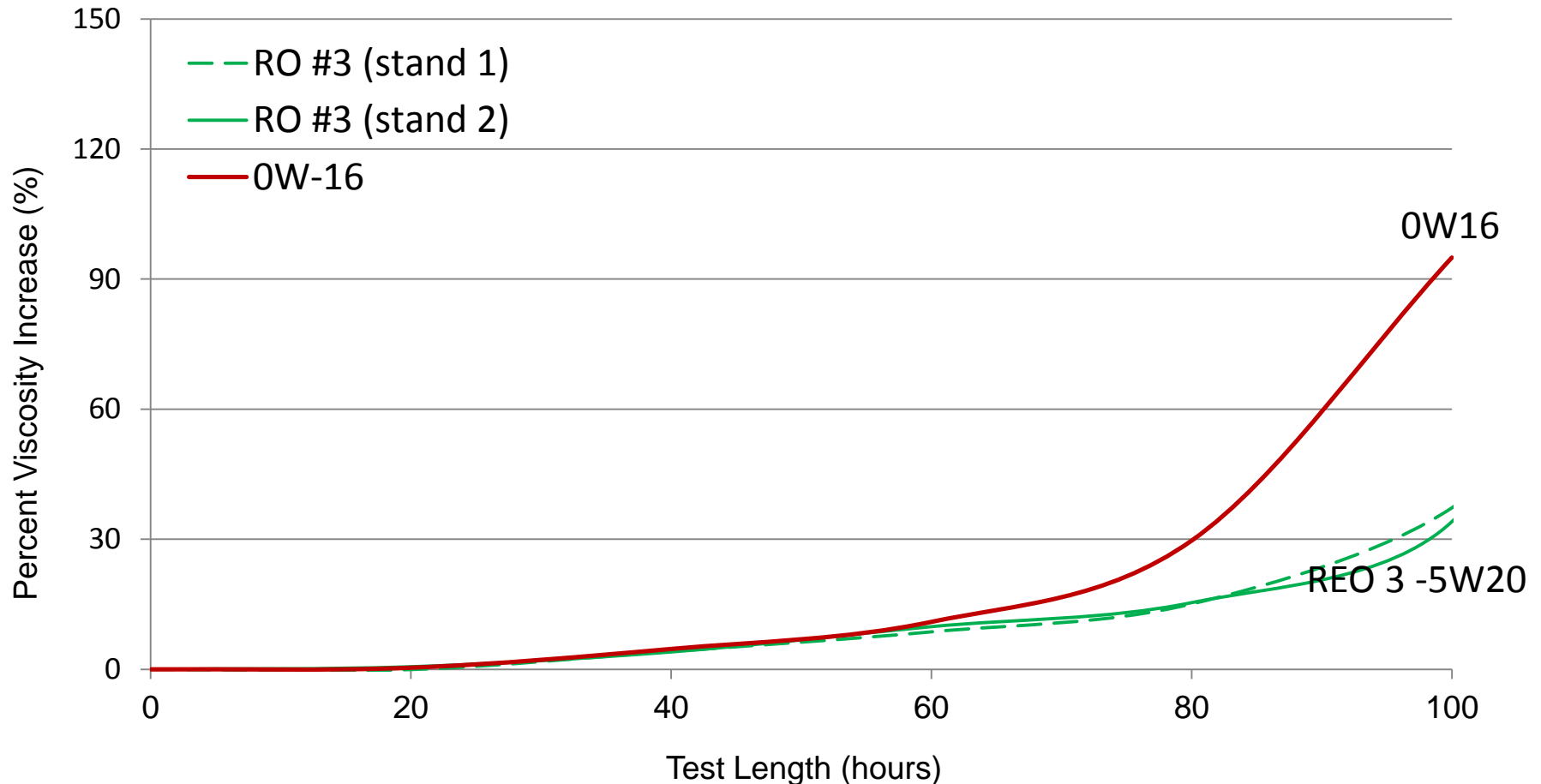
# Results: Viscosity Increase

- 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

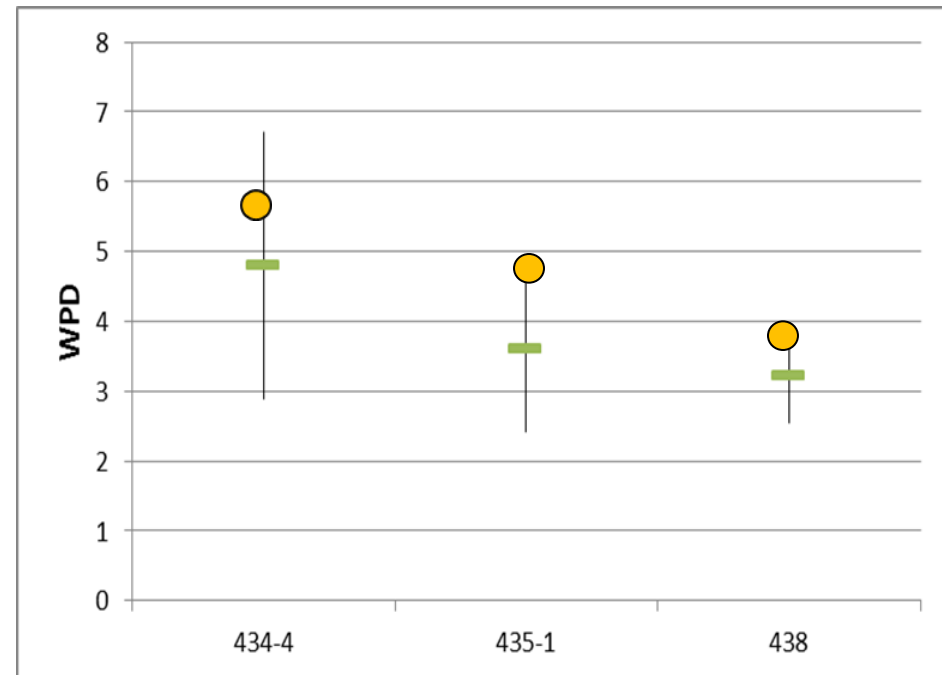
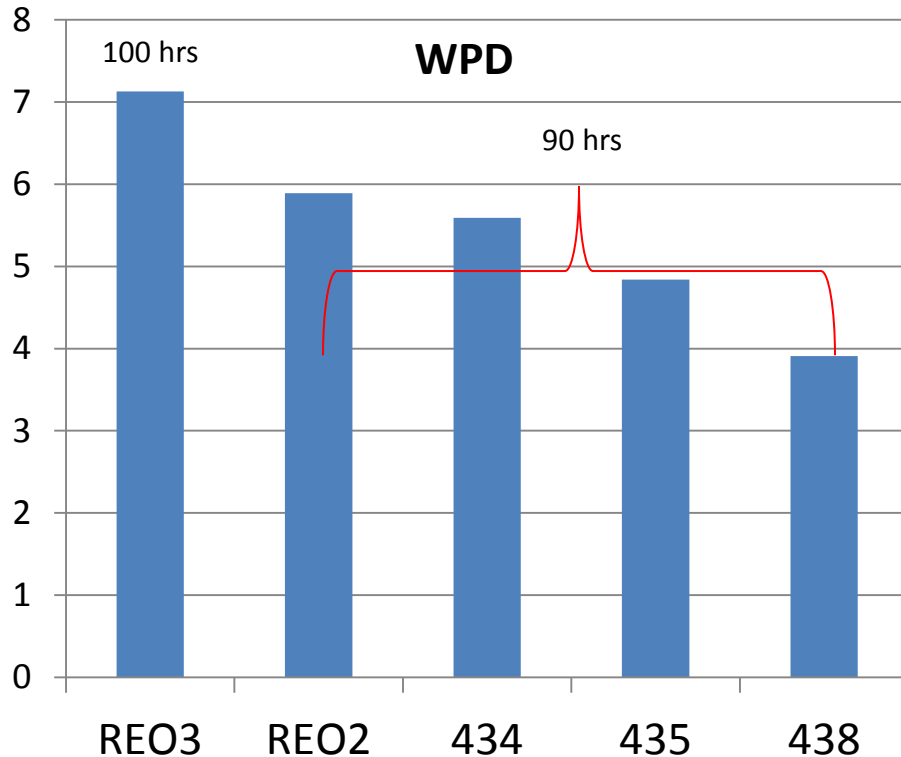
- 0w-16 engine oil was demonstrated in Chrysler Oxidation and Deposit Test



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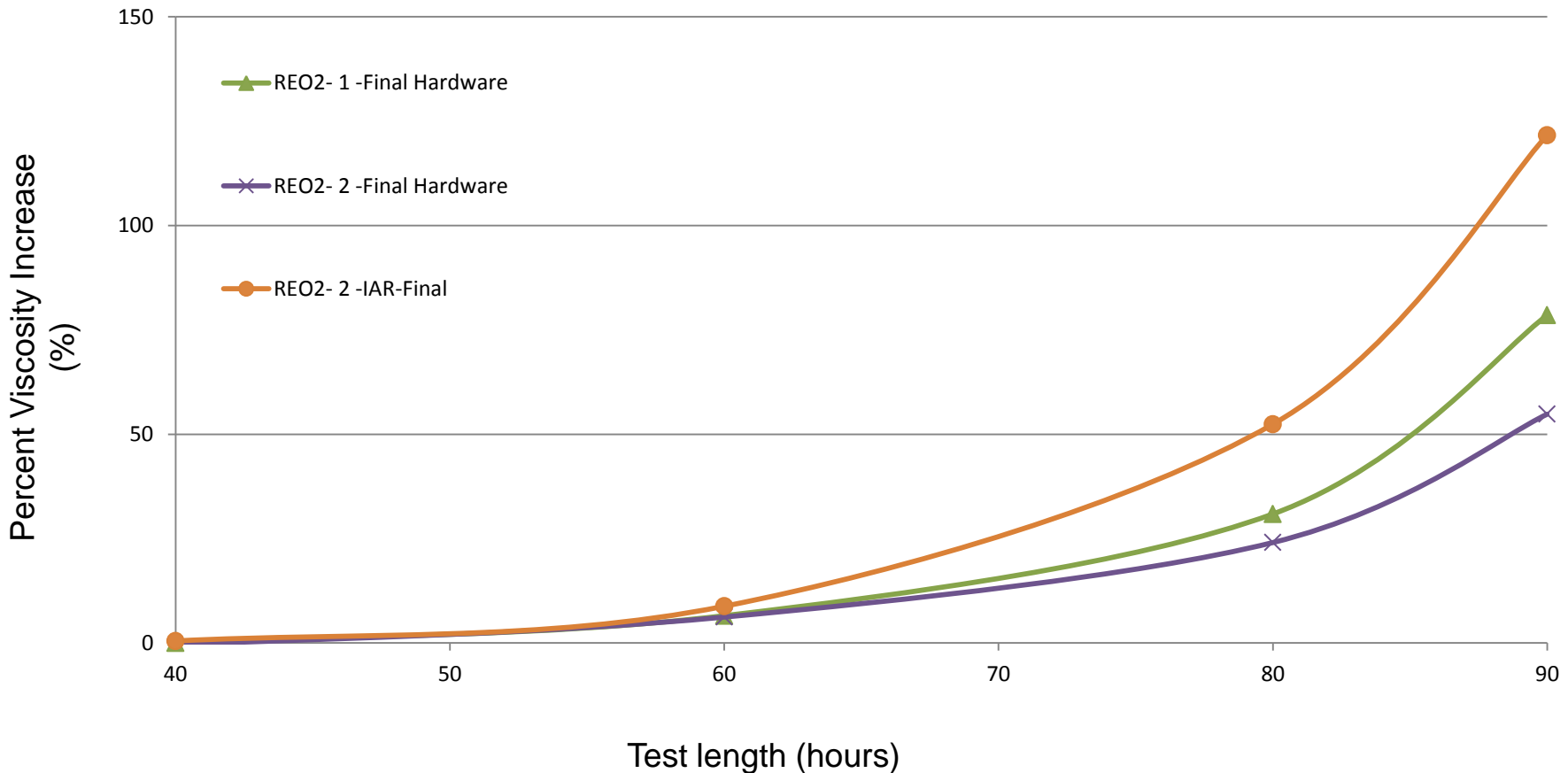
- Phosphorus results show the same ranking and a similar separation with IIIGB and good repeatability
- Chrysler test has higher numbers than IIIG likely due to reduced oil addition

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



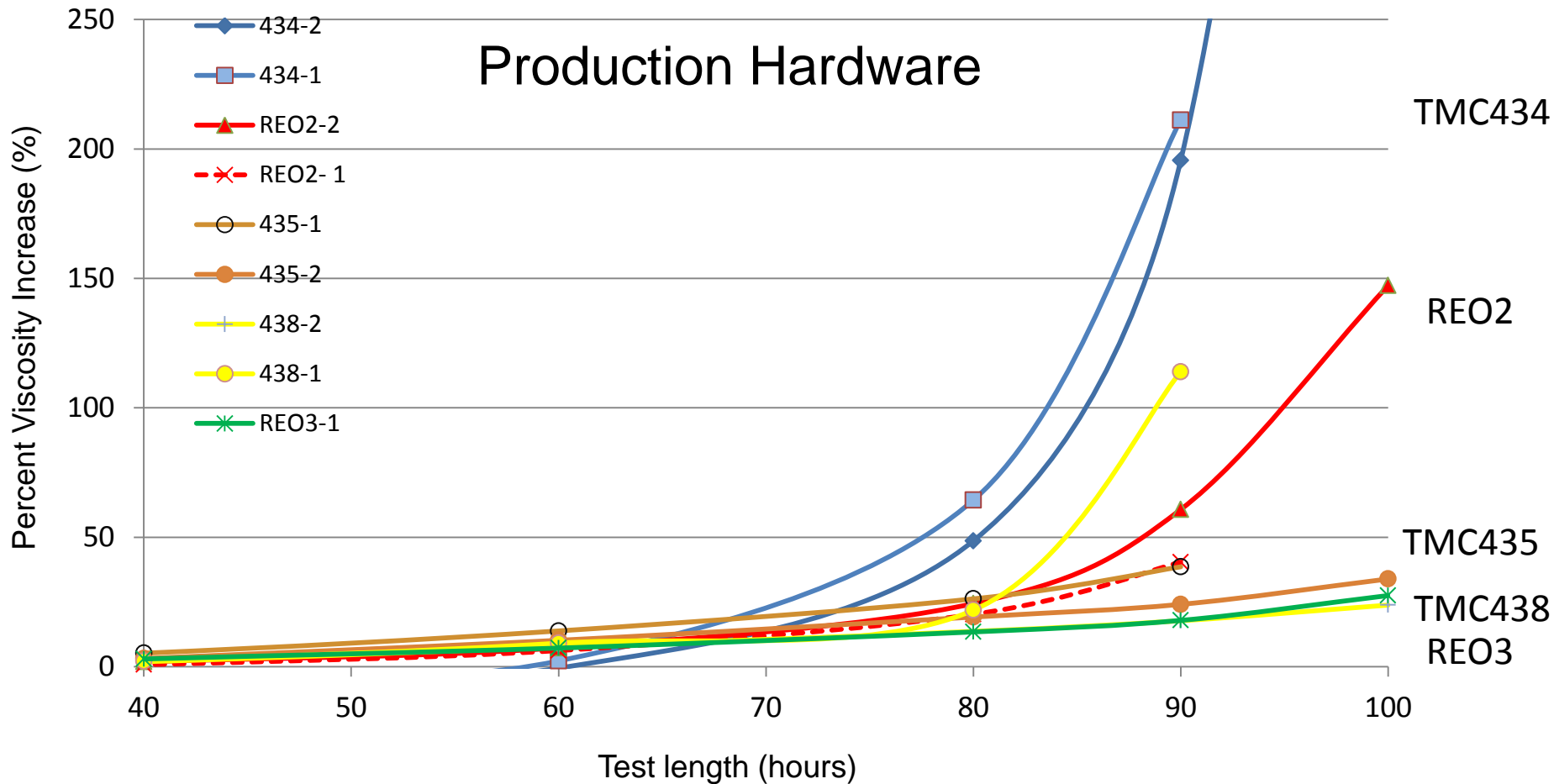
# Results: WPD with Final Hardware

- 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

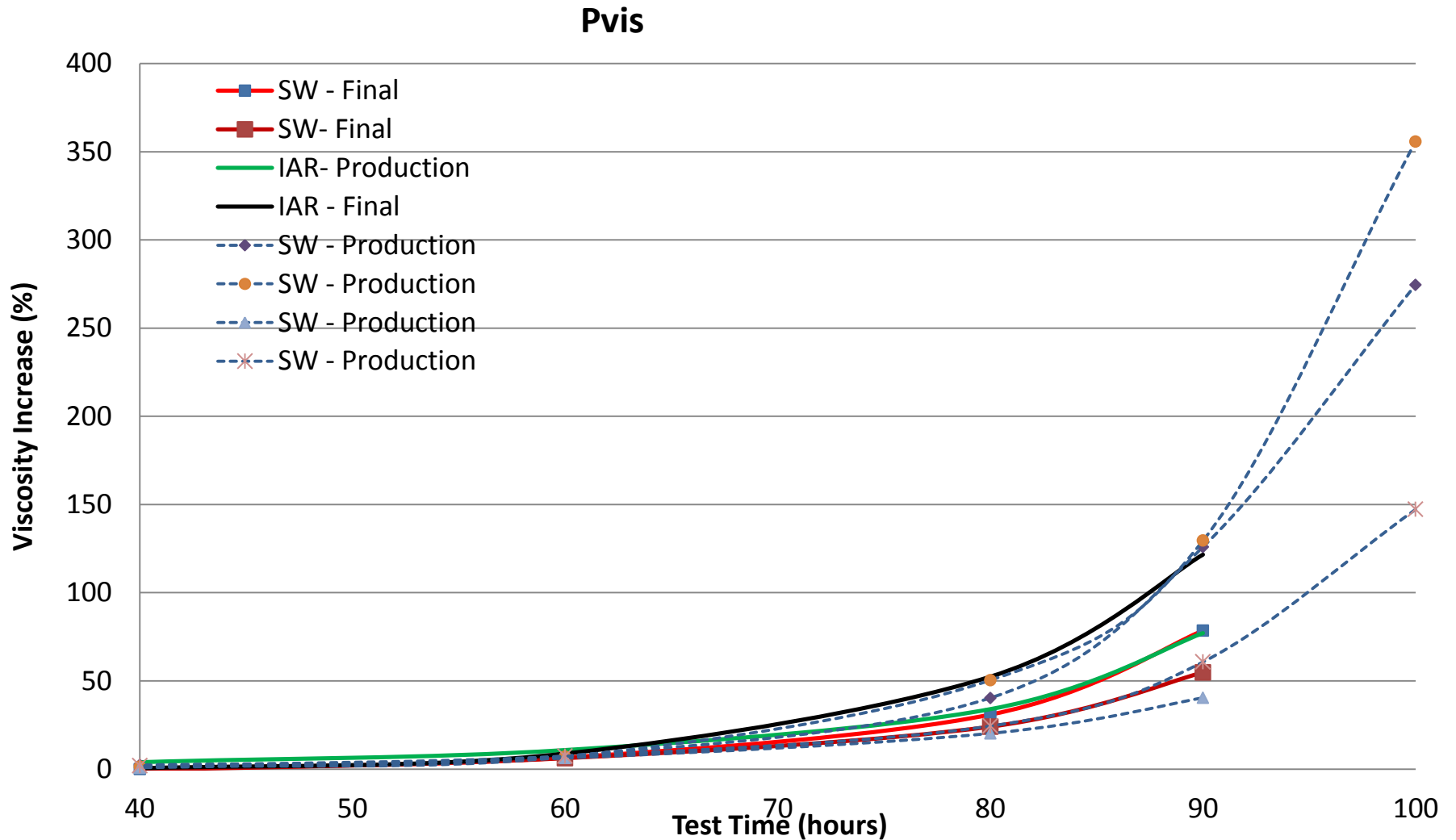


# Discussion: Test Length Data REO2



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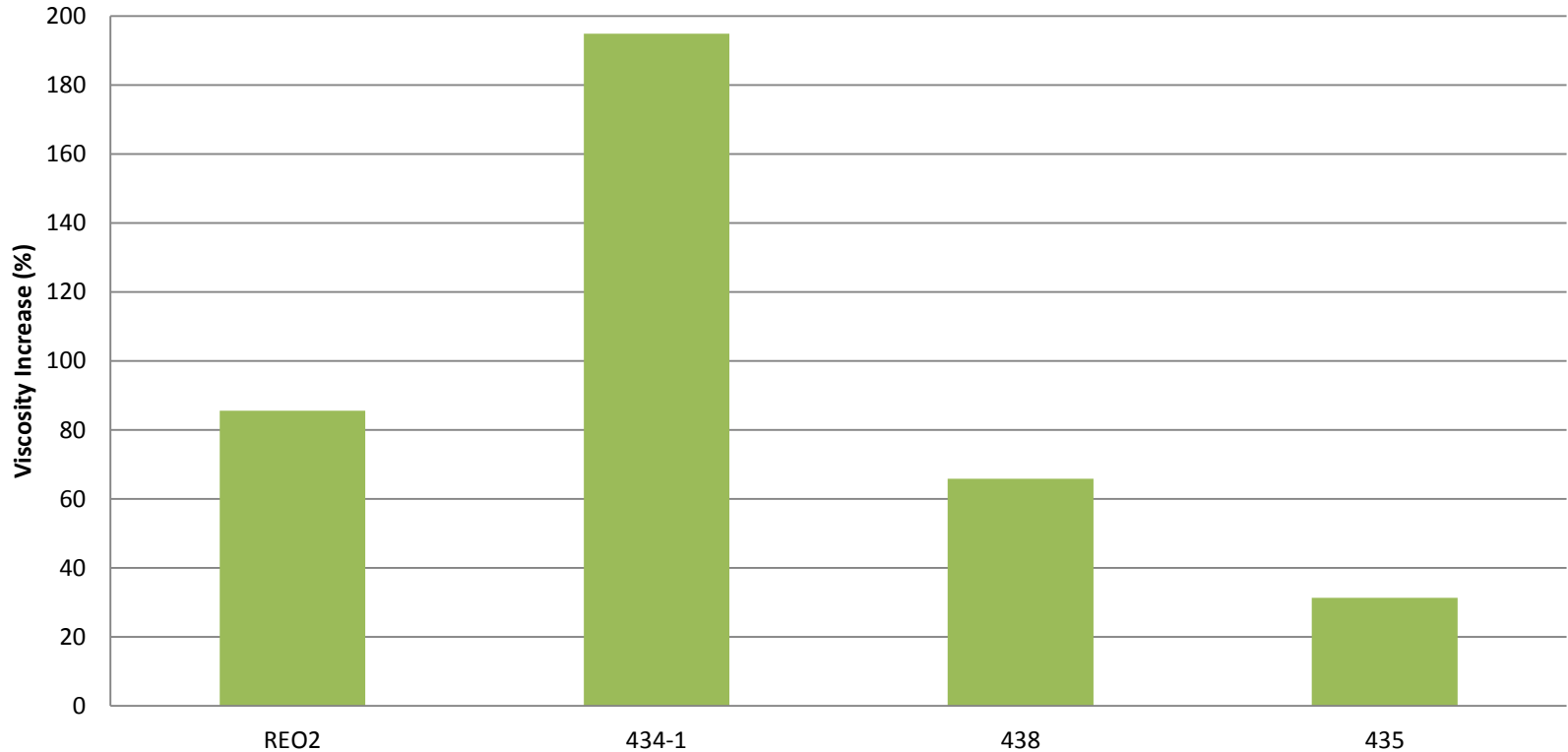
- Increased severity with additional 10 hours with less repeatability



# Discussion: Viscosity Discrimination

- Mean viscosity increase at 90 hours

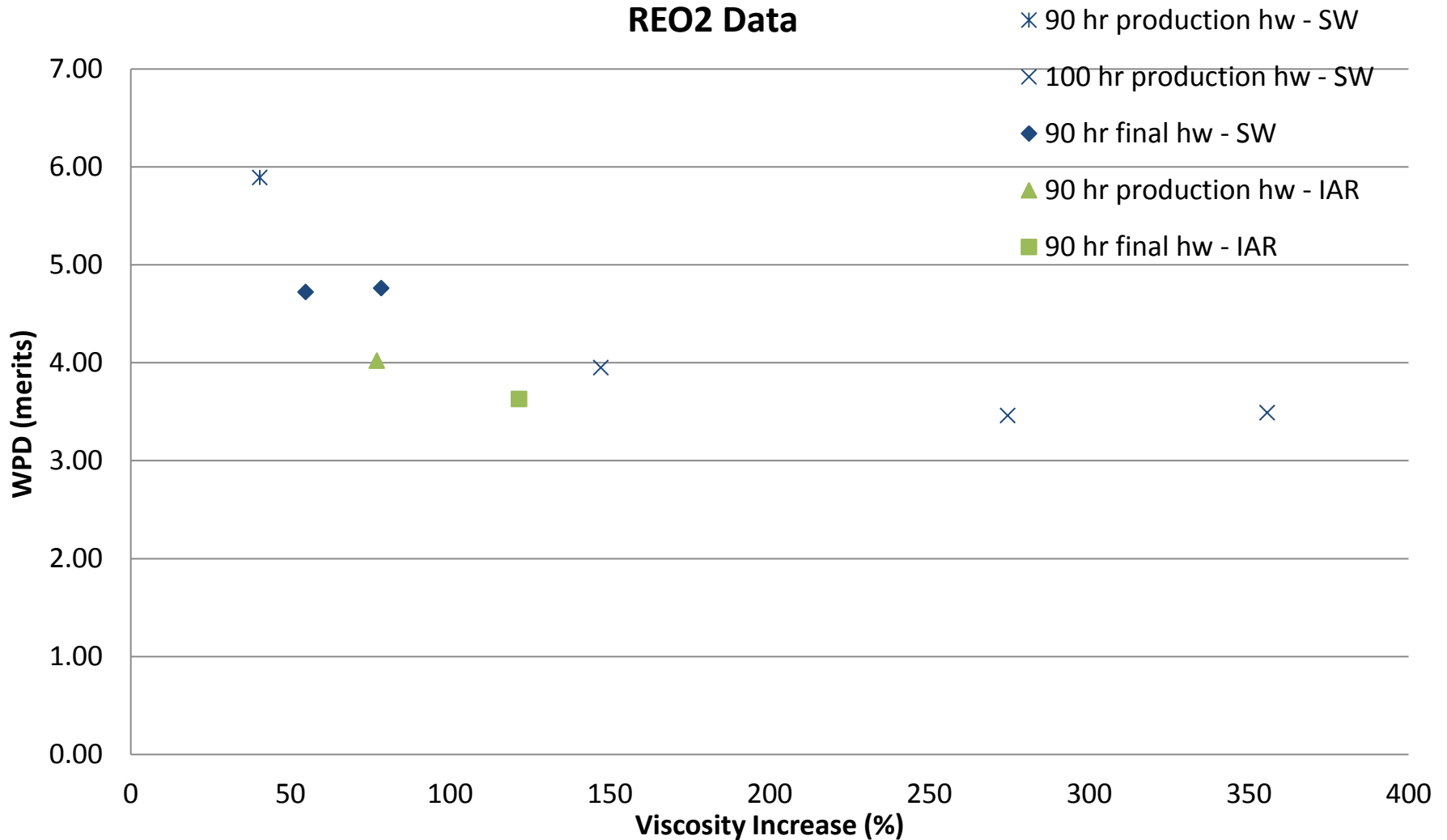
Viscosity Mean by Oil



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

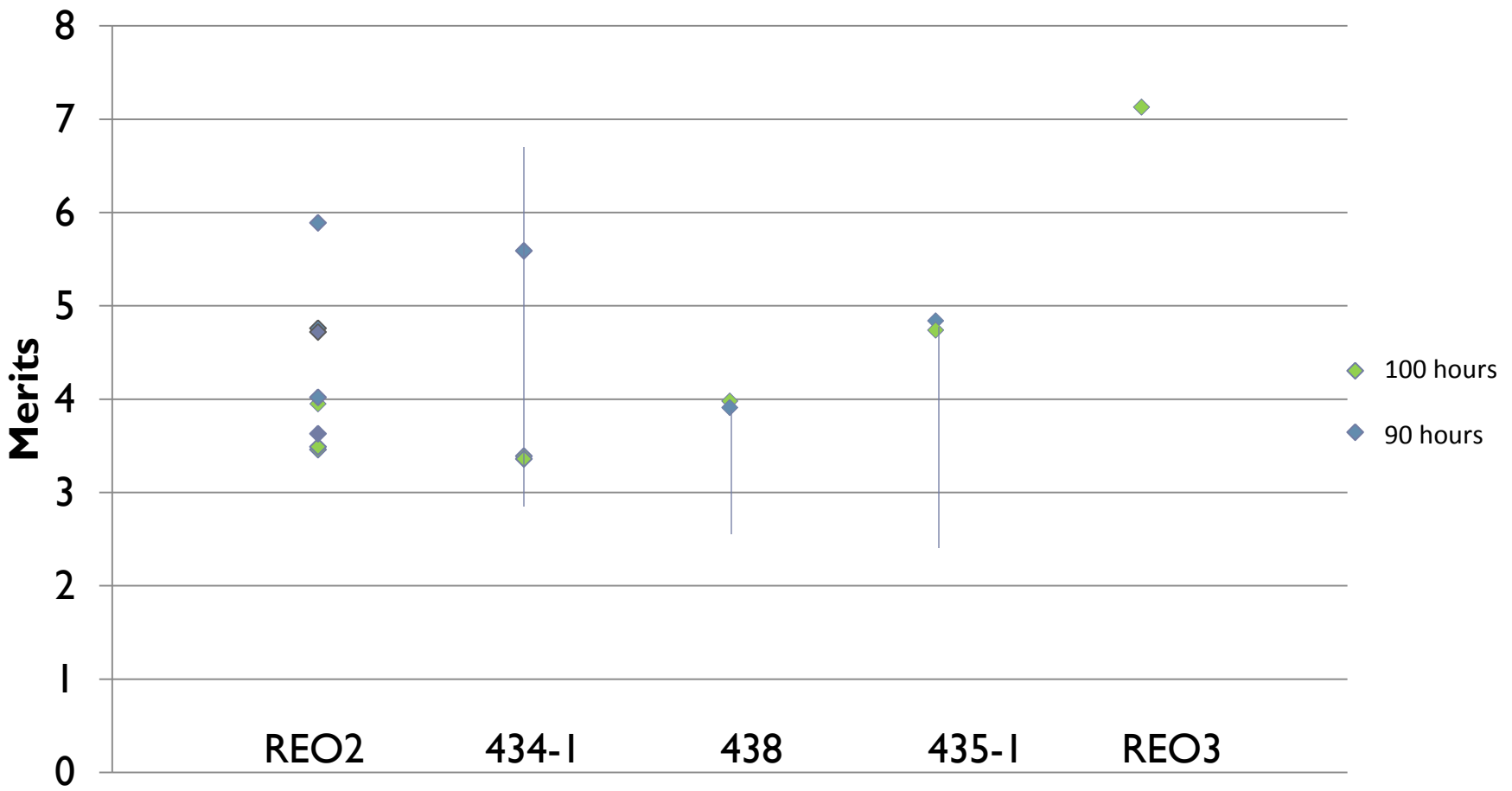
# Discussion : WPD with REO2

- WPD is tied to pVis



# 90 and 100 hour WPD data

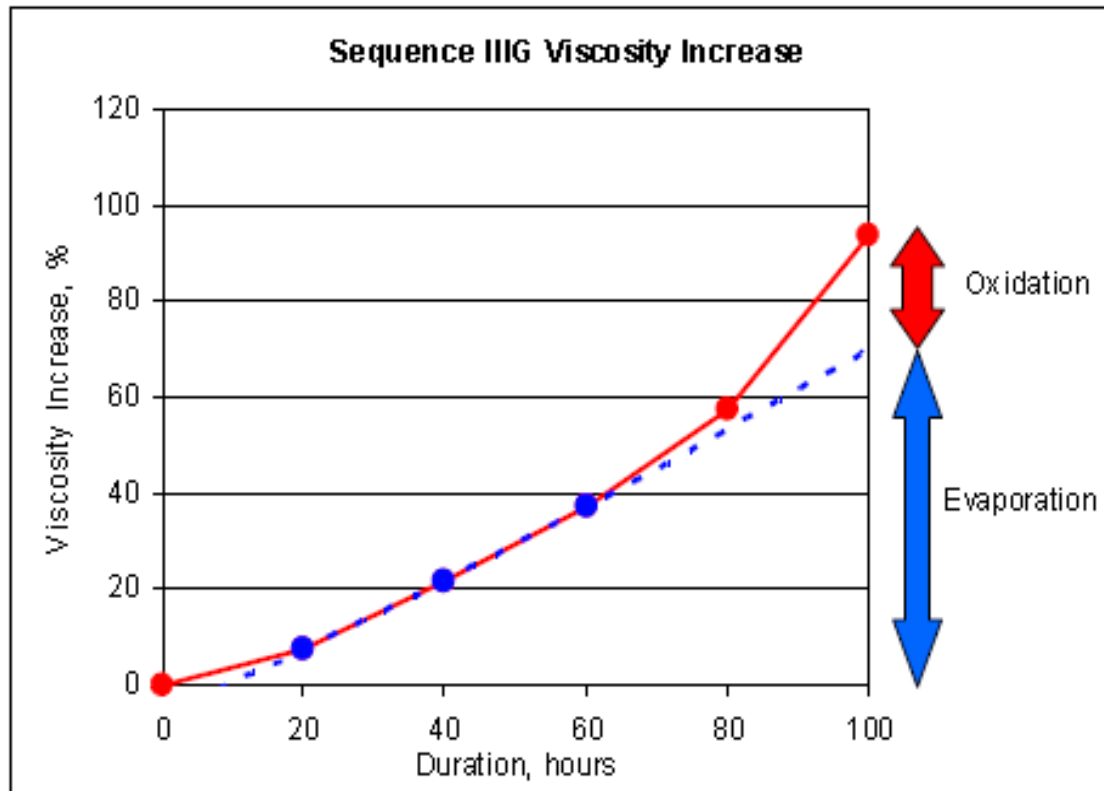
## WPD





# Discussion: comparison with IIIG

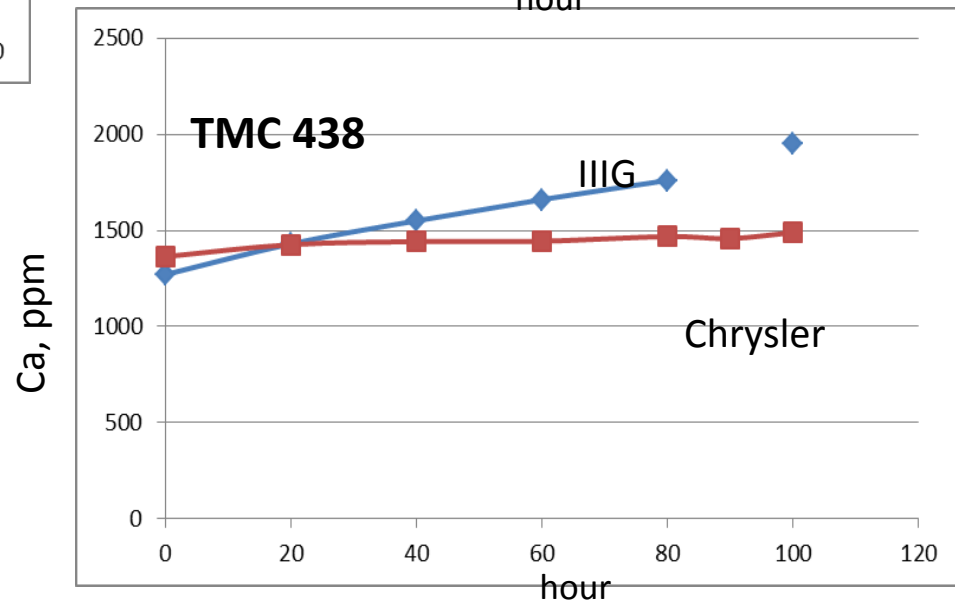
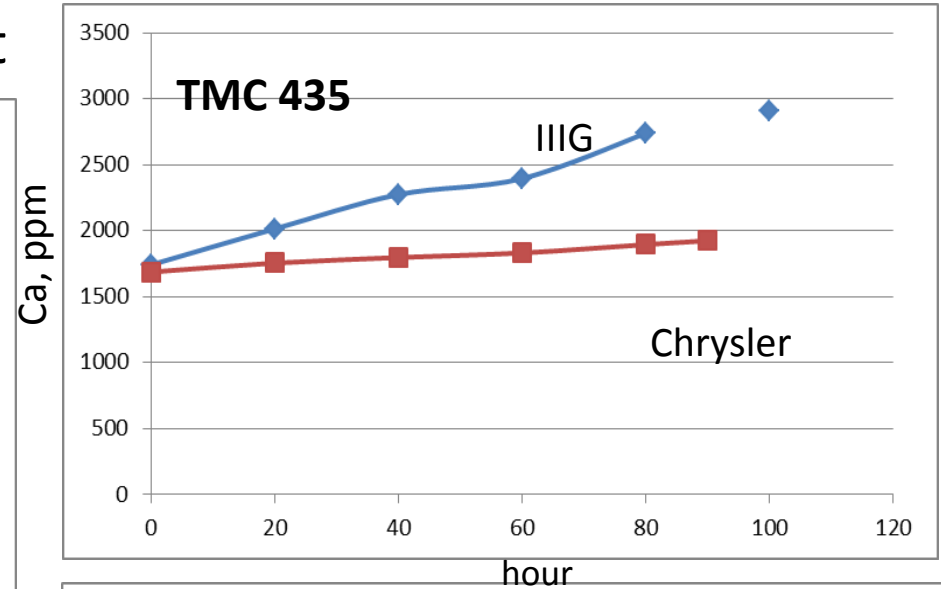
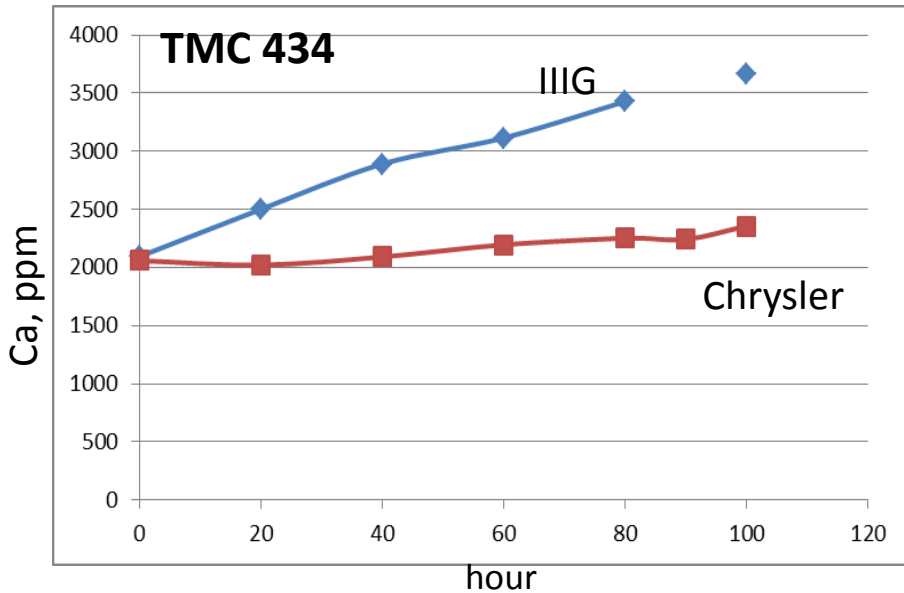
- The study in one SAE paper indicates initial viscosity increase in IIIG test is due to thickening from oil volatility
- Volatility effect could be estimated by assuming pVis increase in earlier hours is due to volatility alone and extrapolated linearly to 100 hours



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

# Calcium Accumulation

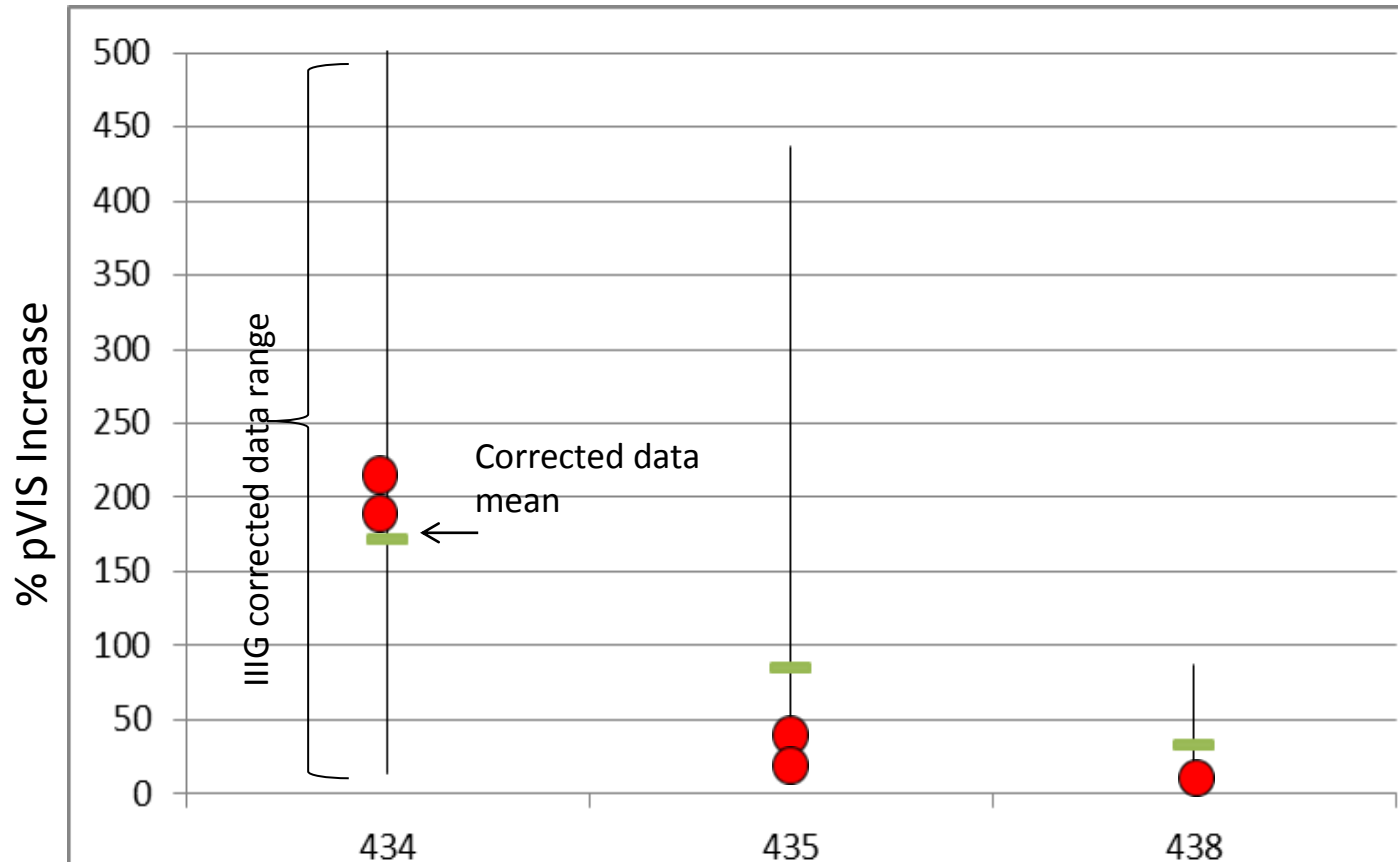
- Lower Ca accumulation indicates that Chrysler Oxidation/Deposit Test has reduced volatility effect



# 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



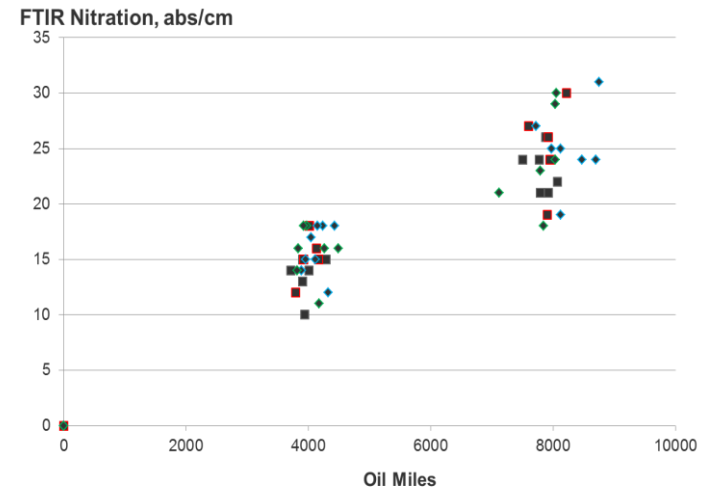
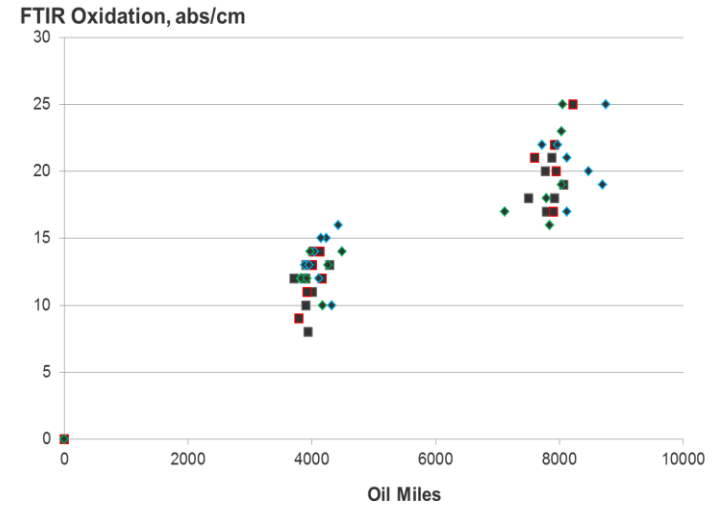
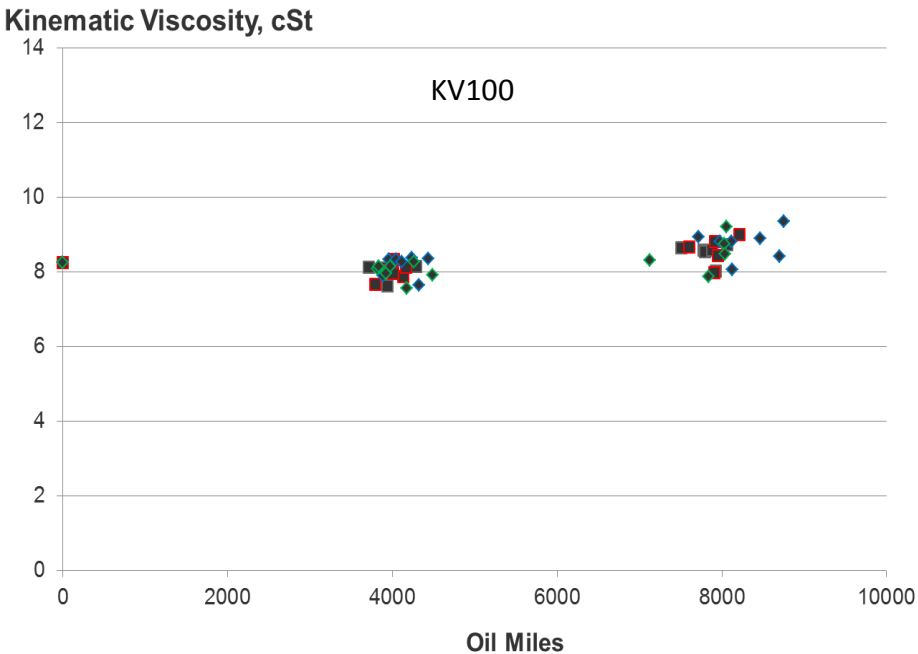
# Chrysler Las Vegas Taxi Field Test

- 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

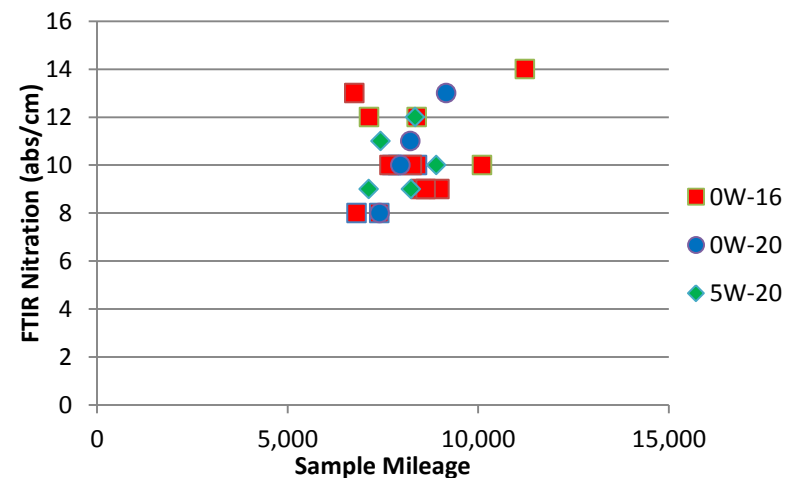
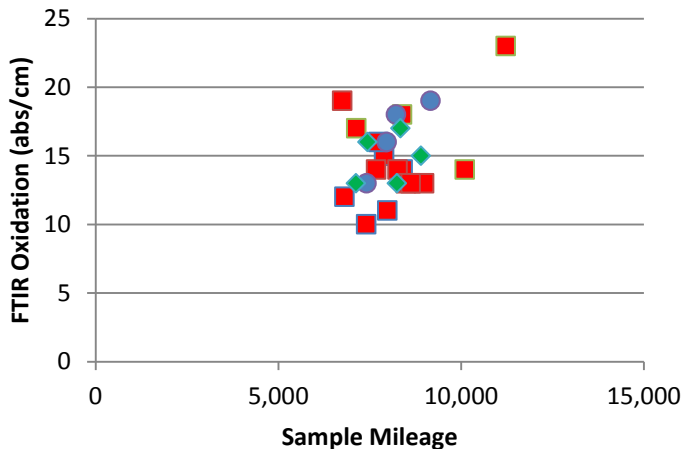
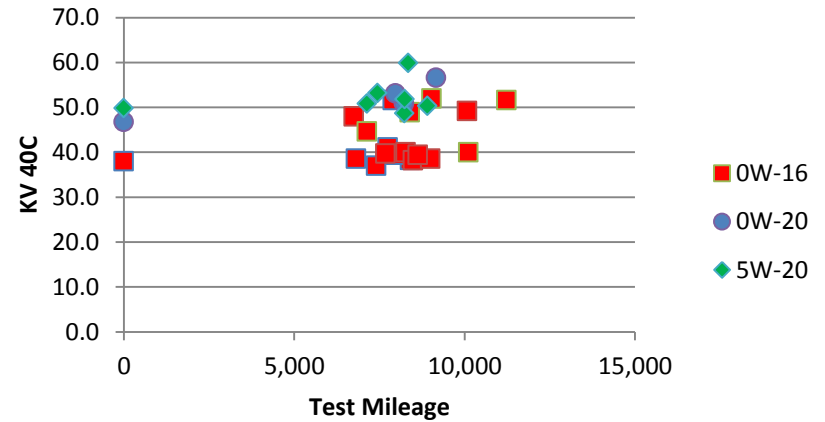
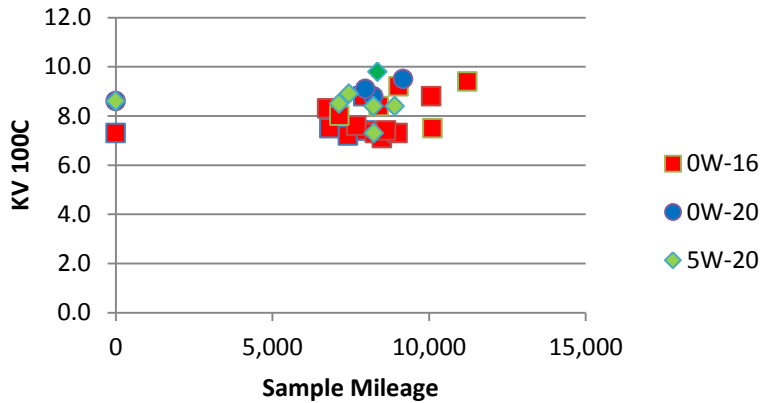


# REO3 Field Performance in 3.6L V6



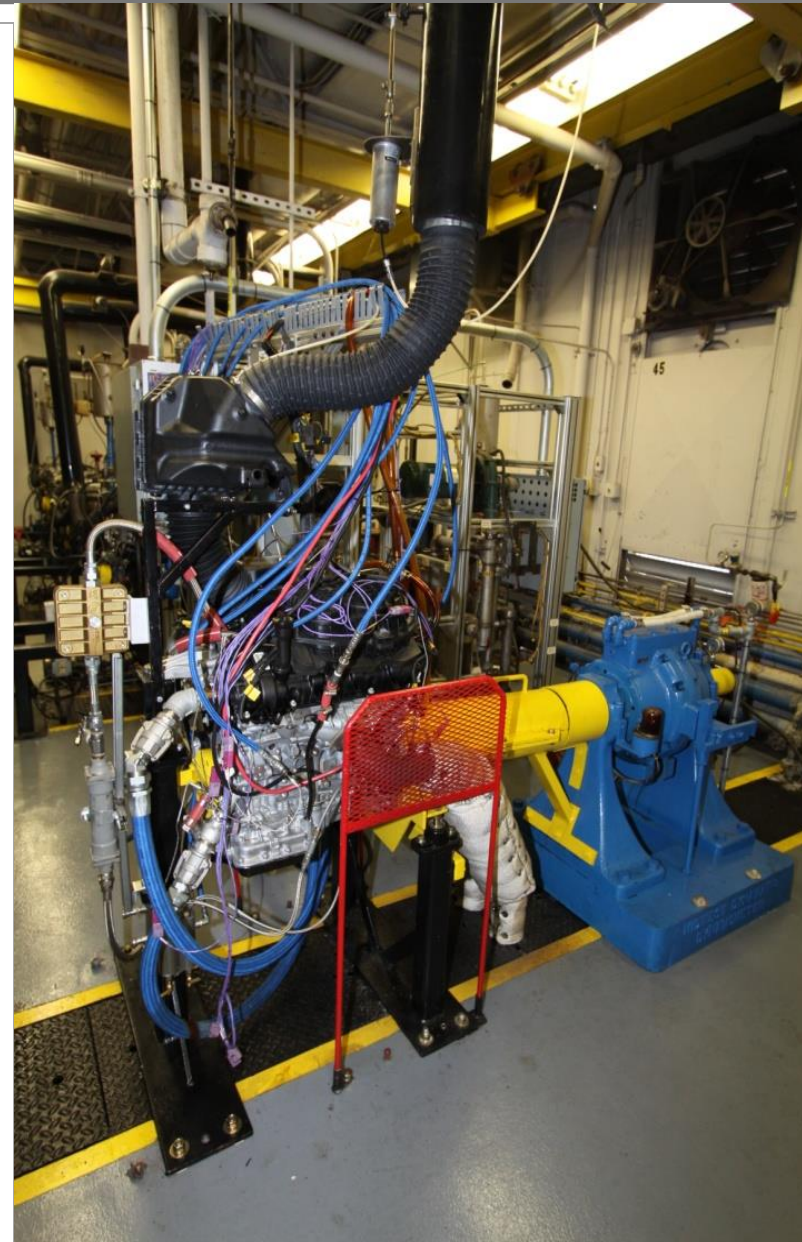
CHRYSLER GROUP LLC

- 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 3<sup>rd</sup> Party
  - 20+ Year storage and preservation guarantee



# Test Status Summary



CHRYSLER GROUP LLC

- 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



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# Thank You!

## ASTM New Test Type Introduction Template

**Items rated as “A” status and marked with \* require supporting documentation to be attached****1.0 Action Plan****1.1 Reference Oils**

- 1.1.1 Do the majority of reference oils represent current technology?   A    
**Yes. REO2 and TMC 434 have been tested.**
- 1.1.2 Are the majority of reference oils of passing or borderline pass/fail performance?   A    
**Based on limits of draft GF-6.**
- 1.1.3 Is reference oil supply and distribution handled through ASTM/TMC?   B    
**REO2 is in the process of being blended for distribution through TMC.**
- 1.1.4 Is a quality control plan defined and in place?   A    
**GF-5 protocols will be implemented.**
- 1.1.5 Is a turnover plan defined/in place to ensure uninterrupted supply of reference oil and an orderly transition to reblends?   A    
**GF-5 protocols will be implemented.**
- 1.1.6 Is a process for introducing replacement reference oils defined and in place?   A
- 1.1.7 Are oils blended in a homogeneous quantity to last 5 years?   A    
**REO2 blend will be ~1100 gallons.**
- 1.1.8 How many reference oil are there and what are the identifying oil codes?

**Comments:****2.0 Test Parts**

- 2.1 Are all critical parts identified?   A
- 2.1.1 List the parts consider as critical. engines, cylinder heads, pistons, rings, wrist pins, clips, bearings, ECU, wiring harness,
- 2.2 Is a system defined/in place to maintain uniform hardware?   A   \*  
**All engines will be produced within the model year, and preserved for long term storage.**
- 2.3 Is there a system for engineering support and test parts supply?   A    
**Jeff Betz will oversee all engine production, and support OHT in their acquisition of pistons and rings.**
- 2.3.1 How many tests can be run with the supply of parts currently in stock?   A    
**75 currently with an additional 6 month supply available within a 14 week lead time after hardware is finalized through prove-out testing.**
- 2.4 Are critical parts distributed through a Central Parts Distributor (CPD)?   A    
**OHT will supply the pistons and rings. IMTS will supply the heads, and Mopar will supply the engines.**
- 2.5 Are critical parts serialized, and their use documented in test report?   A

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

## ASTM New Test Type Introduction Template

Heads, pistons and engines are serialized. Rings are batch controlled. All will be reported in the test forms.

- 2.6 Are all parts used on a first in/first out basis? Yes   A
- 2.7 Are all rejected critical parts accounted for and returned to the CPD?   A    
GF-5 protocols will be followed.
- 2.8 Does the CPD make status reports to the test surveillance body at least semi-annually?   A    
GF-5 protocols will be followed.
- 2.9 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   \*  
GF-5 protocols will be followed.
- 2.10 Is the CPD active in industry surveillance panel/group, and in industry sponsored test matrices?   A

### Comments:

### 3.0 Test Fuel

- 3.1 Is the fuel specified and the supplier(s) identified?   A    
HF003 EEE will be used.
- 3.1.1 Who is the fuel supplier?   Haltermann
- 3.2 Is a process in place to monitor fuel stability over time?   A   \*  
GF-5 protocols will be followed.
- 3.3 Are approval guidelines in place for fuel certification?   A   \*
- 3.4 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   \*
- 3.5 Is a quality control plan defined and in place to assure long term quality of the fuel?   A   \*
- 3.6 Is a turnover plan defined, in place and demonstrated to ensure uninterrupted supply of fuel?   A   \*

Comments: There are no special fuel requirements.

### 4.0 Test Procedure

- 4.1 Is a technical report published documenting, per ASTM Flow Plan:
- 4.1.1 Test precision for reference oils? This will use matrix data.   C   \*
- 4.1.2 Field correlation? REO2 field correlation has been established.   B   \*
- 4.1.3 Test development history? Test development report is planned.   C   \*
- 4.2 Are test preparation and operation clearly documented in a ASTM standard format?   B   \*  
Procedure is in draft form and in the editing process with an ASTM facilitator.

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

## ASTM New Test Type Introduction Template

- 4.3 Are test stand configuration requirements documented and standardized?   A  \*  
Configuration requirements have been established. Changes to the original draft procedure are documented in meeting minutes on the TMC website pending incorporation into the next procedure draft.
- 4.4 Are milestones for precision improvements established?   C  \*  
TMC and Surveillance Panel monitoring are planned to be in place. Included in future scope and objectives of the Surveillance Panel.
- 4.5 Are routine engine builder workshops planned/conducted?   B    
All labs participated in an engine build workshop in August. Test specific build workshop will be conducted after the build manual is complete.
- 4.5.1 How often and by whom?   Can be held by Chrysler annually if necessary.

Comments:

### 5.0 Rating and Reporting of Results

- 5.1 Are the reported ratings from single raters (i.e. not averages from various raters)?   A    
Current procedure will carry over.
- 5.2 Is a suitable severity adjustment system in place?   A  \*  
This is planned pending matrix data.
- 5.3 Is each pass/fail parameter unique and have a significant purpose for judging engine oil performance?   A    
Yes
- 5.3.1 List the pass/fail parameters.   WPD, Viscosity, possibly Phos retention, MRV and CCS. There is a potential to have an interpretability limit for oil consumption pending the matrix data.
- 5.4 Do all rate and report parameters judge operational validity, help in test interpretation or judge engine oil performance?   A    
Yes.
- 5.5 Are routine rater workshops conducted/planned?   B    
Piston rating training workshop will be conducted and reported prior to matrix testing.
- 5.5.1 How often and by whom?   Annually by TMC.

Comments:

### 6.0 Calibration, Monitoring and Surveillance

- 6.1 Is a process in place for independent monitoring of severity and precision with an action plan for maintaining calibration of all laboratories?   A  \*  
TMC and a Surveillance Panel will monitor.

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

## ASTM New Test Type Introduction Template

6.2 Are stand, lab, and industry reference oil control charts of all pass/fail criteria parameters used to judge calibration status? B\*

*This will be implemented by TMC following the matrices.*

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

*There will be an LTMS used to determine calibration based on matrix data.*

6.4 Is an ASTM Surveillance Panel in place? A

6.4.1 Who is chairman? Dave Gleanzer is the Sequence III SP chair

### Comments:

### 7.0 Test prove out data

7.1 Has a test development Task Force/TMC visit been made to each of the labs that will participate in the industry precision matrix? B

*Two of five labs have been visited, with visits planned for an additional two labs planned for the first week of November.*

7.2 Have prove out tests been run with the finalized test procedure and test parts? B\*

*Three tests per lab are required. One lab has completed 2, and a second lab has completed 1. Tests to-date have been conducted on lab gapped rings. All tests going forward will have pre-gapped rings. Two other labs plan to start testing immediately following their TF/TMC lab visits in November.*

7.2.1 How many labs and stands? 5 labs/7 stands

*Assuming the precision matrix will start in Q1 2015 or later.*

ASTM Signature III

ASTM Force III Surveillance Panel (20 Voting members)






Attachment 3  
Attendance List for  
III Ad-Hoc Task  
Force Meeting

Member Name	Phone/Fax/Email	Role	Signature
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Timothy L. Caudill Ashland Oil Inc. 22 <sup>nd</sup> & Front Streets Ashland, KY 41101 USA	606-329-1960 x5708 606-329-2044 <a href="mailto:tcaudill@ashland.com">tcaudill@ashland.com</a>	Voting Member Present	
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Tracey King Haltermann Solutions MI USA	947-517-4107 <a href="mailto:tking@haltermann.com">tking@haltermann.com</a>	Voting Member	
Teri Kowalski Toyota Motor North America, Inc. 1555 Woodridge Ann Arbor, MI 48105 USA	734-995-4032 734-995-9049 <a href="mailto:teri.kowalski@tema.toyota.com">teri.kowalski@tema.toyota.com</a>	Voting Member	
Patrick Lang Southwest Research Institute 6220 Culebra Road P.O. Box 28510 San Antonio, TX 78228 USA	210-522-2820 210-684-7523 <a href="mailto:plang@swri.edu">plang@swri.edu</a>	Voting Member	
Arnol Savant Carrying Proxy for Timothy Caudill		Present	







ASTM Sequence III Surveillance Panel (20 Voting members)

date:

Name/Address	Phone/Fax/Email	Signature
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<p>Bruce Matthews GM Powertrain Mail Code 483-730-472 823 Joclyn Avenue Pontiac, MI 48340 USA</p>	<p>248-830-9197 248-857-4441 <a href="mailto:bruce.matthews@gm.com">bruce.matthews@gm.com</a> <b>Test Sponsor Representative</b></p>	<p>Voting Member</p> <p>Present </p>
<p>Timothy Miranda BP Castrol Lubricants USA 1500 Valley Road Wayne, NJ 07470 USA</p>	<p>973-305-3334 973-686-4039 <a href="mailto:Timothy.Miranda@bp.com">Timothy.Miranda@bp.com</a></p>	<p>Voting Member</p> <p>Present _____</p>
<p>Mark Mosher ExxonMobil Technology Co. Billingsport Road Paulsboro, NJ 08066 USA</p>	<p>856-224-2132 856-224-3628 <a href="mailto:mark.r.mosher@exxonmobil.com">mark.r.mosher@exxonmobil.com</a></p>	<p>Voting Member</p> <p>Present </p>
<p>Andrew Ritchie Infineum 1900 East Linden Avenue P.O. Box 735 Linden, NJ 07036 USA</p>	<p>908-474-2097 908-474-3637 <a href="mailto:Andrew.Ritchie@infineum.com">Andrew.Ritchie@infineum.com</a></p>	<p>Voting Member</p> <p>Present </p>
<p>Ron Romano Ford Motor Company Diagnostic Service Center II Room 410. 1800 Fairlane Drive Allen Park, MI 48101 USA</p>	<p>313-845-4068 313-32-38042 <a href="mailto:rromano@ford.com">rromano@ford.com</a></p>	<p>Voting Member</p> <p>Present </p>
<p>Greg Shank Volvo</p>	<p>301-790-5817 <a href="mailto:greg.shank@volvo.com">greg.shank@volvo.com</a></p>	<p>Voting Member</p> <p>Present _____</p>


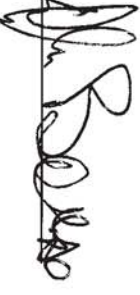

ASTM Sequence III Surveillance Panel (20 Voting members)

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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 <a href="mailto:trsmith@ashland.com">trsmith@ashland.com</a> <b>PCEOCP Chair</b>	Voting Member Present _____
Scott Stap Chevrolet Performance	<a href="mailto:scott.stap@tqdirect.com">scott.stap@tqdirect.com</a>	Voting Member Present <u></u>
Mark Sutherland Test Engineering, Inc. 12718 Cimarron Path San Antonio, TX 78249-3423 USA	210-867-8357 <a href="mailto:mrsutherland@tei-net.com">mrsutherland@tei-net.com</a>	Voting Member Present _____
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ASTM Sequence III Surveillance Panel (20 Voting members)

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Non-Voting Member

Present JG

Mike McMillan

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Non-Voting Member

Present MLM

ASTM Sequence III Surveillance Panel (20 Voting members)

date:

Name/Address	Phone/Fax/Email	Signature
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<p>Bob Olree                      5388 Hill 23 Drive                      Flint, MI 48507                      USA</p>	<p>248-689-3078  <u>olree@netzero.net</u></p>	<p>Non-Voting Member Present _____</p>
<p>Kevin O'Malley                      Lubrizol Corp.</p>	<p><u>kevin.omalley@lubrizol.com</u></p>	<p>Non-Voting Member Present _____</p>
<p>Christian Porter                      Afton Chemical Corp.                      500 Spring Street                      Richmond, VA 23219                      USA</p>	<p>804-788-5837                      804-788-6358  <u>christian.porter@aftonchemical.com</u></p>	<p>Non-Voting Member Present _____</p>
<p>Phil Rabbat                      BASF Corporation                      500 White Plains Road                      Tarrytown, NY 10591-9005                      USA</p>	<p>914-785-2217                      914-785-3681  <u>phil.rabbat@basf.com</u></p>	<p>Non-Voting Member Present _____</p>
<p>Allison Rajakumar                      The Lubrizol Corporation                      Drop 152A                      29400 Lakeland Blvd.                      Wickliffe, OH 44092                      USA</p>	<p>440-347-4679                      440-347-2014  <u>Allison.Rajakumar@Lubrizol.com</u></p>	<p>Non-Voting Member Present _____</p>
<p>Scott Rajala                      Idemitsu Lubricants America Corp.</p>	<p><u>srajala@liacorp.com</u></p>	<p>Non-Voting Member Present _____</p>
<p>Jim Rutherford                      Chevron Oronite Company LLC                      100 Chevron Way                      Richmond, CA 94802                      USA</p>	<p>510-242-3410                      510-242-3173  <u>jaru@chevrontexaco.com</u></p>	<p>Non-Voting Member Present _____</p>

ASTM Sequence III Surveillance Panel (20 Voting members)

date: \_\_\_\_\_

Name/Address Phone/Fax/Email

Signature

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Non-Voting Member Present

*Also working as proxy (Repeated) for Voting Member Tim Caudill.*

*Arnol Savant*

Addison Schweitzer  
Intertek AR

Non-Voting Member

Present

*Addison Schweitzer*

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