

## **Sequence VIII Surveillance Panel Conference Call Minutes**

Date: January 29, 2016

Prepared by: Patrick Lang

Voting Members Present:

Dan Lanctot/TEI

Bill Buscher for Adrian Alfonso/Intertek

George Szappanos/Lubrizol

Jason Bowden/OHT

Dave Glaenzer/Afton Chemical Co.

Patrick Lang/SwRI

Rich Grundza/TMC

Bruce Matthews/GM

Jo Martinez/Oronite

Andy Ritchie/Infineum

Satoshi Hirano/Toyota

Chairman Lang brought the meeting to order at 9:00 AM Central Time and started with a brief update to the Panel on the Sequence VIII bearing weight loss severity problem with the 08-15 connecting rod bearings. The highlights are as follows:

- 1) Severity level of the 08-15 bearings first presented itself in the November 2016 time frame when SwRI first attempted to reference. Shortly thereafter Intertek observed the same severe performance and could not calibrate.
- 2) A Surveillance Panel Conference call was held on December 11, 2016 informing the panel of the situation. A Bearing Task Force was formed to investigate the problem.
- 3) The Bearing Task Force convened for several conference calls to review investigations.
  - a. SEM data from SwRI suggested that the copper and lead concentrations are similar to historic but the tin is slightly lower. Federal Mogul stated that the tin is there for durability (fatigue) and likely would not affect bearing weight loss.

- b. Federal Mogul reviewed all of the production data for the 08-15 batch and concluded that all was in order with respect to the powder metal concentration (ratios of copper/lead) and other production metrics such as lead pull-out and lead distribution based on post-production SEM analysis of the bearing surface.
- c. Labs have done visual inspections of the bearings as well and have not identified any significant anomalies.
- d. Additional data generated by SwRI and IAR to increased test count on 08-15 bearing to entertain a correction factor. Stats group reviewed and didn't recommend using a correction factor.
- e. Bearing task force has not identified the reason that the bearings are severe.
- f. Letter issued by chairman to API and PCEOCP that the independent labs are out of bearings; situation is urgent.
- g. The Bearing Task Force approved a motion during the January 26<sup>th</sup> conference call to make another bearing batch.

Chairman Lang asked at this point for comments from the industry statisticians on the work that was done looking at the possibility of applying a correction factor to the 08-15 bearing batch.

Doyle from Infineum commented that his analysis yielded a correction factor similar to the type that is used for the VG fuel batch corrections. The equation generated would essentially change the current pass from approximately 26 milligrams to 62 milligrams.

Concerns with the correction factor are that it essentially increases the correction amount as the bearing weight loss increases. The issue with this is that we do not know if there is a chemistry influence to the severity. Is 1006 more severe than 704 with the 08-15 bearings simply because it is a higher weight loss oil than 704 or is it the chemistry of the oil that drives that; we just don't know this at this point. Additionally, the magnitude of the correction factor (new pass limit of approximately 62) seems risky as a solution.

Joe Martinez and Kevin O'Malley agreed with Doyle's assessment and all agreed that a correction factor on the 08-15 bearings is not the best path forward.

The following motion was made:

**MOTION:**

Sequence VIII Surveillance Panel suspends the use of the 08-15 bearing batch for calibration and registered testing purposes, and instructs the CPD to proceed with the procurement of a new batch of Sequence VIII bearings.

Andy Ritchie / Bill Buscher / Passed 9 – 0 – 2

Comments:

Kaustav from Oronite commented that we should not completely shut the door on the possibility of using the 08-15 bearings in the future considering that there is a potential that the new batch may not perform properly as well. As a result of this, the motion was catered to suspending the use of the 08-15 and not deeming them as "bad".

Hirano-san from Toyota commented that there have been correction factors in the past in the Sequence VIII Test. He also stated that despite the severity of the 08-15 bearings, a strong performing oil will still pass with these bearings.

Bruce from GM asked about the age of oil 1006. Bill Buscher stated that 1006 is a GF-2/3 oil that was used in the VE, IVA and IIIF. Rich Grundza stated that this oil was suspended in the IVA at one time and also suspended in the IIIF due to severity issues.

Dave Glaenzer asked about the recent performance of oil 1006-2 in the Sequence VIII test, i.e., has it been trending severe. Rich Grundza looked at the LTMS data during the call and observed that there have been a couple recent tests that have exhibited mild bearing weight loss. The conclusion was that over the last six months the LTMS data doesn't indicate a sever trend.

The question was asked regarding the possibility of fuel being a factor. The test uses the green EEE fuel which is now used in the IVB. As a result the fuel is being consumed at a higher rate than previously and there have been no fuel issues in the IVA and IVB related to fuel. Samples of fuel from IAR and SwRI have been sent to Haltermann for analysis and at a glance those samples look ok.

Action Item: Surveillance panel to solicit for a replacement reference oil for ASTM REO 1006-2, with similar total bearing weight loss performance, for the Sequence VIII's use in the GF-6 specification

Action Item: Surveillance panel to consider replacing ASTM REO 704-1 with ASTM REO 1009, since ASTM REO 1009 is of a newer oil technology.

Action Item: As an alternate to one or both of the reference oil action items listed above, surveillance panel to consider adding a third, current GF-5 or GF-6, oil technology reference oil for the Sequence VIII's use in the GF-6 specification

Action Item: Sequence VIII Bearing Task Force to remain active to provide guidance to the CPD and Federal Mogul during the procurement process of a new bearing batch, and to also continue work in identifying the root cause of the severity shift of the 08-15 bearing batch, as well as continuing investigating a potential solution to allow for the use of the 08-15 bearing batch for calibration and registered testing purposes.

Regarding the production of the next batch of bearings, the Bearing Task Force will meet to discuss the possibility of making a change in the manufacturing process to increase the chances of a successful new batch. Some examples would be making a smaller pilot batch, change the powdered metal concentration or the suggestion made by George at LZ to make three different powder concentrations.

All these will be discussed with the task force and passed on to Federal Mogul to see if any of them are feasible. The task force will meet next week.

Next meeting at the call of the chairman.

The following non-voting members were in attendance:

Gordon Farnsworth, Mike McMillan, Doyle Boese/Infineum

Kaustav Sinha, Robert Stockwell/Oronite

Kevin O'Malley, Jerry Brys/LZ

Al Lopez, IAR

Tony Hendrix, Travis Kostan/SwRI