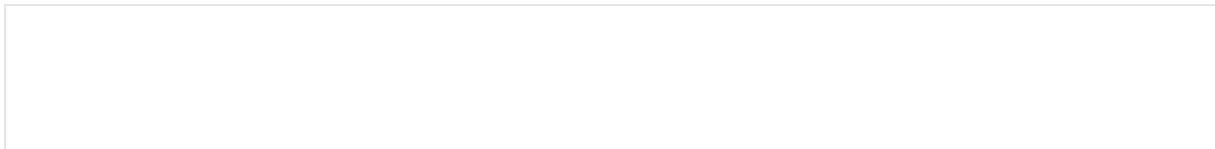


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The following are the unconfirmed minutes of the Mack Surveillance Panel Meeting held on February 25, 2016 by teleconference. Please feel free to let me know if there are any changes or revisions needed. Thanks.

**Call Participants:**

Afton - Bob Campbell, Abaigeal Ritzenthaler  
ExxonMobil - Mike Alessi  
Infineum - Bob Salgueiro (Secretary), Elisa Santos  
Intertek - Jim Moritz, Luis Garcia, Juan Vega  
Lubrizol - Jim Matasic, Nick Secue, Kevin O'Malley, John Ahlborn  
Oronite - Mark Cooper (Chairman), Jim Rutherford  
SwRI - Robert Warden, Travis Kostan  
TEI - Mark Sutherland  
TMC - Sean Moyer  
Volvo/Mack - Greg Shank

**Mack Surveillance Panel Meeting**

The Mack Surveillance Panel meeting was called to order at 10:32 AM Eastern, by Mark Cooper, Chairman of the Surveillance Panel. The agenda topics are listed below, with discussions and actions following.

**Agenda:**

- Discuss potential correction factor updates using additional T-12 reference tests
- T-12 oil consumption versus Pb versus bearing weight loss

**Update of status of additional T-12 reference tests for potential correction factor updates** – Jim Rutherford pulled the latest LTMS data as of Monday and prepared a presentation (attached) for review with the task force. In the end of Test Lead (EOT Pb) and Delta Pb 250-300 hrs charts, the Green lines represent the last two times correction factors were updated. VUYPC parts batch has 5 reference tests, with a lot of variability. Oil consumption has increased but also has high variability. More recent oil consumptions has come down a little bit. The wear parameters have tightened up over time. Looking at Pb vs oil consumption both increase together but so does variability.

**Oil consumption correction for Pb** – Jim developed a model and calculated an estimated Correction Factor for EOT Pb based on oil consumption. Jim used oil consumption as reported to TMC (average over phase II). The correction takes the transformed total Pb and adjusts it per oil consumption in log units and then transfers them back to engineering units. If the oil consumption is high, it adjusts EOT Pb down, if oil consumption is low, it adjusts Pb up. The closer a result is to “on target” oil consumption it would have almost no correction.

**Oil consumption correction for Delta Pb 250-300 hrs** – If the model shows oil consumption is a significant effect, then the general feeling was it should also be corrected. Taking out batch of reference oil, the coefficient was significant.

**Comparing Total Bearing weight loss vs Pb parameters** – There were two results which had high bearing weight loss (BWL) but had low Pb values which was counter to the expected relationship.

**New Industry Correction Factor (ICF) for batch VUYPC** – The current Industry Correction Factor for Oil Consumption was 0.942 with VUXO-A&B pistons. Including the most recent reference data for C pistons it would be 0.930. Current ICF for Cylinder Liner Wear (CLW) is 0.953 and Top Ring Weight Loss (TRWL) is 0.912. Including the most recent reference data for C pistons, they would be revised to (CLW) 1.059 and (TRWL) 0.899 respectively.

**It was proposed that for older hardware batches, to correct both Pb parameters for oil consumption and continue with the current ICFs for the other T-12 parameters (OC, CLW, TRWL).**

A concern was raised that we don't want to penalize oils with low Pb and low oil consumption results, assuming an oil could be formulated to deliver low oil consumption, it shouldn't be negatively affected by the oil consumption correction. A discussion ensued around where would the oil consumption cutoff be, above which Pb correction would apply. We looked at ranges where oil consumption no longer becomes a significant factor in the model (ie: <65, >65). One suggestion was to us 80 as the cut off, since the original range included oil consumption results up to 80. But there were some feelings that perhaps that was too high.

In a normal oil consumption range, oil consumptions should not be correlated to Pb, but if you go higher in oil consumption it does have an impact. The slope coefficients were different when looking greater than 65 and less than 65.

Jim generated charts correcting Pb results greater than 65 and eliminating those below 65.

The task force was generally supportive of applying oil consumption correction factors for the Pb parameters, where oil consumptions is above 65, and applying traditional correction

factors for the other 3 parameters. But the Surveillance Panel wanted more time to review and digest the proposed corrections which Jim would provide to the secretary for distribution to the Surveillance Panel today. The start of VUYPC hardware would be when the new correction factors would be applied to.

Other tests on old hardware, will have the oil consumption adjusted Pb parameters but maintain the other 3 parameters correction factors as they are today. Need to decide how far back do we go to use the new correction on the old hardware and we have to get the Severity adjustments right. There was a proposal to start at 2011. STWN hardware batches were the first to get an industry correction factor, April 5<sup>th</sup> 2011. Labs will need to go back and re-report data after April 5<sup>th</sup>, 2011 applying the new corrections for Pb and keeping the other parameter ICFs as they were.

Jim Moritz motioned: **The new Y batch rod bearings are acceptable under the current rules and are fit for purpose, labs can start tests today using Y batch rod bearings, the revised Industry Correction Factors, developed next week, will be applied to all VUYPC hardware tests.** The motion was seconded by Bob Warden. There were no objections, TMC waived. – The motion carried.

Jim Matasic motioned: **For all test starting on or after Feb 25, for T-12s using non-VUYPC hardware batches, will use the new oil consumption adjusted EOT Pb and 250-300 Pb parameter correction factors along with the current correction factors for CLW, TRWL, and OC.** The motion was seconded by Jim Moritz. There were no objections, TMC waived. – The motion carried

**Next Meetings** - The Mack Surveillance Panel agreed to hold their next teleconference on Wednesday March 2nd, at 1:00PM Eastern. Greg wanted the Surveillance Panel to consider a F2F meeting on May 4<sup>th</sup> in San Antonio, TX.

Respectfully submitted,

**Bob Salgueiro**

Industry Liaison Advisor

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