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Subject:	Mack Surveillance Panel Meeting Minutes - September 20, 2016
Date:	Tuesday, September 20, 2016 12:33:47 PM

Everyone,

The following are the unconfirmed minutes of the Mack Surveillance Panel Meeting held on September 20, 2016. The meeting was conducted by WebEx. Please feel free to let me know if there are any changes or revisions needed. Thanks.

Call Participants:

Afton - Bob Campbell, Christian Porter, Abaigeal Ritzenthaler
Infineum - Bob Salgueiro (Secretary), Elisa Santos, Jim Gutzwiller
Intertek - Jim Moritz, Luiz Garcia, Juan Vega
Lubrizol – Jim Matasic, Nick Secue, Jon Ahlborn, Kevin O'Malley
Oronite - Mark Cooper (Chairman), Jim Rutherford
SwRI – Jim McCord, Jose Starling
TEI - Mark Sutherland
TMC - Sean Moyer
Volvo/Mack - Greg Shank

Mack Surveillance Panel Meeting

The Mack Surveillance Panel meeting was called to order at 10:34 AM Eastern, by Mark Cooper, Chairman of the Surveillance Panel. The agenda topics are listed below, with discussions and actions following.

Agenda Topics:

- **Mack T-12 "W" batch rings / availability**
  Greg Shank had a call with MAHLE and Volvo Aftermarket Parts group. The T-12 piston rings with the correct right plasma coating had been assigned a special Mack Part number to be used when placing orders. Unfortunately, when the latest ring batch was ordered, the upgraded changed part number was ordered. When the parts numbers changed from Mack to Volvo, the Volvo part number superseded the Mack special part number.

Volvo has meeting with MAHLE tomorrow afternoon on the supply of the special part number piston rings. It could take till November to get the proper material to make the rings. Tomorrow MAHLE will share how long it will take them to manufacture the rings once they have the materials and provide a quote on the cost to do so. It is possible replacement rings may not be available till year end as there is also a delay on the material to manufacture the oil rings.

Greg will investigate if the 2nd and oil ring part numbers are still the same as those tied to the original 2012 order for rings. TEI has 92 "S" batch 2nd rings and 414 "S" batch oil rings. If we can use the "W" batch 2nd and oil rings then MAHLE would only need to supply new top rings urgently, which would eliminate the delay on supplying oil rings.

ACTION: Labs will send Sean Moyer at TMC their inventory of T-8, T-11 and T-12 kits with batch "U" rings and a projected run out date.

Infineum also shared an analysis of the "W" batch rings which compared them to the prior batches and confirmed the following differences:

- The material structure of the ring coating has changed between batches
  - The coating surface is much smoother for the "W" batch than previous batches
  - Ring coating has limited pores in surface and substructure.
  - Previous batches had more porosity which added roughness to the ring.
  - Aluminum surface domains present in previous batches of rings ("T" & "U") have been removed
  - Large Moly domains are now present in coating both at the surface, in substructure, and are uniformly distributed
- The barrel rise and symmetry is similar to the previous couple of batches of rings

- **Impact of fuel Severity Factor on T-8 and T-11**

Jim Rutherford presented an analysis on the CPChem reported fuel batch severity factor (FSF) and that it may have a marginal impact on the severity of T-8E Viscosity increase at 3.8% soot. There was some discussion around if the Reference oil TMC1005-5 might also be contributing to the mildness. TMC analysis seemed to indicate the batches looked the same but TMC will recycle to confirm.

CPChem suggested adding severity factor to the spec of the fuel. There was concern about writing FDF into the spec as it is a considered by CPChem to be a proprietary severity factor. Reviewing a plot of fuel batch severity factor seemed to suggest a limit of 105 might be appropriate but it was suggested to also include a review of T-11 data. If aromatics are a large contributor to FSF, then maybe that could be plotted form the CofA.

Jim presented an analysis of the Mack T-11 severity vs the FSF. Looking at soot 4 cSt, 12 cSt, and 15 cSt, it was only the 4cSt which seemed to show a possible link to fuel batch but other the data was inconclusive at the other viscosities.

Options to consider: Let CPChem try fixing the fuel severity factor? Revisit industry correction factor? Allow severity adjustments to correct? Set to target mean for TMC1005-5? Also could move the T-8 LTMS to the more modern LTMS with continuous severity adjustments.

Mark will ask CPChem if they can control fuel severity factor (FSF) better and report it on CofA. Afton felt that industry funded the data that was used to develop the fuel severity factor and therefore it should be shared with the Mack SP so purchasers of the fuel could verify the FSF themselves.

Jim will develop an example of applying the new LTMS to the T-8 and explore what ei and zi limits would do instead of yi.

- **Update from Volvo T-13 Humidity Control Task Force**
  Not covered due to time constraints.

Old/New Business

- T-12 head gaskets – Afton sent Cometic a Mack T-12 head gasket to look at to determine if they would recommend using a single gasket with a single fire ring or making a composite. Cost would be on the order of $3-5K to setup tooling then gaskets will run $50-60. Cometic want to study the gasket some more before providing a final recommendation. Afton will advise Mack SP.

- Add to next meeting, T-13 turbo discussion. SwRI having to replace them after every test.

Other Business

- **None**

Next Meeting

- **T-8 follow up T-12 rings follow up - Wednesday Oct 5, 12:30 PM Eastern**

The Mack Surveillance Panel adjourned at 12:07 PM Eastern.

Respectfully submitted,
Bob Salgueiro
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