UNCONFIRMED MINUTES OF THE
ASTM MACK SURVEILLANCE PANEL MEETING

Held at the Hyatt Regency Hotel
New Orleans, LA
December 7, 1998

1. Call to Order

1.1. This meeting of the Mack surveillance panel was called to order at 1:00 p. m. on December 7, 1998. The agenda is shown as attachment 1. The attendance list is shown as attachment 2.

2. Membership

2.1. Ralph Cerillo mentioned that Floyd Albert will no longer be a member of the Panel due to reorganisations.

2.2. Mark Hull, Lubrizol, notified the panel of a change in membership. Dino Righi will take over Mark's responsibilities as a panel member.

3. Approval of Minutes from the previous meetings

3.1. The secretary notified the members of the panel that Attachments 11, 12, and 13 of the minutes of the previous meeting were inadvertently left off when the minutes were distributed. Copies of those attachments had been sent to several members who requested to have them mailed. In addition, copies were available at the meeting for distribution.

3.2. The minutes of the meeting on September 10, 1998 were approved without further comments.

4. Scope and Objectives (Charlie Passut, attachment 3)

4.1 The chairman presented an updated version of the scope and objectives for the Mack surveillance panel, see attachment 3. The changes resulted from the combining of the Mack T-9 task force and the Mack T-6, T-7, and T-8 surveillance panel.

5. TMC Report (Jeff Clark, attachment 4)

5.1. The TMC data indicate that the Mack T-8/T-8E test is on track for both the viscosity increase @ 3.8% soot and the relative viscosity @ 4.8% soot.

5.2. One T-8 information letter has been issued, 98-3, about changes in the shear and viscosity measurement methods. Two more information letters will be issued shortly. Information letter 98-4 deals with critical parts and information letter 98-5 is about the T-8A.

5.3. Mack T-9 test activity level is low. The results that have been obtained indicate the test is on track for liner wear and ring weight loss, but there might be a mild trend for used oil Pb-content. It is difficult to find out whether this is a laboratory effect or an industry trend since all data came from one lab. No action was taken because a few more T-9 reference tests are underway. TMC has conducted an investigation into several possible causes and although no definite cause could be identified none of these possible causes could be ruled out. There was a question about the possibility of having a base oil change going from TMC 1005 to TMC 1005-1. Jeff took an action item to find out what the base oil characteristics / ratios were for the two batches of reference oil. In addition, Jeff Clark and Greg Shank took an action item to consult the statisticians about this matter.

5.4. Jeff informed the panel about information letter 98-2 and the attached latest version of the T-9 test procedure which is draft number 6. The information letter deals with several issues, one of them is the addition of the TBN and TAN methods. A negative was received on this issue from William T. Tanguay and the panel has to resolve this negative. Later during the meeting Mr. Tanguay clarified his letter with a few comments. He stated that the current TBN/TAN method is several decades old and currently undergoing a major update. A specific issue he mentioned was the recommendation to use the tri-solvent prescribed for D-4739 also for the TAN method. Jeff Clark was appointed as liaison between the panel and ASTM Section 6. Improvements to the methods will be adopted by the panel. With this action the “negative” was changed to an “abstain”.

5.5. A liner wear measurement round robin has been completed. Results from 6 laboratories (7 instruments) were compared. The Taylor-Hobson measuring devices at 2 of the 6 labs have been identified as the standard. All of the other labs/measuring instruments gave either consistently mild or consistently severe results and therefore could not be approved. It seems like the PDI instruments could give the right data provided that the settings are chosen correctly. A workshop will be organised to resolve some of these issues. The ultimate goal is to approve more labs to do the measurements and thereby reduce the amount of shipping of liners to approved labs.

6. Piston Ring Flaking

6.1. Greg Shank brought up the problems with ring flaking and asked the panel to look for ways to speed up the introduction of a new type of piston rings with an improved plasma bonding. These rings have been available for a while but concerns over possible severity shifts slowed down the introduction.

6.2. Wim van Dam, Oronite, presented some micrographs showing that flaking on a microscopic scale occurs on every ring that was evaluated (attachment 5). Although this phenomenon is not characterized as flaking resulting in a rejection of the result for that cylinder, it does result in weight loss. In addition, the chips of plasma could cause both abrasive ring wear and liner wear.

6.3. Ken Goshorn, Mack, informed the panel that a limited number of the rings is available and a larger batch of the new rings could be made available in about a month. A motion, to accept the new piston rings for both candidate and reference testing as soon as the rings are available in sufficient quantities, passed with 12 for, 0 against and 1 abstain. The introduction date of the new rings and any test results on these rings will be discussed per teleconference.

7. Test Engine Hardware

7.1. Ken Goshorn, Mack, introduced the topic of intake valves by giving a short overview of the history. At first, TRW valves with a valve face angle of 30° were used. These valves were replaced by Eaton valves with an angle of 20°. The Eaton valves gave problems so the test labs went back to the first type of valves. In the mean time, Mack has resolved the problems with the Eaton valves and would like to try these valves again. The reason for the move to valves with a 20° angle is that the smaller angle reduces the valve face wear by a factor 4 or 5. A motion to move to the new valves per January 1, 1999 passed unanimously. The part number for the valve is 690 GC 417, and the part number for the valve seat is 13 GC 38.

7.2. Greg Shank showed a picture of two different designs of the rotor in the bypass filter. Although the design looks different, both types function the same and therefore both types may be used. The part numbers for the two types are 57 GC 2134 and 57 GC 2134A.

8. Rotational Viscosity Task Force (Herman George, Attachment 6)

8.1. Herman George, chairman of the ASTM D02.07 task force on Rotational Viscosity Measurements, presented some of the findings of his task force. The behavior of soot laden oils is described using the equation:

$$\text{stress-yield stress} = b * (\text{shear rate})^{c}$$

The “c” value is determined for a given oil sample as a measure of the performance of that oil which is independent of the shear rate. For an oil with Newtonian behavior the “c” value equals 1. When the soot in an oil is not properly dispersed, the “c” value becomes less that 1, indicating non-Newtonian behavior.

Measurements on used oil samples from the Mack T-8 test showed that the “c” value could be determined repeatably.

8.2. In a separate experiment, measurements were carried out according to the standard protocol and these measurements were repeated without allowing the sample to settle. The second measurement gave a higher “c” value (a lower viscosity) in all cases. This could indicate that the first measurement represents the viscometric behavior of an oil in the crankcase upon restart of the engine, and the second measurement is a better representation of the viscometric behavior of the oil in a running engine.

8.3. Herman George requested more used oil samples from Mack T-8 or Cummins M11 engine tests on oils other than TMC 1004. These oil samples should represent the different additive chemistries and base oil types. Herman will work with Mack, Cummins and the labs to obtain these samples. A motion to accept the report from the Rotational Viscosity Measurement Task Force was accepted unanimously.

9. Mack T-6 and T-7 Alternatives for CF-4 (Charles Passut, Attachment 7)

9.1. The chairman showed a presentation prepared for the HDEOCP meeting. The presentation outlined a proposal for the revision of the CF-4 performance category where the Mack T-9 test is accepted as an alternative for the Mack T-6 test and the Mack T-8A test as an alternative for the Mack T-7 test. Data to support this proposal are shown in attachment 7.

10. RSI Report

10.1. The chairman presented a summary of the RSI data for the Mack tests (attachment 8). The data would suggest that the repeatability for candidate tests is worse than for reference tests, but the number of repeat tests in the RSI database is limited.

11. CPD Report (Gary Tietze, Attachment 9)

11.1. Gary showed the results of a large number of parts measurements. He mentioned that all top rings and bearings are now being laser etched. One of the panel members raised a question about the necessity of all the measurements. Reducing the number of measurements could potentially lower the test parts cost. Gary was asked by the panel to report what fraction of the parts received from the OEM is currently being rejected based on the measurements.

12. Old / New Business

12.1. Greg Shank stated that Mack is working on the development of EGR systems for the engines. Increased wear as a result of the introduction of EGR is a

real concern for Mack and they plan to make EGR-engines available in the course of 1999 for lubricant evaluation.

13. Next Meeting

13.1 No date was established for a next meeting. A teleconference will be held early 1999 to discuss the introduction date of the new top piston rings.