

ESCIT Meeting Minutes – 9/28/06

Chairman Engel opened the meeting at 12:40 pm in Detroit.

1. No comments were received on the minutes from the last meeting. Minutes approved as posted to the ASTM TMC web site.
2. Follow up items from last meeting.
 - a. Lubrizol samples from the Ford/LZ field trial work has been sent to Afton, Ciba, and Savant. Samples have been received. Ciba said they would present data at the next meeting on the Afton and Lubrizol control oils.
 - b. No questions were received by Lubrizol on the Ford/LZ presentation. At the meeting Lubrizol was asked when more detailed emissions data would be available? Lubrizol said they plan on writing an SAE paper next year reporting the data in more detail.
3. Chairman Engel reviewed the highlights of our last ESCIT meeting on 8/8/06 and the objectives for today's meeting.
 - a. The main follow up item was for each ESCIT member to be thinking about what potential GF-5 Seq test could be used to measure Phos retention and what test is most promising as a standard for GF-5.
 - b. Engel suggested that perhaps a combination of lower elemental limits and improved phos retention may be the way forward. However, the mission of ESCIT is to focus on phos retention test development and make a recommendation to ILSAC/Oil.
 - c. The GF-5 timeline has been delayed by one year so ESCIT has more time to complete our work. ESCIT should prepare a recommendation to ILSAC by 1Q, 2008.
 - d. Today's agenda.
4. SWRi institute reported on their progress made on developing a test for the impact of lube on TWC.
 - a. Early work by SWRi showed thermal degradation of the TWC. SWRi has taken steps to mitigate potential thermal excursions. SWRi is trying to develop a lube test and needs to control the test conditions to avoid thermal degradation of the TWC which can overwhelm any impact from the lube.
 - b. SWRi is doing additional work on Afton oils 33 and 35 to develop a catalyst durability test. Oil 35 is zero phos with Ca/Mg detergent. Oil 33 is 900 ppm Phos and zero detergent.
 - c. SWRi plans to have all the proof of concept work done by the end of 2006.
 - d. The SWRi test is mapped after the Afton catalyst durability test.
 - e. If SWRi is successful with the initial test development they may run the LZ/Ford oils. Lubrizol to send the oils if needed.

- f. SWRi to give a status report at the next meeting.
5. Lubrizol gave a presentation on work done to evaluate the use of the Seq IIIG as a measure of phosphorus retention.
- a. EAB showed data that using phos retention from the Seq IIIG at 20 hrs may be a method for evaluating lube impact on catalyst durability.
 - b. LZ recommended that other ESCIT members look at their data in the Seq IIIG at 20 hrs.
 - c. LZ to present data from the Ford/LZ field trial and other field trials for comparison to phos retention in the Seq IIIG at 20 hrs.
 - d. It was pointed out that the Seq IIIG may be a good option since there is much more data than from other Sequence tests.
 - e. It was pointed out that the 20 hour measurement would eliminate the complex calculations dealing with oil adds.
6. Infineum gave a summary of their viewpoints on ESCIT work to date.
- a. Infineum would like to see the phos elemental limits remain at 0.08% max in GF-5.
 - b. ESCIT is well on the way to come up with a test to gauge phos impact on TWC or phos retention in the used lube oil.
 - c. Infineum feels phos retention can be improved such that the phos limit for GF-5 can remain at 0.08% wt max and achieve emissions system durability as if we had reduced the phos to 0.05% wt max.
 - d. Using the Seq IIIG and Seq VIB engine tests to generate used oil to evaluate phos retention a move to low impact ZDDP can significantly reduce phos loss and therefore improve TWC durability.
 - e. It was pointed out that using a phos retention test only would not prevent catalyst degradation due to liquid oil consumption.
 - f. Infineum commented that it may be possible to define a test by the end of 2006 if we move quickly. Some team members raised objections to the timing.
 - g. Infineum reviewed their calculation method which is similar to Afton's. The Infineum calculation includes steps to determine phos retention and liquid consumption separately.
 - h. It was suggested by Infineum that we peer review the Infineum calculation to reach consensus and then have the TMC look at the test precision for phos retention as calculated using the Infineum calculation in the Seq IIIG at 20, 40, 60, 80 hrs and EOT. Labs will provide needed data on the Seq IIIG ref oil runs. We will work back thru the Seq IIIG surveillance panel to conduct this study.
 - i. Andy Ritchie volunteered to work with the TMC to determine the best way to use reference oil data from the Seq IIIG test to determine phos retention precision.
 - j. Andy Ritchie volunteered to distribute his phos volatility calculation for peer review.

7. Oronite gave a Presentation on Phos Volatility in GF-4 Engine Tests. No presentation will be in the minutes.

- a. Oronite presented data on 160 observations from the Seq IIIG.
- b. Some data points in the Oronite data base shows that the equilibrium point is later than the 20 hrs LZ observed; around 40 hrs. The equilibrium point is when phos lose stabilizes.
- c. % phos retention on select Oronite chemistry averaged 84% with a std deviation of 3.3%.
- d. Oronite is planning on presenting additional and more refined data at the next meeting.
- e. Determination of Phos retention tests continues to show promise.

8. XOM Phos Volatility Study

a. XOM presented the results of a designed experiment to look at impact of ZDDP types in the NOACK test.

b. Phosphorus Volatility Conclusions

k. Impact of HMW 1 and LMW 2 ZDDP on phosphorus volatility in several tests was studied.

l. PEI ranking did not agree with other tests

a. PEI results suggest more P volatilized from HMW 1 than from LMW 2.

b. Literature, TGA, Seq IIIG, Seq VIB, bulk oxidation test, and ROBO indicate that LMW2 ZDDP volatilizes more than the HMW 1 ZDDP.

i. Magnitude of Phos loss varies for each test—IIIG>VIB.

m. Discrimination of phos volatility is possible with either a bench or engine test.

9. CIBA presented an Update on a Phos Volatility Bench Test.

a. Ciba will run their bulk and thin film phos volatility test on the LZ/Ford samples.

b. Additional data will be presented at the next ESCIT meeting.

10. SAVANT gave an update on their PEI testing.

a. Ted presented bench test correlation to field data.

b. Ted reported that the PEI correlated very well with the Ford samples sent to him by LZ.

c. Ted is suggesting that the PEI be run at 165 C and that we drop the 250 C temperature test.

d. Ted suggested that we form a team under ASTM to develop the PEI test.

11. AFTON

- a. One of the LZ/Ford oils is running in the AFTON ACT catalysts durability test.
- b. An updated version of the AFTON calculation will be circulated to ESCIT.
- c. AFTON thinks the Seq IIIG has significant information to offer in understanding the phos volatility issue.

Next meeting will be at GM Pontiac from 9:00 am until 2:00 pm on 12/12/06.

Action item for the next meeting:

1. SWRi to give a status report on their efforts to develop a catalyst durability test.
2. LZ to present data from the Ford/LZ field trial and other field trials for comparison to phos retention in the Seq IIIG at 20 hrs.
3. Andy Ritchie volunteered to work with the TMC to determine the best way to use reference oil data from the Seq IIIG test to determine phos retention precision.
4. Andy Ritchie volunteered to distribute his phos volatility calculation for peer review.
5. Oronite is planning on presenting additional and more refined data at the next meeting.
6. Ciba said they would present data at the next meeting on the Afton and Lubrizol control oils.
7. LZ recommended that other ESCIT members look at their data in the Seq IIIG at 20 hrs.
- 8.

Attachments: See www.astmtmc.cmu.edu for the attachments.

- a. SWRi status report on test development of the lubricant impact on TWC.
- b. Lubrizol presentation on measuring phosphorus retention by using the Seq IIIG 20 hour results.
- c. Infineum presentation summarizing ESCIT work to date and the Infineum position.
- d. XOM presentation on primary, secondary and aryl ZDDP impact on phos retention.
- e. Ciba update on their efforts to develop phos volatility bench test.
- f. Savant presentation on PEI.
- g. Chairman Engel's opening remarks and meeting agenda.

