

Mack/Volvo Surveillance Panel Meeting

July 29, 2020

1:30 PM – 3:00 PM EST

Attendees:

Afton: Christian Porter, Abaigael Ritzenthaler, Todd Dvorak

Chevron Phillips Chemical: Jon VanScoyoc

ExxonMobil: Steve Jetter

Haltermann: Prasad Tumati

Infineum: David Brass (secretary), Elisa Santos, Jim Gutzwiller

Intertek: Juan Vega, Pablo Ramirez

Lubrizol: Jim Matasic

Oronite: Mark Cooper (chair), David Lee

SWRI: Travis Kostan, Isaac Leer, Bob Warden, Jose Starling

TEI: Derek Grosch

TMC: Sean Moyer

Agenda:

1. Alternate Fuel Criteria
2. Fuel Usage Guidelines
3. Analysis of T-11 Fuel on operational and performance parameters

1. Alternate Fuel Criteria

- Travis (SWRI) presented the working document on the alternate fuel criteria (*T-11 Alternate Fuel Approval Requirements_Combined.pdf*)
- Using Level 2 Ei for Soot @ 12 cSt and Soot @ 15 cSt and Level 3 Ei for Soot @ 4 cSt, the current fuel would have a 57% chance of free pass without SP review. This would not utilize MRV parameter.
- In PCMO tests going through similar alternate fuel discussions they decided to move forward with ~60% chance of free pass for the Sequence IIIH and ~80% chance of free pass for the Sequence VIE.
- Decision to use Yi targets for the free pass criteria is still open for discussion within the Surveillance Panel. Note will remain in working documents until final decision on its usage is made.
- The group was reminded of the criteria that the stand used for testing must have passed its last 3 calibration attempts to be used for this fuel testing.

2. Fuel Usage Guidelines

- Bob W (SWRI) presented document on fuel usage guidelines (*T11 Fuel Transition Requirement Draft.pdf*)
- Mack T-11 uses a fuel that is not a standard market fuel, it will be a batched fuel that is supplied by the manufacturer.
- Individual lab can't bring in a new fuel supplier without bringing the data in front of the surveillance panel first for review.
- This document describes the process of bringing in fuel sources that were already approved by the Surveillance Panel as alternative fuels to a lab.

- i. One operationally valid test with no level 2 Ei alarms on the critical parameter (%Soot at 12cSt). This would act similar to the process of bringing in a new stand at a lab that has active stands.
- Stand can only use fuel that the stand was calibrated on.
- For the labs to transition between approved fuels, the new fuel would need to be brought in as part of the calibration process on that stand.
- Though a fuel has been accepted by the Surveillance Panel, each lab would need to pass calibration to bring the fuel into their lab.
- To switch back to a fuel that has been used in your lab you just need to pass calibration on the stand that will switch back to that fuel.
- To aid this process of bringing in new fuel manufactured sources, the Mack T-11 will benefit from shifting from a Lab based LTMS system to a Stand based system.
- Travis (SWRI): Has this panel discussed moving to a stand based LTMS system for the Mack T-11
- Bob W (SWRI): This panel moved the Mack T-8 to a stand-based system, but never went back to adjust the LTMS for the other tests.
- Todd (Afton): This panel needs to look to see if a stand-based system is warranted for the labs before we move to it.
- Bob W (SWRI): It will be hard to deal with a lab-based system with multiple fuel sources available when the calibrations for the stands won't all come up at the same time.
- **ACTION: Todd (Afton) volunteered to look at the difference between stand-based and lab-based LTMS system calculations for review by Surveillance Panel at next meeting.**
- David (Infineum): Questioned what happens if we stay on the lab-based system.
- Bob W (SWRI): Would create a very complex system to bring in the first stand at that lab with the new fuel. The lab would potentially have to base the severity adjustments on the last calibration and potentially move all stands to the new fuel based on it.
- **ACTION: Travis and Bob W. (SWRI) to combine the Fuel Approval Criteria and Fuel Usage criteria into a single document.**

3. Analysis of T-11 Fuel on operational and performance parameters

- Todd (Afton) shared a presentation on analysis conducted comparing the fuel parameters with its effects on the operational and performance parameters of the Mack T-11 (*T11-Fuel-Analysis-072920.pdf*)
- CofA was supplied for fuels that were used in 59 reference test results
- Analysis conducted on operational variables and performance parameters
- Performed stepwise regression with $p \leq 0.10$ and partial least squares with (Variable Importance in Projection (VIP) to prune the analyses
- Looked at a multitude of variables in the CofA and included the fuel age from time of delivery to usage at the lab
 - i. Fuel age was based off of the middle of the month based on the documents listing only the month.
- There were some operational data points that looked to be outliers when plotted as a collective.
 - i. These points were removed before modelling of the responses was conducted.
- There is a lot of multicollinearity in the data
 - i. Principle Component Analysis indicated that 80% of the variations can be explained by 7 factors for each parameter.

- Modelling of each of the parameters found that there were statistically significant effects from the fuel parameters (those parameters listed below were found by the Stepwise Regression Approach)
 - i. Average Power
 1. Hydrogen
 2. Cetane number,
 3. T5%
 4. Sulfur
 - ii. Front Exhaust Manifold Temp
 1. Bot_Sed_Water
 2. SpecificGravity
 - iii. Rear Exhaust Manifold Temp
 1. Loss
 - iv. Tailpipe temp
 1. Kinematic Viscosity 40C
 - v. Avg Exhaust CO2
 1. Cetane_Index
 2. Flash Pt
 - vi. Soot4
 1. AcidNum
 2. SFC_Arom
 3. Carbon
 4. T10_Percent
 5. LOSS
 - vii. Soot12
 1. *No parameters significant*
 - viii. Soot15
 1. Pourpoint
- Appendix in presentation has plots of all of the fuel parameters versus the operational and performance parameters for others to study.
- Jon (CP Chem): There is some complexity here for some fuel parameters as the measuring test changed. For instance, Aromatics used to be measured by D1319 and now we use GC

2:42 PM meeting adjourned

Next Meeting: August 12, 1:30 PM – 3:00 PM EST