



RECORD OF EMAIL

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Date: January 16, 2020
Person Contacted: Ms. Nancy McAtee (Chemist, NTSB Materials Laboratory)
NTSB Accident Number: WPR19FA093

Narrative:

During an email conversation with Ms. McAtee, she reported the following:

"The left electric fuel pump was submitted to the Materials Laboratory to identify a blue residue found near the inlet. The residue around the inlet was removed with a cotton swab. The residue was examined using a Fourier Transform Infrared (FTIR) spectrometer with a diamond attenuated total reflectance (ATR) accessory in accordance to ASTM E1252-98 (American Society for Testing Materials E1252-98: *Standard Practice for General Techniques for Obtaining Infrared Spectra for Qualitative Analysis and American Society for Testing Materials*). The spectrometer was used to collect and process infrared wavelength absorbance spectra of the unknown material.

The spectrum contained the following combination of spectral peaks corresponding to particular functional groups found within molecular structure of the residue material. The presence of a broad low peak at $\sim 3650\text{ cm}^{-1}$ is indicative of a oxygen-hydrogen (O-H) bond. The presence of a strong doublet peak between $\sim 2900\text{ cm}^{-1}$ and $\sim 2850\text{ cm}^{-1}$ is indicative of a carbon-hydrogen (C-H) stretching bond. The presence of a peak at $\sim 1510\text{ cm}^{-1}$ is indicative of a carbon-oxygen-oxygen function group (O-C=O). The presence of a single peak $\sim 1460\text{ cm}^{-1}$ is indicative of a carbon-hydrogen (C-H) scissoring bond. The presence of a single peak $\sim 1410\text{ cm}^{-1}$ is indicative of a carbon-hydrogen (C-H) rocking bond. A peak at $\sim 1090\text{ cm}^{-1}$ are indicative of the presence of a carbon-oxygen (C-O) stretching bond. This combination of functional groups is consistent with a carboxylic acid. Carboxylic acids are often found in surfactants and other fuel additives. A spectral library search was perform using the residue spectrum. There were no exact matches to the residue, however, the unknown spectrum had several similarities to lead stearate, a metal salt of stearic acid. Stearic acid is used as an emulsify agent.

The residue was further examined using an x-ray fluorescence alloy analyzer. The examination found the presence of lead in the residue.

The presence of a possible surfactant/emulsifier and lead in the residue indicates that the residue is likely degraded/old fuel from a previous leak."

END.

Submitted by: Samantha Link