

Tim Sorensen

From: Nancy McAtee
Sent: Monday, March 24, 2025 11:04 AM
To: Tim Sorensen
Cc: Matthew Fox; Michael Budinski
Subject: Email Report- CEN24LA077 (Unknown material found in fuel pump)

Tim,

A sample of debris found in the fuel pump of the accident aircraft was submitted to the Materials Laboratory for examination. The material consisted of small pieces of a black brittle substance. The material was examined using a Fourier Transform Infrared (FTIR) spectrometer with a diamond attenuated total reflectance (ATR) accessory in accordance with 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 sample spectra contained the following combination of spectral peaks corresponding to particular functional groups found within molecular structure of the material. The presence of a strong doublet peak between $\sim 2920\text{ cm}^{-1}$ and $\sim 2850\text{ cm}^{-1}$ is indicative of a carbon-hydrogen (C-H) single stretching bond. A peak at $\sim 2330\text{ cm}^{-1}$ indicates the presence of a triple bonded carbon-nitrogen ($\text{C}\equiv\text{N}$) group. The presence of a doublet peak at $\sim 2100\text{ cm}^{-1}$ and $\sim 2090\text{ cm}^{-1}$ is indicative of a carbon-carbon (C-C) group (most likely in the form of elemental carbon or carbon black). The presence of a single broad peak at $\sim 1730\text{ cm}^{-1}$ is indicative of a carbon-carbon double stretching bond(s). The presence of a peak at $\sim 1450\text{ cm}^{-1}$ is indicative of carbon-hydrogen₂ (C-H₂) deformation bonds. A peak at $\sim 810\text{ cm}^{-1}$ is indicative of a carbon-hydrogen deformation bond. This combination of functional groups is consistent with straight-chained hydrocarbon attachment and an attached nitrile group. A spectral library search was performed on unknown spectrum. No exact match was found. However, the search found similarities to acrylonitrile-butadiene (buna n/nitrile) copolymers and other similar polymers and copolymers. Nitrile rubbers are often used in the construction of fuel lines. Based on the data plate on a fuel line sent with the debris, the interior hose material was black synthetic rubber.

If you have any questions, please let me know.

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