

From: [Brian Fuchs](#)
To: [Timothy Monville](#)
Subject: Materials Laboratory Email Factual Report (ERA24LA164)
Date: Monday, January 6, 2025 11:35:14 AM

Hello Tim,

Below is the Materials Laboratory report for ERA24LA164. Please let me know if you have any questions.

Four fuel hoses and a piece of debris found in the fuel system were submitted to the Materials Laboratory for inspection. All hoses had metal identification tags attached to them. Three of the four hoses (labeled as Segments 1, 2, and 3) were the same length (23 inch). These hoses had identical metal identification tags attached. The fourth hose (labeled Segment 4) was shorter than the other three (13.5 inch) and had a different identification tag.

The debris was a thin (<0.05 inch) black polymer approximately 1 inch by ¾ inch. It was analyzed 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*). The spectrometer was used to collect and process infrared wavelength absorbance spectrum of the unknown material. A spectral comparison library search was performed and found the spectrum of the debris was similar to nitrile rubber. A high amount of carbon black was identified in the material, which may have obscured the identification. Later FTIR analysis of one of the larger hoses found that the absorbance spectrum of the inner layer of rubber material was an exact match to that of the debris.

An Olympus™ borescope was used to examine the interior walls of the hoses. White, brown, and shiny deposits were noted on the walls of all four tubes. No areas of flaking or missing material were found using the borescope.

The hoses were disassembled and bisected lengthwise for further inspection. The larger hoses (Segments 1, 2, and 3) consisted of three layers – a fiber-reinforced black rubber inner tube, a protective layer of steel braid, then a fire-resistant outer cover. The outer cover was removed and the fittings were cut from the ends of the hoses. The hoses were then cut open to examine the inner wall for areas of cracking, flaking, or material loss. No such damage was noted. Attached images show the hoses as bisected (note – tears in the walls of segment 3 developed during the cutting process and were not present prior to cutting).

The smaller hose (Segment 4) was also bisected. It had a thin (<0.1 inch thickness) polymer inner lining that consisted of a gray outer layer and a black inner layer. No damage was seen to

the walls of this segment.

Brian Fuchs, Ph.D.
Materials Engineer
National Transportation Safety Board
[REDACTED]

Washington, DC 20594