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APPENDIX C

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, DC

MC CRONE, INC., REPORT
(2 pages)

McCrone Associates, Inc.
850 Pasquinelli Drive
Westmont, Illinois 60559-5539
630-887-7100 Fax: 630-887-7417

11 April 2000

Ms. Nancy B. McAtee
National Transportation Safety Board
490 L'Enfant Plaza SW
Washington, DC 20594

Subject: Analysis of Reddish Deposits
Re: McCrone Associates Project MA35182

Dear Ms. McAtee:

This report is a follow-up to your visit to McCrone Associates on 5 April 2000. During your visit, we examined a total of nine samples that were individually packaged in plastic bags. The samples exhibited varying degrees of color deposits ranging from pale yellow to dark red. We initially examined the samples with a stereomicroscope at magnifications up to 64X. For simplicity purposes and sample tracking, we assigned MA codes to each sample. The codes were labeled A through I. The list of the descriptions for the codes was provided to you at the end of your visit.

After the preliminary examination of the samples, we decided to examine Sample code A in the low vacuum scanning electron microscope which is equipped with an energy dispersive x-ray spectrometry (EDS) system that is used to provide the elemental composition of materials. Sample code A was a piece of foam material, and we sliced out a small section of the foam in order to obtain an EDS spectrum of the interior or bulk material. This sample was a control material for comparison to the reddish colored stain on the outer surface. During the EDS analysis of the surface stain, we noted the presence of zinc and magnesium in elevated levels compared to the bulk foam.

During this analysis, we also decided that it would be better to remove portions of the stains from the various samples in order to isolate them for more detailed analysis in the electron microprobe which is also equipped with a similar energy dispersive x-ray spectrometry system. We used a tungsten needle to carefully remove the reddish and yellowish colored stains from the various samples and mounted the small pieces onto a polished beryllium substrate using a thin collodion film to "tack" the particles to the beryllium surface. The collodion is mixed with amyl acetate as a solvent carrier, and we noted during contact with the

solvent/collodion mixture, the reddish coloring was partially leached from the sample indicating that the reddish component is solvent soluble. We proceeded to analyze the sample in the electron microprobe and observed the elevated levels of zinc and magnesium in all the samples except for Sample code D which had carbon and oxygen as the only major components. The zinc material appears to be small particles (0.5 to 2 μm) of zinc oxide. Zinc oxide particles in this size range are commonly used in various polymer formulations. The magnesium appeared to be more uniformly dispersed and was not associated with any particular anionic species. Therefore, the magnesium could be in the form of a magnesium carbonate or perhaps an organo-metallic salt such as magnesium stearate.

We noted during our sampling that the colored stain materials varied in elasticity. Sample code D had the most brittle red colored deposit, and this material also did not contain the elevated levels of zinc and magnesium as found in the other samples. Additional material was removed from this sample and mounted on a potassium bromide salt plate for analysis by infrared microspectroscopy. One of my colleagues, Mary Stellmack, performed the infrared analysis. A comparison sample from the reddish stain from Sample code A was also provided for the infrared analysis.

The infrared spectra of the two materials along with two reference infrared spectra from our spectral library were given to you at the end of your visit. The FTIR data can be compared to previous data generated at other laboratories. In addition, you were given all of the EDS spectra and one SEM image showing the particle size and distribution of the zinc oxide. The remainder of the samples were also returned to you.

Thank you for consulting McCrone Associates. If you have any questions concerning the analyses that we performed, please feel free to contact me.

Sincerely,

Wayne D. Niemeyer
Senior Research Scientist

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Ref: MA35182; P.O. #130231