



## Engineering Sciences Section – 2007

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### **C34 An Investigation Into the Cause of an Explosion During the Refurbishing of Aluminum Mats Used for Portable Landing Fields**

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After attending this presentation, attendees will learn the importance of preparing thoroughly for a field investigation and how microscopic details can effect the long term stability of manufactured materials that were assume to be inert.

This presentation will impact the forensic community and/or humanity by helping the forensic community to realize the importance of investigating and considering the opinions of experts that may not have been considered in early stages of an investigation. The use of the expertise of a skilled materials scientist and metallurgist was instrumental in solving a problem that appeared, on its face, to be a flammable liquids application.

Reportedly a worker was injured after striking an arc to weld an aluminum cap on a refurbished aluminum mat. The aluminum mats are used by the military as portable landing fields for aircraft. To eliminate hydrocarbon fuels as a source of the explosion, aluminum mats were sampled using passive and active activated charcoal samplers. The activated charcoal samplers were analyzed for flammable liquids by GC/MS. Mats stacked awaiting repair were cut in half and immediately sampled with two different types of portable hydrocarbon “sniffers” in an attempt to identify any flammable gas that may be present. After excluding hydrocarbons fuels as a possible source of the explosion the interiors of the aluminum mats were examined using light and electron microscopy. Analysis of aluminum chips left inside the aluminum mats from the initial manufacture of the aluminum mats 15 to 20 years prior revealed heavy oxidation leading to the conclusion that hydrogen production may have contributed to the cause of the explosion. Changing the procedure in the refurbishing process allowed time for any explosive gasses present in the aluminum mats to dissipate prior to welding.

**Microscopy, Hydrogen, Aluminum**