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## Air Force Tests Packaging and Dehumidification Methods

By Cynthia Greenwood

Over the past few years, the Air Force Corrosion Office in Macon, Georgia, has watched industry tout the benefits of technologies designed to protect Air Force aircraft and weapon systems from atmospheric corrosion. These tools include vapor corrosion inhibitor (VCI) emitters, barrier/packaging materials, and dehumidification/controlled humidity storage systems, all of which are designed to protect equipment from the corrosive effects of sunlight, ultraviolet rays, humidity, and saltwater.



*Materials engineers cover bagged test samples with a bird-proof cage to avoid tampering by wildlife. Photo courtesy of Air Force Corrosion Office.*

"A lot of studies have been done but they do not tell us about the effect that a VCI barrier or dehumidification has on a particular piece of equipment," said Kimberly Andrews, Materials Engineer in the Air Force Corrosion Office.

So the agency's corrosion specialists undertook their own study in 2004, spearheaded by Andrews, Wes Barfield, and William H. Abbott from Battelle Columbus. The Air Force is interested in finding good methods to shelter electronic equipment parts, for example, from the desert environment of southwest Asia, Andrews said.

"During the study we took the methods most commonly used today and that's how we chose the samples," she said. The study consisted of two principal experiments. The first involves "leaky" enclosures with and without protection using dehumidification or VCI capsules and another looks at various types of protective films or bags. Andrews and her team exposed structural metals and active electronics to an aggressive subtropical, marine environment at Daytona Beach, Florida. They designed the experiments to elicit data relevant to a wide range of applications.

After a 14-month investigation, Andrews and her colleagues offered preliminary findings at the Tri-Service Corrosion Conference in Orlando last November. They are deferring their final results until the study ends around March 2006. "At this point, it is impossible to draw any conclusions regarding the level of protection provided by VCI materials," according to Andrews' report. "Although the level of protection currently being measured appears to approach the level of protection provided by dehumidification, many of the benefits being observed may be attributable to the sheltering and chloride reduction effect."

Thus far, the Air Force study has highlighted significant drawbacks in the durability of materials used to construct barrier and storage products. According to Andrews' report, "problems have included bag durability and ultraviolet degradation, but the major problem has been the difficulty of preventing moisture intrusion." The report cautions that the study does not aim to produce a side-by-side comparison or relative ranking of the technologies being analyzed.

"Our goal is to conduct an even playing field," Andrews contends. "We want to get enough data to revise the current specifications and translate them into the general series technical orders so our maintenance specialists, especially those deployed in southwest Asia, can use these methods when they have no access to permanent shelters," she said.



*A dehumidification cabinet placed on Daytona Beach is one of several Air Force test samples in an ongoing study of dehumidification methods. Photo courtesy of Air Force Corrosion Office.*