News Release

Sandia National Laboratories

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Sandia helps return firefighting air tankers to service with improved inspection programs

ALBUQUERQUE, N.M. — The United States Forest Service (USFS) this week activated the first two large firefighting tankers using an improved aircraft inspection and certification program designed at the Department of Energy's Sandia National Laboratories.

The fleet of large air tankers including P-3 Orions, DC-4s, DC-6s, and DC-7s, and P-2V Neptunes, are owned and flown by private companies under a contract administered by the Forest Service and used by all firefighting agencies.

After two fatal accidents involving C130A and PB4Y2 air tankers last summer, and following the aviation safety findings of the Blue Ribbon Panel on Aerial Firefighting commissioned by the USFS and the Bureau of Land Management (BLM) and completed in December, USFS and BLM officials pledged that none of the large air tankers on contract would be returned to service until an enhanced inspection program is in place.

On Monday, March 24, using an enhanced inspection program recommended by Sandia for Lockheed P-3 Orions, the USFS certified that a contractor had met all inspections requirements for two P-3s and returned them to service. One of those aircraft is currently assigned to the airtanker base in Fort Smith Arkansas since spring is typically fire season in the southeastern United States. Five more P-3s are undergoing certification procedures now.

Sandia is nearing completion of a similar inspection and certification process for the DC-4, DC-6, and DC-7 classes of tankers. The new procedures should be available to contractors flying those aircraft next week.

Development of the improved inspection process for the Lockheed P-2V is under way. The C130A and PB4Y-2 aircraft are not longer being used by the agencies for aerial firefighting.

"Until we can acquire newer aircraft down the road, this partnership with Sandia and the new inspections they indicate are definite steps towards safer operations with the current contract fleet," said Tony Kern, Forest Service Assistant Fire Director for Aviation.

As part of the three-year program funded by the USFS, Sandia, in consultation with the Federal Aviation Administration (FAA), is evaluating each contractor's procedures for maintaining and inspecting their air tankers and is developing recommendations for enhanced procedures that would improve the contractors' abilities to find and repair cracks and other structural problems before they pose a threat to aircraft and their crews, says Sandia program manager Richard Perry.

Although the final causal report has not yet been released from the NTSB, "fatigue cracks" growing unnoticed in the aluminum components of the center wing box are thought to be among the causes of last summer's C130A accident.

Among Sandia's recommendations will be administrative changes to formalize and improve maintenance and inspection procedures. Sandia also will encourage use of advanced non-destructive inspection (NDI) technologies that can identify flaws in structural materials that are hidden from view or are too small to be detected by visual inspection, says Perry.

Eddy current techniques, for example, detect sizes and locations of subsurface cracks by sensing disturbances in magnetic fields as a hand-held scanning device is applied to the metal. Ultrasonic inspection techniques detect flaws by monitoring sound waves as they pass through materials.

In the past, inspections of in-service aircraft were accomplished primarily by experienced personnel performing visual inspections of critical parts for cracks and other defects.

"Our initial objective is to use modern inspection technology and what we know about the aging of aircraft and materials and get the large air tankers safely back in service as soon as possible for the 2003 fire season," says Perry.

In addition, Sandia will evaluate data gathered this summer from several air tankers instrumented with sensors in an effort to characterize stresses on the planes' air-frames in the unique flight environments the aircraft encounter.

"They fly at low altitudes in mountainous areas under windy conditions," says Perry. "This turbulence causes stresses on the aircraft structure, like driving down a bumpy road in a car. We need to know what kind of workout they get and how these loads differ from other aircraft so we can understand and control the effects of these stresses."

Based on the data, Sandia also will recommend long-term inspection procedures for each class of aircraft, including determining how often each aircraft needs to be inspected to ensure cracks don't have time to grow into structural defects.

Many firefighting tankers operated by contractors are retired military or commercial transport planes designed and built decades ago. The P-3 was previously a submarine surveillance aircraft used by the Navy during WWII. The DC-4s also served in WWII as C-54 transport aircraft. These aircraft are considered national resources and are assigned to assist in initial attack on wildfires on different jurisdictions throughout the country.

Although firefighting aircraft today are flown within their design tolerance limits according to strict guidelines for pilots, it is important to keep a close eye on how the normal aging processes and, in some cases, many hours of flying time are affecting the plane's structural members, says Perry.

Many of the NDI techniques used for aircraft inspection were developed or refined at the Airworthiness Assurance Center (AANC) in Albuquerque, managed and staffed by Sandia for the FAA. The AANC's primary role is to develop improved inspection and maintenance techniques that safely extend the service lives of aging commercial airliners.

Sandia is a multiprogram national security laboratory operated by Sandia Corporation, a Lockheed Martin company, for the U.S. Department of Energy's National Nuclear Security Administration. With main facilities in Albuquerque, N.M., and Livermore, Calif., Sandia has major R&D responsibilities in national security, energy and environmental technologies, and economic competitiveness.

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