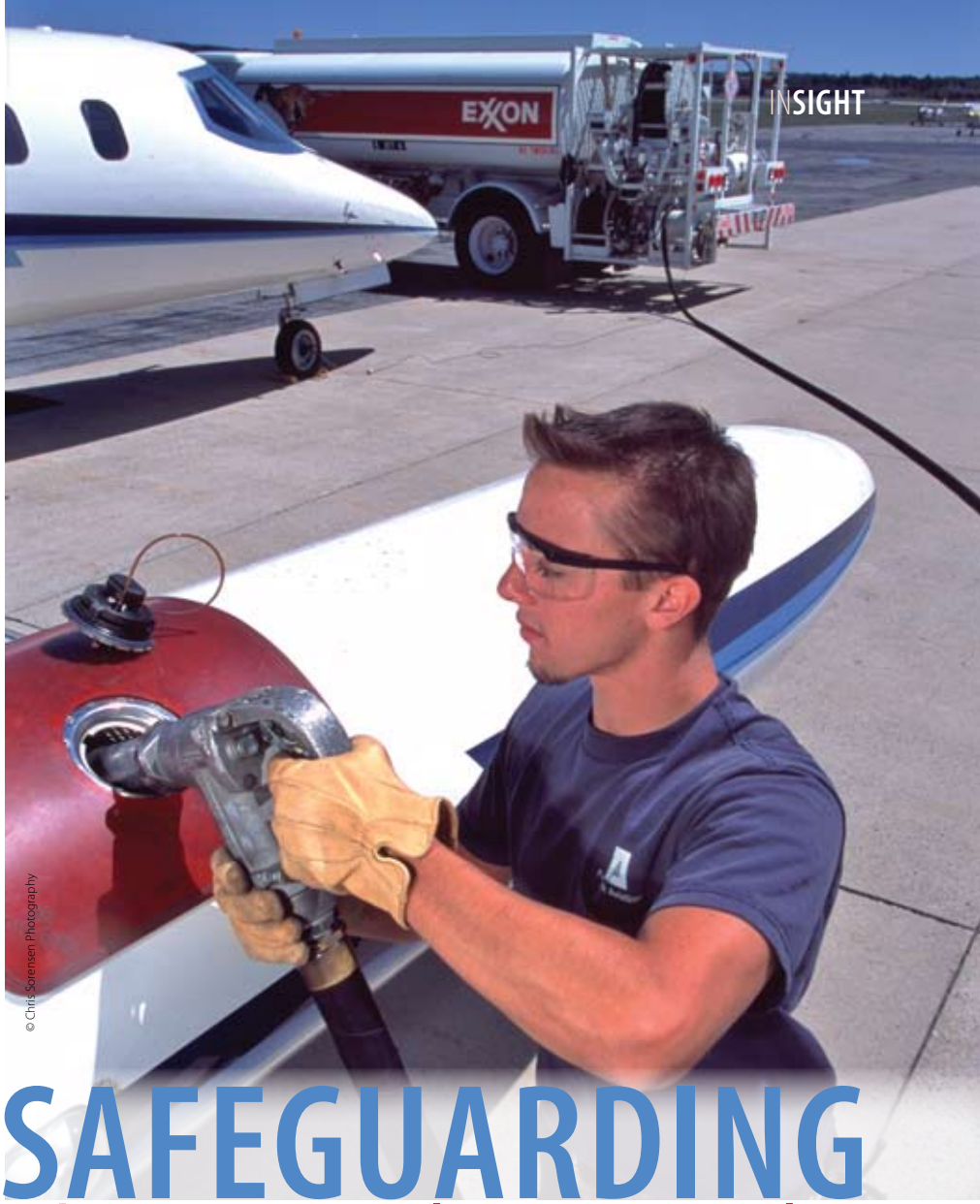

SAFEGUARDING the Fuel Supply

BY BART J. CROTTY

Recent safety audits have identified significant problems in the quality control of aviation fuel supplies and services.

Aviation accident databases show that fuel contamination continues to cause accidents. A survey of U.S. National Transportation Safety Board (NTSB) accidents from 2000 through 2005, for example, reveals that fuel contamination was the probable cause of or a contributing factor in 19 accidents.[1]

Through my own safety audits, I know of two charter aircraft accidents, one of them fatal, involving in-flight fuel starvation/engine stoppages caused by contaminated fuel.[2]

I recently conducted on-site safety audits of seven charter/corporate operators worldwide and found significant problems involving defective conditions and inadequate or nonexistent quality control of aviation gasoline and jet fuel services and supplies. These problems were identified at commercial fueling services at airports and helipads, as well as in operator fuel supplies and self-fueling operations.

Among the most common problems identified during the audits was the absence of written records for many fuel-related maintenance procedures, including filter changes and hose replacements; internal cleaning, inspection and painting of storage tanks; completion of daily, weekly and monthly equipment inspections; receipt of fuel by a fuel farm and the required "settling time" before its use; earth ground-resistance checks; grounding/bonding wire-resistance checks; various pressure gauge and flow gauge calibrations; and formal and on-the-job-training.

Manuals and forms for inspections and audits continue to confuse and misuse the word "grounding," instead of the correct term "bonding."[3] In the late 1990s, the U.S. National Fire Protection Association (NFPA), in *Fire Code 407, Aircraft Fuel Servicing*, stopped requiring that fueling vehicles be grounded and then bonded to the aircraft. Instead, the fire code required only that the fueling vehicle be bonded to the aircraft. Bonding provides a pathway for electrical charges in the fuel transfer system to neutralize the accumulated charge differential between the fuel and the aircraft. For overwing refueling, a bonding jumper connection is required between the fueling nozzle and the wing tank port.

Other problems frequently found during safety audits include uncapped or unprotected fuel nozzles; fuel trucks in unsafe mechanical condition; fire extinguisher hoses with deep cracks or without inspection stickers; leaking fuel connections; corrosion of grounding/bonding clamps or broken wires;

absence of inspection checklists; lack of any policy on records retention; absence of personnel training requirements and/or training records; carelessness in overwing fueling that results in damage to the aircraft wing skin; hazardous items such as matches in the pockets of clothing worn by maintenance personnel, static-generating clothing, and metal buttons or zippers on the clothing; reuse of de-fueled supplies with no specific quality control; and disregard of specified fuel-settling times and/or procedures for retaining samples of sumped fuel. In addition, in some cases, visitors were not prohibited from smoking when they were within 50 ft (15 m) of fueling/de-fueling activities, and fire extinguishers of adequate capacity were not available in sufficient numbers.

In one situation — hardly unique — encountered during an audit, charter and corporate helicopter operators at a private heliport used fuel from a 50-gal (189-l) drum, taking on just enough fuel to fly their helicopters to a nearby airport, where the pilots obtained a full fuel load. Each operator believed that one of the others was monitoring fuel quality, but in fact no one had checked the fuel for more than five years.

Many charter operators have policies and procedures on fuel quality in their company operating manuals, but these usually are not detailed and deal only with flight crew monitoring of aircraft refueling. Operator requirements should be written elsewhere in company manuals or documents, especially if the operator has its own fuel farm, fueling equipment and/or fueling trucks.

Most operators designate a ramp or facility supervisor or employee — rather than the aircraft maintenance manager — to be responsible for quality control. Many of the designees have never attended a formal fuel quality control training course; others have attended such courses only infrequently.

Many operators mistakenly believe that if fuel is obtained from a nationally recognized dealer or supplier, the dealer's reputation alone is assurance of safety. However, the operator also should be familiar with the main fuel provider's quality control program and should review the quality control records at least every year. Infrequent or one-time fuel providers would not warrant the same attention as a primary provider; nevertheless, operators still should inquire about their quality control.

Operators with their own fuel farms, facilities, equipment and/or fuel trucks require a comprehensive fueling operations manual and a full quality control program. International aviation fuel companies can provide operators with current reference material and sample outlines, inspection/check forms and standards from which a company quality control program could be developed. Alternatively, an operator can adopt another company's quality control program, if the program is current and satisfactory, or could hire a specialist to help develop a program.

In addition to the employee designated by the operator to be primarily responsible for the fuel quality control program, a second employee should have outside training and thorough knowledge of the operator's fuel quality control program. If a backup has not been designated, employee turnover, vacations, sick leave and other personnel-related events can regularly leave an operator without the primary "brains" of the quality control program.

The officers of an operator's safety program — usually pilots — should be familiar with their company's fuel quality control requirements and should check periodically for compliance with these requirements.

Charter operators have at least a collateral responsibility, along with their fuel providers, to determine whether aircraft fuel is the right type and the proper quality, and to ensure that safe conditions prevail during fueling operations. This is especially true if the operator itself provides these services. Operators must take all reasonable care in assuring that the responsibilities of fuel providers — and/or the operators themselves — are without any doubt being met satisfactorily. Anything less is not acceptable.●

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Notes

1. Two smaller databases also showed fuel contamination as the cause of a number of accidents. The Helicopter Safety Advisory Conference, in its *Gulf of Mexico Offshore Helicopter Operations and Safety Review, 2005*, said that five accidents (9 percent of the total) during the five previous years were caused by fuel quality problems. The Aircraft Owners and Pilots Association, in a safety advisory issued in 2006, said that in 2004, 18 accidents, including five fatal accidents, occurred as a result of fuel contamination.
2. Client confidentially precludes the discussion of details of these two recent accidents.
3. Grounding, also called "earthing," is the process of connecting an object that conducts electricity to the ground. Bonding is the process of connecting two or more conductive objects to each other.

InSight is a forum for expressing personal opinions about issues of importance to aviation safety and for stimulating constructive discussion, pro and con, about the expressed opinions. Send your comments to J.A. Donoghue, director of publications, Flight Safety Foundation, 601 Madison St., Suite 300, Alexandria VA 22314-1756 USA or donoghue@flightsafety.org.