

ENVIRONMENTAL REQUIREMENTS OF MAINTENANCE ORGANIZATIONS

Fred Workley
Manager Maintenance Operations
National Air Transportation Association

Aircraft Maintenance Technicians, Repair Stations and Aircraft Operators are all faced with an ever-expanding number of environmental laws and regulations. These new requirements can be expensive and require many hours of your time. Several examples in the United States are hazardous waste under RCRA (Resource Conservation and Recovery Act) and hazardous substances under CERCLA (Comprehensive Environmental Response, Compensation and Liability Act), the Safe Drinking Water Act, the Clean Water Act, and the Clean Air Act.

In 1990, the U.S. Environmental Protection Agency began implementing the many amendments to the Clean Air Act. Some of the new amendments have changed the way maintenance is performed and have increased the cost of doing business. Of the many chemicals used in the maintenance of aircraft and system components, a number of these materials and processes are critical to the quality, performance, and reliability of an aircraft over its life cycle. We must develop new ways to maintain the aging aircraft fleet in order to address environmental concerns.

The ozone protection provisions of the Clean Air Act require State Implementation Plans to place controls on the use of solvents, coatings, and paints. In 1993, these new requirements will stop the production of methyl chloroform, commonly used as a chemical degreaser, and restrict chromium processes. Several chemicals such as CFC-113 and methyl chloroform (1,1,1 trichloroethane) will be eliminated by specific deadlines mandated internationally. Development, qualification, and acceptance is well underway for alternative materials and processes that meet specific performance requirements and are cost-effective.

Solvents with a chlorinated formulas are being identified as either ozone depleters or toxic air pollutants. Until recently, Aircraft Maintenance Technicians had to rely on chlorinated hydrocarbons, petroleum naphthas, and CFC-113 to remove grease, oil, flux, and dirt. However, political pressures to eliminate these chemicals is mounting. They deplete stratospheric ozone and are restricted by the Montreal Protocol and the U.S. Clean Air Act. Also, many are suspected carcinogens posing health risks to employees.

Alternatives now on the market use citrus or terpene bases. Some alternative cleaners meet Air Force Specification MIL-C-25769-E. These include citrus-based products that act as a combined solvent and emulsifier system that does not cause corrosion; they are degreasers as well as cleaners. The products are nonflammable, non-toxic, and non-corrosive. Characteristics to look for include the following: biodegradability, water solubility, 100% fireproof, neutralizer for acids, emulsifier, rust retarder, oxidation renewer, multi-purpose concentrate, and economical.

Another option for cleaners are terpene-based cleaning agents that do the same job that chlorinated solvents (like 1,1,1-trichloroethane) and petrochemical solvents have done traditionally. These terpene-based cleaners meet the SAE ARP 1755A standard for use on all alloys. They are safe, non-toxic and biodegradable.

Ozone depletion and global warming are valid and growing concerns throughout the world. Replacement of ozone-depleting chemicals and chromium processes are just two applications that will require new alternatives. CFC-113 is currently used for cleaning printed circuit boards, for surface cleaning during aircraft assembly, and as a coolant and lubricant for many maintenance operations. Also restricted is methyl chloroform (1,1,1-trichloroethane) which is used for degreasing and as a carrier solvent for a variety of coatings and adhesives.

Another complex problem is eliminating the use of chromium and its compounds. Chromium has been used for many years in a number of surface finishing processes, coatings, and sealants due to its favorable corrosion protection characteristics. On the other hand, there is now an opportunity for new alternative coatings and paints to find a ready market.

In order to find a replacement for methylene chloride chemical stripping systems, there have been studies using dry media, dry ice and sodium bicarbonate, and flashlamps. They all have to be evaluated with these criteria: the cost of paint stripping, the labor and facility costs, and the possibility of causing fatiguing of the airframe, as well as causing additional corrosion problems.

We have to find alternatives to eliminate the safety and environmental headaches associated with chemical strip operations. The flashlamp system prevents the generation of large amounts of hazardous waste. The flashlamp is a Xenon arc lamp used directly on the coating. Depainted surfaces are ready for paint application after a simple water washing and solvent wipe. The coating will absorb light and carbonize without going through the melt phase. This is just one example of how new technology provides alternatives to using hazardous chemicals.

We, as Aircraft Maintenance Technicians, have several ways to comply with the law. We can practice waste minimization, source reduction, and recycling. *Waste minimization* means the reduction of waste generated or subsequently treated, stored, or disposed. Waste minimization includes source reduction of the quantity of hazardous waste or its toxicity while minimizing present and future threats to health and the environment.

An example of waste minimization is the substitution of cleaners for MEK, methyl ethyl ketone, which was identified as hazardous in November 1980. Do not dump these substances down the drain in the hanger. The Clean Water Amendments of 1987 mandates three classes of penalties, criminal, court-imposed, and administrative civil, that apply to certain municipal and industrial storm water discharges. The penalties are as follows:

Criminal Penalties (Penalties doubled for second conviction.)

- Negligent Violations - Person shall be punished by a fine of not less than \$2,500 nor more than \$25,000 per day of violation or by imprisonment for not more than one year, or by both.
- Knowing Violations - Person shall be punished by a fine of not less than \$5,000 nor more than \$50,000 per day of violation or by imprisonment for not more than three years, or both.

- **Knowing Endangerment Violations** - Person subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. A person which is an organization (meaning a legal entity, other than a government) shall, upon conviction, be subject to a fine of not more than \$1 million.

Court-Imposed Civil Penalties - Courts may impose civil penalties of \$25,000 per day for each violation. In determining civil penalties, the court shall consider the seriousness of the violation, economic benefit (if any) resulting from the violation, any history of such violations, any good- faith efforts, and the economic impact of the penalty on the violator.

Administrative Civil Penalties - The 1987 law gave the EPA new authority to administer administrative civil penalties (judicial review allowed) and fines may range from \$25,000 to \$125,000, depending on the type of enforcement action the EPA decides to pursue.

Source reduction is a second option. This approach means reduction of hazardous waste usually within a process. Source reduction measures involve process modifications, material substitutions, improvements in material purity, housekeeping and management practices, increases in the efficiency of machinery, and recycling within a process. Source reduction implies any action that reduces the amount of waste exiting a process.

Recycling is the use or reuse of waste as an effective substitute for a commercial product, or as an ingredient or additional material in a process. Recycling implies use, reuse, or reclamation of a waste after it has been generated. One example of a recycled material is used oil.

We all hope that we manage our resources wisely, provide for sustainable development, and improve the quality of life for all people. Reducing potentially toxic emissions into the air, water, and land is fundamental to this growing worldwide concern for our planet and its future.