Discussion

Over the past ten years, the FAA has received numerous reports of leakage of waste fluid from the lavatory service systems on in-service transport category airplanes. This leakage has resulted in the formation of ''blue ice'' on the fuselage. In some instances, the ''blue ice'' has subsequently dislodged from the fuselage and has been ingested into an engine. In several of these incidents, the ingestion of ''blue ice'' into an engine resulted in the loss of an engine fan blade, severe engine damage, and the in-flight shutdown of the engine. In two cases, the loads created by the ''blue ice'' being ingested into the engine resulted in the engine being physically torn from the airplane. Damage to an engine, or the separation of an engine from the airplane, could result in reduced controllability of the airplane.

The FAA also has received reports of at least three incidents of damage to the airframe of transport category airplanes caused by foreign objects and ''blue ice,'' resulting from leakage of the forward toilet drain valve and flush/fill line, striking the airframe. One report was of a dent on the leading edge of the right horizontal stabilizer on a Boeing Model 737 series airplane that was caused by ''blue ice'' that had formed from leakage through a flush/fill line; in this case, the flush/fill cap was missing from the line at the forward service panel. Numerous operators have stated that leakage from the flush/fill line is a significant source of problems associated with ''blue ice.'' Such damage caused by ''blue ice'' could adversely affect the integrity of the fuselage skin or surface structures.

Additionally, there have been numerous reports of ''blue ice'' dislodging from airplanes and striking houses, cars, buildings, and other occupied areas on the ground. Although there have been no reports of any person being struck by ''blue ice,'' the FAA considers that the large number of reported cases of ''blue ice'' falling from the lavatory drain system is sufficient to support the conclusion that ''blue ice'' presents an unsafe condition to people on the ground. Demographic studies have shown that population density has increased around airports, and probably will continue to increase. These are populations that are at greatest risk of injury and damage due to ''blue ice'' dislodging from an airplane during the airplane's descent into the airport. Without actions to ensure that leaks from the lavatory drain systems are detected and corrected in a timely manner, ''blue ice'' incidents could go unchecked and eventually someone may be struck, perhaps fatally, by falling ''blue ice.''

Current Rules

In response to these incidents, the FAA has issued several AD's applicable to various transport category airplanes:

1. *AD 86–05–07, Amendment 39–5250 (51 FR 7767, March 6, 1986):* Issued on February 26, 1986, this AD required periodic leak checks of all Boeing Model 727 aircraft forward lavatory drain systems (both dump valve and drain valve) at intervals not to exceed 15 months, and corrective action, if necessary.

2. *AD 94–23–10, amendment 39–9073 (59 FR 59124, November 16, 1994):* Issued on November 9, 1994, this AD supersedes AD 86–05–07. It continues to require various leak checks of Boeing Model 727 series airplanes, but adds requirements for leak checks of other lavatory drain systems; provides for the option of revising the FAA-approved maintenance program to include a schedule of leak checks; requires the installation of a cap on the flush/fill line; and requires either a periodic leak check of the flush/fill line cap or replacement of the seals on both that cap and the toilet tank anti-siphon (check) valve.

3. *AD 89–11–03, amendment 39–6223 (54 FR 21933, May 22, 1989):* Issued on May 9, 1989, this AD is applicable to certain Boeing Model 737–300 and –400 airplanes. It requires repetitive leak checks of the forward lavatory service system at intervals of 200 hours time-in-service, and repair, if necessary. That AD also provided operators with an optional action in lieu of performing these periodic checks, which entails draining the system, locking the lavatory, and placarding the lavatory inoperative.

4. The FAA is planning to amend AD 89–11–03 to make it applicable to all Boeing Model 737 series airplanes, and to require additional inspections and other actions similar to those of AD 94–23–10.

5. The FAA is currently considering additional rulemaking to address the problems associated with ''blue ice'' on various other transport category airplanes, including those manufactured by Airbus, British Aerospace, Fokker, and Lockheed, as well as other models manufactured by McDonnell Douglas.

Description of Relevant Service Information

The FAA has reviewed and approved McDonnell Douglas DC–9 Service Bulletin 38–47, dated April 17, 1992, which describes procedures for installing a lever lock rinse cap on lavatory service panels. The development of this installation was in response to reports that the quarter-turn caps, which are normally installed on the fill/rinse line at the lavatory service panel, are often removed by ground service personnel or are not properly re-installed and reseated after servicing. Installation of lever lock rinse caps in place of quarter-turn caps will inhibit the closing of the service panel doors when the cap is not properly closed; this will enable service personnel to recognize situations when the cap needs to be closed correctly. This, in turn, will minimize the possibility of leakage of lavatory waste liquids from the cap and the subsequent formation of ''blue ice.''

The FAA also has reviewed and approved McDonnell Douglas DC–9 Service Bulletin 38–41, Revision 3, dated July 5, 1994, which describes procedures for modifying and replacing the lavatory vent system piping. The development of this modification was in response to reports of ''blue ice'' build-up at the lavatory overboard vent on four Model DC–9 series airplanes. The ice build-up was attributed to lavatory waste tanks exceeding their capacity and overflowing through the overboard vent piping. This build-up of ''blue ice'' can break loose and damage either the nose cowl of engine No. 1 or the engine itself. The modified vent system piping minimizes the possibility of waste water siphoning overboard.

Description of the Proposed Rule

Since an unsafe condition has been identified that is likely to exist or develop on other products of this same type design, the FAA is proposing an AD that would require the following actions:

Paragraph (a) of the proposed AD would require repetitive leak checks of the lavatory dump valve, drain valve (either service panel or in-line drain valve), and lavatory vent system. The intervals for performing these leak checks would vary from 200 flight hours to 1,500 flight hours, depending upon what type of valve is installed at each location. The leak check of panel valves would be required to be performed with a minimum of 3 pounds per square inch differential pressure (PSID) applied across the valve. If any leak is discovered during the leak checks, operators would be required either to repair the leak and retest it, or drain the lavatory system and placard it inoperative until repairs can be made.

In cases where the panel valve has an inner seal, in lieu of pressure testing, operators are provided with the option of performing a visual inspection for damage or wear of the outer cap seal