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14 CFR Parts 25 and 121

Revised Standards for Cargo or Baggage Compartments in Transport Category Airplanes; Final Rule

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 25 and 121

[Docket No. 28937, Amdt Nos. 25–93 and 121–269]

RIN 2120–AG42

Revised Standards for Cargo or Baggage Compartments in Transport Category Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; request for comments.

SUMMARY: These amendments upgrade the fire safety standards for cargo or baggage compartments in certain transport category airplanes by eliminating Class D compartments as an option for future type certification. Compartments that can no longer be designated as Class D must meet the standards for Class C or Class E compartments, as applicable. The Class D compartments in certain transport category airplanes manufactured under existing type certificates and used in passenger service must meet the fire or smoke detection and fire suppression standards for Class C compartments by early 2001 for use in air carrier, or most other commercial service. The Class D compartments in certain transport category airplanes manufactured under existing type certificates and used only for the carriage of cargo must also meet such standards or the corresponding standards for Class E compartments by that date for such service. These improved standards are adopted to increase protection from possible in-flight fires.

The FAA also requests additional comments concerning specific issues related to transport category airplanes used by part 135 operators. Those issues are enumerated under the section entitled **REQUEST FOR COMMENTS.**

DATES: *Effective* March 19, 1998. Additional comments, as requested in the section entitled **REQUEST FOR COMMENT**, must be received on or before June 17, 1998.

ADDRESSES: Additional comments on the specific issues identified under the section entitled **REQUEST FOR COMMENTS** may be mailed in duplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC–200), Docket No. 28937, 800 Independence Avenue, SW, Washington, DC 20591, or delivered in person to Room 915G at the same address. Comments delivered must be marked: Docket 28937. Comments may also be submitted electronically to 9-nprm-cmts@faa.dot.gov. Comments may be inspected in Room 915G weekdays, except Federal holidays, between 8:30 a.m. and 5:00 p.m. In addition, the FAA is maintaining an information docket of comments in the Transport Airplane Directorate (ANM–100), Federal Aviation Administration, 1601 Lind Avenue, SW, Renton, Washington 98055–4056. Comments in the information docket may be inspected in the Transport Airplane Directorate weekdays, except Federal holidays, between 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: Gary L. Killion, Manager, Regulations Branch, ANM–114, Transport Airplane Directorate, Aircraft Certification Service, FAA, 1601 Lind Ave., SW, Renton, Washington 98055–4056; telephone (425) 227–2114.

SUPPLEMENTARY INFORMATION:

Availability of Final Rule

This document may be downloaded from the FAA regulations section of the FedWorld electronic bulletin board (telephone: 703–321–3339) or the **Federal Register's** electronic bulletin board (telephone: 202–512–1661). Internet users may access the FAA's web page at http://www.faa.gov or the **Federal Register's** web page at http://www.access.gpo.gov/su_docs to download recently published rulemaking documents.

Any person may obtain a copy of this final rule by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue, SW., Washington, DC 20591, or by calling (202) 267–9680. Communications must reference the amendment number or docket number of this final rule.

Persons interested in being placed on the mailing list for future Notices of Proposed Rulemaking and Final Rules should request a copy of Advisory Circular (AC) No. 11–2A, Notice of Proposed Rulemaking Distribution System, which describes the application procedure.

Small Entity Inquiries

The Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) requires the FAA to report inquiries from small entities concerning information on, and advice about, compliance with statutes and regulations within the FAA's jurisdiction, including interpretation and application of the law to specific sets of facts supplied by a small entity.

The FAA's definitions of small entities may be accessed through the FAA's web page htt//www/faa.gov/avr/arm/sbrefa.htm, by contacting a local FAA official, or by contacting the FAA's Small Entity Contact listed below.

If you are a small entity and have a question, contact your local FAA official. If you do not know how to contact your local FAA official, you may contact Charlene Brown, Program Analyst Staff, Office of Rulemaking, ARM–27, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591, 1–888–551–1594. Internet users can find additional information on SBREFA in the "Quick Jump" section of the FAA's web page at http://www.faa.gov and may send electronic inquiries to the following Internet address: 9–AWA–SBREFA@faa.dot.gov.

Background

These amendments are based on Notice of Proposed Rulemaking No. 97–10 (62 FR 32412, June 13, 1997). As discussed in Notice 97–10, there have been a number of fires in the cargo or baggage compartments of transport category airplanes in recent years, some of which have resulted in accidents and loss of life. Although the FAA had already taken action to improve the safety of these compartments by improving the fire-resistance of liners, the continuing occurrence of fires and the seriousness of the consequences of an uncontrolled fire resulted in a review of the entire cargo compartment classification system.

During the early post-World War II period, it was recognized that timely detection of a fire by a crewmember of the airplane while at his or her station and prompt control of the fire when detected were necessary for protection of the airplane from a fire originating in a cargo or baggage compartment. Because the requirements for detection and extinguishment varied depending on the type and location of the compartment, a classification system was established. Three classes of cargo or baggage compartments were initially established and defined in 1946 (Amendment 04–1 to part 04 of the Civil Air Regulations (CAR) effective November 1, 1946) as follows:

Class A

A compartment in which the presence of a fire would be easily discovered by a crewmember while at his or her station, and of which all parts are easily accessible in flight. This is typically a small compartment used for crew luggage, and located in the cockpit where a fire would be readily detected and extinguished by a crewmember. Due to the small size and location of the

compartment, and the relatively brief time needed to detect and extinguish a fire, a liner is not required to prevent the fire from spreading to other parts of the airplane or protect adjacent structure.

Class B

A compartment with a separate, approved smoke or fire detection system to give warning at the pilot or flight engineer station and with sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with a hand fire extinguisher. Smoke or fire detection systems must provide indication of a fire to the flightcrew. Because it has a smoke or fire detection system, a Class B compartment may be located in an area remote from any crewmember's station. Due to the potentially larger size of the compartment and the greater time interval likely to occur before a fire would be extinguished, a liner meeting the flame penetration standards of § 25.855 and Part I of Appendix F of part 25 must be provided to prevent the fire from spreading to other areas of the airplane and to protect adjacent structure. Although Class B compartments are typically the large cargo portions of the cabins of airplanes carrying a combination of passengers and cargo (frequently referred to as "combi" airplanes), there are also Class B compartments that are relatively small baggage compartments located within the pressurized portions of airplanes designed for executive transportation.

Class C

As defined at the time of initial classification in 1946, any compartment that did not fall into either Class A or B was a Class C compartment. Class C compartments differ from Class B compartments primarily in that built-in extinguishing systems are required for control of fires in lieu of crewmember accessibility. As with Class B compartments, smoke or fire detection systems must be provided. Due to the use of a built-in extinguishing system and closer control of ventilating airflow, the distribution of extinguishing agent in a Class C compartment is considerably more uniform than in a Class B compartment. The volumes of Class C compartments in transport category airplanes currently used in domestic service range from approximately 700 to 3,000 cubic feet.

Later, two additional classes of cargo or baggage compartments were established and defined as follows:

Class D

A compartment in which a fire would be completely contained without endangering the safety of the airplane or the occupants (Amendment 4b–6 to part 4b of the CAR effective March 5, 1952). A Class D compartment is similar to a Class C compartment in that both may be located in areas that are not readily accessible to a crewmember. As originally defined in 1952, Class D compartments were required to have smoke or fire detection systems; however, that requirement was deleted shortly thereafter. In lieu of providing smoke or fire detection and extinguishment, Class D compartments are designed to control a fire by severely restricting the supply of available oxygen. Because an oxygen-deprived fire might continue to smolder for the duration of a flight, the capability of the liner to resist flame penetration is especially important. A note following the definition of a Class D compartment stated, "For compartments having a volume not in excess of 500 cubic feet, an airflow of not more than 1,500 cubic feet per hour is considered acceptable. For larger compartments, lesser airflow may be applicable." That note was interpreted to mean that a Class D compartment could not exceed 2,000 cubic feet in volume even if the leakage of air into the compartment was zero. The standards for Class D compartments were later amended (Amendment 25–60, 51 FR 18236, May 16, 1986) to specifically limit the volume of those compartments to 1,000 cubic feet; however, some previously-approved airplanes in air carrier service have Class D compartments as large as 1,630 cubic feet. Other airplanes designed for executive transportation, and also used in on-demand service, have relatively small Class D compartments located outside the pressurized portions of the cabin.

Class E

A cargo compartment of an airplane used only for the carriage of cargo (Amendment 4b–10 to part 4b of the CAR, adopted in 1959). A smoke or fire detection system is required. In lieu of providing extinguishment, means must be provided to shut off the flow of ventilating air to or within a Class E compartment. In addition, procedures, such as depressurizing a pressurized airplane, are stipulated to minimize the amount of oxygen available in the event a fire occurs in a Class E compartment. Typically, a Class E compartment is the entire cabin of an all-cargo airplane; however, Class E compartments may be located in other portions of the airplane. This, of course, does not preclude the installation of compartments of other classes in all-cargo airplanes.

Prior to the adoption of § 25.858 in 1980, fire or smoke detection systems that provided indication within five minutes were considered acceptable. In order to ensure that a fire would be detected in time to permit effective use of the means provided to control it, § 25.858 was adopted at that time (Amendment 25–54, 45 FR 60173, September 11, 1980) to require the detection systems of Class B, C and E compartments to provide visual indication to the flightcrew within one minute of the start of the fire.

It should be noted that the overhead storage areas and certain other areas in the cabins of passenger-carrying airplanes are considered "stowage" compartments rather than cargo or baggage compartments. They are therefore not required to meet these standards.

Although the standards for Class A, B, C, or D compartments make no distinction between compartments used for the carriage of passengers' baggage and those used for cargo, most of the industry experience at the time they were classified was limited to the carriage of passengers' baggage. Furthermore, compartments seldom, if ever, exceeded 200 cubic feet in volume at that time.

When first defined, Class D compartments were envisioned to be small compartments, although not as small as Class A compartments, and were to suppress a fire by severely restricting the amount of available oxygen. Later, however, larger Class D compartments were installed in transport category airplanes, increasing both the amount of potentially combustible material and the available oxygen. Although there is little or no flow of air into a Class D compartment at the time a fire occurs, there is oxygen available from the air already contained in the compartment. In some instances, particularly when the compartment is larger or only partially filled, the oxygen already present in the compartment may be sufficient to support an intense fire long enough for it to penetrate the liner. Once the integrity of the liner is compromised, there is an unlimited flow of air into the compartment, resulting in an uncontrollable fire that can quickly spread throughout the rest of the airplane.

An uncontrollable fire of this nature did occur in 1980 when a Saudi Arabian Airlines Lockheed L–1011 was destroyed shortly after landing. The fire, which resulted in a loss of 301 lives, was reported to have started in a Class

D compartment. (The compartment in that airplane is sometimes described erroneously as a Class C compartment because it has smoke detection. During normal operation, the compartment has ventilating airflow greater than that generally acceptable for a Class D compartment in order to facilitate the carriage of live animals. When a fire is detected, the ventilating airflow is shut off to restrict the supply of oxygen. That compartment, therefore, functioned as a Class D compartment insofar as that fire is concerned.)

The growing concern over this and other reports of cargo or baggage compartment fires led to the adoption of Amendment 25–60. In addition to establishing a maximum volume of 1,000 cubic feet for Class D compartments, Amendment 25–60 also established new standards for liners with greater resistance to flame penetration for use in Class C and D compartments. That amendment applies to transport category airplanes for which an application for type certificate is made on or after June 16, 1985. Similar, but not identical, standards were also established for the liners of other transport category airplanes operated under the provisions of parts 121 or 135 (Amendments 121–202 and 135–31, 54 FR 7384, February 17, 1989). Operators of those airplanes were required to install liners that meet the new standards by March 20, 1991. Unlike Amendment 25–60, Amendments 121–202 and 135–31 do not establish a maximum volume for Class D compartments. Also Amendment 25–60 applies to all Class C or D compartments regardless of size, while Amendments 121–202 and 135–31 apply only to compartments greater than 200 cubic feet. The safety benefits that could be gained at that time by replacing existing liners in compartments smaller than 200 cubic feet were not considered sufficient to justify the cost of doing so. As discussed in greater detail below, the subsequent introduction of consumer aerosol cans with highly flammable propellants has introduced a hazard that did not exist at that time.

A Boeing 737 operated by Gulf Air was destroyed in September 1983 as a result of an inflight fire in a Class D compartment. The fire, which resulted in 112 casualties, was attributed to an incendiary device.

In February 1988, a fire occurred in the Class D compartment of an American Airlines McDonnell Douglas MD–83. Although there was no loss of life, the fire severely damaged the cabin floor above the compartment. As a result, the FAA initiated a review of service experience and existing regulations, policies and procedures pertaining to the certification of airplanes with Class D compartments. From this review, it was determined that a dozen fires had occurred in Class D Compartments over the past two decades. The consequences of those fires ranged from no airplane damage and no occupant injury to complete destruction of the Saudi Arabian Airlines Lockheed L–1011, as discussed above.

Since the time the review of Class D compartments was completed there have also been seven additional known instances of fires occurring in those compartments. Most resulted in no injuries and little or no damage to the airplane. The exception, insofar as injuries and damage are concerned, was the fire that occurred in May of 1996 in the Class D compartment of a McDonnell Douglas DC–9 operated by Valujet Airlines. Like the American Airlines MD–83 fire noted above, that fire involved the carriage of undeclared hazardous materials; however, unlike the MD–83 fire, it resulted in the destruction of the airplane with a loss of 110 lives. It must be noted that this undeclared shipment occurred in spite of existing prohibitions concerning such shipments.

In the meantime, an additional potential hazard in the cargo or baggage compartments of passenger-carrying airplanes has been brought to light. Due to environmental concerns, the aerosol cans now manufactured for consumer use utilize a mixture of propane, butane and isobutane for propellants in lieu of the non-flammable gases previously used. Passengers are not prohibited from transporting such aerosol cans by the applicable hazardous materials rules, and they have become so widely used by the general public that a high percentage of the pieces of checked baggage contain at least one aerosol can. Tests conducted by the FAA Technical Center show that they can burst if they are in a burning suitcase. The tests further show that if the burst occurs in a non-inert atmosphere, such as that of a Class D compartment, there is immediate auto-ignition of the propellant. The accompanying explosion is of such force and intensity that the liner could be rendered ineffective in limiting the supply of oxygen to the fire. Because the liner would be damaged by the explosion rather than by flame penetration, the use of a liner meeting the newer standards of Amendment 25–60 would not provide protection from this hazard. With an unlimited supply of oxygen and the integrity of the liner compromised, there is no longer any effective means to prevent an uncontrollable fire from spreading to other parts of the airplane. If, on the other hand, the burst occurs in an inert atmosphere, such as that of a Class C compartment in which the extinguishing agent has been discharged, the propellant does not ignite and poses no further hazard. (As noted above, smoke or fire detectors are required to provide indication to the flightcrew within one minute after the start of a fire, allowing sufficient time in which to inert the compartment before aerosol cans would burst.) The results of these tests are contained in Report No. DOT/FAA/CT–89/32 entitled "Fire Hazards of Aerosol Cans in Aircraft Cargo Compartments." A copy of that report was placed in the docket for examination by interested persons.

In at least one instance, a cargo or baggage compartment fire resulted in the plastic cap being melted from an aerosol can. Fortuitously, however, none of the fires experienced since the time aerosol cans with flammable propellants were introduced were of such intensity or proximity to result in an aerosol can being ruptured.

It must be noted that the probability that an ignition will occur is primarily a function of the flammability of the material being carried in the compartment and the sources of ignition; however, the consequences of a fire, once ignition has occurred, depend greatly on the fire-protection features of the compartment in which it occurs. The FAA is aware of at least four fires that have occurred in Class C compartments during the past decade—a rate of occurrence somewhat commensurate with that of fires occurring in Class D compartments. (Three of those fires involved U.S. air carriers.) In marked contrast to the fatalities that have occurred as a result of fires originating in Class D compartments, the FAA is not aware of any fatality that has occurred as a result of a fire originating in a Class C compartment.

Discussion

As noted above, some Class D compartments are much larger than envisioned at the time they were originally defined. As a result, they typically contain considerably more combustible material than anticipated. Although there is little or no airflow into a Class D compartment at the time a fire occurs, there is oxygen available from the air already contained in the compartment. In some instances, particularly in the larger compartments or those that are only partially filled, this quantity of oxygen may be sufficient to support an intense fire long

enough for it to burn through the liner. If the integrity of the liner is compromised, there is an unlimited flow of oxygen into the compartment. With the liner no longer intact and an unlimited flow of oxygen supporting the fire, there is no means to prevent it from spreading rapidly throughout the airplane. Due to the widespread use of aerosol cans with highly flammable propellants, there is now a possibility that an explosion will destroy the liner integrity. A fire originating in a Class D compartment could, therefore, become uncontrollable very quickly. In view of these possibly catastrophic results, the FAA proposed in Notice 97–10 to amend past 25 to eliminate Class D compartments altogether. Compartments in passenger-carrying airplanes that could no longer be approved as Class D compartments would have to meet the standards of Class C compartments.

Due to uncertainties concerning the availability of suitable suppression agents, as discussed in greater detail under Halon Considerations below, the FAA also considered the possibility of requiring only the installation of detection systems. Having a detection system would enable the flightcrew to abort a takeoff if an ignition occurred during the brief period before the airplane became airborne. If, on the other hand, the fire occurred after the airplane became airborne, which is more likely, the fire could burn out of control before a safe landing could be made. (This, of course, refers to compartments other than Class E. As discussed below, Class E compartments are required to have means other than extinguishing systems to control any fire that may occur.) In that regard, it should be noted that 301 lives were lost in the Saudi Arabian Lockheed L–1011 fire described above even though the compartment did, in fact, have a detection system. Since the installation of detection systems alone would provide only a small incremental increase in safety, it is essential that both detection and suppression systems be provided for these compartments.

As discussed above, Class E compartments may be installed in airplanes used only for the carriage of cargo. As in the case of a Class C compartment, a smoke or fire detection system is required for a Class E compartment. In lieu of providing an extinguishing system, as required for a Class C compartment, means must be provided to shut off the flow of ventilating air to or within a Class E compartment. In addition, procedures, such as depressurizing the airplane, are stipulated to further minimize the amount of oxygen available in the event a fire occurs in a Class E compartments could be shown to meet the standards of Class E compartments in lieu of those for Class C compartments. The installation of smoke r fire detection systems and the means provided to minimize the amount of oxygen in Class E compartments would provide an improvement in safety for compartments presently designated as Class D and installed in all-cargo airplanes. The benefit from that improvement in the safety of operation of all-cargo airplanes would be commensurate with the cost of converting Class D compartments to Class E compartments.

Part 25 contains an inconsistency between the terminology used in § 25.857 and that of § 25.858. The former refers to a "smoke detector or fire detector system" for Class B, C or E compartments while the latter refers to compartments with "fire detection provisions." Smoke detectors are, of course, a form of fire detectors since the purpose of installing a smoke detection system is to detect a fire. Nevertheless, the use of different terminology in the two sections may cause confusion. For consistency with § 25.857, the FAA proposed that § 25.858 would be amended to refer to "smoke or fire detection provisions." That would place no additional burden on any person since the intent of § 25.858 would remain unchanged.

It was also noted that the term "fire extinguishing system" appearing in § 25.857(c) in regard to Class C compartments is actually a misnomer in that the system is not required to extinguish a fire in its entirety, but rather to suppress it until it can be completely extinguished by ground personnel following a safe landing. Although the intent of the term is well-understood, consideration was given to replacing it with "fire suppression system" for technical accuracy. While the latter would be more accurate, it appeared that changing the terminology at this time could actually create confusion and, therefore, be counterproductive. The FAA, therefore, did not propose any change to § 25.857(c) in that regard.

Although the amendment to part 25 proposed in Notice 97–10 would provide new standards for future transport category airplanes, it would not affect airplanes currently in service nor the airplanes that will be produced under type certificates for which application was made prior to the effective date of the amendment. The FAA, therefore, proposed that parts 121 and 135 would be amended as well to require the Class D compartments of transport category airplanes type-certificated after January 1, 1958, to meet the standards for Class C or Class E compartments, as applicable, when they are used in air carrier or commercial operations. Although those compartments need not be reidentified as such, they would become the equivalent of Class C (in regard to detection and suppression) or Class E compartments (in regard to detection and means to limit ventilating air flow).

The date January 1, 1958, was chosen so that all turbine-powered transport category airplanes, except for a few 1947 vintage Grumman Mallard amphibians and 1953–1958 vintage Convair 340s and 440s converted from reciprocating power, would be included. No reciprocating-powered transport category airplanes are known to be used currently in passenger service, and the few remaining in cargo service would be excluded. Compliance was not proposed for those older airplanes because their advanced age and small numbers would make compliance impractical from an economic standpoint. This is consistent with similar exclusions made for those airplanes from other retroactive requirements adopted for flammability of seat cushions (49 FR 43188, October 24, 1984), flammability of cabin interior components (51 FR 26206, July 21, 1986), cargo or baggage compartments liners (54 FR 7384, February 17, 1989) and access to passenger emergency exits (57 FR 19244, May 4, 1992). Nevertheless, the FAA specifically requested comments as to the feasibility of requiring those older airplanes to comply and the safety benefits likely to be realized. The FAA noted that it retained the option of including applicability in the final rule to transport category airplanes type-certificated prior to January 1, 1958, in the event comments indicate that a significant safety benefit could be realized.

As proposed in Notice 97–10, the changes to parts 121 and 135 concerning Class D compartments would require compliance within three years after the effective date of the amendment. It was noted that Class D compartment in passenger-carrying airplanes would be required to comply with existing standards for Class C compartments. Since the rulemaking would not involve any new technology and installation components are readily available, compliance within three years was considered feasible. A three-year compliance period would also allow sufficient time for the necessary modifications to be performed while each airplane is out of service for scheduled maintenance activity.

As noted above, the compartments in all-cargo airplanes could be shown to meet the standards of Class E compartments in lieu of those for Class C compartments. The proposed three-year compliance period was also considered appropriate for operators that elect to meet the standards for Class E compartments. As in the case of Class C compartment standards, the standards for Class E compartments do not involve any new technology and installation components are readily available.

Although the FAA considered that a three-year compliance period would not impose an unreasonable burden on any operator, based on available information, the FAA specifically requested comments as to whether a longer compliance period would be needed for particular operators (for example, small carriers) due to their particular circumstances. The FAA noted that it would retain the option of adopting a longer compliance period in the final rule based on such comments.

The FAA also noted that it intends to monitor operators' compliance. Such monitoring would serve two purposes. First, it would help to ensure that the carriers are converting affected compartments on a regular basis, so as to avoid disruptions in service, and to avoid requests for extensions near the end of the compliance period. Second, the FAA could inform the public of the operators' progress in achieving compliance. The FAA, therefore, proposed specific reporting requirements for affected operators under parts 121 and 135. As proposed, a new paragraph would be added to §§ 121.314 and 135.169 to require each certificate holder to report, on a quarterly basis, the serial numbers of the airplanes in that holder's fleet in which all Class D compartments have been retrofitted to meet Class C or E requirements, and the serial numbers of airplanes that have Class D compartments yet to be retrofitted.

The FAA intends to make the reported information publicly available, thus allowing the public to monitor the carriers' compliance progress. As required by the Paperwork Reduction Act, the Office of Management and Budget (OMB) has granted approval for the proposed reporting requirements. The assigned information collection control number, 2120–0614 will be listed in part 11, subpart F, of Title 14. This OMB approval expires August 31, 2000.

The FAA also requested comments on what effects, if any, mandatory public disclosure requirements would have on the behavior of operators and others, given that the FAA intends to collect and make the information publicly available. For example would disclosure of the reported information result in compliance with retrofit requirements sooner than would otherwise be the case? If so, what effect would this have on the total amount and timing of benefits and costs of the rule? Also, what would be the best way to collect and make the information available, in order to enhance its usefulness to the public?

As noted above, the new standards adopted in parts 121 and 135 for liners in Class C and D compartments are similar, but not identical, to those adopted for part 25. Section 25.855(c), as amended by Amendment 25–60, states that ceiling and sidewall liner panels in such compartments must meet the test requirements of Part III of Appendix F of part 25. At the time the corresponding standards of parts 121 and 135 were adopted, it was found that panels of glass fiber reinforced resin consistently meet or come very close to meeting the test requirements of Part III of Appendix F. As a result, the cost of replacing them with panels meeting Part III of Appendix F would not have been commensurate with the negligible improvement in safety that could be realized. Section 121.314(a) therefore permits the ceiling and sidewall panels to be constructed of materials that meet the test requirements of Part III of Appendix F or, alternatively, of glass fiber reinforced resin. Similarly, it was also found that panels of aluminum construction came close to meeting the test requirements of Part III of Appendix F, although not as close as those constructed of glass fiber reinforced resin. Section 121.314(a) therefore permits continued use of ceiling and sidewall panels constructed of aluminum provided they were approved prior to March 20, 1989. Since the FAA did not propose any change in this regard, Class D compartments that are reconfigured to the equivalent of Class C compartments could continue to utilize glass fiber reinforced resin panels or, if they were approved prior to March 20, 1989, aluminum panels in lieu of those meeting the test requirements of Part III of Appendix F.

Due to the recent adoption of part 119 and related amendments to part 121 (60 FR 65832, December 29, 1995), scheduled operations of propeller-driven transport category airplanes with ten to thirty passenger seats and all turbojet-powered airplanes, regardless of their seating capacity, must be conducted under the provisions of part 121 rather than part 135. Nevertheless, changes to part 135 were proposed because non-scheduled operations of transport category airplanes with ten or thirty passenger seats may still be conducted under part 135. Scheduled, as well as non-scheduled, operations of propeller-driven airplanes with fewer than ten passenger seats may also remain under part 135; however, none of these are transport category.

Halon Considerations

As proposed in Notice 97–10, most Class D compartments would, in essence, become Class C compartments. Operators of all-cargo airplanes would have the option of converting their Class D compartments to Class E compartments; however, operators of passenger airplanes would have to convert their Class D compartments to meet the requirements of Class C. Although they were not previously required to have any means of fire extinguishment, the Class D compartments in passenger airplanes would have to have approved built-in fire extinguishing (or suppression) systems installed as required by § 25.857(c)(2). Currently the most effective and most commonly used suppression agent is a halogenated hydrocarbon known as halon.

Although reserve supplies of halon are currently available, the manufacture of additional halon is restricted under the Montreal Protocol, an international agreement to phase out production of ozone-depleting substances, including halon. The Montreal Protocol, in existence since 1987, prohibits the manufacture or import of new halon in all developed countries (including the United States) as of January 1, 1994, and will extend this prohibition to developing countries in the future. At this time, there is no restriction on the use of existing supplies of halon manufactured prior to 1994.

Prior to the issuance of Notice 97–10, some operators expressed concern that they would be required to install suppression systems which would, as a matter of practicality, utilize halon, then be required by the FAA or another government agency to replace those suppression systems with systems that do not utilize halon. The FAA would not do so for two reasons. First, halon has been shown to be an effective suppression agent. The FAA would, therefore, not require its replacement due to safety considerations. Second, the FAA would not require its replacement due to environmental considerations because the FAA lacks the statutory authority to do so in any event. The federal agency that would have that authority is the Environmental Protection Agency (EPA).

The EPA is responsible for the regulation of halons in accordance with the Montreal Protocol and the requirements and authority of Sections 602 and 604 of Title VI of the Clean Air Act. The EPA has advised in its letter of May 8, 1997, that it does not intend to ban the use of halon in installed fire suppression systems for the life of the airplanes, that it can support the use of stockpiled halons to retrofit aircraft cargo holds, and that it can support these policies in international negotiations related to aircraft or environmental matters. A copy of this letter was placed in the docket for examination by interested persons. Nevertheless, the EPA support for this rulemaking program is conditional on airline and aircraft industry support of on-going efforts to develop suitable alternatives for use in future aircraft, and on FAA's accelerated efforts to develop criteria for certification of alternatives, as described more fully below.

In this regard, the FAA has participated in an extensive program to develop criteria on which to evaluate possible alternatives. Although initially proposed by the FAA, this is an international program with active participation by the aviation industry and the regulatory authorities in Europe and Canada. It must be emphasized that the work of this group, which is known as the International Halon Replacement Working Group, is to participate in the research and development of alternative agents and systems—not to select specific agents to replace halons. The FAA has accelerated development of criteria for certification of alternatives and is committed to expeditious review and certification of alternatives as they are developed.

The objective of this program is to develop certification criteria for approval of alternative agents and systems. Such alternatives must, of course, have satisfactory environmental characteristics, such as reduced ozone depletion potential, global warming potential and atmospheric lifetime. In order to maintain the excellent record of in-flight fire safety that exists today, new agents and systems must provide extinguishing and suppression performance equal to or better than the halons. In this regard, the development of minimum performance standards for alternative agents and systems in cargo or baggage compartments has focused on four critical threats—cargo container fires, bulk-loaded luggage fires, surface-burning fires and fires in luggage containing aerosol cans.

In addition to performing their intended function of suppressing or extinguishing fires and having satisfactory environmental characteristics, alternative agents and systems used in airplanes must have certain other characteristics that may not be significant for non-aircraft usage. They, of course, must not present a health hazard during normal operations to persons working within the compartments or animals being shipped in the compartments. Due to the proximity of the occupants of airplanes to the cargo or baggage compartments, the cumulative toxicology effect of the agents, their pyrolytic breakdown products and the by-products of combustion must not pose an unacceptable health hazard if a fire does occur. They must be non-corrosive and otherwise compatible with aircraft materials. Discharge of the agent must leave a minimum of residue that can be safely cleaned up. Finally, such alternative agents and systems must be relatively low in weight for economical use in airplanes.

One very promising alternative is the use of a waterspray system. The FAA has conducted a very comprehensive program to develop cabin waterspray systems as a means of affording occupants more time to escape a post-crash cabin fire. Although a waterspray system serving only the cabin has not been found to be cost-effective, it appears that benefits of a waterspray system that could also serve as the extinguishing agent in a cargo or baggage compartment fire may outweigh the costs of the system.

Since the future availability of halon is uncertain, the FAA specifically invited comments concerning the following:

1. The cost, feasibility and availability of halon for use as the suppression agent in former Class D compartments that would be reconfigured to meet the requirements of Class C as a result of this proposed rulemaking;

2. The cost, feasibility and availability of waterspray systems that could provide protection from fires occurring in cargo or baggage compartments as well as in the cabin, and;

3. The cost, feasibility and availability of other possible alternative agents.

Discussion of Comments

More than 100 commenters responded to the invitation extended in Notice 97–10. The commenters included individuals, operators and manufacturers of affected airplanes, foreign airworthiness authorities, labor organizations, organizations representing aircraft manufacturers and operators, and the National Transportation Safety Board (NTSB).

The NTSB strongly supports the proposal to convert Class D compartments to Class C in passenger airplanes and to convert Class D compartments to Class E compartments in all-cargo airplanes and believes that the FAA should expedite final rulemaking in that regard.

Transport Canada also concurs with and fully supports the proposed rulemaking. The Civil Aviation Authority (CAA) of Great Britain fully supports the proposed rulemaking and proposes that parallel action be taken for equivalent airplanes registered in Joint Aviation Authorities (JAA) member countries. Although none are mentioned specifically, the CAA comment suggests that its data base may include relevant occurrences in addition to those mentioned in the preamble to Notice 97–10.

The National Association of Fire Marshals supports increased fire detection and suppression aboard airplanes and concurs with the FAA's assessment that detection alone does little to increase passenger safety when the airplane is airborne. The commenter opposes the introduction of halon suppression systems in airplanes, and recommends that the next 18 months be used to dramatically accelerate the process of approving halon alternatives. While the FAA fully supports the development of halon alternatives, that process is already being pursued as expeditiously as possible.

The FAA noted in the preamble to Notice 97–10 that one promising alternative to halon is the use of a waterspray system. Several commenters express strong support for the further development of waterspray systems, while others adamantly oppose even mentioning it. As suggested by the latter, further research is needed before it can be verified that waterspray systems are indeed viable means of suppressing cargo compartment fires. Also, their cost effectiveness has not been fully established. Nevertheless, waterspray systems are promising. Consistent with their promising—but not yet proven—status, the final rule neither requires nor prohibits the use of waterspray systems as a means of compliance.

One commenter submitted a videotape of testing conducted by a manufacturer of a combined halon and dry powder extinguishing agent. While interesting, the videotape promotes the manufacturer's product for home, stable and office use and did not directly address aircraft requirements. It, therefore, is not directly relevant to Notice 97–10.

The FAA also invited comments concerning the cost, feasibility and availability of halon or possible alternative agents. Except for the comments noted above concerning waterspray systems, none of the commenters provided any specific information in those regards.

Environment Australia expresses an understanding that the rulemaking proposed in Notice 97–10 would require the installation of halon 1301 suppression systems and draws the FAA's attention to four specific issues: the impact of increased emissions of halon 1301 from the installation of additional halon systems, the need to investigate and evaluate alternative agents for protection of unoccupied baggage compartments, potential problems in obtaining a supply of halon 1301, and possible ramifications of inconsistent national approaches. The commenter makes no specific recommendation concerning any of the above issues.

Contrary to the commenter's understanding, the current standards for Class C compartments, which would be applicable to compartments presently classed as D compartments, are written in an objective sense, without specifying the means of obtaining the objective, so that suitable replacement agents could be used in lieu of halon. Nevertheless, each issue raised by the commenter was carefully considered in the preparation of Notice 97–10 and discussed in the preamble to that document.

As discussed in the preamble to Notice 97–10, the Environmental Protection Agency (EPA) advised in its letter of May 8, 1997, that it does not intend to ban the use of halon in installed fire suppression systems for the life of the airplanes, that it can support the use of stockpiled halons to retrofit cargo compartments, and that it can support these policies in international negotiations related to aircraft or environmental matters. One commenter requested that EPA's commitment in this regard be incorporated in the final rule. The final rule is consistent with the EPA's commitment; however, it would be inappropriate and of doubtful legal effect for the FAA to commit another regulatory agency to any course of regulatory action in FAA rulemaking.

One commenter recommends that the final rule be harmonized with the corresponding regulations of the European Joint Airworthiness Authorities (JAA). The JAA is an organization whose membership consists of the airworthiness authorities of various European countries. In order to standardize and greatly simplify type certification of aircraft, JAA has adopted a common code for type certification of transport category airplanes known as Joint Aviation Requirements-25 (JAR–25). JAR-25 is patterned on, and is generally similar to, 14 CFR part 25. The JAA has also adopted other codes corresponding to other parts of the FAR. Although the JAA and FAA counterparts are generally similar, there are differences in certain areas. (The JAR-25 provisions relating to Class C, D and E compartments are the same as the part 25 provisions as they existed prior to this amendment.) The FAA and the European airworthiness authorities are working together to minimize those differences to the greatest extent possible. This includes adopting new standards that are common to both FAA and JAA codes as well as harmonizing existing differences. In this particular instance, however, the FAA considered that the importance of obtaining the safety benefits of this rule outweighed the general policy in favor of harmonization. Nevertheless, as noted above, both the Civil Aviation Authority (CAA) of Great Britain, a prominent member of the JAA, and Transport Canada fully support the rulemaking proposed in Notice 97–10 and suggest that they may pursue similar changes to their respective airworthiness codes.

In a somewhat similar vein, one commenter notes that the proposed rulemaking would apply only to part 121 and 135 operators and requests that FAA make the proposed rules equally applicable to foreign as well as domestic operators. While the FAA appreciates the competitive considerations involved, any requirement for foreign airlines to meet these standards would be dealt with more appropriately by the airworthiness authorities of their country of registry. In any event, the imposition of such requirements on foreign airlines would be beyond the scope of Notice 97–10.

The Regional Airline Association (RAA) concurs with the proposed requirement for retroactive installation of fire or smoke detection systems, but believes that extinguishing (or suppression) systems should be required only in compartments with volumes greater than 325 cubic feet. In support of that position, the RAA expresses an assumption that, in referring to "ATA (Air Transport Association of America) airplanes" and "non-ATA airplanes," the FAA is making a distinction between the larger transport category airplanes that ATA members typically operate and the small transport-category airplanes that RAA members typically operate. As discussed in Notice 97–10, ATA members agreed to install detection and suppression equipment voluntarily. The reference to non-ATA airplanes simply identifies those airplanes which are not subject to the ATA agreement. It is not related to the size of the airplane involved.

In support of its belief that suppression systems are not needed, RAA makes the erroneous assertion that most fires have occurred during takeoff when certain articles in a cargo or baggage compartment have become dislodged. Contrary to the RAA's assertion, most of the fires or cargo or baggage compartments occurred after the airplane became airborne.

The RAA also questions why the cost-benefit analysis would include Class C compartment fires when the proposed rule affects only Class D compartment fires. As noted in the preamble to Notice 97–10, the consequences of a fire depend greatly on the fire-protection features of the compartment in which it occurs. The probability that an ignition will occur, however, is primarily a function of the flammability of the material being carried in the compartment and the sources of ignition. Service experience with Class C compartments is, therefore, equally relevant insofar as the probability that a fire will occur is concerned. The RAA is correct in noting that the adverse experience with Class D compartments to date has been with larger compartments; however, the recent substitution of highly flammable propellants in consumer aerosol cans has introduced a new hazard that did not exist previously.

The RAA believes that the tests conducted by the FAA with aerosol cans were not representative of conditions that could be encountered in a small Class D compartment. In that regard the RAA does not believe that a fire of sufficient intensity to cause an aerosol can to explode could occur in smaller Class D compartments. Contrary to the RAA's understanding of the mechanism of the explosion, the fire only has to be of sufficient intensity to cause the aerosol can to burst from over pressure. When an aerosol can bursts in a non-inert atmosphere, such as that in a Class D compartment, it is likely to explode.

The RAA also believes that it is unrealistic to imagine that the resulting explosion could rupture not only the compartment liner, but also the surrounding aircraft structure. As discussed in Notice 97–10, tests have shown that an explosion of an aerosol can is of such force and intensity that the liner could be rendered ineffective in limiting the supply of oxygen to the fire. With an unlimited supply of

oxygen and the integrity of the liner compromised, there is no longer an effective means to prevent an uncontrollable fire from spreading to other parts of the airplane regardless of whether the surrounding structure of the airplane is ruptured. Notice 97–10 was intended to address this risk of uncontrollable fire rather than problems resulting from damage to surrounding structure. Regarding such damage, however, the FAA did conduct additional testing subsequent to the issuance of the notice, using a simulated aerosol can and a portion of the fuselage of a Boeing Model 727. The explosion experience in that test was of sufficient force to rupture not only the liner, but the end of the compartment and the cabin floor structure above the compartment as well. The structure of airplanes used by regional airlines would be no more resistant to such damage than 727 structure. A copy of Technical Note No. AR–TN97/103, entitled "Development of an Exploding Aerosol Can Simulator," describing that test and a videotape of the test have been added to the docket for this final rule.

The RAA notes that the FAA requires the retroactive installation of improved cargo compartment liners (Amendments 121–202 and 135–31, 54 FR 7384, February 17, 1989) only on Class C and D compartments larger than 200 cubic feet and believes that is inconsistent with the proposed requirement to install detection and suppression in all Class D compartments regardless of size. As discussed earlier, part 25 was amended to require all new installations of Class C or Class D compartments to meet the new liner standards regardless of size. Parts 121 and 135, on the other hand, require only compartments greater than 200 cubic feet to have liners that meet the new liner standards.

As discussed in Notice 97–10, the primary purpose of the liners is to withstand penetration by flames and thereby prevent the fire from spreading from the cargo or baggage compartment to other parts of the airplane. Retroactive compliance with the newer liner standards of Amendments 121–202 and 135–31 is not required for smaller compartments because the safety benefits that could be realized were not considered sufficient to justify the costs of replacing their liners. This conclusion was based on the fact that the effect of the newer liner standards was to provide an incremental increase in the ability of cargo compartments to contain fires. Because compartments smaller than 200 cubic feet contain relatively less oxygen to sustain a fire, the improvement in containment for these compartments was not considered sufficient to warrant their replacement.

In addition to its argument that no suppression is required for compartments smaller than 325 cubic feet, the RAA suggests that it may not be necessary, in relatively small airplane compartments, to provide both an initial "knockdown" discharge and the capability to maintain a 3 percent halon concentration for one hour. In RAA's view, a suppression system that simply knocks down the fire should be considered adequate for certain compartments that do not contain sufficient oxygen for a fire to continue.

The reference to a 3 percent concentration quoted by the RAA is actually contained in the Regulatory Evaluation Summary of Notice 97–10 and is the amount of halon that is typically used, not an amount that is required. The standards for Class C compartments, which the current Class D compartments in passenger-carrying airplanes would have to meet, neither specify the agent that must be used nor the specific concentration of agent that must be maintained. The agent, typically halon, and the concentrations expended must simply be sufficient to extinguish the fire altogether or suppress it until a safe landing can be made. It must be recognized, however, that a system that could not prevent a fire from growing back after initially suppressing it would not be acceptable.

In contrast, this final rule has the effect of changing, from containment to suppression, the primary means of preventing uncontrolled fires in Class D compartments in passenger-carrying operations. Rather than resulting in an incremental improvement, this change is expected to make a decisive difference in preventing uncontrolled fires, particularly under two scenarios. First, when a fire is initiated as a result of improper carriage of hazardous materials, suppression is much more likely to be successful than containment alone. Second, with the widespread use of consumer aerosol cans with highly flammable propellants, containment is no longer the primary consideration. Although still extremely important in the overall fire safety of the compartment, the capability of the liners to withstand the penetration of flames is a secondary concern because the integrity of a liner can be destroyed by the force of an exploding aerosol can regardless of its capability to resist flame penetration. Apart from its erroneous beliefs that the proposed rulemaking is inconsistent with the earlier rulemaking and that most cargo or baggage compartment fires occurred during takeoff, the RAA offered no technical justification for excluding compartments smaller than 325 cubic feet.

The FAA does acknowledge RAA's assertion that inadvertent carriage of oxygen generators aboard airplanes flown by RAA members is unlikely because their fleets typically consist of airplanes with oxygen-containing cylinders rather than oxygen generators. It must be recognized, however, that oxygen generators are only one example of hazardous flammable materials that may be loaded in compartments inadvertently or surreptitiously. Also, patrons of regional airlines would be no less likely to have aerosol cans in their checked baggage than the patrons of major airlines.

In view of the above, the FAA does not concur with the RAA's belief that compartments smaller than 325 cubic feet need not have fire suppression.

At the time Notice 97–10 was drafted, it was believed that most smaller transport category airplanes designed for business use incorporate Class B compartments that are accessible in flight and that relatively few have Class D compartments. It was also believed that most of those airplanes are used for personal or executive use under the provisions of 14 CFR part 91. Since that time it has become apparent that a significant number do have Class D compartments located in the nose or tail section outside the cabin pressure vessel and that many are, in fact, used for on-demand service under the provisions of 14 CFR part 135. Some airplanes originally designed for executive use have also been converted for all-cargo operations conducted under part 135. Consequently many more of those airplanes would be affected by the proposed rulemaking than originally anticipated.

As noted above, scheduled common-carriage operations of propeller-driven airplanes with ten to thirty passenger seats and all turbojet-powered airplanes, regardless of their seating capacity, must now be conducted under the provisions of part 121 rather than part 135. Scheduled common-carriage operations with propeller-driven airplanes having fewer than ten passenger seats may still be conducted under part 135, but none of those airplanes are transport category. Accordingly, the proposed changes to part 135 would not apply to any airplane likely to be used in scheduled passenger operations.

In regard to operations that may still be conducted under part 135, airplanes with 30 or fewer passenger seats and 7,500 pounds or less maximum payload may be used for non-scheduled, i.e. on-demand, common-carriage operations.

Typically, such operations involve charter flights for transportation of company executives, entertainment groups, etc. The transport category turbojet-powered airplanes designed for business travel (as opposed to the few larger airliners flying as executive airplanes) fall within these seating and weight limits. As discussed above some of these airplanes are used for such operations, and some do have Class D compartments. Because of the seating and payload limits, the only extant propeller-driven transport-category airplanes with Class D compartments that would be eligible for such operations are CASA C.212's or Jetstream 4101's. No airplanes of either model are known to be so used.

With passenger seats removed, transport category airplanes with 7,500 pounds or less maximum payload are also eligible for all-cargo service.

In addition to non-scheduled common carriage, airplanes with fewer than 20 passenger seats and 6,000 pounds or less payload are eligible for non-common or private carriage operations.

The National Air Transportation Association (NATA), which represents operators of airplanes utilized for on-demand flights, recommends that airplanes operated under part 135 be excluded from the proposed rulemaking. The NATA asserts that on-demand carriers maintain close control of the contents of baggage placed in their Class D compartments. In that regard, the NATA believes that the carriage of consumer aerosol cans should be prohibited. The NATA notes that part 135 operators do not transport other types of cargo, such as parcels being transported on behalf of customers other than those chartering the airplanes, tires and other aircraft parts.

The NATA states that the Class D compartments in the airplanes used in part 135 service are no larger than 25 cubic feet and, like the RAA, believes that the FAA set a precedent in that regard by requiring the retroactive installation of improved cargo compartment liners only on Class C and D compartments larger than 200 cubic feet. Raytheon, a manufacturer of such airplanes, also recommends that compartments less than 200 cubic feet not be required to comply. As discussed above, the earlier exclusion of compartments smaller than 200 cubic feet is not relevant to the hazards addressed by this rulemaking.

Approximately one dozen commenters, who identified themselves as part 135 operators, provided comments similar in nature to those of the NATA. The General Aviation Manufacturers Association (GAMA), which represents manufacturers of airplanes intended for business use, provides similar comments and suggests that such airplanes with maximum takeoff weights less than 75,000 pounds operated in non-scheduled flight under part 91 or part 135 be excluded from the rulemaking. (The FAA did not propose that any airplanes operated only under part 91 would have to comply.) GAMA also notes that no uncontrolled fire has ever occurred in a Class D compartment in a business airplane.

An operator engaged in all-cargo operations under the provisions of part 135 notes that it does not face the problem of flammables in passenger baggage (presumably referring to aerosol cans) and that the majority of cargo carried in such operations is bank documents. Bank documents are shipped in tightly compressed bundles which, according to the commenter, are not capable of spontaneous combustion.

The commenter also notes that the airflow in Learjets, which are typically used for such service, is from the main cargo bay forward, so that the flightcrew would detect any unusual fumes or odors from the cargo in time to effectively fight with on board halon or make an emergency landing. The commenter is undoubtedly referring to airplanes in which the main cabin has been converted to a cargo compartment. While the comment may be correct, it is not relevant because the main cabins of those airplanes would not be Class D compartments. The Class D compartments of Learjets and other airplanes used for such service are the small isolated compartments located in the nose or tail of the airplanes.

The FAA does not concur with the NATA suggestion that the carriage of aerosol cans should be prohibited in lieu of the proposed rulemaking. The use of consumer aerosol cans with highly flammable propellants is so widespread that it would be impossible to enforce a prohibition of this nature in any type of aircraft operation regardless of how well an operator could maintain control of the contents of its customers' baggage.

While no conclusive evidence has been presented, the commenters have raised issues worthy of further study to determine whether a significant safety benefit could be realized by requiring all transport category airplanes operated under part 135 to comply. In order to preclude delaying compliance of the airplanes flown by the mainstream part 121 operators, the FAA has elected to delay rulemaking pertaining to part 135 operators for further study. In order to assess the possible safety benefits and costs more accurately, the FAA is requesting further comments concerning the types of operations conducted under part 135. (See Request for Comments below.) Following completion of the further study, the FAA will take one of the following three actions: (1) If the FAA determines that the proposed requirements are necessary for safety and cost effective for all part 135 operators, part 135 will be amended as proposed in Notice 97–10 to require all operators of transport category airplanes with Class D compartments to comply. (2) If the FAA determines that the proposed requirements are necessary for safety and cost effective only for some types of part 135 operators, part 135 will be amended to require compliance by those operators. (3) If the FAA concludes that the proposed requirements are not necessary for safety and cost effective for part 135 operators generally, the proposal to amend part 135 will be withdrawn.

Forty-eight individuals, most of whom identified themselves as pilots for a major all-cargo airline, and a labor organization representing those pilots submitted similarly-worded comments opposing the continued use of Class E compartments. The commenters quote the statement, "In the case of all-cargo airplanes, the expected life saving benefit is assumed to be zero," and construe it to mean that the FAA does not value the lives of crew members of all-cargo airplanes. On the contrary, that statement, which appeared in the Benefits Estimates section of the preamble to Notice 97–10, merely reflects a conservative assumption made in calculating the estimated total benefits that would likely result for all airplanes, passenger and cargo, from the proposed rulemaking. It is not the basis for any action taken or not taken, and it does not, in any way, reflect a lack of concern for the safety of occupants of all-cargo airplanes. In that regard, it must be recognized that this final rule requires a higher level of safety for all-cargo airplanes by requiring the Class D compartments in those airplanes to meet the superior standards for either Class C or Class E compartments.

Those commenters, and three other labor organizations, assert that the rulemaking must eliminate Class E as well as Class D compartments as an option. Some cite a recent accident in which an all-cargo Douglas DC–10 was destroyed by a fire originating in a Class E compartment. As discussed above, Class E compartments are, like Class C compartments, required to have smoke or fire detection systems; however, means must be provided to shut off the flow of ventilating air to or within a

Class E compartment, in lieu of providing extinguishment. In addition, procedures, such as depressurizing a pressurized airplane, are specified in order to minimize the amount of oxygen available in the event a fire occurs in a Class E compartment. Class E compartments can be installed only in all-cargo airplanes since these procedures are generally not feasible in passenger-carrying airplanes.

The accident to which the commenters refer is undoubtedly that which occurred on September 5, 1996. According to the National Transportation Safety Board (NTSB), the crew made an emergency landing at New Windsor, New York, following activation of the cargo compartment smoke detectors. Although cited by the commenters as an indication that Class E compartments are unsafe, the smoke detectors provided warning that a fire had occurred; and the crew was able to land and safely evacuate the airplane approximately one hour before it was destroyed by the fire. The NTSB did not issue any safety recommendations as a result of this accident.

Adopting a final rule that would eliminate Class E compartments as well as Class D compartments would be beyond the scope of Notice 97–10, in any event, but service experience does not show that Class E compartments are unsafe as claimed by the commenters.

As proposed in Notice 97–10, part 121 would be amended to require the Class D compartments of transport category airplanes type-certificated after January 1, 1958, to meet the standards for Class C or Class E compartments, as applicable. That date was chosen so that all turbine-powered transport category airplanes, except for a few 1947 vintage Grumman Mallards and 1953–1958 vintage Convair 340s and 440s converted from reciprocating power, would be included. Compliance was not proposed for the older airplanes because their advanced age and small number would make compliance impractical from an economic standpoint. Nevertheless, the FAA specifically invited comments in that regard and retained the option of including applicability to the older transport category airplanes in the final rule if comments indicate a significant safety benefit could be realized thereby. Several commenters support the exclusion of those older airplanes. No comments were received opposing the exclusion; however, two commenters request that the date be adjusted to exclude Lockheed 188 Electras, which were type-certificated on August 2, 1958—seven months later than the proposed date.

One commenter uses its three Electras for service to certain remote Aleutian points that cannot be served safely with jet aircraft. Those airplanes plus one Electra flown by the other commenter on military contract flights are the only passenger-configured Electras in service in this country. Because of their small numbers, the manufacturer of those airplanes has chosen not to provide engineering support for the installation of detection and suppression systems. The commenter states that installing fire suppression systems on its three Electras would, therefore, present an excessive economic burden. Apart from the four passenger-configured Electras, there are approximately two dozen all-cargo configured Electras in service in the U.S.

In addition to the passenger-configured Electra flown on military contract flights and an all-cargo Electra, the other commenter also operates ten Convair 340s and 440s. That operator requests that an exclusion be made for the Convairs as well as Electras. Since the Convair airplanes were type-certificated well before January 1, 1958, that comment is interpreted to be support for the exclusion already proposed in Notice 97–10 for the older airplanes.

The FAA does not consider the information presented by the commenters sufficient to warrant a general exclusion of Electras from compliance—particularly in the absence of comments from other Electra operators opposing the January 1, 1958, date. Because the two commenters' concerns relate to circumstances peculiar to their operations, the appropriate process for considering those circumstances is a petition for exemption filed under the provisions of 14 CFR part 11. That process would entail a showing by the petitioner that the requested relief is in the public interest. The date January 1, 1958, is, therefore, adopted as proposed.

Three commenters, the RAA, a manufacturer of airline airplanes and an all-cargo airline, oppose the reporting provisions proposed in Notice 97–10. The RAA quotes the probable event rate of 0.085 cargo compartment fires per million departures stated in the Benefits Estimates section of the preamble to Notice 97–10 and characterizes the probability of one becoming injured as a result of a fire in an airplane operated by a regional carrier as an extremely remote event. The RAA believes that the reporting requirement would mislead the public into believing that airplanes that do not have detection and suppression systems installed pose a safety risk unwarranted by the probable event rate.

The manufacturer characterizes the proposed quarterly reporting requirement as unnecessary bureaucracy. That commenter further states that it is the FAA's responsibility to regulate operators and characterizes publishing information concerning persons that have not met the rule before being required to do so as invidious and of doubtful legality.

Two commenters do not particularly oppose the proposed reporting requirement, but nevertheless offer constructive suggestions. One suggests that care must be taken to present the information to the public in such a manner that it is not misleading. For example, one carrier's entire fleet may have Class D compartments while another's fleet might consist largely of airplanes that have no such compartments. The latter's progress (or lack of progress) in fleet compliance would be much less significant in terms of overall fleet safety than the former's progress. The other commenter suggests that § 121.314 specifically state that the reporting requirement is discontinued once the carrier has completed the conversion of its entire fleet.

The FAA does not consider that the dissenting commenters have provided persuasive reasons to delete the proposed reporting requirement from the final rule. In that regard, the FAA considers that the public has a strong interest in knowing how aggressively operators are acting to provide the safety benefits of compliance with this rule. Concurrence with this position is reflected in approval for the reporting requirement granted by the Office of Management and Budget. The FAA does, however, concur that the results of the required reporting must be presented to the public in a manner that is not misleading. It was understood, but not specifically stated in proposed § 121.314(d), that the reporting requirement would apply only until the carrier's entire fleet is converted. In order to preclude any confusion in that regard, the second sentence of paragraph (d) is changed to read, "Until such time as the certificate holder's entire fleet is in compliance, each certificate holder must * * *."

In addition, the reporting requirement has been revised to refer to airplanes in which all Class D compartments have been converted to Class C or Class E (i.e., those reidentified as such), or retrofitted to meet the applicable requirements of Class C or Class E. As explained elsewhere in this preamble, a Class D compartment that is converted to a Class C compartment (and

reidentified as a Class C compartment) prior to the three-year compliance date is, literally, not a Class D on that date; the airplane with that compartment would not be reported under the literal language of the proposal. However, the agency is clarifying that each airplane that has Class D compartments converted in such a manner should be reported in the same manner as an airplane on which all class D compartments have been retrofitted with the requisite detection or detection and suppression systems. This clarification is consistent with the commenters' apparent understanding of the proposal.

Several commenters express their belief that compliance should be required in less than three years, as proposed. A three-year compliance period was proposed because, according to information available to the FAA, a shorter period would not enable operators to perform the necessary modifications while their airplanes are undergoing other scheduled maintenance. Having to remove airplanes from service earlier specifically to perform the modifications required by this final rule would increase the cost of compliance to the point that the final rule would no longer be cost effective. In addition, it appears doubtful whether parts and materials would be available to enable compliance of all affected airplanes within a shorter compliance period. The FAA, therefore, does not concur that a compliance period shorter than three years would be appropriate. In any event, commenters have not been specifically asked to focus on the effects of imposing a shorter compliance period. In fact, as discussed below, most operators appear to believe that a compliance period longer than three years is warranted. Under the current circumstances, therefore, the FAA would not want to adopt a shorter compliance period without publishing a notice for additional comments. The additional notice, in turn, would result in a delay that would be counterproductive.

In contrast to the commenters that believe a compliance period earlier than three years should be adopted, several commenters believe that a longer period should be adopted. The Air Transport Association of America (ATA) and the Aerospace Industries Association (AIA), which represent airlines and manufacturers of airline airplanes, respectively, request that the compliance period should be five years. This request is based primarily on the commenters' assertions that a compliance period of less than five years would not enable compliance while the airplanes are undergoing other scheduled maintenance. The RAA requests that it be four years, but provides no specific justification for its request. The FAA has carefully evaluated the assertions made by the ATA and AIA and other available information concerning compliance. In that regard, it must be noted that the changes proposed in Notice 97–10 do not require the use of new technology. Future compartments that could no longer be Class D, and existing Class D compartments, must meet the standards for either Class C or Class E, as applicable. Those standards have been in existence for 51 and 38 years, respectively; and many of the airplanes currently in the U.S. air carrier fleet already meet them. It is also noted that approval has already been granted for the installation of detection and suppression systems in some of the models that comprise most of the affected airplanes in the U.S. air carrier fleet. The FAA recognizes that a three-year compliance period, as proposed in Notice 97–10, would be aggressive and would require careful planning; however, none of the commenters have provided credible reasons suggesting that detection and suppression systems cannot be installed in all affected airplanes within three years while the airplanes are undergoing other scheduled maintenance. A three year compliance period is, therefore, adopted as proposed.

The FAA noted in the preamble to Notice 97–10 that the term "fire extinguishing system" appearing in § 25.857(c) in regard to Class C compartments is actually a misnomer in that the system is not required to extinguish a fire in its entirely. The system is intended, instead, to suppress a fire until it can be completely extinguished by ground personnel following a safe landing. The FAA also noted that consideration was given to replacing the term with "fire suppression system" for technical accuracy, but that no change was proposed because it appeared that changing the terminology at this time could actually create confusion and, therefore, be counter-productive. Several commenters suggest the term "fire suppression system" should indeed be used in order to preclude any misunderstanding. In light of the comments received, § 25.857(c)(2) is changed to read "fire extinguishing or suppression system." This is a nonsubstantive change that places no additional burden on any person.

One commenter states that § 121.314(c) should clearly state that an existing approved Class C compartment detection system meeting the earlier five-minute detection standard remains acceptable for conversion of existing Class D compartments. The suggested change to that section is unnecessary. As discussed under Background above, § 25.858 was adopted in 1980 to require the detection systems of Class B, C and E compartments to provide visual indication to the flightcrew within one minute of the start of the fire. Prior to that time, systems that provided indication within five minutes were considered acceptable. This final rule does not require any changes to Class C compartments, including those that were approved previously when five-minute detection time was considered acceptable. In some instances, for example, a manufacturer offered a specific compartment in a specific airplane model as either a Class C or Class D compartment can convert that compartment to the previously-approved Class C compartment. By virtue of having been converted to a Class C compartment (and no longer a Class D compartment), § 121.314(c) would no longer be applicable to the compartment.

Therefore, whether it meets the older five-minute standard or the current one-minute standard would not be an issue in determining compliance with this section.

There may be instances in which a specific airplane model incorporates one or more Class C compartments with detection systems meeting only the older five minute standard and one or more Class D compartments. The existence of a previously-approved detection system in another compartment would not be relevant to whether the system for a Class D compartment in that airplane had to meet the new one-minute standard.

There may also be instances in which detection systems were installed in Class D compartments and not shown to meet any particular standard for detection (i.e., approved on the basis that they did not detract from the performance of the compartments as Class D compartments.) Those systems would have to be demonstrated to meet the current one-minute standard or replaced with systems that do.

Similarly, there are instances in which the means of fire suppression in Class D compartments were approved on the basis that the systems did not detract from the performance of the compartments as Class D compartments. Such previously-approved systems must also meet the standards for fire suppression systems in Class C

compartments or be replaced with systems that do.

The RAA, in its comments, references a system for inserting hand fire extinguishers into the compartments of Shorts SD3–60 and Jetstream 4104 airplanes. The RAA states that the compartments with the hand fire extinguishing systems were originally approved as Class C compartments, but later reidentified as Class D compartments to accommodate dispatch reliability requirements. However, these compartments are not certificated as Class C compartments. Moreover, the certification of these compartments as Class D was not centered on the need to facilitate dispatch. Therefore, for these compartments to be certificated as Class C, the applicant must demonstrate that the built-in suppression systems meet Class C requirements.

Alternatively, an RAA member always has the option of petitioning for an exemption under the provisions of 14 CFR part 11. Under part 11, an interested person may petition the Administrator for a temporary or permanent exemption from any FAA rule. In a petition for exemption, the person seeking relief must include: (1) the text or substance of the rule from which the exemption is sought; (2) a statement of the petitioner's interest; specifically, the nature and extent of the relief sought and a description of the aircraft or person(s) to be covered by the exemption; and (3) arguments for granting such an exemption, focusing on the reasons why the proposed exemption is in the public interest and would not adversely affect, or would provide an equivalent level of, safety akin to the rule from which the exemption is being sought.

In consideration a petition for exemption from the fire detection and suppression requirements, the FAA will evaluate whether the petitioner has demonstrated unique circumstances that make granting the proposed exemption in the public interest. Under 49 USC 40101(d), Congress requires the Agency, in making a public interest funding, to consider that "assigning, maintaining and enhancing safety and security are the highest priorities in air commerce." Therefore, an RAA member would have an opportunity, for example, to demonstrate that the continued use of a hand extinguisher is functionally equivalent to an approved built-in fire extinguishing system or that some other unique circumstances justifies an exemption while avoiding an adverse effect on safety.

Two commenters offer comments concerning dispatch reliability requirements. Others offer comments that actually deal with acceptable means of compliance rather than the rulemaking per se. Since the Class D compartments will become the equivalent of Class C or Class E compartments, they will be treated as such insofar as dispatch requirements are concerned. For the same reason, means that are presently acceptable for compliance with the standards for Class C or Class E compartments will remain applicable.

One commenter expresses the concern that the chemical to suppress a fire could also deplete the amount of oxygen needed to support human life. While valid, that concern is addressed by the standards already contained in § 25.851(a)(8) and (b)(1)(i).

Other commenters suggest changes that would be beyond the scope of Notice 97–10, including such diverse subjects as incorporation of extinguishment systems in containers containing hazardous materials, access to and positioning of such containers, the use of detection systems that sense both heat and smoke, improved crew training procedures, increased crew oxygen supplies, and a re-evaluation of existing Class C compartments. While some of those suggestions might have merit, they would require considerable further study and could not be adopted at this time. Several commenters provide information of an economic nature which has been considered in the preparation of the regulatory evaluation for this final rule. Although one commenter expressed a concern related to a particular Alaskan intrastate operation involving Lockheed Electras, no commenters responded to the FAA's request for comments on whether there is sufficient justification for applying the proposed rule differently to intrastate operations in Alaska.

Except as discussed above, parts 25 and 121 are amended as proposed in Notice 97–10. As also discussed above, no amendment is made to part 135 pending receipt of additional information as requested below.

Request for Comments

As a result of comments received, it appears that the impact of the proposed rulemaking on part 135 operators may be much greater than anticipated at the time Notice 97–10 was drafted. Also, it is not clear whether the proposed rulemaking would be cost beneficial for all such operators. In order to not delay the applicability of the proposed rulemaking to manufacturers and the other operators for which it has been found cost-beneficial, the FAA has elected to adopt this final rule amending parts 25 and 121 and defer the proposed changes to part 135 pending receipt of additional information. The FAA, therefore, requests additional comments addressing the following specific questions:

1. Which airplane models operated under part 135 have Class D compartments that were installed at the time of manufacture? Of these, which are used in all-cargo operations?

2. Which airplane models operated under part 135 have been subsequently modified to incorporate Class D compartments? Of those, which are used in all-cargo operations?

3. What are the sizes (by model) of the Class D compartments of airplanes operated under part 135?

4. In the case of on-demand passenger flights, are Class D compartments ever used to transport items other than the baggage of the persons chartering the airplane? If so, what types of cargo or baggage are carried in these compartments, and how frequently are they carried?

5. In the case of all-cargo flights, are the Class D compartments utilized? If so, what types of cargo or baggage are carried, and how frequently are they carried?

6. In the case of operators that have approval to transport hazardous materials, are Class D compartments ever use to transport those materials?

7. Do you have any knowledge of a fire occurring in a Class D compartment of an airplane operated under part 135? Was the fire safely contained in the compartment?

8. Are there any existing FAA-approved installations of detection and suppression systems meeting the standards for Class C compartments in these compartments?

9. For those Class D compartments for which there are no existing FAA-approved installations of detection and suppression systems, what would be the costs of designing and obtaining FAA approval of such systems?

10. How much labor would be required to retrofit the Class D compartments with detection and suppression systems? Could these modifications be accomplished during regularly scheduled maintenance, or would the airplanes need to be taken out of service specifically for this purpose? If so, for how long?

11. What would be the costs of materials and compartments needed to retrofit the Class D compartments with detection and suppression systems?

12. If the FAA required part 135 operators to install detection and suppression systems in Class D compartments, would those operators modify those compartments

accordingly, or would they comply by simply deactivating those compartments and utilizing other compartments? Be model-specific for both passenger and cargo airplanes, if possible.

13. What would be the economic consequences of deactivating a Class D compartment? Could operators utilize other compartments to continue to carry the same payloads if the Class D compartments are deactivated?

Comments submitted to Docket Number 28937 no later than May 18, 1998 will be considered. The FAA will review all additional comments relevant to the above questions and publish either a supplemental final rule presenting FAA findings and adopting any necessary changes to part 135 or a notice stating the basis for its conclusion that no further changes are warranted.

Regulatory Evaluation Summary

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon reasoned determination that the benefits of the intended regulation justify its costs.

Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this rule: (1) will generate benefits that justify its costs and is a "significant regulatory action" as defined by Executive Order 12866; (2) will have a significant impact on a substantial number of small entities; and (3) will not constitute a barrier to international trade. The FAA has also determined that this rule is "significant" according to DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979) because there has been considerable public interest in this subject. These analyses, available in the docket, are summarized below.

Discussion of Comments Related to the Economic Analysis

Comments related to the economic analysis can be grouped as follows: (1) comments addressing specific benefit or cost assumptions, (2) comments recommending a reduction in the compliance time, (3) comments requesting an increase in the compliance time, (4) comments calling for the expansion of detection and suppression requirements, (5) comments requesting that some operations be excepted from detection and suppression requirements. The last four groups of comments are addressed elsewhere in the preamble. What follows is a discussion of comments specifically addressing the economic assumptions.

At least one commenter raised questions regarding the inclusion of non-domestic aviation incidents, such as the Gulf Air and Saudi Arabian incidents, for purposes of developing a quantified estimate of the benefits of the rule. The FAA believes that it is reasonable to include the Gulf Air and Saudi Arabian incidents in the calculation of quantified benefits. Some may argue that these incidents are not pertinent. However, a careful examination of these accidents by FAA security and other safety experts concluded that nothing about the causes of those accidents could be classified as risks that are inherently different from U.S. risks. Thus, the FAA believes that the circumstances that caused both the fires and the deaths could occur in U.S. operations. Another alternative analysis just relying on domestic incidents could also have been done. If the two foreign accidents were not counted, of course, the total benefits quantified in the Regulatory Evaluation for this rule might be lower. However, the FAA believes that, even without considering the foreign accidents, the quantified and non-quantifiable benefits (such as the potential for increased future risk resulting from the proliferation of aerosol cans using flammable propellants) are sufficient to justify the costs of this rule. Moreover, there are other potential benefits that the FAA did not quantify, such as those fortuitous domestic cases in which the passengers and crew just barely escaped with their lives from fires initiated in Class D compartments.

Detection and Suppression Unit Cost Estimates

Few comenters provided cost estimates; most referred to cost figures from the preliminary regulatory evaluation. One major carrier, however, provided detailed detection and suppression cost estimates (for two affected airplane models) that were substantially lower than FAA estimates. Even after including out-of-service costs (which the FAA estimates do not include for reasons discussed elsewhere in the preamble) the commenter's unit cost estimates were approximately equal to—and in one case lower than—those calculated by the FAA. This is consistent with anecdotal evidence gathered by the FAA since the publication of Notice 97–10: competitive forces have in many cases significantly bid down retrofit costs. From this evidence, the FAA concludes that the original cost assumptions (which are maintained in the final regulatory analysis) and benefit-cost findings are conservative.

The Cost of Diversions

One commenter interpreted the economic analysis to imply that the FAA believes the costs associated with a false alarm are approximately $60 to $2,800 per event. "Assuming that each of our fleet types would incur one additional diversion per year," this commenter writes, "the cost is estimated to be $30,000 for a 727 and $50,000 for a DC–10." "Consequently," the commenter concludes, "the costs per diversion of $60 to $2,800 are not valid estimates."

The FAA agrees that the cost per division is in the range suggested by the commenter—in fact, this is consistent with the diversion cost assumptions used in the preliminary regulatory evaluation. In any given year, however, most airplanes will not experience a diversion. The $60 to $2,800 range is a calculation of the annualized false alarm costs per airplane—that is, the cost of a diversion weighted by the annual probability of a diversion.

It is also worth noting that the regulatory evaluation accounts for the fact that the false alarm rate exhibited by detectors installed as result of this rule will be lower than the historical false alarm rate. Current-generation detectors, for example, make use of microprocessor technology that permits the system to discriminate between fire-generated smoke and other non-hazardous particulates (water vapor, for example).

Downtime Costs

Several commenters contend that the rule will require significant downtime, and, concomitantly, result in substantial lost revenue. The Air Transport Association estimates that "it will cost $22,400 per airplane more to complete the program on a 3-year schedule compared to a 5-year schedule. For a fleet of 2,994 passenger airplanes and 321 all-cargo airplanes [figures contained in Notice 97–10], the excess cost would be over $74 million." "We do not think," ATA concludes, "that the marginal added benefits resulting from a 3-year schedule justifies the extra cost." The comment does not include specific details as to how the per-airplane cost estimate was derived.

As noted earlier, the FAA has given considerable thought to the option of

extending the compliance deadline. Based on the information received in the comments, however, the FAA still believes that a three-year compliance schedule is the optimal compromise between cost and safety considerations. First, as noted earlier, design approval has already been granted for the installation of detection and suppression systems in some of the more numerous airplane models in service with Class D compartments. The comments provide no additional information that causes the FAA to alter its conclusion that fleetwide compliance can be achieved without additional downtime.

Second, the FAA believes that revenue loss estimates provided by the airline industry are overstated. This follows since total industry losses cannot be calculated by multiplying net revenue loss (revenue minus variable operating costs) per airplane-day by the total number of down-days (the methodology apparently used in the ATA comment). While it is true that at different times during the compliance perid individual airlines will be affected to varying degrees, overall airline competition is approximately a constant-sum contest for passengers. That is, most passengers unable to book a flight of first preference (assuming aircraft unavailability as a result of this rule) will book another flight on the same or a competing airline. The fact that competition in many markets encourages airlines to increase schedule frequencies, even if available seats are plentiful, further mitigates the possible impact to the industry as a whole.[1]

Installation Labor Costs

One foreign air carrier stated that C-check work for its fleet is broken down into a number of smaller units and accomplished over a longer period of time; therefore, it is likely that some airplanes will not have a 5-day downtime period for scheduled maintenance. (The proposed rulemaking would not be directly applicable to the foreign carrier; however, the comment is noted for illustrative purposes.) According to the commenter, this is likely to lead to unscheduled downtime. In addition, the commenter notes "the estimated 30% reduction in labor hours, allowed in Notice 97–10 due to 'existing' access," does not apply.

Comments relating to additional downtime costs are addressed above. The FAA did note in the notice that scheduling the cargo compartment retrofit to coincide with scheduled maintenance could lower work hours by approximately 30%. The actual retrofit cost estimates, however, were not adjusted to account for this savings—this observation was made only to show that installation costs were conservatively estimated.

Summary of Final Analysis

This analysis separately considers newly-manufactured airplanes and in-service airplanes. There are 21 transport-category airplane models operating under 14 CFR part 121 that have Class D compartments. Airplanes that are expected to be permanently retired from service before the year 2001 (the assumed compliance deadline), are omitted from the analysis. Based on changes proposed in this rule, the FAA now estimates that 2,991 passenger airplanes and 313 all-cargo airplanes will be affected by the rule. These estimates are based on an inventory compiled by the FAA's National Aviation Safety Data Analysis Center (NASDAC) from airplane-specific registry and insurance records.

Cost Estimates

Cost estimates consider: (1) the costs associated with submitting compliance reports, (2) certfication expenses including one-time equipment and tooling costs, (3) fire detection and suppression equipment and installation costs, and (4) variable operating costs (fuel costs, maintenance and inspection costs, weight off-load costs, and the costs associated with unnecessary diversions initiated because of false alarms). In addition, it is assumed that Class D compartments in all-cargo airplanes will be converted to E compartments which do not require the installation of active suppression systems.

The proposal will require each affected operator to submit a quarterly report listing the serial numbers of those airplanes in its fleet that are in compliance with the provisions of the rule and those that are not in compliance. One major carrier stated that, since records of modifications of this scale are computerized, the reporting requirement will involve less than one-half of one work hour. Initially, however, reports may take additional time to generate as carriers establish procedures, forms, etc. Also, records may not be computerized for smaller carriers. Thus, FAA conservatively estimates that, on average, the rule will require two additional work hours per quarter for each of the approximately 130 affected carriers. Assuming that each carrier will file 11 reports during the three year compliance period and that the fully burdened hourly compensation rate is $65, the estimated nominal cost of this provision to the entire industry is approximately $186,000 or $151,000 at present value (printing, postage, and other miscellaneous costs are assumed negligible).

The FAA will also incur additional costs as a result of this reporting requirement. This analysis conservatively assumes that each of approximately 90 Flight Standards District Offices (FSDO) will, on average, spend approximately one-half of one work hour per quarter processing air carrier reports (some will spend no time, some considerably more than one-half hour). Also, approximately 20 hours per quarter will be required at FAA headquarters to tabulate these reports. Assuming the fully burdened hourly compensation rate is $38, the estimated nominal cost of this provision to FAA is approximately $27,000 or $22,000 at present value (data transmission costs between FAA headquarters and each of the FSDO's is assumed negligible).

Type design approval of the detection and suppression systems will be required for most airplane models affected by the proposal. Type design approval will be in the form of a supplemental type certificate (STC) issued to an applicant other than the manufacturer; or, in the case of the manufacturer, either an STC or an FAA-approved type-design change. (The requirements for obtaining FAA approval are the same in either case.) The FAA assumes that type-design approval will be required for all airplane models affected by the proposed rule. Certain models will require a separate type-certification program for each different variant, while in other cases, all variants will be sufficiently similar that type-design approval could be granted for all variants following only one type-certification program. In some instances, an alternate Class C compartment configuration has already been FAA-approved. For those models or variants, no further type-certification effort will be required.

[1] It should be noted that this observation is not inconsistent with the "overbooking" phenomenon. See, for example, Crandall, Robert L., "The Unique U.S. Airline Industry," in the *Handbook of Airline Economics*, McGraw-Hill, 1995, p. 4. "The influence of even small differences in departure time on customer buying behavior creates a powerful incentive for carriers to increase frequency, even when there are plenty of seats available on existing flights . . . [T]he fact that more capacity represents more frequency—and thus a more desirable product—gives every airline an incentive to use every airplane as intensively as possible. While this strategy makes sense for each individual carrier, it produces a tendency toward perpetual oversupply."

The cost of a type-certification program of this nature ranges from $315,000 to $1.8 million depending on the airplane model. In principle, no more than one type-certification program will be needed per model or variant; since operators could elect to utilize the same detection and suppression system installations on all affected airplanes of that particular type. If additional entities obtain separate type-design approvals for a given model or variant, they will do so for economic gain, not as a result of an FAA requirement to do so. Therefore, the analysis assumes the minimum number of type-certification programs theoretically necessary to accomplish the conversions.

Detection-suppression system and installation cost estimates postulate that compartments will be fitted with a system of optical smoke detectors (configured to give indication of a fire within one minute) and a halon suppression system. The analysis further assumes a quantity of halon that will provide: (1) an initial "knockdown" discharge, and (2) the capability subsequently to maintain a 3 percent halon concentration for one hour. This is consistent with the standards currently in effect for Class C compartments.

Although the U.S. bans the import of newly-produced halon, sufficient quantities of recycled halon are known to be available to meet the additional demand generated by this rule. The cost of halon has risen from approximately $2 per pound before production was banned to $20 per pound currently. This analysis assumes that halon used in a retrofit will be available at $20 per pound. Nominal equipment and installation unit (i.e. each airplane) costs range from $13,000 to $101,000 depending on the airplane model.

Although the time to retrofit could be substantial, especially for airplanes with three Class D compartments, industry representatives state that conversions could be accomplished during a C-check, a scheduled maintenance check that occurs about once a year. C-checks are typically accomplished over a four- to five-day period. Conversions conducted concurrent with a C-check could reduce labor hours by as much as 30 percent, because many areas of the airplane are easily accessible. As noted previously, the comments received by the FAA do not provide any credible reasons that detection and suppression systems cannot be installed in all affected airplanes within three years while the airplanes are undergoing other scheduled maintenance. Therefore, this analysis attributes no foregone revenues due to downtime (i.e., time out-of-service) associated with these conversions.

Depending on the airplane model and its configuration, installing fire suppression and detection systems will add between 7 and 300 pounds to the empty weight of an airplane. This weight, in turn, will affect fuel consumption. Incremental fuel consumption costs were estimated for each airplane model based on the weight of additional equipment and suppression agent required, statistical estimates of the change in fuel consumption as a function of incremental weight by airplane type, and estimates of annual flight hours by airplane model. Annual per-airplane incremental fuel consumption estimates range from $50 to $4,900 depending on the airplane model.

Inspection and maintenance of fire detection and suppression systems will include: (1) a leak check; (2) a visual inspection of the system; (3) a sensor test; and (4) a hydrostatic check of the fire bottles. The first three checks could be accomplished at each C-check, i.e., about once per year. A hydrostatic check will involve removing and replacing the fire bottle and will occur approximately once every five years. The bottle would be returned to the halon provider where it would be recharged and checked for leaks.

Six work-hours at a burdened hourly rate of $60 will be required to conduct a leak check of the system of each compartment. A visual inspection of the system will require 1.5 hours per compartment at $60 per hour. Checking the sensors will require about one hour per compartment. It will take two mechanics one hour at a burdened hourly rate of $60 to remove and replace a fire bottle. Fire-bottle vendors typically charge between $600 and $1,000, including shipping, to perform a hydrostatic test and recharge the bottles, irrespective of the size of the bottle. Annual unit maintenance and inspection costs, therefore, range from $700 to $2,100 depending on the airplane model.

Under certain combinations, some departures might be weight-constrained. In those cases, the additional weight of the fire detection and suppressions system will require an operator to off-load passengers or cargo. The cost of his off-load penalty is measured by estimating the number of displaced passengers or the amount of displaced cargo that cannot be accommodated. (On the basis of a statistical analysis of load factors and unaccommodated demand, the FAA estimates that 5 percent of the departures will be fully booked. Generally, most of these flights are not weight constrained, but this figure is a conservative assumption.) The cost of unaccommodated off-load—approximately $0.30 per pound—is a weighted average of passenger and cargo revenue derived from revenue/enplanement, and freight data collected by the Bureau of Transportation Statistics, Office of Airline Information. Annual unit off-load penalties range from $30 to $800 depending on the airplane model.

Operators will also incur costs associated with flight diversions caused the false fire warnings. Costs include incremental airplane operating costs incurred during the diversion and passenger costs. Based on a recent FAA study of Service Difficulty Reports (SDR), proprietary aircraft operating data, and information from airborne fire detection equipment manufacturers, the FAA estimates that the frequency of false alarms is approximately 44 per million departures. In the absence of more detailed information, this analysis makes the conservative assumption that all false alarms result in a diversion. Annual diversion costs per airplane range from $60 to $2,800 depending on airplane type.

Based on the above, the FAA estimates total life-cycle costs for the retrofitted fleet in nominal terms are approximately $294 million, or $193 million at present value. For a newly-manufactured airplane delivered to an ATA carrier, the rule will increase life-cycle costs for an average affected airplane by approximately $110,000 in nominal terms, or $60,000 at present value. Unit lifecycle costs for a newly-manufactured airplane delivered to a non-ATA carrier will increase by approximately $179,000, or $100,000 at present value. (Per-airplane life cycle costs for ATA carriers are lower than for non-ATA carries since they are adjusted to account for voluntary installations of detection equipment. Similarly, estimated benefits for ATA carriers are adjusted—that is, reduced—to account for this voluntary action.)

Unfunded Mandates Reform Act Analysis

Title II of the Unfunded Mandates Reform Act of 1995 requires Federal agencies to assess the effects of any Federal mandate in a proposal or final rule that may result in the expenditure by State, local, or tribal governments, or by the private sector of $100 million or more in any one year. This rule does not contain a Federal mandate meeting that criterion, therefore the requirements of the Act do not apply.

Benefits Estimates

The benefits of detection and suppression systems depend on the degree to which the systems enable an airplane to avert a catastrophic accident in the event a fire occurs in a cargo or baggage compartment. Measuring this benefit, however, is problematic since it is determined not only by the relative fire-protection capabilities of Class C and Class D compartments, but on the probability that a fire will occur. Amendments to regulations—e.g. restrictions on the transportation of hazardous materials and more stringent burn—through requirements for compartment liners-also impinge on this analysis. (It should be noted, however, that the improvement standards for liners apply equally to both Class C and Class D compartments.)

The expected (future) rate of fires occurring in cargo or baggage compartments estimated using historical accident and incident data from the National Transportation Safety Board (NTSB), FAA, insurance underwriters, and foreign aviation authorities. These records show that during the 20-year period between 1977 and 1996, there were 19 fires reported as having occurred worldwide in Class D and Class C compartments involving transport category airplanes while used in commercial service. During this period, air-carriers worldwide (excluding domestic operations within the former Soviet Union, the Russian Federation, and the Commonwealth of Independent States) accumulated approximately 224.5 million departures in transport category airplanes having Class C or Class D compartments. The event rate for fires occurring in Class D and Class C compartments is, therefore, approximately 0.085 per million departures.

It must be noted that the event rate of 0.085 per million departures is based, for the most part, on service experience that occurred when consumer aerosol cans contained inert propellants. As described above under Background, the current use of highly-flammable propellants in consumer aerosol cans presents an additional hazard.

The available evidence shows that in the majority of incidents, Class D compartments successfully contain fires. Of the 16 inflight fires occurring in Class D compartments, only four were reported to have resulted in casualties or substantial damage to the airplane. A precise estimate of the likelihood of injury or airplane damage in the event a fire occurs in a Class D compartment is difficult to compute, however, owing to the limitations of accident and incident information. In many cases, necessary details had to be estimated. Where the post-event condition of the airplane is unknown, it is assumed that there was no damage. Where fatalities and injuries are unreported, it is assumed that there were no casualties. Where necessary, the number of occupants is estimated by applying the average load factor for that year by the average passenger capacity for a given airplane model.

The expected reduction in the proportion of occupants fatally injured in an accident resulting from a fire occurring in a Class D compartment is estimated as the ratio of fatalities to total occupants. Of the 1,411 individuals involved in the accidents cited above, 523 were fatally injured, representing approximately 37% of occupants.

Applying the risk reduction estimate above to airplane-specific departure, capacity, and load factor information (and using the statistical value of $2.7 million to represent the economic benefit associated with each fatality averted), FAA estimates that the rule will yield benefits of approximately $461 million over the life of the affected in-service fleet, or approximately $230 million at present value.

For a representative newly-manufactured airplane delivered to an ATA carrier, the FAA estimates that the rule will yield a life-cycle benefit of $280,000, or $94,000 at present value. For a newly-manufactured airplane delivered to a non-ATA carrier, FAA estimates that the rule will yield a life-cycle benefit of $340,000, or $115,000 at present value.

In view of the above, the FAA finds that the benefits of the rule justify its costs. Specifically, for the affected in-service fleet, discounted benefits will exceed costs by a factor of approximately 1.19. For affected newly-manufactured airplanes delivered to ATA carriers, discounted benefits will exceed costs by a factor of 1.57. For newly-manufactured airplanes delivered to non-ATA carriers, discounted benefits will exceed costs by a factor of 1.15.

The FAA believes there are also non-quantifiable benefits contained in this proposal, including increased consumer confidence in the aviation industry due to the installation of detection and suppression systems. The White House Commission on Aviation Safety and Security recommended that the FAA include these non-quantifiable benefits in evaluating safety proposals. The FAA took these non-quantifiable benefits into consideration while formulating the proposal.

Regulatory Flexibility Analysis

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily and disproportionately burdened by government regulations. Specifically, the RFA requires federal agencies to prepare a regulatory flexibility analysis for any rule that will have a "significant economic impact on a substantial number of small entities." The purpose of this analysis is to ensure that the agency has considered all reasonable regulatory alternatives that would minimize the rule's economic burdens for affected small entities, while achieving its safety objectives.

Based on the initial Regulatory Flexibility Analysis and information received during the comment period, the FAA certifies that a significant number of small entities would be substantially affected by the proposed rule. In its preliminary analysis, the FAA concluded that there were no alternatives for small entities that could provide an equivalent level of safety at reduced cost. This conclusion was based on an exhaustive study of options that ranged from relatively low-cost, purely preventive approaches (e.g., banning certain types of material from air transport) to mitigative approaches such as: (1) retrofit of detection systems only, (2) a requirement for detection systems on newly manufactured aircraft only, (3) a requirement for detection and/or suppression systems for extended overwater operations only, (4) retrofit of detection and suppression systems, (5) a requirement for detection and suppression systems on newly manufactured aircraft only, (6) logical combinations of the above.

Based on information received during the comment period, the FAA determines that this conclusion is correct with respect to 14 CFR part 121 operations. There were no comments indicating that: (1) the rule would place small part 121 operators at a competitive disadvantage relative to large part 121 operators, or (2) that there were alternatives that could provide the same level of safety benefit at reduced cost to small operators. Significantly, no analysis was submitted indicating that fire safety risks for small part 121 carriers were different than for large part 121 carriers.

As noted earlier, however, the FAA is reconsidering the options for part 135 operators (most of which are small). Several commenters note that the FAA's economic analysis did not consider smaller turbojet airplanes operated in nonscheduled service under part 135. These commenters also observe that

there are significant differences between nonscheduled part 135 operations and operations conducted under 14 CFR part 121. These differences, they claim, render the likelihood of an inflight cargo fire extremely remote.

The FAA agrees that further research is needed to evaluate the costs and benefits of detection and suppression systems for part 135 operators—in particular, those engaged in nonscheduled operations involving turbojet airplanes originally designed for business travel.

A copy of the regulatory evaluation prepared for this project may be examined in the Rules Docket or obtained from the person identified under the caption **FOR FURTHER INFORMATION CONTACT.**

International Trade impact Assessment

Recognizing that regulations that are nominally domestic in nature often affect international trade, the Office of Management and Budget directs Federal Agencies to assess whether or not a rule or regulation would affect any trade-sensitive activity.

This final rule could potentially affect international trade by burdening domestic manufacturers and air carriers with requirements that are not applicable to their foreign competitors, and thereby increase the relative price of domestically-produced goods and air travel provided by domestic operators.

The FAA holds, however, that this final rule will have a negligible impact on international trade. First, the rule will not establish either a competitive advantage or disadvantage for domestic airframe manufacturers—both domestic and foreign firms will be unable to sell newly-manufactured transport category airplanes with Class D cargo or baggage compartments in the U.S. since they will be ineligible for air carrier service in this country after December 31, 2000. Second, as noted above, several major U.S. Air carriers have already voluntarily installed detection or detection and suppression systems in airplanes for which there is no existing requirement to do so. This is also true for at least one major foreign airline. Third, the proposed rule will primarily affect smaller narrow-body airplanes that are used on domestic routes. Foreign carriers, of course, are not permitted to compete on domestic routes. Most airplanes used in international service are larger models which are already equipped with cargo of baggage compartment fire-detection and suppression systems. Finally, foreign civil aviation authorities have indicated to the FAA that they expect to adept similar fire-detection and suppression requirements.

Federalism Implications

The regulations adopted herein will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power or responsibilities among the various levels of government. In accordance with Executive Order 12612, it is, therefore, determined that this final rule will not have significant federalism implications to warrant the preparation of a Federalism Assessment.

International Compatibility

The FAA has reviewed the corresponding international Civil Aviation Organization regulations, where they exist, and has identified no differences in these amendments and existing ICAO standards. The FAA has also reviewed the regulations of the Joint Aviation Authorities and has discussed similarities and differences in these proposed amendments and the foreign regulations.

Paperwork Reduction Act

The Office of Management and Budget (OMB) has granted approval (control number 2120–0614, expiring August 31,2000) for the reporting required by this final rule. The costs and benefits of these proposed collection requirements are set forth in the section entitled "Cost Estimates," Above.

Regulations Affecting Intrastate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying regulations in Title 14 of the CFR in a manner affecting intrastate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish such regulatory distinctions as he or she considers appropriate. The FAA, therefore, specifically requested comments on whether there is justification for applying the proposed rule differently to intrastate operations in Alaska. Although one commenter expressed a concern related to a particular Alaskan intrastate operation involving Lockheed Electras, no comments were received concerning such justification in general. Since no comments in that regard were received and the FAA is not aware of any justification for such regulatory distinction, the final rule is not applied differently to intrastate operations in Alaska.

List of Subjects

14 CFR Part 25

Aircraft, Aviation safety.

14 CFR Part 121

Aviation safety, Air carriers, Air transportation, Aircraft, Airplanes, Transportation.

Adoption of the Amendment

In consideration of the foregoing, the FAA amends 14 CFR parts 25 and 121 of the Federal Aviation Regulations (FAR) as follows:

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

1. The authority citation for part 25 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702 and 44704.

2. Section 25.855(c) is revised to read as follows:

§ 25.855 Cargo or baggage compartments.

* * * * *

(c) Ceiling and sidewall liner panels of Class C compartments must meet the test requirements of part III of appendix F of this part or other approved equivalent methods.

* * * * *

3. Section 25.857 is amended by revising paragraph (c)(2) to read as follows and by removing and reserving paragraph (d):

§ 25.857 Cargo compartment classification

* * * * *

(c) * * *

(2) There is an approved built-in fire extinguishing or suppression system controllable from the cockpit.

* * * * *

(d) [Reserved]

* * * * *

4. Section 25.858 is amended by revising the section heading and introductory paragraph to read as follows:

§ 25.858 Cargo or baggage compartment smoke or fire detection systems.

If certification with cargo or baggage compartment smoke or fire detection provisions is requested, the following must be met for each cargo or baggage compartment with those provisions:

* * * * *

PART 121—OPERATING REQUIREMENTS: DOMESTIC, FLAG AND SUPPLEMENTAL OPERATIONS

5. The authority citation for part 121 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 40119, 44101, 44701–44702, 44705, 44709–44711, 44716–44717, 44722, 44901, 44903–44904, 44912, 46105.

6. Section 121.314 is revised to read as follows:

§ 121.314 Cargo and baggage compartments.

For each transport category airplane type certificated after January 1, 1958:

(a) Each Class C or Class D compartment, as defined in § 25.857 of this Chapter in effect on June 16, 1986 (see Appendix L to this part), that is greater than 200 cubic feet in volume must have ceiling and sidewall liner panels which are constructed of:

(1) Glass fiber reinforced resin;

(2) Materials which meet the test requirements of part 25, appendix F, part III of this chapter; or

(3) In the case of liner installations approved prior to March 20, 1989, aluminum.

(b) For compliance with paragraph (a) of this section, the term "liner" includes any design feature, such as a joint or fastener, which would affect the capability of the liner to safely contain a fire.

(c) After March 19, 2001, each Class D compartment, regardless of volume, must meet the standards of §§ 25.857(c) and 25.858 of this Chapter for a Class C compartment unless the operation is an all-cargo operation in which case each Class D compartment may meet the standards in § 25.857(e) for a Class E compartment.

(d) *Reports of conversions and retrofits.* (1) Until such time as all Class D compartments in aircraft operated under this part by the certificate have been converted or retrofitted with appropriate detection and suppression systems, each certificate holder must submit written progress reports to the FAA that contain the information specified below.

(i) The serial number of each airplane listed in the operations specifications issued to the certificate holder for operation under this part in which all Class D compartments have been converted to Class C or Class E compartments;

(ii) The serial number of each airplane listed in the operations specification issued to the certificate holder for operation under this part, in which all Class D compartments have been retrofitted to meet the fire detection and suppression requirements for Class C or the fire detection requirements for Class E; and

(iii) The serial number of each airplane listed in the operations specifications issued to the certificate holder for operation under this part that has at least one Class D compartment that has not been converted or retrofitted.

(2) The written report must be submitted to the Certificate Holding District Office by July 1, 1998, and at each three-month interval thereafter.

7. Appendix L to part 121 is amended by adding to the table an entry for § 121.314(a) to read as follows:

Appendix L to Part 121—Type Certification Regulations Made Previously Effective

* * * * *

Part 121 section	Applicable aircraft	Provisions: CFR/FR references
	* * * * *	
§ 121.314(a)	Transport category airplanes type certificated after January 1, 1958.	Class C or D cargo or baggage compartment definition, 14 CFR 25.857 in effect on June 16, 1986, 14 CFR parts 1 to 59, Revised 1/1/97, and amended by Amendment 25–60, 51 FR 18243, May 16, 1986.

Issued in Washington, D.C. on February 10, 1998.

Jane F. Garvey,

Administrator.

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