NPRM 84-11

Cargo Compartment Summary of Comments

1. The vast majority of commenters endorse the proposals, although some suggest minor modifications to the requirements.

2. Two commenters support the new rulemaking for the fire resistance of cargo compartments, but only for Class C and D. The same commenters also express their opinion that the rulemaking for improving fire safety in air carrier airplanes is proceeding faster than the fire safety technology. In response to this, another commenter contends that rulemaking for safety improvements should not be restrained by the philosophy that, if the technology does not exist, then no improvements are possible.

3. The commenters thought that the proposed test procedures are too severe, and one of the two thought the proposal should address smoke and toxicity.

4. Several commenters contend that the 1,000 cubic foot limitation for the Class D cargo compartment is too restrictive. Other commenters, in support of the volume, suggest that the proposed regulation specify an acceptable leakage airflow for the size. Our commenter suggests that the rate of ventilation and leakage into and out of Class D compartments be as low as practicable and should not exceed the following formula, which is a deduction from FAR 25.857(I)(5) and understood to be acceptable to the FAA:

W=2,000-V

Where W=ventilation and leakage airflow in cu. ft. hr.

V=compartment volume in cu. ft.

One commenter suggests that such compliance be shown for both pressurized and unpressurized flight.

5. Several commenters suggest different panel sizes for the test. The NPRM proposes the test specimen size as 16 x 25 inches. One commenter recommends that the test method be revised to allow the use of 16 x 24 inch specimens. This would reduce waste when cutting specimens from a standard 4 x 8 foot sheet as twelve specimens can be obtained compared to nine.

FAA Position: We concur.

6. Our commenter recommends that ceiling, sidewall and floor panel material should be required to exhibit an equal resistance to flame penetration . Two commenters contend that the proposal to retain the existing 45 degree bunsen burner test for approving floor panels to be inconsistent with the 5 minutes test proposed fro ceiling panel.

7. One commenter suggests a different qualification test to be used in conjunction ith the proposed NPRM test, in which different sized panels (610 mm x 610 mm) and positioning (203 mm below the surface of the horizontally mounted specimen and aimed at the center) are introduced.

Heat flux and temperature measurements of the NPRM prevail provided this does not preclude the use of aluminum sheets.

8. Several commenters suggest that the proposed rule address the fire containing performance of constructional fixtures, such as panel joints, structural attachments, lamp units, lashing points, pressure relief panels, etc. One of the commenters states that in this regard the proposed rule is misleading and inadequate.

9. One commenter's concern was that the research and development testing did not take into account the exacerbating adverse effects due to the presence of dangerous goods in the cargo compartment. The same commenter also suggests that the testing not be limited to Class C and D cargo compartments, but should also cover the other type compartments. In particular the commenter refers to Class B compartments on combi aircraft.

10. Two commenters recommend that fire detection systems be required for the Class D cargo compartment, so that the flight crew an be alerted to the existence of a fire. Another commenter recommends that all cargo compartments, except Class A and B, should be classified as Class C.

11. One commenter contends that the proposed test defined in Part II of Appendix F seems to confuse two objectives, namely, the need to demonstrate the ability of a material to resist flame penetration and the need to demonstrate fire containability of a "simulation" of the ceiling and sidewall. The commenter states that view A-4 of Figure I shares the edges of the panel held in a manner that is not representative and is not

therefore a "simulation" that will test a constructional detail. The commenter also contends that the apparatus assumes that the sidewall will be vertical which is not always the case.

12. One commenter contends that, although reinforced with fiberglass and using state-of-the-art resins, almost all ceiling liners and some side wall liners that are used in the current jet transport fleet do not meet one or more of the proposed requirements in the NPRM. The commenter also contends that state-of-the-art cargo/baggage compartment liner materials are not available that simultaneously satisfy the functional requirements and NPRM requirements for all ceiling/sidewall applications.

13. One commenter contends that additional FAA/Industry developmental work is clearly required prior to issuance of regulatory material to establish a test apparatus procedure/evaluation criteria that will accomplish the intent of the proposed rule.

14. One commenter made the following recommendations which were supported by another commenter:

a. Remove the applicability to Class B and E compartments;

FAA Position: The test methods specified in §§ 25.855 and 25.853 are not adequate to show compliance with the intent of the FAR's for cargo lining burn through resistance during a fire.

Full-scale cargo compartment fire tests showed that some cargo liners that passed the Bunsen burner test rapidly burned through when exposed to a realistic fire.

b. Require that Class D compartments comply with the 2,000 policy at all times;

FAA Position: Class "D" compartments should be restricted to 1,000 cubic feet.

This is based on the fact that even good burn through resistant liners become porous in the area of flame impingement. The larger the compartment the longer and larger the fire. Tests showed that the volume of the compartment was much more important then leakage in determining the size of a fire. Since it is necessary to limit any oxygen entering the compartment, the amount of liner that becomes porous is very important. Previous testing using oxygen starvation as the means to control fires (FAA-RD-70-42) indicated that "the severity of the resulting fire was greatly reduced when the compartment size was lowered to 1,000 cubic feet. The maximum temperatures recorded were less than half those in the larger compartments."

c. Remove the requirement limiting Class D compartments to 1,000 cubic feet.

FAA Position: Same as b.

d. Redefine the burner heat flux density, flame temperature, and time of application for Class D compartments to reflect the conditions established by FAATC in a compartment complying with the 2,000 policy at all times;

FAA Position: The test burner simulates the worst case exposure conditions including temperature, heat flux and duration of a realistic cargo fire, as determined by an analysis of several full-scale test programs. It thus provides a margin of safety for liner evaluation.

e. Redefine the burner heat flux density, flame temperature, and time of application for Class C compartments to reflect the fire conditions of a defined standard (to be established) in a compartment with a properly operating detection/extinguishing system complying with the § 25.858 one minute detection response time;

FAA Position: We feel we want to use the same burn-through criteria as Class D because the lining material in Class C compartments must maintain their integrity in order to keep a concentration of halon capable of suppressing a cargo fire.

The recent liner integrity survey indicates greater air leakage due to poor liner maintenance. This greater air leakage negates the effectiveness of current Class C compartment extinguishing system

design (second bottle discharge), indicating even more so the need for burn-through resistant liners.

f. Remove the acceptance criteria requiring that self-extinguishing time remain less than 15 seconds, and that glow time remain less than 10 seconds;

FAA Position: We concur.

g. Remove the requirement that sidewall and ceiling liners be tested simultaneously, and replace with a separate test for each;

FAA Position: We will conduct tests to see if that procedure is acceptable.

h. Increase the temperature limit from 400° F. in the acceptance criterion involving temperature four inches above a tested ceiling liner (the AIA will recommend a maximum above-ceiling temperature value);

FAA Position: We concur.

i. Revise the test fixture to allow a baffle to be placed around the liner which simulates a ceiling to prevent the piloted ignition of combustion gases;

FAA Position: We concur.

j. Revise the cost-benefit analysis,

FAA Position: We feel the cost-benefit analysis is realistic for the intent of the NPRM.

k. The NPRM proposes that "kerosene" be used as the fuel for the burner. "Kerosene"is too broad a term, as use of it has led to problems in the cargo liner material testing and seat cushion testing. The fuel requires more careful definition. Work is currently underway in the ASTM F-7.06 Subcommittee to define the burner fuel in the test method for seat cushions. It is recommended that an ASTM method be specified in a new cargo liner rule.

FAA Position: We concur.

l. The NPRM proposes that the burner cone have a dimension of twelve inches wide at the exit. Some equipment now in use was built to a dimension of eleven inches which was specified in the original draft. The AIA recommends that the NPRM be revised to allow the use of either by specifying the dimension at 11.5 $\pm$ 0.5 inches.

FAA Position: We are concerned that the burner exit cone area may have a bearing on the heat output of the burner flame. Therefore, we believe that the cone area should be strictly specified as 11 inches rather than 11.5 $\pm$ 0.5.

m. The NPRM proposes the test specimens be temperature conditioned prior to test. It is recommended that the relative humidity also be included and specified to be 50 ± 5% RH, as in the current FAR. Another commenter recommended the same.

FAA Position: We concur.

n. The NPRM proposes that only flat panels made of materials which comprise the liner be tested to determine if they need the requirements. Some assembled components installed in compartment ceilings and sidewalls are constructed of several different materials. It is recommended that these types of items be allowed to be tested as assemblies installed in appropriate flat panels. In this way, panel fabrication costs and testing costs can be maintained without compromising the rule effectiveness.

FAA Position: We concur.

15. One commenter mentions that the NPRM is not very well thought out and full of loopholes. The commenter further states that the NPRMs concept of allowing a fire to burn or letting it burn until reaching a fire blocking material is ridiculous and extremely risky. The commenter recommends putting out the fire with an on-board fire protection system.

16. One commenter considers the proposed rule is deficient in analysis. The commenter further states that the author of the proposed rule is

reacting to the preconceived notion that Kevlar and Nomex are less desirable than fiberglass as liner since there is nothing in the analysis to indicate that the L-1011 accident would have been prevented if fiberglass liners had been used.

17. One commenter requests the FAA review the proposed test methods to ensure that the procedures are repeatable throughout industry and that such test methods resemble as closely as possible an actual fire.

18. The same commenter also requests that any economic analysis used by the FAA to justify the proposed rule consider only those accidents that would have been prevented by the proposed rulemaking.

19. Our commenter notes that since publication of NPRM 84-11, Amendment 59 to § 25 has been adopted and that many of the elements of the test procedure for seat cushion flammability tests of that amendment would seem appropriate for cargo compartment liners. The commenter suggested including tolerances for length, time, temperature and heat flux. Also include a specimen relative humidity requirement, specify type of fuel for the test and insulating block material. The commenter also asks about the new burner width specified as 11 inches; whereas, the required width per (d)(2)(iii) of Appendix F, Part II, is 12 inches.

20. Our commenter requests inclusion of tolerances on thermocouples as specified in Appendix F, Part II, (d)(4),in the proposed item (d)(4).

21. One commenter requests addition to item (d)(7)....to flame penetration or test completion.

22. One commenter requests addition to item (g) of test procedure of requirement to record the flame time after removal of the flame source and the glow time.

23. One commenter states that predicated on review of the discussion section of NPRM 84-11, it is evident that action is required to correct deficiencies of those in-service aircraft not equipped with fiberglass cargo compartment liners and/or which have Class D compartments whose volume exceeds 1,000 cubic feet. The commenter encouraged the FAA to issue appropriate airworthiness directives to ensure that the minimum standards proposed in NPRM 84-11 are applied to in-service aircraft.

24. One commenter states that the purpose of this NPRM appears to be similar to that of the part of Advisory Circular AC-107A related to composite structures required to be fire resistant. The commenter adds, however, that the NPRM requirement appears to be more severe than the AC when considering severity of a fire in a cargo compartment should be lower due to the limited amount of oxygen in such a volume. The commenter considers this unjust and recommends adopting the AC method as a basis: vertical specimen, horizontal burner, aluminum witness, same flame temperature.

25. Our commenter contends that acceptance should be given to alternative use of other adequate burners (with adequate performance data). The

commenter claims that kerosene burners with improved adjustment and controlling devices are known and wonders why the use of gas-type burners is not considered for test purposes.

26. One commenter asserts that measurement of heat flux by using a specific colormeter should be more precise regarding what kind of heat energy shall be measured; heat radiation only on the heat flux consisting of radiation or convection.

27. One commenter states that specific regard should be applied to pure freighter and requirements should not be unified for a passenger and freighter aircraft.

28. One commenter contends that the NPRM should give credit to provisions of active fire extinguishing/suppression in Class B (manually) and Class C (auto) by use of liners with lower standard of fire containment than defined in the NPRM.

29. One commenter claims that research shows that the burner equipment as proposed does not confidently reproduce the test conditions specified for cargo liner certification testing.

30. One commenter made the following NPRM recommendation:

a. Establish a tolerance on the thermocouple calibration temperature as follows:

a 1700° F. minimum average temperature over the seven thermocouples with a maximum lower deviation for any one thermocouple of 100° F.

b. State in the rule that the details of the burner configuration are included for reference purposes only. The rule should emphasize the required burner type, the fuel flow rate and the minimum average heat flux density and flame temperatures.

c. In paragraph (f) of Appendix F which specifies the burner calibration procedure, all references to minimum values of flame temperature and heat flux density should be changed to minimum averages.

d. Change the maximum allowed temperature measured four inches above the horizontal test specimen to 500° F. and require that a baffle be placed around the upper test panel to prevent piloted ignition of the top surface.

#