B-H300-08-DML-49
November 3, 2008

U.S. Department of Transportation
Docket Operations, M-30
Docket No. FAA-2005-22997
1200 New Jersey Avenue, SE.
Room W12-140, West Building Ground Floor,
Washington, DC 20590-0001

BOEING

Subject: Additional Comments to Docket No. FAA-2005-22997, "Reduction of Fuel Tank Flammability in Transport Category Airplanes"

Reference:
(a) Boeing Letter B-H300-06-EAP-29, dated May 8, 2006, Comments to Docket FAA-2005-22997

(b) Notice of Proposed Rulemaking (NPRM) published in the Federal Register on November 23, 2005 (70 FR 70921)

(c) Final Rule published in the Federal Register on July 21, 2008 (73 FR 42444)

Dear Sir or Madam:

Enclosed are additional comments from Boeing Commercial Airplanes that provide data to further explain our comments previously submitted in our reference (a) letter to Docket FAA-2005-22997. We request that the FAA please consider this additional data when determining compliance with the final rule.

Please direct any comments or questions to Ms. Jill DeMarco of this office at (425) 965-3005.

Sincerely,

/Douglas Lane/

Douglas M. Lane
Director, Airplane Certification & Regulatory Affairs

Enclosure

Boeing Commercial Airplanes
Additional Comments to Docket FAA-2005-22997

The following additional comments concern "descent rates" in reference to NPRM, Appendix L, paragraph L25.3(b)(5); and Final Rule, Appendix N, paragraph N25.3(b)(5):

The Applicant should be able to provide and utilize representative airplane performance and fleet data regarding descent where available. Where representative airplane performance or fleet data is not available, one standardized descent is recommended. The FAA defined descent is inconsistent with the fleet averaging Monte Carlo approach that the rule is based upon, as it represents a descent that is faster than almost all (~99%) current descents and beyond ATC speed limitations in some cases. A more realistic, yet still conservative, single descent profile that takes into consideration min-idle descent with no unusual use of flaps or spoilers to reduce speed and minimal holds is; 2000 ft/min to 12,000 ft, then 1000 ft/min to 2000 ft, then 500 ft/min to sea level. Again, the applicant should only be required to use this if they are unable to provide representative data for the specific aircraft to which the design is applicable.

Boeing Developed Descent Distributions

The descent distributions provided below may be used as examples of actual substantiated descent distributions. The distributions are consistent with the systems found compliant to the Boeing 737 and 747 Special Conditions.

Boeing 737 to 777 airplane fleet data was acquired for a comprehensive understanding of fleet performance to be used for the NGS sizing and Monte Carlo Analysis.

Specifically, fleet data for the following parameters was used:

- Rate of Descent versus Altitude, with subsets of data covering different flap extensions
- Descent Level-Off data
    - Descent phase level-off probability versus altitude
    - Number of descent level offs per altitude band
    - Duration of individual descent level-offs including altitude dependence
- The Descent data was adjusted to account for sea level landings, rather than the actual airport altitudes, since the Monte Carlo Modeling assumes all landings occur at SL
- Comparisons were made with Boeing aerodynamic modeling data as a cross-check. Comparison shows the fleet data captures other effects such as ATC requirements, speed brake use and throttle changes.

This data was then used to generate descent profiles for specific Boeing airplane models. The output was validated by statistically analyzing the profiles and comparing

with the fleet statistics. Finally, these model-specific profiles were used to generate a generic descent duration histogram curve and a corresponding level-off duration histogram curve.

The generic curves were provided in Boeing letter B-H300-06-EAP-30 (dated May 8, 2006) to the FAA's Transport Airplane Directorate as Boeing's comments to the Advisory Circular and the Fuel Tank Flammability Assessment Method User's Manual (FTFAM) (see below).

Recommendation

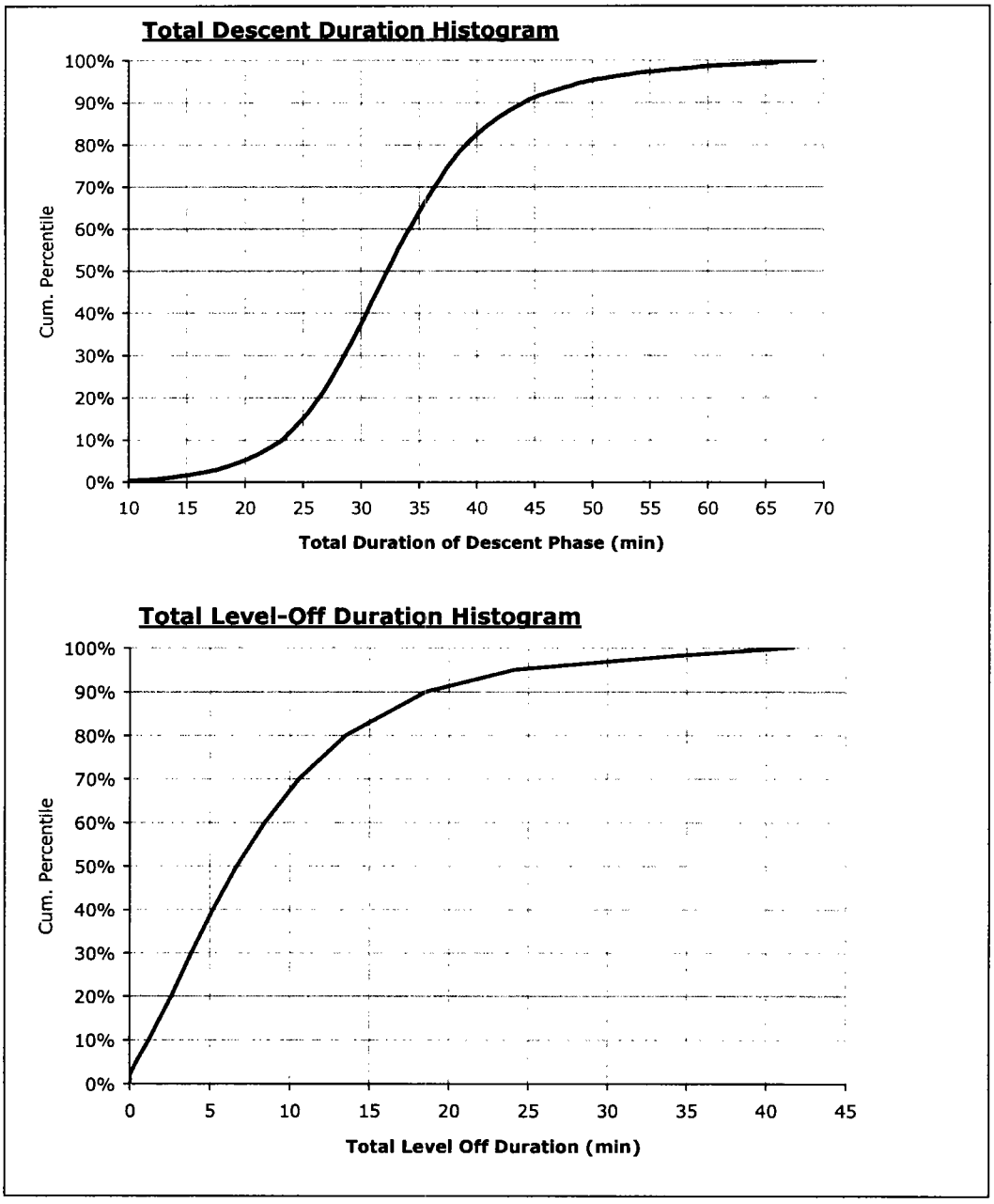
Boeing recommends the FAA allow applicants to use substantiated data to develop descent distributions for use in the Monte Carlo analysis. Boeing suggests the FAA provide the generic distributions below as examples of acceptable substantiated data. If an applicant is unable to substantiate distributions for the aircraft their design is applicable to, then the single descent rate (2,000 ft/min to 12,000 ft, then 1,000 ft/min to 2,000 ft, then 500 ft/min to sea level) should be used.

Boeing Response to Fuel Tank Flammability Assessment Method User's Manual (FTFAM):

The user should be given the option to utilize airplane performance and fleet statistics to determine descent durations. Specifically:

- Fleet data has shown that descent time is primarily a function of air traffic control operations. The applicant shall propose a descent profile distribution that fits within the guidelines defined in Appendix 2.

- *Appendix 2*: The descent profile shall be based on airplane performance, plus level-offs. Total descent time is a sum of time actually descending, plus time in level-offs. Level-offs shall be included resulting in a distribution of total descent times with a median of approximately 32 minutes. The median of total descent times shall not exceed 35 minutes. Included shall be a distribution of level-off time that has a range of approximately 0 to 45 minutes and a median of approximately 7 minutes. Approximately 20% of flights shall have level-off times greater than 14 minutes. Level-off time is the sum multiple periods of level-off occurring at separate altitudes during a typical descent. The distribution shall include an average of approximately 3 separate level-off periods during a typical descent. Examples of distributions that fit these guidelines are shown below:


Total Descent Duration Histogram
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cum. Percentile
10
15
20
25
30
35
40
45
50
55
60
65
70
Total Duration of Descent Phase (min)
Total Level-Off Duration Histogram
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Cum. Percentile
0
5
10
15
20
25
30
35
40
45
Total Level Off Duration (min)

Justification:

The tables values provide descent durations that are significantly shorter in duration than the real-world fleet. For an FRM involving the injection of inert gas into a fuel tank, airplane descent presents the critical performance phase for achieving flammability reduction. Airplane descent profiles derived from commercial fleet data will allow accurate characterization of FRM performance. The table look-up approach in the proposed NPRM is an unrealistic representation, and its application towards sizing and performance modeling of such an FRM will result in FRM systems that are extremely oversized. The cost and weight of such a system would be disadvantageous to the commercial airplane fleet, as compared to an inert gas injection-based FRM that was sized based on actual fleet statistics. This is a parameter that does not affect the comparative analysis with a main wing tank, but one which needs improved accuracy in order to be able to design a practical FRM.

BOEING

bcc (E-MAIL) for Letter B-H300-08-DML-49

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