U.S. Department
of Transportation
**Federal Aviation
Administration**

Transport Airplane Directorate
1601 Lind Avenue, S.W.
Renton, Washington 98057-3356

December 23, 2015

Exemption No. 11070C
Regulatory Docket No. FAA-2014-0299

Mr. Douglas M. Lane
Director, Regulatory Administration
The Boeing Company
P.O. Box 3707, MC 03-56
Seattle, WA 98124-2207

Dear Mr. Lane:

This letter is to inform you that we have granted your petition for another amendment to Exemption No. 11070. It explains the basis for our decision and describes its effect.

**The Basis for Our Decision**

By letter no. RA-15-03488, dated August 28, 2015, you petitioned the Federal Aviation Administration (FAA), on behalf of The Boeing Company, for another amendment to Exemption No. 11070. A previously granted amendment to the exemption (Exemption No. 11070A) allows substituting laboratory and ground tests for the requirement to investigate engine operating characteristics in flight. It also permits use of airplane speed as a means to set minimum engine power needed to maintain engine operability in ice crystal icing (ICI) environments. Since granting the original exemption, the FAA has concurred with Boeing's proposal to utilize data gathered from in-service events in combination with ground tests and analysis as a means of compliance with the requirement of § 25.939(a) to investigate engine operating characteristics in flight. However, the Boeing-proposed airplane flight manual (AFM) limitations and operating procedure for operating near or in ICI conditions, requiring the flightcrew to maintain a minimum airplane speed, is not directly compliant with § 25.939(a). Therefore, the amendment requested by Boeing would extend the time-limited grant of exemption to September 30, 2016, and allow certification of a configuration that removes the operational limitations imposed by the airworthiness directive (AD) action. The time extension is necessary to allow Boeing sufficient time to validate and certify an engine configuration that is fully compliant with § 25.939(a), Amendment 25-40, of Title 14, Code of Federal Regulations (14 CFR).

In the petition submitted to support Exemption No. 11070B (extending the time-limited relief from § 25.939(a) to December 31, 2015), Boeing estimated that certification of a fully compliant engine configuration by the end of 2015 would be achievable. However, Boeing states that the numerous certification projects associated with the final ICI limitation

revision have taken more time than initially estimated. In addition, the evaluation of the results of the extensive testing conducted at the National Aeronautics and Space Administration (NASA) Glenn Research Center has also taken more time than anticipated.

We have reviewed the data provided by Boeing and have determined that the additional time requested will allow Boeing to complete the analysis and compilation of substantiating documentation required to demonstrate full compliance with the requirements of § 25.939(a).

For the reasons cited in the original petition and repeated in the request for amendment, the FAA agrees with Boeing's statement of public interest. Therefore, we find that extending the expiration for this time-limited exemption to September 30, 2016, is in the public interest.

In addition, the FAA has determined that good cause exists for not publishing a summary of the petition, for public comment, in the *Federal Register* because the requested amendment to the exemption would not set a precedent, and any delay in acting on this petition would be detrimental to The Boeing Company and operators and flightcrews of 747-8/-8F airplanes.

In the petition for amendment, Boeing requested clarification on the following:

> Boeing requests that the FAA clarify whether it was the FAA intent, with the sentence "Design changes and modifications to in-service Model 747-8 and 747-8F airplanes involving engine ice-protection systems and associated [airplane flight manual] AFM limitations made after December 31, 2015, must also fully comply with § 25.939(a) at Amendment 25-40," to include revenue service airplanes in the exemption.

This requirement has been included in all amendments to this exemption and was added when Boeing requested that the FAA add time-limited relief from § 25.939(a) to Exemption No. 11070. The original intent of this provision was to require that design changes approved after December 31, 2015, for existing airplanes (modifications) be compliant with § 25.939(a). However, Boeing expressed concerns that this provision could force operators to complete major modifications to multiple engines at the same time. Since § 25.939(a) applies to the airplane, and not just to individual engines, this provision would require that all four engines be modified to bring them into compliance at the same time. This is a practice advised against in Boeing and industry publications because of possible maintenance errors that would be repeated on multiple engines, potentially introducing significant common-cause safety problems. We have considered Boeing's concerns and have removed the reference to modifications from the provision and extended the date to September 30, 2016. This will allow approval of service instructions that are not directly compliant until that time. The service instructions approved prior to that date could include configurations with partial incorporation of design modifications, allowing airlines to avoid concurrent major modifications on multiple engines. However, after that date, all design changes, whether for newly produced or existing airplanes, must be fully compliant with § 25.939(a).

**Our Decision**

The FAA has determined that the justification for the issuance of Exemption No. 11070 remains valid with respect to this amendment and is in the public interest. We based this determination on additional information Boeing provided to support this petition and additional data provided to the FAA on August 18, 2015, which contained a summary of recent in-service ICI encounters that resulted in elevated engine vibrations. This information provides indication that the ICI logic that is now fully incorporated into the fleet is providing the expected benefit to the engines when operating in ICI conditions. The ICI logic, in conjunction with the current airplane flight manual ICI limitations and operating procedures (which by themselves are acceptable from a workload and complexity standpoint), result in no compromise in the level of safety for the airplane for the requested time period of this exemption.

**The Effect of Our Decision**

Our decision extends a time-limited exemption from § 25.939(a), at Amendment 25-40, to Exemption No. 11070 for Model 747-8 and 747-8F airplanes that have incorporated engine ice protection system modifications and associated AFM limitations. This grant of amended exemption provides a specific expiration date of September 30, 2016.

**The Grant of Amended Exemption**

In consideration of the foregoing, I find that a time-limited grant of exemption is in the public interest regarding 14 CFR 25.939(a) at Amendment 25-40. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701, delegated to me by the Administrator, I grant The Boeing Company an exemption until September 30, 2016, from the requirements of § 25.939(a), as amended by Amendment 25-40. This amendment to the exemption is applicable to new production and in-service Boeing Model 747-8 and 747-8F airplanes incorporating modified electronic engine control software with engine ice protection system changes and associated AFM limitations.

Boeing must show full compliance to 14 CFR 25.939(a), at Amendment 25-40, for newly produced Model 747-8 and 747-8F airplanes in order to receive a certificate of airworthiness after September 30, 2016. Approval of design changes for in-service Model 747-8 and 747-8F airplanes involving engine ice protection systems and associated AFM limitations made after September 30, 2016, must also fully comply with 14 CFR 25.939(a) at Amendment 25-40.

All conditions and limitations of Exemption No. 11070 remain the same. This letter must be attached to, and is a part of, Exemption No. 11070.

Sincerely,

*Original signed by-*

John P. Piccola
Acting Manager, Transport Airplane Directorate
Aircraft Certification Service