Exemption No. 10922

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98057-3356

In the matter of the petition of **The Boeing Company** for an exemption from §§ 25.901(c) and 25.981(a)(3) of Title 14, Code of Federal Regulations	**Regulatory Docket No. FAA-2013-0106**

TIME-LIMITED PARTIAL GRANT OF EXEMPTION

By letter no. RA-13-00338, dated January 31, 2013, Virinder Duggal, on behalf of Douglas M. Lane, Director, Regulatory Administration, The Boeing Company, P.O. Box 3707, Seattle, WA 98124, petitioned the Federal Aviation Administration (FAA) for an exemption from the requirements of §§ 25.901(c) and 25.981(a)(3) of Title 14, Code of Federal Regulations (14 CFR). This exemption, if granted would allow planned changes to the Fuel Quantity Indication System (FQIS) for the fuel-quantity processor unit (FQPU) parts-obsolescence modification on Boeing Model 777-200 and -300 airplanes.

The petitioner requests relief from the following regulation(s):

> **Section 25.901(c) at Amdt 25-126** – *Installation*. For each powerplant and auxiliary power unit installation, it must be established that no single failure or malfunction or probable combination of failures will jeopardize the safe operation of the airplane except that the failure of structural elements need not be considered if the probability of such failure is extremely remote.
>
> **Section 25.981(a)(3) at Amdt 25-125** – *Fuel tank ignition prevention*. (a) No ignition source may be present at each point in the fuel tank or fuel tank system where catastrophic failure could occur due to ignition of fuel or vapors. This must be shown by: (3) Demonstrating that an ignition source could not result from each single failure, from each single failure in combination with each latent failure condition not shown to be extremely remote, and from all combinations of failures not shown to be extremely improbable. The effects of manufacturing variability, aging, wear, corrosion, and likely damage must be considered.

Related sections of 14 CFR

Section 25.1309 – Equipment, systems, and installations, states that required equipment, systems, and installations be designed to ensure that they perform their intended functions under any foreseeable operating condition and that the occurrence of any failure condition that would prevent the continued safe flight and landing of the airplane be extremely improbable.

The petitioner supports its request with the following information:

This section quotes the relevant information from the petitioner's request, with minor edits for clarity. The complete petition is available at the Department of Transportation's Federal Docket Management System, on the Internet at http://regulations.gov, in Docket No. FAA-2013-0106.

Description of Issue:

The Fuel Quantity Processor Unit (FQPU) manufacturer informed Boeing that their supply of particular components within the FQPU would be exhausted in late 2013 and that they had unsuccessfully attempted to find alternate sources for the procurement of these components, leading to component changes within the FQPU. The FQPU component changes included the following hardware changes to the FQPU Circuit Card Assemblies (CCAs), which contain the following airborne electronic hardware (AEH) devices that are complex per RTCA/DO-254:

- ARINC 429 receiver Application Specific Integrated Circuit (ASIC) device
- ARINC 629 ASIC device
- Three unique FPGAs (Field Programmable Gate Array)
- Commercial Off The Shelf (COTS) microprocessors

It is the position of The Boeing Company that system level full compliance to 25.901(c) Amendment 25-126 and 25.981(a)(3) Amendment 25-125 for Fuel Quantity Indicating Systems (FQIS) for retrofit of previously delivered 777-200 and 777-300 model series airplanes prior to line number 562 should not be required for this proposed change. The objective of this exemption is to allow airline operators to install the changed FQPU on earlier airplane models that are no longer in production. The basis for this exemption request is that without exemption relief, significant airplane changes would be required for these earlier airplanes. These changes involve new system architecture and extensive airplane wiring installation changes to ensure adequate wire separation throughout the fuel quantity indication system. This level of retrofit change for the existing fleet would be a significant burden as the changes are costly and time consuming and would not provide a proportional benefit or increased level of safety that is comparable to the level of effort required to incorporate them.

Statement of Public Interest:

Granting this exemption is in the public interest because denial of this petition for exemption would result in the airlines having to perform extraordinary work which would result in disruption of operations and would pose significant burden on the airlines to

make the airplane changes outlined for installation of a 25.901(c) and 25.981(a)(3) compliant FQIS whenever an in-service FQPU fails within their fleet.

Statement of No Adverse Effect on Safety:

The current FQIS system on the 777-200 and 777-300 model series has been thoroughly evaluated for safety aspects in such forums as Boeing's safety assessment that was required per 14 CFR Special Federal Aviation Regulation No. 88 (SFAR88) for the FQIS and no safety issues were identified by Boeing. Since then there have been safety improvements to address issues identified by the FAA. The replacement FQPU will be certified and thoroughly tested to the current regulations during qualification testing. Allowing the changed FQPU to be retrofitted and installed as a part of the existing FQIS will not adversely affect the existing level of safety.

Request to Waive Publication and Comment:

In view of the anticipated obsolescence of parts by late 2013, Boeing requests that the Public comment period be kept to a minimum.

Privileges of the Exemption Outside the United States:

Per 14 CFR 11.81(h), Boeing requests that the privileges of this exemption be extended outside the United States. This extension of privileges is necessary for operations based within foreign countries having bilateral agreements with the United States accepting FAA 14 CFR part 25 as their airworthiness standards for transport category aircraft.

Conclusion:

Boeing is petitioning for an exemption from the provisions of 14 CFR 25.901(c)[25-126] and 14 CFR 25.981(a)(3)[25-125] at the system level as they apply to the FQIS installed on the 777-200 and 777-300 airplanes prior to line number 562 for the FQPU parts-obsolescence change described.

The following component changes are necessary due to part obsolescence:

- ARINC 429 receiver ASIC device (Application Specific Integrated Circuit)
- ARINC 629 ASIC device
- Three unique FPGAs (Field Programmable Gate Array)

The changed FQPU with these components will not impact the FQIS safety and the part itself will be shown to meet the requirements of 14 CFR 25.901(c) and 25.981(a)(3). Granting this exemption will allow use of the type certified production FQPU line replaceable unit (LRU) on previously delivered 777-200 and 777-300 model series without extensive rework to an in-service aircraft.

Federal Register publication

Although the petitioner requested that action on its petition not be delayed for publication in the Federal Register, the FAA found that the petition, if granted, would set a precedent. Therefore, to allow an opportunity for the public to comment on the petition, a summary of it was published in the Federal Register on February 25, 2013 [78 FR 12807].

Comments were received from the National Air Traffic Control Association (NATCA) National Safety Committee. NATCA recommended granting only a time-limited exemption for the existing fleet of airplanes. This would provide the minimum time necessary for operators to modify their existing airplanes such that the installation complies with the regulations listed in the petition for exemption. This would be consistent with, and complement issuance of, the airworthiness directive (AD) required by FAA policy memorandum PS-ANM100-2003-112-15, "SFAR 88 – Mandatory Action Decision Criteria" dated February 25, 2003, for the airplanes covered by this petition for exemption.

NATCA supported their recommendations as follows:

> NATCA has reviewed the subject petition for exemption and has similar concerns as those raised in our comments to the 757 NPRM (see docket item FAA-2012-0187-0005) and the similar petition for exemption for the Model 737 airplanes (docket FAA-2012-1137), Model 767 airplanes (docket FAA-2012-1132) and Model 747-400 airplanes (docket 2012-1324). NATCA questions how allowing the noncompliant design features described in the petition for exemption to remain in 777 airplanes indefinitely "would not adversely affect safety, or how the exemption would provide a level of safety at least equal to that provided by the rule from which you seek the exemption" (see 14 CFR 11.81). Those design features are defined by the FAA as unsafe in airworthiness directives issued for similar designs on 747 and 737 classic model airplanes and in the FAA's own published SFAR 88 "Mandatory Action Decision Criteria" document; FAA Memorandum number 2003-112-15, dated February 25, 2003. Granting an exemption for a "phased compliance" approach clearly doesn't provide the level of safety that requiring an initially compliant design would provide.

Therefore, as discussed above, NATCA recommended that the FAA not grant the petition for exemption as submitted in docket number FAA-2013-0106, but instead recommended a time-limited exemption for the existing fleet of airplanes.

The FAA's analysis

In June of 2011, Boeing met with the FAA to describe the changes to the 737NG FQIS that are similar in nature to the changes to the 777 that are the subject of this exemption request. The FAA informed Boeing that we could not approve modifications to the FQIS since the ignition-source-prevention features of the system could not be shown to meet § 25.981 at Amendment 25-102. We also reminded Boeing of our decision to issue SFAR 88-related ADs for FQIS, and of our letters of August 2009 and April 2011 requesting that Boeing develop design changes and service information describing the corrective actions for FQIS protection.

The petitioner's justification for requesting a permanent exemption to §§ 25.981 and 25.901 relies largely on the availability of a design modification, which Boeing refers to as "safety improvements," which the FAA infers means the installation of a nitrogen-generation system (NGS). The NGS provides fuel-tank flammability-reduction means (FRM) meeting criteria determined to be equivalent to the standards established by the FAA through the Fuel Tank Flammability Reduction (FTFR) rule introduced into 14 CFR part 25 at Amendment 25-125. However, not all 777 series airplanes in the fleet are required to be retrofitted with NGS. The petitioner also confirmed that all current 777 series airplanes in production fully comply with the current fuel-system ignition-prevention standards of §§ 25.901(c) and 25.981.

Mandating retrofit of FRM was found to be in the public interest on newer transport airplanes in passenger service with high-flammability fuel tanks. All 777 series passenger airplanes registered in the United States and operating under 14 CFR parts 121, 125, and 129 will be required to have FRM. However, FRM is not required to be retrofitted into cargo airplanes; airplanes operated under 14 CFR parts 91 and 135; and airplanes operated in foreign countries unless the foreign country has adopted regulations that implement the fleet-safety improvements provided by FRM.

For clarity, the FAA does not agree with the petitioner's statement that, "The current FQIS system on the 777-200 and 777-300 has been thoroughly evaluated for safety aspects as was required per 14 CFR part 21, Special Federal Aviation Regulation No. 88 (SFAR 88) for the FQIS and no safety issues were identified." As identified in the Notice of Proposed Rulemaking (NPRM) for 757 series airplanes, Docket No. FAA-2012-0187, the FAA intends to issue ADs for other airplane models, such as the 777, with high-flammability fuel tanks that are not required to retrofit FRM. These ADs will incorporate FQIS protection to prevent potential sources of fuel-tank ignition per SFAR 88. This includes all airplanes in cargo operation, and airplanes in 14 CFR part 91 and 135 operations. The ADs are expected to affect many foreign-registered airplanes produced before Boeing incorporated its FRM, which they refer to as the NGS, in production in 2009 as well. We are currently preparing a supplemental NPRM, to add another method of compliance for airplanes in cargo operation, to achieve an acceptable level of safety for those airplanes. Boeing is required by 14 CFR 21.99 and 183.63(d) to submit appropriate design changes, as well as service information, for FAA approval, and has agreed to do so in a timely manner to support these ADs. We do not anticipate that changes to the FQIS resulting from these planned ADs will involve changes to the FQPU itself.

The FAA's current fuel-tank-safety airworthiness standards rely upon a balanced approach of limiting fuel-tank-flammability exposure time and precluding ignition sources that could form in the fuel tanks. For this reason, § 25.981 includes separate and distinct requirements for limiting fuel-tank flammability and preventing ignition sources in the fuel tanks. The Boeing NGS was shown to meet criteria equivalent to the flammability requirements of § 25.981, Amendment 25-125; however, fuel-tank-ignition failure modes described in the petition for exemption do not comply with the ignition-prevention requirements of § 25.901(c), Amendment 25-46 or 25-126, or § 25.981(a)(3), Amendment 25-102 or 25-125. When considering the FQPU design change described in the petitioners request, that design change has no negative effect on potential fuel-tank ignition and no negative effect on the level of safety in the 777 FQIS. However, granting a permanent exemption would not provide a level of safety at least equal to that provided by the rule from which Boeing seeks the exemption (see 14 CFR 11.81) because areas affected by this change would not be compliant, as required by 14 CFR 21.101.

NATCA recommended that the FAA only grant a time-limited exemption to the petitioner. We partially agree. Completing the design changes necessary to fully comply with the fuel-tank-ignition prevention standards of §§ 25.901(c) at Amendment 25-46, and 25.981(a)(3) at Amendment 25-102, and incorporating the changes into newly-produced airplanes, will further reduce the risk of fuel-tank ignition and enhance safety by restoring the balanced approach to fuel-tank safety required by 14 CFR part 25. However, the changes described by Boeing in the exemption request, which are needed to bring in-service airplanes into compliance, are extensive.

Not granting the exemption would not be in the public interest because it would not allow operators to replace fuel-quantity processor units on in-service airplanes, when replacement FQPUs are needed, without unintended impact to scheduled operations. Therefore, a partial grant of exemption is in the public interest. We are establishing a 36-month time limit for this exemption, corresponding with a similar petition for exemption for the Model 767 airplanes (docket FAA-2012-1132). This time limit provides reasonable time to incorporate the modifications required for full compliance in the event Boeing produces Model 777-200 or 777-300 airplanes in the future.

As indicated in the 757 FQIS NPRM, the FAA plans to mandate FQIS protection similar to that discussed in the NPRM on other Boeing airplanes, which includes the 777 series airplanes. The ADs will incorporate the long-term FQIS protection for in-service airplanes to which this exemption applies. Boeing is required by §§ 21.99 and 183.63(d) to develop design changes and service information describing the corrective action for FQIS protection. Boeing has committed to provide the data necessary to support these modifications, mandated by the ADs, in a timely manner to support these ADs.

The FAA's decision

In consideration of the foregoing, I find that a time-limited partial grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701 delegated to me by the Administrator, The Boeing Company is hereby granted an exemption from 14 CFR 25.901(c), Amendment 25-126, and 25.981(a)(3), Amendment 25-125, as they pertain to fuel-tank-ignition prevention associated with the FQIS, limited to design changes within the FQPU in support of parts obsolescence, for in-service Model 777-200 and -300 series airplanes prior to line number 562.

Within 36 months after the effective date of this exemption, any newly produced Model 777-200 and -300 series airplanes must be shown to comply with 14 CFR 25.901(c) at Amendment 25-46, and 25.981(a)(3) at Amendment 25-102, or later amendments, prior to receiving a certificate of airworthiness.

Issued in Renton, Washington, on January 31, 2014.

/s/ John P. Piccola, Jr.

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