FAA
Aviation Safety

SPECIAL AIRWORTHINESS INFORMATION BULLETIN

SAIB: 2020-02

SUBJ: Engine Fuel – Jet Fuel Biocide Additive **Date:** March 25, 2020

This is information only. Recommendations aren't mandatory.

Introduction

This Special Airworthiness Information Bulletin (SAIB) advises gas turbine-powered aircraft and engine manufacturers, aircraft operators, fixed-base operators (FBOs), FAA repair stations, flight standards district offices, and other civil aviation authorities of the recent developments regarding the use of aviation fuel biocides and adverse engine operating conditions that have resulted from its use. The recommendations in this bulletin provide general guidance on the use of Kathon FP1.5 and Biobor JF biocide jet fuel additives that can be used to supplement existing original equipment manufacturer procedures.

While the airworthiness concern is not an unsafe condition that would warrant airworthiness directive (AD) action for every aircraft and engine combination, under Title 14 of the Code of Federal Regulations (14 CFR) part 39, some individual AD action may be necessary on certain aircraft engine combinations.

Background

FAA approved aviation fuel operating limitations may be listed in the product's aircraft flight manual, type certificate data sheet (TCDS), installation manual, service instructions or manuals, or as limitations associated with a supplemental type certificate. Many of the fuel specifications allow for the use of a biocide to control microbiological growth in the fuel system of the aircraft. The two most common biocides in use today are Kathon FP1.5 and Biobor JF.

Microbiological contamination is caused by micro-organisms (bacteria, molds, yeasts) that grow in water and feed off the hydrocarbons in the fuel. Good housekeeping to prevent water accumulation in the fuel tanks is the most effective means to prevent this contamination. In case microbiological contamination is detected and needs to be treated with biocides, all maintenance personnel, aircraft owners and operators are expected to follow up-to-date instructions in the engine and aircraft manufacturer's Aircraft Maintenance Manuals (AMMs) to ensure that the correct method and dosage is applied. In case of discrepancies, e.g. due to different update cycles of aircraft documentation, the manufacturer should be contacted for further advice.

In engines and aircraft where biocides are approved for use, the manufacturers provide procedures in their AMMs for the application of these biocides into the aircraft fuel tanks. Several recent events have been documented showing adverse engine effects on the ground and in-flight after application of a biocide treatment of the aircraft. Two of these events were the result of overdosing the fuel system beyond the recommended dosage, however, one event has shown no evidence of misapplication. While lack of clarity of the AMM procedures, or lack of adherence to those procedures by the maintenance personnel, may have contributed to the overdosing events, evidence suggests that some engine models are more sensitive to Kathon FP1.5 concentration than others.

As a result, DuPont, the manufacturer and distributor of Kathon FP1.5, has recommended discontinuing the use of Kathon FP1.5 for aviation-related products. General Electric is also taking measures to remove Kathon FP1.5 from the approved fuels additives across all their engine

products while additional testing is being conducted. This SAIB provides recommendations in response to these recent events and notes publications for the proper continued use of biocide in fuel for products for which it is approved.

Recommendations

1. Operators should consult their Aircraft Flight Manuals (AFMs), AMMs, the latest service documents, and communications from the manufacturers of their engines and aircraft to determine which biocide additives are approved for use on their aircraft and engines and adjust their procedures to reflect the latest approvals.
2. Gas turbine powered engine and aircraft manufacturers and operators should review current biocide application procedures and practices and consider the following recommendations:
    a. Aircraft fuel tanks should have the following minimum volume of fuel upon completion of biocide treatment:
        i. 1/3 of tank volume for the initial treatment of a tank with confirmed biological contamination. This may be increased if the aircraft is not limited by fuel weight for its intended mission.
        ii. 100% of tank volume for a second treatment of a tank with confirmed biological contamination (if necessary).
        iii. 10% of tank capacity for preparing aircraft for storage.
    b. The additive should be applied to an aircraft fuel tank as follows:
        i. For aircraft equipped with underwing pressure refueling capability, the additive should be injected with a metered injection cart at the concentration levels shown in Table 1. The injection cart should be equipped with a graduated additive vessel to allow the determination of the volume of additive injected during a biocide servicing.
        ii. For all other aircraft, a means should be provided to blend the biocide additive into the jet fuel upstream of a pump and/or filtering system prior to loading into the aircraft fuel tank. This can be accomplished by blending the biocide additive into a refueling vehicle or separate fuel tank and then pumping the fuel into the aircraft.
    c. The resulting concentration of biocide additive in the aircraft fuel tank should not exceed the levels shown in Table 1. Prior to treatment, care should be taken to account for residual biocide levels that exist in the tank, either from previous treatments or from the fuel supplier.
    d. For each application of an approved biocide additive, record the following information:
        i. Type of biocide used
        ii. Quantity of fuel in the aircraft tank before additive injection
        iii. Quantity of fuel uplifted into the tank when injecting the biocide additive
        iv. Quantity of fuel in the tank after injection of the biocide additive
        v. Quantity of biocide additive injected for each application

Table 1
Maximum Recommended Concentrations in Jet Fuel

	Kathon FP1.5	Biobor JF
Maximum Concentration of Biocide Additive in Uplifted Fuel	0.135 ml/L[1]	0.269 ml/L[2]
Maximum Concentration of Biocide Additive in Aircraft Fuel Tank after Biocide Injection	0.100 ml/L [3]	0.199 ml/L[4]

3. Operators, Repair Stations, and FBOs should review their procedures, training requirements, and training records of persons charged with adding biocide to affected aircraft. They should also verify that their biocide application procedures are consistent with those provided in the manufacturer's AMM, and that maintenance personnel are adhering to those procedures.
4. Operators and FBOs should keep detailed records of any biocides applied to fuel farms and uploaded to aircraft such that the proper end dosage can be determined based on the fuel supplied.
5. Operators should review their records for potential unreported cases of fuel control damage or contamination that may be the result of biocide contamination. If any cases are found, they should be reported to the engine and aircraft manufacturer.
6. Procedures for decontaminating fuel systems on aircraft should also consider:
    a. Maximum biocide concentration permitted in uplifted fuel and in the fuel in the aircraft tank are clearly specified.
    b. Proper quality controls are included in the process such that real-time calculation are not required by the crew trying to perform the decontamination tasks.
    c. Necessary caution statements and warnings for administering any fuel additive that can overdose the fuel system and cause hazardous engine effects are included.
7. Environmental regulations may restrict the use of certain aviation jet fuel biocides in some localities. The FAA recommends that the engine and aircraft manufacturers ensure that adequate procedures are in place to prevent biological contamination of aircraft fuel tanks using alternative means other than the restricted biocide.
8. Engine and aircraft manufacturers should survey their operators who may have experienced biocide contamination of engine fuel system components and report the results to their appropriate airworthiness authority.
9. Flight Standards Inspectors and airworthiness authorities should focus audit activities on the proper application of all biocides. Pay particular attention to those steps that ensure the proper concentration of additive is blended into the fuel.

For Further Information Contact

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[1] 0.135 ml of Kathon FP1.5 per liter of jet fuel is equal to 135 parts per million (ppm) by volume.
[2] 0.269 ml of Biobor JF per liter of jet fuel is equal to 269 parts per million (ppm) by volume (also equivalent to 364 ppm by weight based on a minimum density jet fuel)
[3] 0.100 ml of Kathon FP1.5 per liter of jet fuel is equal to 100 parts per million (ppm) by volume.
[4] 0.199ml of Biobor JF per liter of jet fuel is equal to 199 parts per million (ppm) by volume (also equivalent to 270 ppm by weight based on a minimum density jet fuel)