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OPERATION OF AIRCRAFT

SAFETY

FUEL CONTAMINATION

A Indicates changes.

A This AIC replaces AIC 21A1 dated 94-01-15.

1. Several aircraft accidents have been attributed to loss of engine power due to water in the fuel system.

The purpose of this AIC is to assist the aviation community in identifying and preventing fuel contamination.

1.1 WATER

Aviation fuels absorb water from the air and retain it in the form of suspended liquid particles. Water also condenses in fuel tanks. The greatest amount of water is absorbed under high temperature conditions. When the temperature decreases the water becomes suspended and forms small droplets which give the fuel a cloudy appearance. If the fuel is not agitated the suspended water will become liquid if adequate settling time is allowed. The minimum settling times for AVGAS and turbine fuels are 15 minutes and 1 hour, respectively, per 30 cm depth of fuel. Settled water will become suspended if the fuel in the tank is agitated, for example, when fuel is added.

Water may also enter fuel tanks when it rains, or the aircraft is washed, and filler caps leak, or when fuel from contaminated containers is added.

1.2 RUST

Pipe lines, storage containers and drums tend to rust and this may enter fuel in the form of small particles. A high degree of filtration is necessary to remove such impurities.

1.3 DUST AND SAND

Fuel may be contaminated with dust and sand which enter the fuel through openings in tanks and dirty fuel handling equipment.

1.4 MICRO-ORGANISMS

Microbes which may enter the fuel from the atmosphere or from storage containers live at the interface between the fuel and the water in the tank since it lives on hydrocarbons in an aqueous solution. The microbes multiply rapidly and cause serious corrosion in fuel tanks. They may also clog filters and metering equipment. The growth is particularly serious if it occurs together with other forms of contamination. Turbine fuel is particularly susceptible to microbes.

2. Contamination in fuel systems may to a large extent be prevented by taking precautionary measures such as the following:

2.1 Ensure that filler caps seal properly.

2.2 If possible, fuel tanks should be filled before parking the aircraft at the end of each day's flying as this will minimise condensation.

2.3 Allow for adequate settling time before checking fuel for the presence of water.

2.4 Before refuelling and again before flight, check the fuel for the presence of water. Use a transparent container and drain off generous amounts of fuel from the fuel tank sumps and the filter bowl. If still in doubt use water detecting paste.

- 2.5 *When refuelling from drums or other containers, carefully inspect, identify and check the contents for contamination.*
- 2.6 *Do not use fuel which has a cloudy appearance or which is "off-colour".*
- 2.7 *When refuelling from drums, filter the fuel through a 5 micron metal filter or, as a last resort only, a chamoisskin filter. Filtration through chamoisskin is dangerous because of the excessive static electricity which is generated when the fuel passes through the skin pores.*
- 2.8 *Use only the fuel recommended by the engine manufacturer.*
- 2.9 *Use only additives approved for use in the aircraft.*
- 2.10 *Ensure that the aircraft is parked on level ground when checking the fuel. Failure to do this could result in water gravitating to an area of the fuel tank where it will not flow through the tank drain.*

COMMISSIONER FOR CIVIL AVIATION