

**MICROBIOLOGICAL CONTAMINATION OF FUEL TANKS OF
TURBINE ENGINED AIRCRAFT**

1. Introduction

- 1.1 Reports have been received that aircraft regularly operating in climatic conditions such as those prevailing between latitudes 30° North and South have been contaminated in the fuel tanks by a fungus. Another aircraft, regularly operating from the United Kingdom, was found to have localized areas of heavy growth when inspected after standing in a heated hangar for two months with fuel in the tanks. It is considered that the storage conditions were a contributory factor.
- 1.2 In one case contamination was found during an investigation into the cause of erratic fuel contents indication, when white crusty deposits and brown stains were seen on the probes. Further examination revealed the presence of brown/black slimes adhering to horizontal upward facing surfaces within the tanks. Examination by the Commonwealth Mycological Institute, Kew, confirmed that this substance was a fungal growth of the type *Cladoporium Resinae*.

2. Effects of Contamination

- 2.1 The problems associated with microbiological growths have been known for some years and research into their behavior has been conducted throughout the world. In the case of *Cladoporium Resinae*, the spores of the fungus can exist in a dormant state in kerosene fuels in most parts of the world. These will only develop when in contact with water in fuel at temperatures such as those reached when the aircraft or storage tanks are exposed to a warm ambient temperature such as radiation from the sun for long periods in a tropical or sub-tropical environment, or prolonged periods in a heated hangar. If developing fungus forms on water not drained off which adheres to the tank surfaces, the fungus is able to absorb water later introduced with fuel or condensing following a cold soak.
- 2.2 Where fungus has formed there is a probability that corrosion will occur. Corrosion has been found where fungus has formed on the bottom tank skin, on the chordal support member in the wing root and on fuel pipes within the tank. In some cases aircraft have been sufficiently affected to necessitate replacement of some component parts.
- 2.3 The fungus itself, if dislodged by fuel during refueling can obstruct fuel filters.

DEPARTMENT OF CIVIL AVIATION
Airworthiness Notices

T-9

3. Inspection

3.1 Operators uplifting fuel or operating regularly in areas having high normal ambient temperatures and high humidity or where fungus development is known to have been encountered, are advised to scrutinise tank areas for signs of fungus whenever access is gained for any purpose. It is further recommended that, for aircraft operation under these conditions, maintenance schedules should be amended to include visual internal tank checks at periods prescribed by the aircraft constructor.

It is also important, whenever fuel tanks are inspected, to ensure that all passage ways between rib cleats, etc., are not obstructed, so that a drainage path for water is maintained at all times. If the aircraft has been standing in a heated hangar for prolonged periods the fuel in the tanks should be treated with a biocide.

3.2 If contents gauges give suspect indications, immediate consideration should be given to the possibility that tank probes may be contaminated with water and/or fungus and appropriate inspections should be carried out.

3.3 Whenever fuel filters are checked they should be closely examined for the presence of slimes of any color.

3.4 The need to prevent water collection by good maintenance practices and control of fuel supplies is emphasized. A high degree of protection can be maintained by strict adherence to water drain checks before and after refueling and, if the aircraft has been standing for any length of time, again before the next flight. Fuel quality control checks should be rigorously applied.

4. Treatment

4.1 If fungus is discovered, the fuel system should be cleaned as soon as possible by a method approved by the aircraft constructor and the engine manufacturer. It must be appreciated that if the fungus is allowed to develop, cleansing and rectification could become a major operation involving grounding of the aircraft for a long period.

4.2 It is strongly recommended that when aircraft operate in an area where fungal growth can be encountered, or where there is any possibility of temperature in the fuel tanks frequently rising above 25°C, a fungicide additive should be used in the fuel as approved by the aircraft constructor and the engine manufacturer. The frequency of treatment and the dilutions prescribed by the aircraft constructor and the engine manufacturer must be adhered to. Introduction of an unapproved fungicide or inhibitor may jeopardize the safe operation of the aircraft.