

Safety Initiative – Hazardous contamination of flight deck cabin air.

CAA has received reports of occurrences on two aircraft types where flight crew performance was impaired following exposure to fumes on the flight deck. Affected pilots have reported symptoms such as headaches and dizziness, with a few events where their judgement was impaired. In the most severe case, the first officer was affected to the extent that he could take no part in the latter stages of the flight.

The receipt of those reports prompted an immediate CAA reaction to address the threat to continued safe flight and safe landing from pilot incapacitation (partial or total) arising from hazardous contamination of cabin air. Although the immediate investigations were not able to find a definitive cause of the symptoms experienced, circumstantial evidence suggested potential contamination of cabin air by abnormal concentrations of noxious gases or vapours. The CAA response involved short, medium and long-term actions aimed at ensuring the safety of the aircraft types involved. A particular focus was given to contamination from lubricating oils leaking from engine / auxiliary power unit internal oil seals.

CAA research into contamination of flight deck air included a toxicological review of the products of 'pyrolised' oil, which identified no single component or set of components at concentrations that conceivably could cause the symptoms reported in cabin air quality incidents. However, the study did identify the presence of short chain organic acids at levels that could cause 'irritant' effects. This CAA research was considered with the research of others and common findings emerged to justify taking actions on the affected aircraft types to address the most likely causes and to manage the risk. These are being introduced in a progressive and pragmatic manner as knowledge and confidence has become available from the research, and analysis of service history, and include:

- CAA Flight Operations Department Communications (FODCOMS) and associated Flight Manual amendments that require donning of oxygen masks by flight crew when contaminated flight deck air is suspected. Flight deck crew are isolated thereby from undesirable contamination products and speedy recovery from effects is promoted.
- Type specific Mandatory Service Bulletins that introduce effective trouble shooting of engines and the APU to minimise contamination exposure from 'leaky' engine internal oil seals.
- A type specific Mandatory Service Bulletin that requires inspection and removal of air conditioning ducts if found contaminated with engine oil.
- A type specific Mandatory Service Bulletin that modifies the APU bay sealing to prevent ingestion of APU bay contaminations or APU exhaust gases. into the air conditioning system.
- Engine type specific oil seal modifications that address the design deficiencies that give propensity to leakage of oil into the air-bleed-off-take beyond normal industry standards.
- Aircraft and engine maintenance manual changes that introduce additional controls to prevent engine oil overfilling at maintenance. Overfilling can defeat internal oil seal arrangements and allow contamination of bleed air.

- Future rulemaking on reduction of cabin contamination is being pursued in the international arena through the Aviation Rulemaking Advisory Committee (ARAC).

It is believed the safety risk is being adequately contained by the actions taken to date. Nevertheless, the service history indicators on all aircraft types are being kept under constant review. Further measures are in development and may be subject of future regulatory action as necessary.