

COMMITTEE ON TOXICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT

Summary of Engine Air Quality Measurements Undertaken on a BAe 146 Aircraft

In July 2006, the Committee considered commercial in-confidence data on bleed air tests conducted on an ALF502R-5 turbofan engine from a BAe 146 aircraft involved in a cabin air incident (TOX/2006/21). When inspected on the wing of the aircraft, the engine exhibited evidence of a minor oil leak but during the bleed air tests no oil leaks were apparent. The engine was subject to two tests representing the flight profile and bleed air conditions of the incident flight as closely as possible. For each test, the engine was taken from ground idle through take-off, climb, cruise, descent, stabilisation at ground idle and then normal shutdown. Air samples were taken from both the bleed and inlet ducts at ground idle, take-off, climb, cruise and descent test points, and one set of air samples was taken over the entire test interval from initiation of ground idle through to termination of descent. The engine test air samples were analysed for aldehydes, polycyclic aromatic hydrocarbons (PAHs), VOCs, SVOCs, carbon dioxide, carbon monoxide, methane and ozone precursors. Around one hundred compounds were evaluated. Overall, the identities were established of around 90 compounds at the bleed and/or inlet ducts, including alkanes, alkenes and aldehydes. The concentration of the compounds was generally below 12 parts per billion (ppb) at the engine bleed port. Acetone, methylene chloride, carbon monoxide, methane, carbon dioxide, ethylene, 2-methylpentane, 3-methylpentane were detected at varying concentrations above this level in various phases of flight but there were marked differences between the two test runs. Assuming no significant in-cabin sources, the levels of these chemicals would be expected to be lower in cabin air. The ortho- isomer of tricresyl phosphate was not detected but total isomers of tricresyl phosphate had been detected and quantified.