Statements

# Statement on Aircraft Cabin Air Quality – Non-technical Summary

1. The COT was asked to consider the question: “Is there evidence of exposure to chemical contaminants, in cabin air that could have long-term health impacts, either from acute exposures or due to long-term low level exposures including mixtures, e.g., of volatile organic compounds?”. This follows a COT statement in 2007 addressing aircraft cabin air, relating to organophosphate compounds, the cabin air environment, ill-health in aircraft crews and the possible relationship to smoke or fume events (COT, 2007) and subsequently a position statement following research on aircraft cabin environment (COT, 2013).

2. The objective of the present review was to investigate whether specific chemicals commonly identified in aircraft cabin air could potentially cause ill-health in aircrew. This review did not look for other potential causes of aircrew ill-health (which the 2007 review did).

3. For the present review the COT considered a number of papers on organophosphates, volatile organic compounds, carbon monoxide and carbon dioxide.

4. Most of the published information on these chemicals in aircraft cabin air related to background levels during normal flight operation. There continued to be only very limited information on levels following smoke or fume events, with little additional data since COT’s previous work in 2007 and 2013. Smoke or fume events are when abnormal odours, smoke, haze or fumes occur in the aircraft cabin, which may come from various internal or external sources.

5. The COT considered the potential risk to health from organophosphate exposure in aircraft cabin air (TOX/2022/40). Two studies investigated health effects in aircrew. The COT considered there were shortcomings with both studies, in particular neither study reported the levels of organophosphate exposure the crew had experienced. However, the COT agreed with the authors’ conclusions that the data did not indicate any association between impact on mental ability and organophosphate exposures.

6. One paper carried out a risk assessment for a specific organophosphate, tri-ortho-cresyl phosphate, commonly used in aviation lubricants. Levels of exposure to this organophosphate were substantially below those at which a risk of adverse effects on health might arise.

7. The Committee concluded that it was unlikely that exposure to organophosphates at the low levels identified in aircraft cabin air would have adverse effects on aircrew.

8. For volatile organic compounds, levels in aircraft were compared with levels in other modes of transport (TOX/2022/46) or other work environments ( TOX/2022/55) in the UK and EU. If the highest average levels of an individual compound in aircraft were above all the highest average levels in other environments in which that individual compound was measured, the COT carried out a specific risk assessment for that chemical.

9. The reported levels of six volatile organic compounds in aircraft were above the levels in other UK and EU modes of transport or work environments ( TOX/2023/15). However, the concentrations were all lower than relevant guidelines and standards, indicating that no risk to health is anticipated at these levels.

10. Mixtures of volatile organic compounds were considered using a hazard index approach. This compares the level of each chemical with the level below which there would not be a risk to health and adds these ratios together. In considering the volatile organic compounds in aircraft cabin air, the result of this hazard index approach indicated that no effects, including mixture effects, are anticipated.

11. Levels of carbon monoxide and carbon dioxide in UK and EU-operated aircraft were collated and compared with various standards as well as levels that cause discernible symptoms (TOX/2022/65 and TOX/2023/14). The Committee considered these data and concluded that levels of carbon monoxide and carbon dioxide reported in aircraft are unlikely to be associated with any short- or long-term adverse health effects.

12. Overall, the COT concluded that the levels of the chemical contaminants reviewed (organophosphates, volatile organic compounds including as mixtures, carbon monoxide and carbon dioxide) in aircraft cabin air, at the concentrations reported, are unlikely to cause adverse health effects in aircrew after being exposed for long or short time periods. However, there is still limited information

about the levels of chemicals in cabin air following smoke or fume events.

**Non-technical Summary to COT Statement 2024/04**