

# Fume Events

Cabin air contamination events occur when heated oils, lubricants, and fluid residue from the engine leak into the cabin air supply. Since cabin air must be replenished, it consists of 50% outside air drawn from the engines into the air conditioning unit (Auxiliary Power Unit - APU) and 50% recirculated air. This air system can lead to contamination when outside air, mixed with oil residue from an engine leak, enters the APU.

Fume events can happen on any aircraft using bleed air filtration systems, except for the Boeing 787, which avoids this issue by sourcing air from outside the aircraft through two inlets, feeding it to electric cabin air compressors (CACs).

Typically, the only indicators of contamination are odors and physical symptoms experienced by individuals. Occasionally, there are reports of visible haze; therefore, the primary detection system on our aircraft relies on observations from flight attendants, pilots, maintenance personnel, or ground staff who detect odors or show symptoms.

## ***Oil Fumes***

Oil fumes do not usually smell like oil. Oil fumes or hydraulic fluid odor is often described as smelling of musty, stinky locker room, rancid cheese, wet dog, rotten eggs, old garbage, acrid chemical, and sweet. Symptoms of this contamination are called aero-toxic syndrome and can cause short term or long-term illness. The effects can be dizziness, headache, nausea, trouble breathing, abnormal taste, eye, nose, and throat irritation, rash, tingling, fatigue, reduced motor skills/cognitive deficiency.

## ***Exhaust, Fuel, & Deicing Fluid Fumes***

It is important to understand there are other than other types of fumes you may smell, such as exhaust, fuel, and deicing fluid. Engine fumes from oil, hydraulic fluid, exhaust, and smoke can contain carbon monoxide gas. Exposure to carbon monoxide inflight can be more severe because there is less concentration of oxygen than on the ground. Carbon Monoxide poisoning can cause symptoms, such as dizziness/fainting, headache, and slowed thought processes. Gasoline is a volatile, flammable liquid that can permeate into the cabin air from the outside when fueling the aircraft or in some cases a fuel spill on the tarmac. If inhaled, gasoline vapors can cause symptoms such as dizziness, headache, and nausea.

## ***Tri-cresyl-phosphate (TCP)***

The chemical tri-cresyl-phosphate (TCP) is an organophosphate in engine oil, lubricants, and hydraulic fluids. It is a flame-retardant additive in oils. Exposure to this chemical is toxic and increases the risks of health effects, such as aero-toxic syndrome.

Air contamination by this chemical is harmful. The only detection system on our aircraft are the workers. The only way to know on an air contamination fume event occurrence is from flight attendants, pilots, maintenance, or ground workers who either smell the odor or exhibit symptoms.

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## ***Deicing Fluid***

Deicing of aircraft is a required practice for the operation of aircraft by the FAA under FAR 91.527. [eCFR :: 14 CFR 91.527 – Operating in icing conditions. \(FAR 91.527\)](#) Deicing fluid sprayed on aircraft, Ethelene Glycol, keeps water from freezing on the wings. Ethelene Glycol is more commonly associated with anti-freeze and described as having a sweet odor, but if mixed with other oils and fluids, it can take on other smells, sometimes described as sweet, musty, burnt crayon, oily, burning plastic.

## ***Carbon Monoxide (CO)***

Engine fumes from oil, hydraulic fluid, exhaust, and smoke can contain carbon monoxide gas. Exposure to carbon monoxide inflight can be severe. Symptoms of this contamination are called aero-toxic syndrome and can cause short term or long-term illness. The effects can be dizziness, headache, nausea, trouble breathing, abnormal taste, eye, nose, and throat irritation, rash, tingling, fatigue, reduced motor skills/cognitive deficiency. The effects of CO are more intense in-flight because of reduced oxygen environment. Even though CO clears from the body quickly, it still can cause short- or long-term symptoms such as dizziness, headaches, fatigue.

## **Ozone**

Ozone is a gas composed of three oxygen atoms and occurs in the Earth's upper atmosphere. Ozone is present in concentrations on aircraft in flight because of the presence in the atmosphere at higher altitudes. Symptoms for ozone inhalation can be a cough, pain and/or shortness of breath, respiratory irritation, nasal congestion, eye irritation.

## **Insecticides**

Disinfecting of aircraft is a process of applying pesticides to decrease and prevent transmission of diseases that can be carried by insects. Airplanes have strict schedules for pretreatment to assure this requirement is met before entering these countries. The program ensures that the aircraft is unoccupied, unless on rare occasions, the spraying was not accomplished prior to entering a country that requires it. The sprays contain the active ingredient, 2% permethrin or d-phenothrin. Symptoms of being in contact with these pesticides can be respiratory, sinus, skin irritation, headache. In extreme cases, anaphylactic shock, immune, respiratory, and neurological problems have been reported. If inhaled it is recommended you relocate to an area with fresh air. If on your skin, wash the affected areas of the skin with soap and water. Get medical attention if irritation persists.