



**APFA**

***Fumes Training***

ICAO 344 Training Circular

In Nov. 2015, ICAO published guidance for airlines to train/educate their crews and mechanics to recognize and respond to fumes. APFA is being proactive and providing you with this education module referencing ICAO 344 Training Circular.



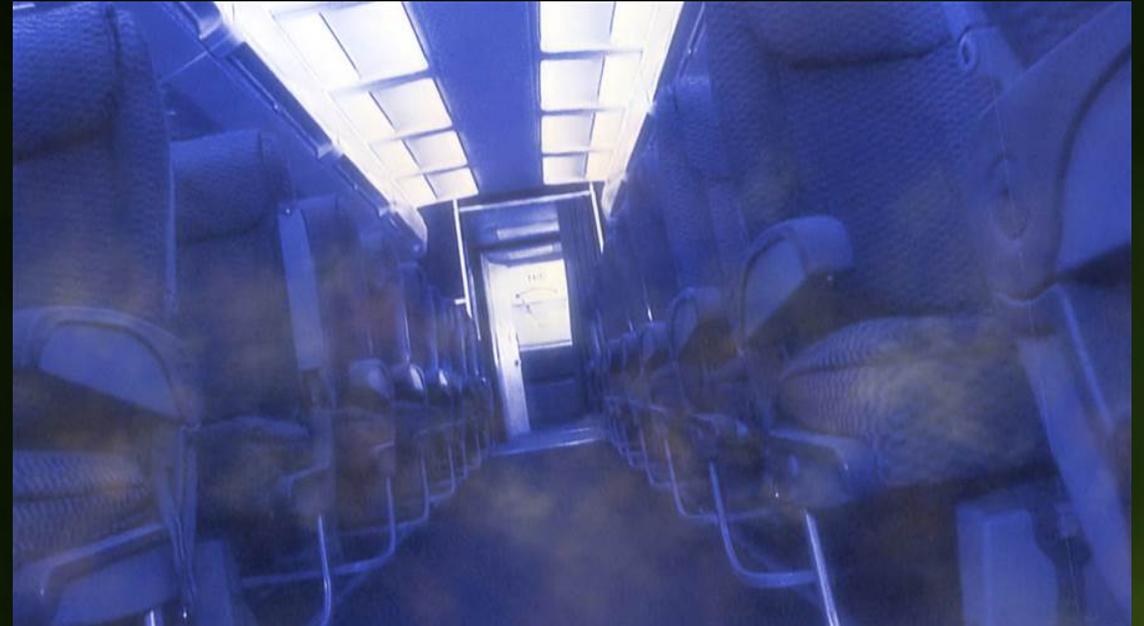
# Key Definitions for Understanding Fume Events

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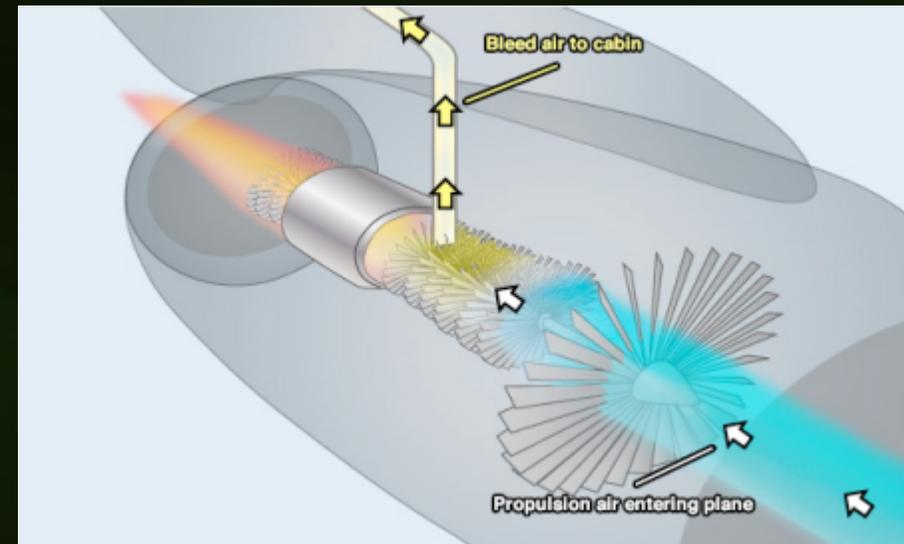
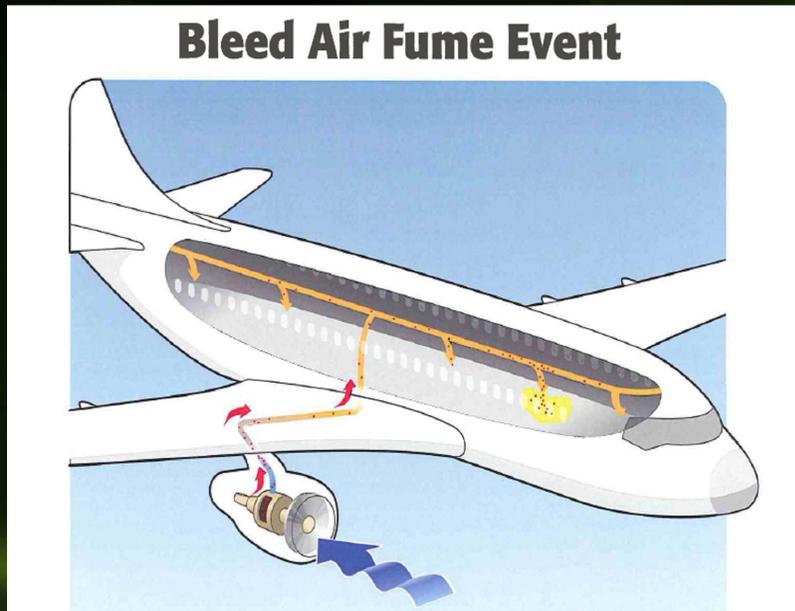
***DID YOU KNOW?*** FUMES are airborne contaminants which are NOT visible (but are usually odorous). In contrast, SMOKE is made up of small, visible particles. ICAO recommends that crews pay attention to the presence of FUMES (“just” a smell) if coming from the air supply vents and suspected to be oil or hydraulic. Lots of odors are unpleasant, but are not an issue. Others require attention.

**Fume(s)** - Odorous, gaseous compounds which are not visible



# Key Definitions for Understanding Fume Events

**DID YOU KNOW?** The air you breathe on board comes from outside, but it has first been compressed in either the aircraft engines or the APU. This compressed air is called “bleed air” and it’s what gets supplied through the cabin and flight deck vents. The engine/APU compressors are hot (temperatures range from 200-1000°F) and they are lubricated with oil. If the hot oil from the compressor contaminates the bleed air, then oil fumes will be supplied to the cabin/flight deck through the vents. It is helpful to know that fact so that you can recognize and respond to the presence of those types of fumes in the cabin.



# Key Definitions for Understanding Fume Events

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**De-icing and/or anti-icing fluid fumes** – De-icing and/or anti-icing fluid is applied to the exterior surfaces of the aircraft in large volumes and under high pressure. If procedures are not properly applied, then fumes may enter the cabin and flight deck. For example, if the de-icing and/or anti-icing applicators spray the engines or APU intake, then the fluid can be heated to high temperatures in the engines or APU and fumes can contaminate the aircraft air supply. It is usually apparent if fumes in the cabin are sourced to de-icing and/or anti-icing fluid because these operations are highly visible and the odor of the fumes is distinctive.



# Key Definitions for Understanding Fume Events

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**Electrical fumes** – Fumes from either failed or faulty electrical systems can contaminate the aircraft air supply to the cabin and flight deck. Electrical fumes can also be sourced to in-cabin electrical faults.

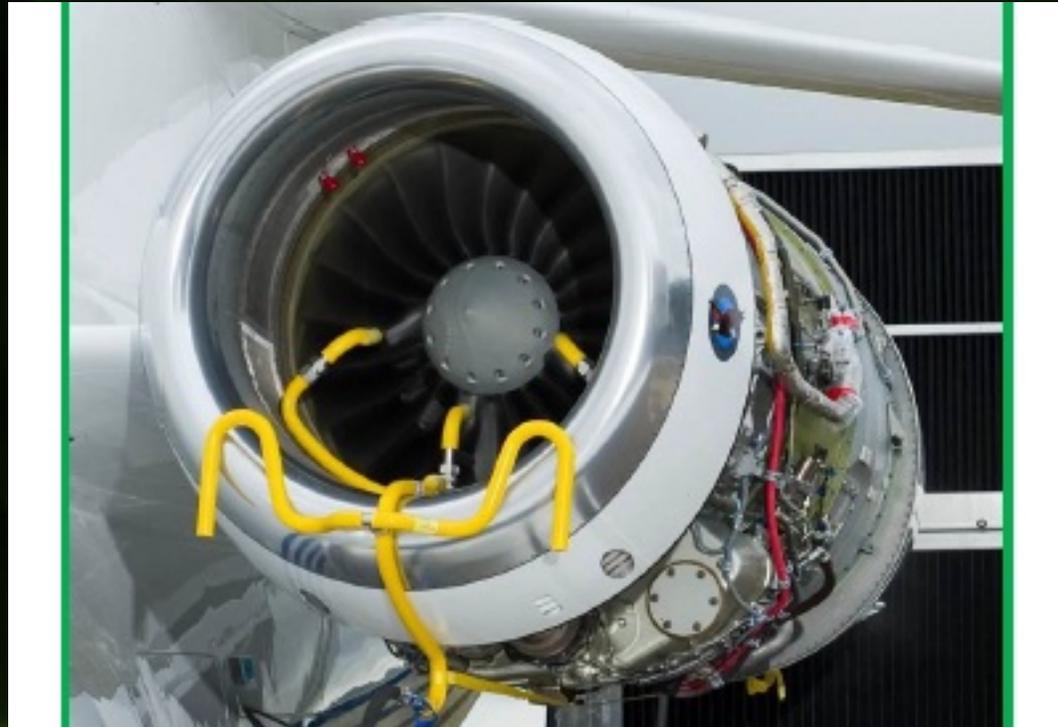


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**Engine compressor wash fumes** – After washing the engine compressor using detergent, fumes from residual detergent may enter the cabin and flight deck air supply systems.



# Key Definitions for Understanding Fume Events

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**Engine oil fumes** – Engine seals, starter generator, accessory gear box, and oil-lubricated bearings are engine and APU components that can leak oil into the cabin and flight deck ventilation supply air. In addition, the oil reservoir for an engine or APU can be over-filled, resulting in spillage and ingestion into the aircraft air supply system.



# Key Definitions for Understanding Fume Events

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**Exhaust fumes** – Fumes from diesel-powered ground service vehicles and other aircraft can be ingested into the air supply, especially if the air intake is located near to the vehicles.



# Key Definitions for Understanding Fume Events

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**Fuel fumes** – Fueling operations at an airport, aircraft tank venting during fueling are sources of fuel fumes that may enter the cabin and flight deck air supply systems.



# Key Definitions for Understanding Fume Events

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**Hydraulic fluid fumes** – Hydraulic fluid leaks and spills on the surface of the fuselage can be drawn into the APU, along with the outside air intended for ventilation. In such instances, the hydraulic fluid and outside air are heated in the compressor and, ultimately, supplied to the cabin and flight deck.

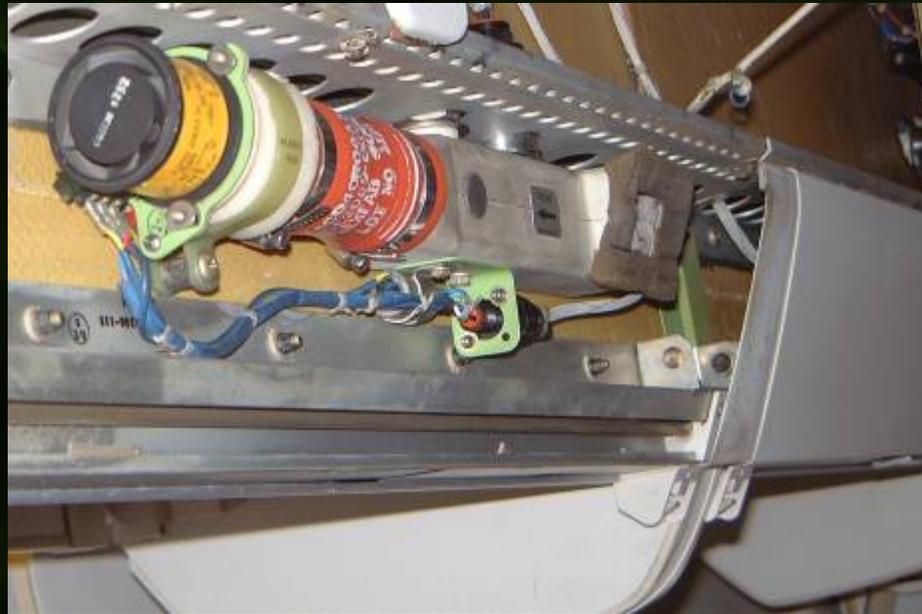


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**Recirculation fan fumes** – Recirculation fans can fail and produce fumes/odor caused by electrical or bearing failure.



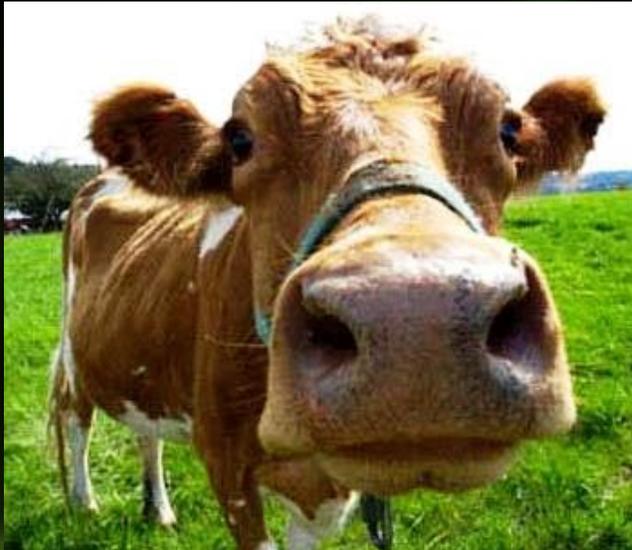
# *What types of smells maybe generated outside of the aircraft?*

Are flying over a farm, landfill or some other place that may smell?

- What is the location of the aircraft? Higher or lower altitude?

Are you parked at the gate and smell automobile exhaust?

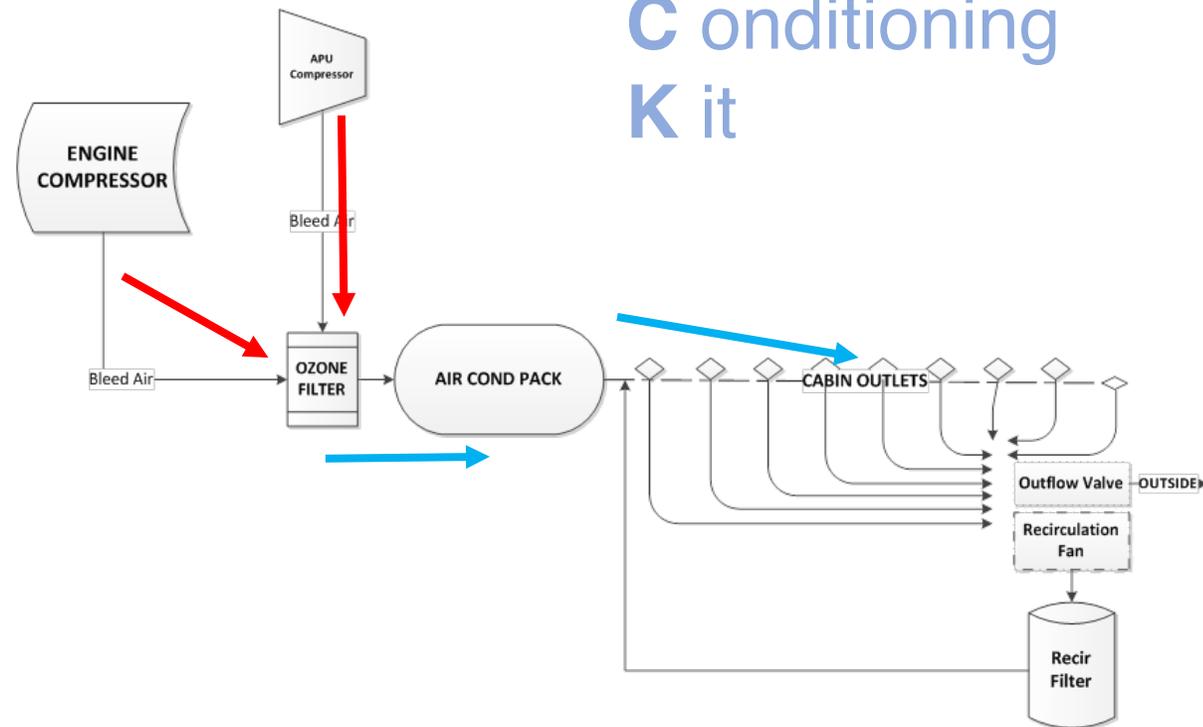
- This could be a sign of the exhaust from a tug being sucked into the cabin air



# How do these smells get into the cabin?

Ambient air enters either thru the engines or **APU** and is heated and compressed, then sent thru an ozone filter (If equipped). It s introduced to the **Air Conditioning Pack** and conditioned for the cabin for distribution thru the cabin outlets

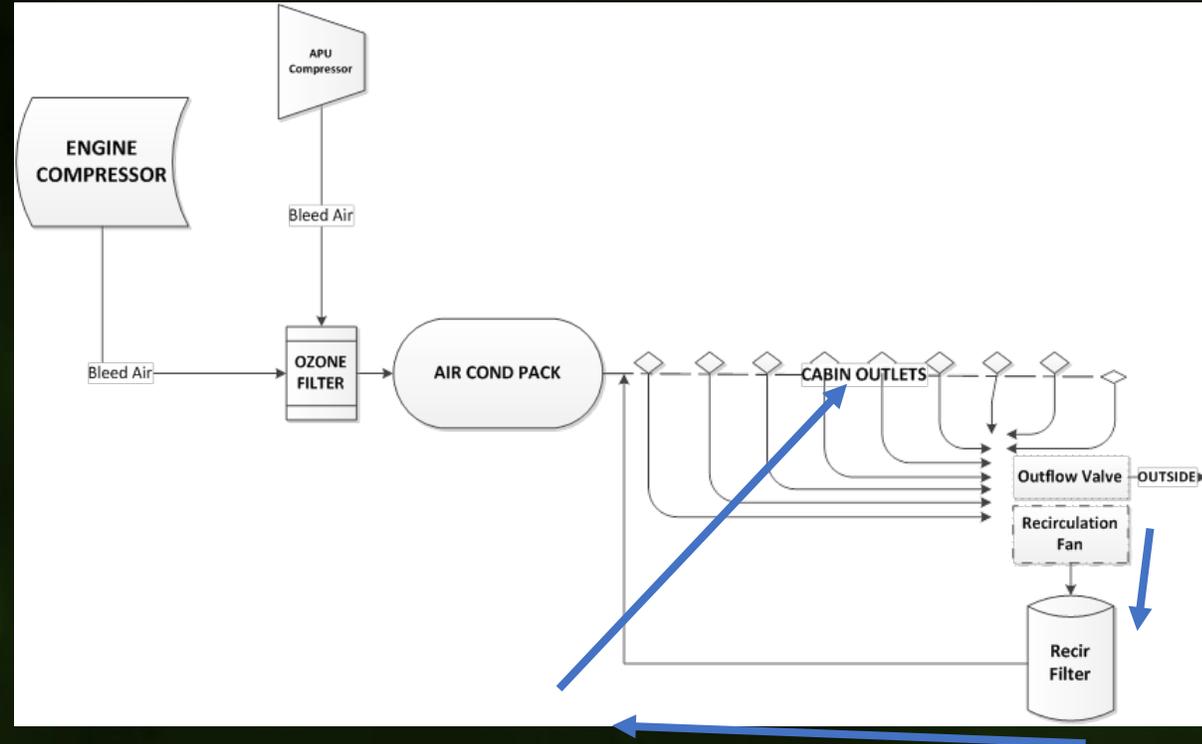
**P**neumatic  
**A**ir  
**C**onditioning  
**K**it



# How does the air recirculate in the cabin?

The recirculation system uses cabin air and recycles this air thru a carbon HEPA/ or possibly just a HEPA filter. Then this air is mixed with the conditioned bleed air and distributed to the cabin vents.

Carbon in the recirculation filters pick up 90-60% of the VOC's (Volatile Organic Compounds)



# Fumes/odor in the cabin and/or flight deck can be sourced to:

- a) the ventilation supply air; and
- b) items in the cabin and/or flight deck.

The ventilation air supply system can distribute contaminants that are either internal to the aircraft systems (e.g. engine oil, hydraulic fluid) or external to the aircraft itself (e.g. exhaust, de-icing fluid, fuel, ozone).



Items in the cabin and/or flight deck can also be sources of fumes/odor. Personnel should understand the importance of distinguishing, where possible, between these two sources (i.e. ventilation supply air versus items in cabin/flight deck). Information should be provided to crew members to enable them to quickly assess and attempt to distinguish between these two sources of contaminants and respond accordingly.

Crew members use a wide variety of terms to describe oil and hydraulic fluid fumes. Often, oil fumes do not smell like oil. Instead, they are typically described as smelling like dirty socks/smelly feet, foul, or musty. Hydraulic fluid often has a distinctive and recognizable odor that is often described as acrid.

Odor is subjective, such that different people can experience and describe the same fumes differently. Also, olfactory fatigue reduces a person's ability to detect odors over time.



FAA regulations do **not require** chemical sensors **OR** chemical filters in the bleed air supply system.

(Most recent model,  
onboard chemical sensor)



**When flight and/or cabin crew members are impaired by acute symptoms, flight safety may be compromised.**

Potential acute symptoms from exposure to oil or hydraulic fluid fumes include: **irritated eyes, sinus congestion, respiratory symptoms, gastrointestinal upset, and neurological symptoms.**

The neurological symptoms may downgrade crew member performance during flight operations on measures such as: alertness, attention span, information processing, working memory, and response time. **Symptoms may develop slowly, and degraded performance may not be initially obvious.** Given the potential flight safety implications, flight and cabin crew members should be trained to promptly recognize and respond to the presence of fumes/odor, particularly air supply system-sourced fumes/odor (refer to Chapter 3).

# ***What should I do if I smell fumes?***

- Remain calm and ask yourself several questions to systematically identify the source of the fumes.
  - Do you see visible mist/haze/smoke, in addition to the odor (fumes)?
  - What do the fumes smell like?
    - Dirty socks? Burning smell? Standing water? Sweet smelling?
  - Does the smell appear to be coming from the **air supply vents**, or an in-cabin source?
  - Where in the cabin do\did you smell it?
  - Location in cabin? Phase of flight?
  - What is the outside environment like?
    - What is the location of the aircraft?
      - Are you flying over a farm or landfill at a lower altitude?
  - Is it constant, or was it just a passing odor?
  - Report your answers to the flight deck, fumes in the air supply can be a safety of flight issue

# ***What should I do if I do not feel well and its been reported to the cockpit?***

## ***On the ground***

- If passengers are not on the aircraft get off the plane and move to fresh air-this is per the SDS(Safety Data Sheet) from the oil manufacture
- If passengers are on board coordinate with the Capitan to remove the passengers and get off the plane to fresh air.
  - Always remember to use a POB if needed, but do remember that a POB is a diluter demand O2 mask and does not provide complete coverage from the events.

## ***Follow up with medical care on landing***

- Reference-IATA **Guidance for airline health and safety staff on the medical response to cabin air quality events.**

**Passenger and cabin management** – Cabin crew members should manage the passengers and the cabin. This may include, but is not limited to:

- 1) relocating passengers, if required;
- 2) informing passengers and reassuring them; and
- 3) administering first aid to passengers and/or crew members.

**Post-event procedures** – Cabin crew members should apply post-event procedures for the remainder of the flight. These may include, but are not limited to:

- 1) monitoring the area;
- 2) continued communication with the flight crew and other cabin crew members; and
- 3) applying crew member incapacitation procedures, if applicable.

**Applicable documentation** – Cabin crew members should complete the applicable documentation, such as the smoke/fumes reporting form, in coordination with the flight crew in order to obtain the most complete information possible

Note.— Detailed guidance on cabin crew training, including training specific to crew member incapacitation and first aid, is contained in the Cabin Crew Safety Training Manual (Doc 10002).

