

# Cabin safety bulletin No.14 - Cabin safety incident investigation

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## Who does this bulletin apply to?

This document applies to all operators of Australian registered aircraft and should be read in conjunction with section 82 of the Civil Aviation Orders as they relate to a safety management system.

## What is the purpose of this bulletin?

The purpose of this bulletin is to provide operator guidance material for cabin investigators responsible for investigating an incident<sup>1</sup> [\[#footnote1\]](#). It focuses on cabin safety aspects that should be addressed as part of an incident investigation process and by way of example includes material that can be applied when building a report that relates to a fire/smoke/fume occurrence. Other aspects required during an incident investigation are outside the scope of this bulletin. Excerpts from ICAO Doc 10062 Manual on the Investigation of Cabin Safety Aspects in Accidents and Incidents, first edition 2017 are contained in this bulletin.

The bulletin does not seek to replace formal cabin investigator training.

This bulletin describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. On its own this bulletin does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

## Background

As per ICAO definitions, accidents and incidents are differentiated by their outcomes. For example, an evacuation in which occupants sustain serious injuries is classified as an accident. An evacuation without injuries or aircraft damage is classified as an incident. However, the lack of a negative outcome (e.g. serious injury) does not mean that lessons cannot be learned from the occurrence.

Cabin safety aspects of any incident should be addressed as part of the investigation<sup>2</sup> [\[#footnote2\]](#) process. The goal of a cabin safety investigation is to analyse all aspects of an incident in relation to the actions of cabin crew members and passengers, as well as the cabin environment and relevant systems and equipment on board, in order to identify safety deficiencies and lessons learned. The investigations may result in the development of recommendations related to operator procedures, fatigue (e.g. scheduling practices), training, safety and emergency equipment, and aircraft systems.

As part of a safety management system, operators should have documented policies, procedures and guidelines for the conduct of accident and incident investigations.

ICAO Annex 13 – Aircraft Accident and Incident Investigation contains the Standards and Recommended Practices (SARPs) for aircraft accident and incident investigation. Annex 13 defines the sole objective of an aircraft accident or incident investigation as the prevention of future accidents and incidents. It also states that it is not the purpose of an investigation to apportion blame or liability.

The investigation process includes the gathering, recording and analysis of all relevant information. The order in which an investigation report will be compiled, delivered and managed is by:

- ▶ preparing for the investigation
- ▶ collecting data
- ▶ analysing data
- ▶ presenting findings and recommendation
- ▶ continuously improving performance.

Operators should document procedures to be applied to all operational investigations conducted, including reference to determining the investigation level. Some occurrences may not require a full investigation report, rather a partial one, i.e. factual investigation with limited analysis.

Information that should be collected and included in an incident report will typically reflect what is incorporated into an accident report. Based on the type and severity of the incident, not all the aspects covered in an accident investigation will be addressed. For example, investigators may review photographs of the incident, taken by the crew, as opposed to travelling to the site of the occurrence.

## Cabin investigator role

The cabin investigator is responsible for examining and documenting the factors that affect the survival of occupants involved in accidents, incidents and occurrences<sup>3</sup> [\[#footnote3\]](#) involving safety violations. In addition to survival factors, the cabin investigator is responsible for determining factors that affect the safety of flight and contribute to an occurrence and its outcomes (e.g. change in an operator policy or procedure which is not supported by training). In the context of an occurrence investigation, these factors are collectively referred to as 'contributing factors.'

Cabin investigator responsibilities include:

- ▶ acting as a cabin safety expert in the aircraft accident or incident investigation with emphasis on cabin interior and emergency equipment design, safety and emergency procedures, cabin safety, occupant protection and related issues
- ▶ acting as a resource for investigations into other survival factor issues that may be outside the area of primary expertise
- ▶ conducting surveys, special studies and investigations, and developing proposed safety recommendations and testimonies
- ▶ documenting, analysing and evaluating survival factors including cabin safety and cabin crew training, occupant protection, airport operations, and airport and community emergency management factors that may arise during an investigation
- ▶ determining requirements for special tests, studies and technical assistance that may be necessary in one or more aspects of a given investigation. Directing and monitoring these activities and evaluating their findings in terms of relevancy to contributing factors and occupant survivability
- ▶ developing a formal report including significant findings from the investigation in relation to cabin safety and survivability, together with the development of supporting documentation such as photographs, records, charts and diagrams

- ▶ ensuring the report is timely and technically correct and accurately reflects the findings
- ▶ identifying pertinent safety recommendations and contributing factors
- ▶ liaising with appropriate authorities.

## Types of occurrences

Operators should define which occurrences will be investigated. Examples include:

- ▶ inadvertent slide deployment
- ▶ malfunction of aircraft systems or safety and emergency equipment
- ▶ a medical event involving a crew member or passenger
- ▶ spillage or leakage or any occurrence related to the transport of dangerous goods
- ▶ occurrences that endanger the operation of the aircraft or which causes a danger to persons or property
- ▶ fire and smoke occurrences, including those where the fire was extinguished
- ▶ an unanticipated emergency landing
- ▶ use of fire extinguishing or suppression agents
- ▶ evacuation of crew and/or passengers
- ▶ significant safety and security related occurrences such as bomb threats, hijack, security breaches
- ▶ an unruly passenger.

## Conducting crew member interviews

The aim of the interview is not to apportion blame; it is to enhance cabin safety and survivability. The investigator should give each individual an opportunity to describe in their own words, without interruption or coercion, an account of what happened. After this account, the investigator should ask follow-up questions to determine any additional information required. Together with this phase of the investigation, consideration should be given to:

- ▶ gathering and reviewing information related to events prior to, during and following the occurrence
- ▶ setting a clear objective for the interview
- ▶ determining a series of basic questions
- ▶ coordinating roles of other investigators in the interview, if applicable
- ▶ verifying all required documentation and equipment are available
- ▶ applying interview protocols
- ▶ stating clear objectives and clarifying roles for the investigation being undertaken
- ▶ establishing and maintaining an atmosphere of open communication and mutual respect
- ▶ recognising and being flexible and supportive to the interviewee's needs
- ▶ demonstrating effective facilitation
- ▶ documenting information in an accurate, complete and detailed manner
- ▶ managing time.

Cabin crew should be interviewed as soon as possible after the occurrence and should provide a written statement to the investigator. If deemed necessary, crew members may be re-interviewed at a later

date. It is important that the environment for these interviews allows cabin crew to provide information freely and without coercion.

The interview should address the following points:

- ▶ pre-flight/in-flight activities
- ▶ occurrence information
- ▶ training
- ▶ information specific to the type of occurrence (e.g. evacuation)
- ▶ any additional comments that the cabin crew member may wish to make, such as further information that he/she thinks may assist in the investigation.

## General questioning of crew members

Crew members should be asked the following questions by the investigator. The investigator may also tailor their own questions.

- ▶ Experience as a crew member (in years) with the current operator.
- ▶ Their rank, e.g. cabin crew member, in-charge/senior cabin crew member.
- ▶ The number of different aircraft models and series on which the cabin crew member is qualified.
- ▶ Any other qualifications they hold e.g. emergency procedures instructor.
- ▶ Their sleep/wake cycle for the seven-day period preceding the occurrence.
- ▶ Their flight and duty schedule for the seven-day period preceding the occurrence.
- ▶ Their commute time to the airport, mode of travel and time at base prior to sign on.
- ▶ Any injuries sustained as a result of the occurrence. If so, describe the injuries, when and how the injuries occurred and what medical attention was required.

Crew members should also be questioned on pre-flight/in-flight activities. The following questions should be asked.

- ▶ Describe the pre-flight cabin crew briefing. What was included, were all crew members present, who conducted the briefing, where was the briefing conducted, where there any difficulties in understanding the briefing?
- ▶ Describe any briefing conducted by the pilot-in-command (PIC). If the PIC briefing was with the senior cabin crew member only, was the information conveyed to the rest of the cabin crew?
- ▶ Were all cabin crew made aware of any unserviceable cabin system(s) at the commencement of, or during the flight? Was that information relayed to the entire crew?
- ▶ Were pre-flight safety and security checks conducted? Were any abnormalities found?
- ▶ Describe observations of, or interaction with, passenger agents, aircraft maintenance technicians, ground service personnel, in-bound crew members, other cabin crew, and/or flight crew that may be pertinent to the investigation.
- ▶ Describe the final cabin safety checks. Were the passengers compliant?

Crew members should be asked the following questions about the occurrence.

- ▶ Describe how you became aware or were informed of the problem. If briefed by the PIC, what information was provided? If briefed by another crew member, what information were you given?
- ▶ Describe your location during the occurrence and what you were doing.
- ▶ Describe if and how the passengers were informed of the problem and what was their reaction.
- ▶ Describe the pre-occurrence preparations, i.e. type of warning, cabin preparation.
- ▶ Describe the occurrence. What were the conditions of the cabin, conditions of the galley?
- ▶ Were any able-bodied passengers used to help? If so, explain.
- ▶ Describe any safety or emergency equipment that was used. Why and how was it used? Was it effective?

Note: an aircraft diagram is a useful tool to orient an individual during an interview.

Crew members should be asked the following questions about their training.

- ▶ Describe your initial and recurrent safety and emergency procedures training. Was it computer based or in a classroom? How much time was provided for practical training?
- ▶ Where and when were your initial and recurrent safety and emergency procedures training conducted?
- ▶ When was your last simulated exercise of an aircraft evacuation? Describe the simulated exercise. How often is the simulated exercise conducted?
- ▶ Describe your firefighting training.
- ▶ Described any practical training you have had with respect to the use of safety and emergency equipment. Are training devices representative of the actual equipment found on board the aircraft in the fleet?
- ▶ Is the safety and emergency procedures training realistic? Explain in regard to emergency equipment, simulated exercises, etc.
- ▶ Did training provide adequate preparation for what happened? Were you confident in your abilities?

At the end of the interview, crew members should also be asked:

- ▶ Based on your experience, can you suggest any improvements to procedures, training or equipment
- ▶ Do you have any further information that you think may assist in the investigation of this occurrence?

## Conducting passenger interviews

Passengers should be interviewed as soon as possible after the occurrence. They may be re-interviewed at a later date, if deemed necessary. Questionnaires may be developed and sent to passengers, as a means of gathering information remotely. The passenger interview should address the following points:

- ▶ personal data
- ▶ pre-flight preparations
- ▶ occurrence information
- ▶ information specific to the type of occurrence
- ▶ any additional comments that the passenger may wish to make, such as further information that he/she thinks may assist in the investigation.

## General questioning of passengers

Passengers should be asked the following questions by the investigator. The investigator may also tailor their own questions.

- ▶ Describe the weight, size and stowage location of your carry-on baggage.
- ▶ Was there a pre-flight safety briefing? How was it provided (i.e. pilot, cabin crew member, video or other means)? What information do you recall from it? Did you understand it? Was it helpful?
- ▶ Did you read the passenger safety briefing card? Did you understand the information on it? What information do you recall from it?
- ▶ Did you note the locations of more than one exit near your seat? Were you seated adjacent to an emergency exit?
- ▶ Describe any observations you had of maintenance, ground service personnel (e.g. de-icing the aircraft) or flight crew that might be pertinent to the investigation.
- ▶ How and when did you first become aware of the situation? Where were you when you first became aware of the problem?
- ▶ How did the crew prepare you for the emergency? Were you given instructions over the PA system or by an individual crew member? Were the instructions clear?

Note: an aircraft diagram is a useful tool to orient an individual during an interview.

At the end of the interview, passengers should also be asked:

- ▶ Based on your experience, can you suggest any improvements to passenger briefings, procedures, cabin crew training or equipment?
- ▶ Do you have any further information that you think may assist in the investigation of this occurrence?
- ▶ Did you fully understand the information provided to you (e.g. language)? If not, please describe.

## Conducting other interviews

Systems failures may require interviews with maintenance and ground service personnel. The investigator may also consider interviewing off-duty flight crew members, cabin crew supervisors, instructors, firefighting personnel, witnesses, next of kin, etc. to gather any additional information needed.

## Fire, smoke or fumes

This part of the bulletin presents guidance material relating to investigating an onboard fire/smoke/fumes event<sup>4</sup> [[#footnote4](#)], inflight or on the ground, which are not the result of impact. The fire/smoke/fumes category includes:

- ▶ fire/smoke/fumes due to a combustive explosion from an ignition source (including from dangerous goods in the cabin or the cargo hold)
- ▶ fire/smoke/fumes from system/component failures/malfunctions in the flight deck, cabin or cargo area
- ▶ fumes contaminating the outside air fraction of the ventilation air supplied to the cabin and/or flight deck.

The investigation of a fire/smoke/fumes event should reconstruct the sequence of events while focusing on the following aspects in as much detail as possible:

- ▶ pre-flight activities and pre-fire/smoke/fumes actions; tasks conducted by the cabin crew prior to/during the flight to detect and eliminate fire hazards (e.g. cabin surveillance to identify/monitor potential sources of fire)
- ▶ during the fire/smoke/fumes event:
  - ▶ how and when occupants became aware of the fire/smoke/fumes, including who first became aware of the situation (i.e. a passenger or crew member)
  - ▶ what activities were taking place in the cabin at the time (e.g. meal service, clean up, rest)
  - ▶ what occupants witnessed or smelled, such as description of visible flames (colour and height), characteristics of the smoke (density and size) and odours in the cabin
  - ▶ immediate cabin crew actions when they became aware of the fire/smoke/fumes
  - ▶ suspected source of the fire/smoke/fumes at the time
  - ▶ the function and effectiveness of systems and equipment used by cabin crew to fight the fire and manage the situation (including accessibility of equipment, equipment used by cabin crew, and inoperative equipment)
  - ▶ flight crew and cabin crew actions (including firefighting procedures and communications procedures applied by the crew), as well as passenger actions
  - ▶ any actions that minimised the risk of injuries in the event of fire/smoke/fumes (e.g. relocating equipment, such as oxygen bottles, alcoholic beverages and passenger baggage from the vicinity of the fire; relocating passengers; instructing passengers to breathe into a cloth; crowd control)
  - ▶ effect of fire/smoke/fumes on occupants (burns, difficulties seeing or breathing, other injuries) and their reactions
  - ▶ injuries, including how and when they were treated
  - ▶ increase, decrease or change in conditions in the cabin/flight deck as the occurrence progressed (e.g. locations in the cabin where smoke became denser; level of visibility in the cabin or flight deck)
  - ▶ damage sustained by the aircraft/in the cabin, which affected the safety of occupants/flight
  - ▶ difficulties experienced during the occurrence (e.g. locating the source of the fire).
- ▶ post-fire/smoke/fumes actions; crew member and passenger actions; emergency response upon landing (e.g. firefighting and medical services at the airport).

As part of the investigation, a determination should be made as to whether the cabin crew members acted in accordance with operator policies, procedures and approved training programmes. This includes managing the passengers and interacting with other flight and cabin crew members. The investigator should ascertain whether the operator's policies and procedures were followed and if they were effective in the preparation of the cabin crew to respond appropriately to the situation. Additionally, the cabin crew safety training programme content, particularly regarding firefighting, should also be reviewed, including any specific hands-on and simulated exercises. Other sources of

information, such as operator records, may also be analysed to determine contributing factors (e.g. cabin defect log).

## General questioning relating to the fire/smoke/fumes occurrence—cabin crew specific

Along with the questions above, cabin crew should also be asked:

- ▶ When, where and how did you become aware of the fire/smoke/fumes? Describe what you saw and/or smelled (colour, density and odour).
- ▶ Did the conditions (e.g. amount of smoke) increase, decrease or change during the occurrence?
- ▶ Did you have difficulty breathing? Did you use portable breathing equipment or other protection?
- ▶ Did you have problems communicating with other crew members or passenger? If yes, describe the problems.
- ▶ Describe any communication you had with the flight crew.
- ▶ What role did you play, if any, during the firefighting? Which firefighting equipment did you use? Describe the actions taken to fight the fire.
- ▶ Describe any actions taken to assist the passengers (e.g. distribution of wet cloths, relocation of passengers and equipment such as oxygen bottles, which may fuel the fire etc.).
- ▶ Did any passengers or crew require first-aid?
- ▶ Have you received training on fighting a lithium battery fire? If so, was it effective?
- ▶ Did any passengers assist in the firefighting? If so, how?

## General questioning relating to the fire/smoke/fumes occurrence—passenger specific

Along with the questions above, passengers should also be asked:

- ▶ When, where and how did you first become aware of the fire/smoke/fumes? Describe what you saw and/or smelled (colour, density and odour)?
- ▶ Did the conditions (e.g. amount of smoke) increase, decrease or change during the occurrence?
- ▶ Did you have difficulty breathing? Did you use portable breathing equipment or other protection?
- ▶ If you were travelling with an infant, child or any other passenger needing assistance, what happened to that passenger(s)? Did you do anything to protect them from the fire/smoke/fumes?
- ▶ Did you observe any firefighting procedures? If so, please describe.

Material to assist investigators with information analysis when investigating an occurrence involving fire/smoke/fumes will be published in the next cabin safety bulletin in January.

## Additional resources

This section presents existing guidance material. This guidance includes, but is not limited to, the following:

1. International Civil Aviation Organisation Annex 13 Aircraft Accident and Incident Investigation.
2. International Civil Aviation Organisation (Circular 344) Guidelines on Education, Training and Reporting Practices related to Fume Events.

3. International Civil Aviation Organisation (Circular 315) Hazards at Aircraft Accident Sites.
4. International Civil Aviation Organisation (Circular 240) Human Factors Digest No. 7 Investigation of Human Factors in Accident and Incidents.
5. International Civil Aviation Organisation (2017) (Doc 10062) Manual on the Investigation of Cabin Safety Aspects in Accidents and Incident.
6. International Civil Aviation Organisation (Circular 298) Training Guidelines for Aircraft Accident Investigators.

## Further information

View the [cabin safety](#) pages.

If you have an inquiry, please contact the cabin safety team on 131757 and ask to speak to a cabin safety inspector or email [cabinsafety@casa.gov.au](mailto:cabinsafety@casa.gov.au).

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<sup>1</sup> ICAO defines an incident as an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation

<sup>2</sup> ICAO defines an investigation as a process conducted for the purpose of accident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and/or contributing factors and, when appropriate, the making of safety recommendations

<sup>3</sup> ICAO define an occurrence as any accident or incident associated with the operation of an aircraft

<sup>4</sup> Further guidance on investigating fume events is outlined in the Guidelines on Education, Training and Reporting Practices related to Fume Event (Cir 344)

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