CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

# Advisory Circular
# AC12-2

**Revision 3**

**30 July 2025**

## Occurrence Investigation

### General

Civil Aviation Authority (CAA) Advisory Circulars (ACs) contain information about standards, practices, and procedures that the Director has found to be an **acceptable means of compliance** with the associated rules and legislation.

Consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

### Purpose

This AC describes an acceptable means of compliance, when investigating and submitting occurrence investigation reports, to meet Civil Aviation Rule Part 12, *Accidents, Incidents and Statistics.*

### Related Rules

This AC provides general guidance for occurrence investigation.

### Change Notice

Revision 3 adds information about updating the occurrence investigation report form, and updates contact information for CAA teams.

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**Version History**

The version history is outlined below:

| Revision No. | Effective Date | Summary of Changes |
|---|---|---|
| AC12-2, Rev 0 | 3 April 2000 | Initial issue of this AC. |
| AC12-2, Rev 1 | 21 March 2016 | Updated title from *Incident Investigation* to *Occurrence Investigation* and changed the content of this AC to reflect industry best practice. |
| AC12-2, Rev 2 | 22 August 2022 | Updated content to reflect related ACs, AC12-1 and AC100-1, which have had new revisions since the previous revision of this AC.<br><br>Revised Appendix A to reflect the form CAA005i, *Occurrence Investigation Report.*<br><br>Added references to an AC from Transport Canada which contained a lot of relevant tips and guidance.<br><br>Added a Version History to make changes easier to track. |
| AC12-2, Rev 3 | 30 July 2025 | Adds information about updating the occurrence investigation report form.<br><br>Updates contact information for CAA teams. |

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# Introduction

1. This AC is intended for certificate holders who have to undertake an occurrence investigation and submit a report as required by Part 12, *Accidents, Incidents and Statistics*. It pertains to occurrences defined in AC12-1, *Mandatory Occurrence Notification and Information.*

2. Part 12 requires certain certificate holders to notify and provide CAA with details of specific types of occurrences. Part 12 is aligned with the certification requirement for organisations, which also requires them to establish a system for safety management (also referred to as a Safety Management System or SMS) under Part 100, outlined in more detail in AC100-1, Safety Management. Ideally, Part 12 investigation and reporting requirements should be incorporated into an organisation's SMS, as the need to investigate occurrences is only one facet of running a safe operation and sits alongside ongoing SMS activities such as assessing trends and risks.

***Note**: This AC refers to "occurrences" to reflect the definition in rule 12.3. While some participants are more familiar with the term "safety", occurrence investigations include safety investigations. Investigations for occurrences reported under Part 12 are carried out to the same standards: there is no difference in how safety-related incidents and accidents are investigated.*

3. AC12-1 and AC100-1 should be read in conjunction with this AC. Certificate holders required by Part 12 to notify and provide details to CAA may also need to investigate the occurrences and submit their occurrence investigation report to CAA. This must also include any actions taken to prevent reoccurrence of a similar event.

4. Any specific accident reporting requirements applying to Part 102 operators of unmanned aircraft must comply with the procedures outlined in the Part 102 holder's exposition — see rule 102.21(a)(3).

5. CAA may analyse the reports to determine if any other corrective measures are needed on an industry-wide basis.

## CAA's role in occurrence investigation

6. CAA may take part in an organisation's internal occurrence investigation or conduct an independent occurrence investigation. However, where this is not the case, this AC aims to provide advice to help an organisation run its own internal occurrence investigation.

7. The emphasis of Part 12 is for industry to be responsible for conducting their own occurrence investigations, thereby contributing to their SMS by dove-tailing the occurrence investigation process with their risk management process.

8. The core purpose is to identify hazards and to take all practicable steps to eliminate, isolate or minimise them. There are also useful process steps in AC100-1.

9. However, CAA recognises that not all certificate holders have trained investigators, so it maintains a group of qualified investigators who may be consulted for advice or assistance. Organisations who would like more information or advice can contact this team at the inbox triage@caa.govt.nz or investigations@caa.govt.nz.

## Purpose of investigating occurrences

10. Historically, CAA has investigated aviation occurrences to find the contributing factors, and to identify strategies that reduce the risk of recurrence. While this purpose remains, the transition to risk-based regulation brings another focus of occurrence investigations: the identification and reduction of safety-related risk.

11. The purpose of any good occurrence investigation is to carefully examine the factors that led to an occurrence and to focus on the future, making changes in the organisation that build its resilience against future safety risks. An occurrence investigation can transform data about an occurrence into information that the organisation can use to improve its safety performance. It is not the purpose of an occurrence investigation to apportion blame or liability.

12. Undertaking a thorough occurrence investigation can provide insight into how policies and procedures are designed and implemented and where improvements and cost savings can be made, for example:

    - where repeated damage can be prevented by ensuring the correct equipment is available and that it is in good condition, or
    - by identifying how ambiguous or confusing procedures could lead to staff not following them.

13. Occurrence investigation forms an important part of an organisation's SMS framework, as explained in AC100-1. High-calibre occurrence investigations should form part of an organisation's SMS process. These investigations should inform the design of the organisation's training programmes.

***Note:*** *Organisations also have obligations under the Health and Safety at Work Act (2015) (HSWA) to make sure their operation is safe, including minimising the risk of fatigue for all workers. Further information and guidance can be found on the CAA Fatigue Risk Management webpage and the WorkSafe New Zealand website.*

## Benefits of investigating occurrences and submitting reports

14. Occurrence investigations have played a major role in the improvement of civil aviation safety throughout its history. By mandating occurrence investigations, the International Civil Aviation Organisation (ICAO) has implemented a system where the performance of international aviation has improved due to evolving rules, procedures, standards and technology. This is in response to information the occurrence investigations into major accidents and incidents have provided.

15. Under Part 12, occurrence investigations are a critical means of improving the safety performance of New Zealand's civil aviation operators. Since a risk-based regulation approach requires an effective SMS, CAA is committed to ensuring that the lessons learned from occurrence investigations are promulgated so that the aviation system can benefit from each occurrence investigated.

16. Individual organisations, aviation associations, clubs and private pilots can also benefit from occurrence investigations. These investigations may be treated as an opportunity to conduct a structured review of policies and procedures, staff and company culture and the work environment. Resulting changes can:

    - dramatically improve operational performance and efficiency, and
    - most importantly, increase the level of organisational resilience to risks.

17. In summary, the occurrence investigation turns the occurrence into detailed information that the organisation can learn and improve from. Disseminating the information around the organisation and wider sector is a key means of improving the safety of the aviation system.

## Investigation guidance

18. Ideally, all occurrences should be investigated. However, resources can be limited, so the effort expended should be proportional to the perceived benefit in terms of potential for identifying hazards and risks to the organisation.

19. This section outlines CAA's recommended guidance for running an occurrence investigation. It is designed to:

    - be understandable and straightforward
    - be adaptable to different situations
    - contain enough information to determine the different factors that led to the occurrence
    - lead to ideas about what might be necessary to reduce the risk of reoccurrence, and
    - aid in establishing both the corrective and preventative measures needed to prevent any reoccurrence.

20. It is designed to complement the Investigation Report format, which is explained in Appendix A of this AC.

21. Some large operators may already have detailed safety management tools for conducting their investigations to discover and analyse key safety information, and generate their own occurrence investigation report. These operators may find this AC less useful, as it is tailored to smaller and non-commercial operators, pilots and engineers who do not have these well-developed tools at their disposal. There are, however, general principles in this AC that are relevant to all operators and organisations.

22. Organisations can also learn from Transport Canada's equivalent to this AC, although the Transport Canada AC reflects their civil aviation system, which is different to New Zealand's in some respects: Advisory Circular (AC) No. SUR-002 (canada.ca)

23. Although the Transport Canada AC has some slight operational differences to CAA, many of the models and templates outline methods that organisations, no matter their scale or scope of their operations, can learn from.[1]

24. A good occurrence investigation does three things. It outlines:

    - what happened
    - why it happened, and

[1] An example of a Corrective Action process can be found in Advisory Circular (AC) No. SUR-002, on the Transport Canada webpage *here.*

- what should be done to prevent it from happening again.

**What happened?**

25. This should be a clear and straightforward description of what took place.

| |
|---|
| For example:<br>On landing, a significant down draught caught the aircraft. The pilot was unable to arrest the resulting rate of descent. The aircraft landed heavily on the threshold of the runway and sustained minor damage to the undercarriage. The pilot was uninjured. |

26. It is important to collect information on what happened as soon as practicable, so that the evidence is preserved, and items are not disturbed. Statements from those who witnessed the event should be collected as near to the time as possible, while their memories are fresh. In addition, exposure to occurrence-related information (such as recorded data) should be avoided to prevent memory distortion.

27. All available and relevant information should be collected at the outset, as it is difficult to know at this stage what the important facts are.

**Why did it happen?**

28. The difficult part of an occurrence investigation is determining what caused the occurrence.

*Tools and techniques*

29. There are several prominent tools and techniques to assist in determining causation including:

    - an article on root cause analysis and the '5 Whys' in the Autumn 2020 edition of Vector – Autumn 2020 (aviation.govt.nz), and
    - examples in the Transport Canada AC cited on page 7, and
    - specific tools such as:
        - James Reasons' 'Swiss Cheese' model, explained in SKYbrary or by the author here
        - fault tree analysis methods, as explained here and here.

30. The 5 Whys root cause analysis technique, referenced in the Vector article, explains how an investigator or team, by repeatedly asking the question "Why?", can peel away the layers of an issue and get to the root cause of the problem.

31. Some questions related to aviation could be:

    - Is it training that caused this, or is it the ergonomics of the aircraft?
    - Have the manufacturers made the landing gear selector handle look similar to the flap lever and placed them in close proximity to each other?
    - Could it be poor maintenance practice, or is the maintenance manual deficient?
    - Does the way the company is organised contribute to the occurrence?

32. The Australian/ New Zealand Standard AS/NZS IEC 62740:2016 provides greater detail around the principles of root cause analysis and the various recognised techniques available to help with an investigation.

33. AC No. SUR-002 also provides guidance around both root cause analysis (including the 5 Whys and fishbone/ Ishikawa methods) and establishing Corrective Actions.

34. Lastly, there are further resources and templates here and here.

35. CAA also uses a simpler method where the four main types of cause are each considered in the occurrence investigation, as outlined below.

36. It is important to understand that each area interacts with other areas, and in some cases, there is a lot of overlap. Not all categories will apply to every occurrence. However, they have been included here to make sure that an investigator or investigation team gathers as much good quality causal information as possible.

*Human factors*

37. This part of the investigation asks you to consider who is involved in the occurrence. Most often this will be the pilot, but it can also include other flight crew, ground crew, engineers, air traffic controller, and passengers.

38. Determining who is involved can be a challenging task. It is also important to remember that the investigation purpose is not to assign blame, but rather to identify why the event in question occurred and how reoccurrence can be prevented.

39. Human factors are thought to underpin between 70–80% of aviation accidents, so it is very important that all aviation participants learn as much as possible about this element of aviation safety.

40. Questions for the investigator or team to ask or consider include:

    (a) Were there any physiological factors such as fatigue, vision, or hearing issues that may have been involved?

        (i) Some specific questions regarding fatigue are:

            - What time of day did the occurrence happen?
            - How long has the person(s) involved been awake?
            - How long did the person(s) involved sleep for last?
            - What was the quality of their sleep?
            - Were there any sleep or medical disorders affecting the person(s) involved?

    (b) What level of experience and training did the individuals involved with the occurrence have with:

        (i) the aircraft type?

        (ii) the manoeuvre or type of flying being conducted at the time?

        (iii) the area/location?

    (c) Were any of these common themes involved:

        (i) situational awareness?

(ii) decision making?

(iii) communication?

(iv) fatigue?

*Aircraft/equipment/ mechanical factors*

41. Under this category, the investigator or investigation team considers whether there was anything about the condition or design of the aircraft/equipment and its components/systems that contributed to the occurrence.

Some examples of common aircraft/equipment issues include:

(a) components failing

(b) components not working to specification, and/ or

(c) components being used beyond specified limitations.

*Environmental factors*

42. This category involves consideration of environmental factors that may have been involved in the occurrence. In New Zealand, this is a factor in a significant number of occurrences and so requires careful consideration in occurrence investigations.

43. Some examples of common environmental factors include:

(a) weather (wind, snow, icing, etc.)

(b) temperature/dew point

(c) topography/terrain

(d) surface conditions

(e) cloud/visibility (including sunstrike), and/ or

(f) ground-based hazards including trees, masts, and wires.

44. Where relevant the investigator or investigation team should consider the environmental elements above, in relation to the area/location where the occurrence took place and the prevailing conditions. It is very common for environmental factors to interact closely with human factors, especially with decision making and situational awareness.

*Organisational/ regulatory factors*

45. Organisation and regulatory factors are the policies, procedures, and practices that might – directly or indirectly – have contributed to what took place. These factors include an organisation's Standard Operating Procedures (SOPs), Civil Aviation Rules, Airworthiness Directives (ADs), ACs, and other policies and procedures that influence how an organisation operates.

46. The investigator or investigation team should think about what led to the occurrence and ask:

(a) Is there anything about 'the way we do things' in the organisation that might have contributed to the occurrence?

(b) Is there anything about 'the way we do things' in this particular aviation sector (e.g. the agricultural sector, the recreational sector) that might have contributed to the occurrence?

(c) Were there established procedures written down for personnel to follow?

(d) Were these procedures evaluated on a regular basis to ensure that:

(i) they were still functional, and

(ii) personnel were following and being trained in the established procedures, and

(iii) training was provided that demonstrated how personnel were to apply the established procedures?

(e) Is there anything about the Civil Aviation Rules or policies that might have contributed to the occurrence?

**What should change as a result?**

47. This is the final and most important stage of the occurrence investigation. If the investigators or investigating team identified causal factors during the investigation, they need to make recommendations designed to facilitate positive change in the organisation.

48. These recommendations should lead to corrective and preventative measures being established to help prevent similar risks to safety arising in the future.

CAA encourages you to consider:

Are there any tips, information, or advice that you would give to an individual or operator similar to yourself, in order to reduce their chances of a similar occurrence happening to them?

49. The reason to phrase it like this is to emphasise how the information your occurrence investigation provides can ultimately benefit the aviation system as whole.

50. During the occurrence investigation, investigators may also want to consider the avoidance and recovery barriers in place at the time and review their robustness. The investigation may even identify where new barriers need to be placed.

51. These recommendations, along with any additional hazards that may have been identified during the investigation, can be fed back into your SMS and investigation methods, aiding your organisation's hazard identification, risk assessment and risk mitigation processes, and driving continual improvement.

## Does this need to be reported to CAA?

52. AC12-1, and rules 12.55, 12.57 and 12.59, outline who must report and what types of occurrences must be reported to CAA, but if in doubt please report anyway. Reporting on occurrences helps CAA build up a clearer picture of civil aviation occurrences and how to improve aviation safety.

53. Appendix A provides prompts and advice to help participants provide complete and useful information.

# Appendix A— Occurrence Investigation Report format

CAA provides an investigation report Form, which can be found here. Participants may use this form if they do not have their own means of providing the information, which has been found to be acceptable to CAA.

The following table provides brief advice on the information required for each field, but participants are encouraged to provide any additional detail which will help the investigation. As advised in AC12-1, if in doubt about whether something is relevant, provide the information anyway.

As of 2025, CAA is looking into ways to improve how their investigations function works, and what information is useful to monitor trends in the aviation sector. To help us do this, this form may be updated. Please check the website link to make sure you have the current version of this form.

As well as the inbox triage@caa.govt.nz , participants can also contact investigations@caa.govt.nz

| DATA FIELD | FILLING ADVICE |
|---|---|
| **Date and time of occurrence** | This must be the same as the initial notification submitted to CAA. Choose UTC NZST or NZDT. |
| **Location** | The geographical location where the occurrence happened or where it was identified. Use the 4-letter ICAO location indicator (for example NZWN) or a 4-digit postcode. If there is no known location indicator or postcode use a description of the nearest recognisable city or town. (See NZAIP Planning Manual for a complete list of NZ location indicators). |
| **Aircraft registration ZK-** | The registration mark of an aircraft involved (if applicable). |
| **Aircraft manufacturer and model** | The popular name of the aircraft and model. Note: if NZ registration, CAA database will populate this field. |
| **Operator/ reporter name** | |
| **Contact phone** | |
| What happened and why it happened? Please provide a brief summary of the occurrence | Refer to the 'what happened?' section of this AC. |
| Human factors - please indicate if any of the factors below may have contributed to the occurrence | Tick any relevant factors listed below, or explain in the 'Other' box. |
| Comment on how human factors may have contributed to the occurrence | Refer to the 'Human Factors' section of this AC, including answers to any questions. |

| | |
|---|---|
| Equipment/mechanical - please indicate if any of the factors below may have contributed to the occurrence (Note: if you have supplied engineering/defect information in the occurrence reporting form this will usually be sufficient for this part of the investigation) | Tick any relevant factors listed below, or explain in the 'Other' box. |
| Comment on how aircraft/ equipment/mechanical factors may have contributed to the occurrence | Refer to the 'equipment/ mechanical factors' section of this AC, including answers to any questions. |
| Environmental factors - please indicate if any of the factors below may have contributed to the occurrence | Tick any relevant factors listed below, or explain in the 'Other' box. |
| Comment on how environmental factors may have contributed to the occurrence | Refer to the 'environmental factors' section of this AC, including answers to any questions. |
| Organisational/regulatory - please indicate if any of the factors below may have contributed to the occurrence | Tick any relevant factors listed below, or explain in the 'Other' box. |
| Comment on how organisational/regulatory factors may have contributed to the occurrence | Refer to the 'organisational/ regulatory factors' section of this AC, including answers to any questions. |
| Steps taken to mitigate or eliminate the identified issue(s) - describe what has been/will be done to ensure this occurrence doesn't happen again | Summarise the steps taken to mitigate or eliminate the above identified causal factors which may have contributed to the occurrence. |
| Lessons learned - what advice would you give to other operators to reduce their chances of something like this happening to them? | Summarise the main points from the investigation and your findings. |

# Appendix B – Suggested Further Research

For more information, search for the following key phrases on the internet:

- James Reason HF Model - Swiss Cheese Model
- Maintenance Error Decision Aid (MEDA)
- Investigation of Human Factors in Accidents and Incidents
- Human Factors Management and Organisation
- Human Factors in Aircraft Maintenance and Inspection
- CONTROL - Hierarchy of controls
- The ARMS Methodology for Operational Risk Assessment in Aviation Organisations
- Fault tree analysis methods
- Fishbone/ Ishikawa methods
- Australian/ New Zealand Standard AS/NZS IEC 62740:2016[2]

CAA's website also includes sections on:

- Human factors
- Safety Management Systems (SMS)

[2] Not a free resource.