International Civil Aviation Organization
Asia and Pacific Office

Tenth Meeting of the Asia Pacific Accident Investigation Group (APAC-AIG/10)

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Agenda Item 4: Enhancing Accident Investigation Capabilities

CLASSIFYING SERIOUS INCIDENTS BASED ON ATTACHMENT C OF ANNEX 13

(Presented by Australian Transport Safety Bureau)

SUMMARY

Attachment C of Annex 13 provides guidance for classifying incidents as serious incidents for investigation under Paragraph 5.1.2. This presentation is an opportunity for states to learn of the intent for Attachment C to help future decision making. The guidance in Attachment C is explained, and some examples provided.

1. INTRODUCTION

1.1 Paragraph 5.1.2 of Annex 13 — *Aircraft Accident and Incident Investigation* calls for the investigation of serious incidents when the aircraft involved is of a maximum mass of above 2 250 kg. The reason why Annex 13 requires these serious incidents (with minimal consequences) to be investigated is so that lessons can be learned that can be implemented to prevent future accidents with injuries and damage.

1.2 However, unlike the clearer definition of an accident, serious incidents are defined in Annex 13 as "An incident involving circumstances indicating that there was a high probability of an accident". Practically, the classification of a serious incident is left to the discretion of States, which may result in some serious incidents not being investigated and valuable safety lessons going undocumented and unlearned. Based on the proportion of investigation reports held by ICAO AIG involving accidents compared to those involving serious incidents, it has been suggested that there is an under-investigation of serious incidents across all ICAO States.

1.3 Attachment C to Annex 13 contains a list of typical examples of incidents that are likely to be serious incidents. However, it was also recognised that not all of these examples *always* the definition of "a high probability of an accident".

1.4 As such, an event risk classification-based approach was introduced into the 12th Edition of Annex 13 in July 2020. This information paper is to provide guidance to states to help use this material in Attachment C to make classification decisions for serious incidents.

2. DISCUSSION

2.1 Paragraph 3 of Attachment C in Annex 13 provides 20 examples of incidents that *may* be serious incidents. The intent of this list is for it not to be exhaustive, nor restrictive. A version of this list of examples was provided earlier editions of Annex 13. However, it was apparent that some states were using this list of examples as a checklist, which was not the intent.

a) The list of examples in Attachment C does make an excellent list of incidents that state investigation agencies should ensure are reported to them. The ATSB has done this with amendments to the regulations controlling incident reporting to the ATSB, coming into effect in 2023. All of these incidents need to be reported to the investigation authority so that they can then make a decision about whether the incident also meets the definition of "a high probability of an accident".

b) However, the list is not exhaustive, so state investigation agencies should also ensure that any incident which indicated a likely a high probability of an accident is also reported.

2.2 As per Attachment C, there may be a high probability of an accident if there are few or no safety defences remaining to prevent the incident from progressing to an accident (where an accident is per the Annex 13 definition involving injury and/or damage, and not necessarily a "crash"). To determine this, an event risk-based analysis is used, based on a simplified version of the established Aviation Risk Management Solutions (ARMS) event risk classification (ERC) methodology.

2.3 The event risk takes into account the most credible scenario had the incident escalated beyond what actually occurred on the day, and the effectiveness of the remaining defences between the incident and the potential accident. It is performed as follows:

a) consider whether there is a credible scenario by which this incident could have escalated to an accident; and

b) assess the remaining defences between the incident and the potential accident as:
— effective, if several defences remained and needed to coincidently fail; or
— limited, if few or no defences remained, or when the accident was only avoided due to providence. Consider both the number and robustness of the remaining defences between the incident and the potential accident. Ignore defences that failed, and consider only those that worked and any subsequent defences still in place.

2.4 As per Note 1, the most credible scenario refers to the realistic assessment of injury and/or damage resulting from the potential accident. Without applying this realistic scenario, then every incident considered would be catastrophic outcomes. Although appropriate for some incidents, the process is designed to differentiate between serious incidents and those other incidents that really have less possible consequences.

2.5 As per Note 2, defences include crew, their training and procedures, ATC, alerts (within and outside the aircraft), aircraft systems and redundancies, structural design of the aircraft and aerodrome infrastructure. So for example, if an aircraft involved in a technical incident has been designed with two independent hydraulic systems and the technical event would only cause interruptions to one of them, then this is a defence that must be considered. Likewise, if the credible accident scenario involved a runway excursion, defences that need to be taken into consideration include the flat graded areas around runways that minimise aircraft damage.

2.6 The combination of these two assessments helps to determine which incidents are serious incidents as per the table in Attachment C:

		b) Remaining defences between the incident and the potential accident outcome	
		Effective	*Limited*
a) Most credible consequence	*Accident*	Incident	Serious Incident
	No accident	Incident	

2.7 Example 1: Engine failure, single engine piston aircraft

a) Most credible consequence is a forced landing (possible accident).

b) The only remaining defences between an inflight engine failure and an accident is limiting the damage during the forced landing. If the incident occurred in an urban area, or mountainous terrain, then damage and injury is very likely, so defences are limited (serious incident). If it was on an airfield, then defences are effective (incident).

2.8 Example 2: single engine failure, twin engine turbojet aircraft in cruise

a) Most credible consequence a diversion due to capabilities of the aircraft and pilot training etc. (No accident).

2.9 Example 3: single engine failure, twin engine piston aircraft during take-off

a) Most credible consequence is a forced landing off aerodrome due to lack of climb performance (Accident).

b) The only remaining defences are pilot training and experienced, procedures, the area available to land. These are dependent on the pilot(s) involved etc, and what actions they did in response to the engine failure, so may be limited (serious incident) or effective (incident).

2.10 Example 4: loss of separation in controlled airspace between two aircraft

a) Most credible consequence is a mid air collision, but only if the aircraft were on potential a collision course (Accident) and not diverging.

b) Remaining defences are air traffic control (were ATC aware, did ATC receive an alert, did they issue separation instructions?), TCAS (were the aircraft equipped with TCAS?), pilot awareness (did any of the pilots have awareness of the other aircraft?). Depending on whether these defences were in place or not will result in whether the remaining defences were limited or effective. For example, if both aircraft had TCAS which provided resolution advisories that were followed, then they were probably effective (incident). If the aircraft passed each within 100 ft and ATC did not notice until the aircraft at that point, then it is definitely limited (serious incident).

3. ACTION BY THE MEETING

3.1 The Meeting is invited to use the above guidance and examples to further their understanding of classifying serious incidents to ensure that lessons can be learned through investigations where there were minimal consequences rather than waiting for catastrophic outcomes.

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