

United Kingdom Overseas Territories Aviation Circular

OTAC 139-5

Aeronautical Studies

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GENERAL

Overseas Territories Aviation Circulars (OTACs) are issued to provide advice, guidance and information on standards, practices and procedures necessary to support Overseas Territory Aviation Requirements. They are not in themselves law but may amplify a provision of the Air Navigation (Overseas Territories) Order or provide practical guidance on meeting a requirement contained in the Overseas Territories Aviation Requirements.

PURPOSE

This Overseas Territories Aviation Circular provides guidance on the production of an Aeronautical Study in accordance with OTAR Part 139 where an aerodrome is unable to meet the OTAR requirement and need to identify alternative means to achieve an equivalent level of safety. Although this OTAC relates to aerodromes, the principles contained in it may be applied more widely in circumstances where requirements cannot be met and an alternative means of compliance is proposed.

RELATED REQUIREMENTS

This Circular relates primarily to OTAR Part 139.

CHANGE INFORMATION

First issue.

ENQUIRIES

Enquiries regarding the content of this Circular should be addressed to Manager PQS, Air Safety Support International, to the appropriate Director or Director-General of Civil Aviation or to any office of ASSI.

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1 Introduction

- 1.1 OTAR Part 139.91 contains basic provisions on the use of Aeronautical Studies as a means to identify alternative means to achieve an equivalent level of safety by means other than full compliance with a specific OTAR requirement, when so permitted by that requirement. This OTAC provides broad guidelines as to how an aeronautical study or risk assessment may be carried out.
- 1.2 The same basic procedure may be used for Aeronautical Studies, conducted in accordance with OTAR Part 139.91, or for a risk assessment/safety case in support of an application for a deviation from the OTAR in those cases where a particular requirement cannot be (fully) complied with.
- 1.3 It is acknowledged that there could be some other cases where full compliance with requirements cannot be achieved, and for which a deviation from an OTAR requirement will have to be sought. A safety case based on the same principles as an Aeronautical Study should accompany any application for a deviation.
- 1.4 It is important to note that the preferred option must always be to seek compliance with the requirements. In order to achieve an equivalent level of safety by other means, one must usually establish mitigating measures that affect the efficiency and usability of the aerodrome.

2 Definition

ICAO Doc 9774 defines an aeronautical study as:

a study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety.

3 Who should perform it?

If the aerodrome cannot meet the requirements it needs to propose, and have accepted, an alternative means of compliance or a deviation from the requirement. Consequently the burden of justifying an application by means of an Aeronautical Study rests with the aerodrome.

4 Who should take part in an Aeronautical Study?

Both aerodrome and flight operational expertise is needed. In some cases also ATS and/or PANS OPS expertise must be involved. Finally, depending on the complexity of the issue, specialists on risk analysis may have to be brought in.

5 Steps of an aeronautical study

An Aeronautical Study implies a systematic and documented approach to a problem. Thus it consists of certain steps, notably:

1. A description of problems and objectives.
2. Selection of procedures, methods and data sources.

3. Identification of undesired events.
4. An analysis of causal factors, severity and likelihood.
5. A description of risk.
6. Identification of possible mitigating measures
7. An estimation of the effectiveness of mitigating measures
8. Choice of mitigating measures
9. Presentation of results.

5.1 A description of problems and objectives

The first step of any risk analysis is to define the problem and the objective of the exercise.

The problem will be to identify the safety implications of not complying (in full) with a certain requirement or requirements.

The objective will be to identify suitable mitigating measures, which will mitigate these safety implications.

Thus, it is important to understand which hazards and scenarios the requirement(s) in question are designed to protect against.

5.2 Procedures, methods and data sources

A main issue is whether the study shall follow a quantitative or qualitative approach. The answer will to a large extent depend upon the data-sources available.

A qualitative approach based on common sense and qualified expert opinion will probably, in many cases, yield results that are far better than nothing, and better than a quantitative approach based on a limited set of unrepresentative or unreliable data.

Even if it is possible to carry out a quantitative approach, qualified expert opinion is necessary, particularly in the next step.

5.3 Identification of hazards

Hazards are any situation or condition that has the potential to cause damage or injury.

The basic question one must ask is: what can go wrong, and where?

Examples of 'what' include, but are not limited to:

- Aircraft colliding with terrain, aircraft, vehicles or objects.
- Aircraft landing in front of the threshold, running off the far end of the runway or veering off the side of the runway.
- Aircraft colliding with, or ingesting wildlife or foreign objects

Examples of 'where' include, but are not limited to:

- During flight (approach, landing, balked landing, take-off, climb-out)
- On the ground (Runway, taxiway, apron, strips, RESAs, or outside these areas)

The key is to identify hazards that the requirement in question is designed to protect against.

5.4 An analysis of causal factors, severity and likelihood

5.4.1 Causal factors

The basic questions are: why can it go wrong, what is the consequence if it does go wrong and how likely is it that it will go wrong?

Examples of 'why' include, but are not limited to:

- Lack of guidance (non-visual aids, lights, markings, signs, charts)
- Confusing guidance (non-visual aids, lights, markings, signs, charts).
- Inaccurate obstacle surveys and obstacle publications
- Inaccurate aeronautical data
- Insufficient protected areas (strips and RESAs)
- Insufficient separation distances
- Insufficient surface widths
- Insufficient maintenance programmes

In some cases these factors can contribute to an accident happening. In other cases they can increase the consequences of an incident so that it becomes an accident.

5.4.2 Severity

What are the (potential) consequences if it goes wrong?

Extreme Harm

Accident as defined in OTAR Part 1,
fatal or serious injuries caused, structural damage etc.

Moderate Harm

Serious incident
Outcome not under control
Affecting or would affect safety of operation

Slight Harm

Minor incident
No or minor injuries caused

Nuisance

No immediate effect on safety

This model of severity and likelihood (see paragraph 5.4.2 below) follows that in Appendix D of OTAC 139-3 Documenting the Safety Management System.

5.4.3 Likelihood

How likely is it that it goes wrong?

This is a probability issue. How often is it likely to go wrong within a certain number of movements?

If relevant and reliable data to make a quantitative assessment is available that is fine. If not, a qualitative assessment based on expert opinion can be used. A qualitative description from OTAC 139-3, Appendix D is given below, but note that quantitative descriptions can also be used.

Very unlikely

Unlikely ever to occur

Unlikely

Unlikely to occur during total operational life

Possible

May occur during total operational life

Likely

Likely to occur once during total operational life

Very Likely

Likely to several times during total operational life

5.5 A description of risk

Risks are the potential adverse consequences of a hazard, and are assessed in terms of their severity and likelihood.

Thus, for each hazard resulting from the non-compliance, one can now describe the risk by placing the combination of severity and likelihood in the Risk Classification Matrix shown below. If the risk comes out as medium or above, risk reduction measures must be identified.

Risk Classification Matrix

	Very Unlikely	Unlikely	Possible	Likely	Very Likely
Extreme Harm	MEDIUM RISK	HIGH RISK	HIGH RISK	VERY HIGH RISK	VERY HIGH RISK
Moderate Harm	LOW RISK	MEDIUM RISK	MEDIUM RISK	HIGH RISK	VERY HIGH RISK
Slight Harm	LOW RISK	LOW RISK	LOW RISK	MEDIUM RISK	MEDIUM RISK
Nuisance	LOW RISK	LOW RISK	LOW RISK	LOW RISK	MEDIUM RISK

5.6 Identification of possible mitigating measures

As can be seen from the risk classification matrix, risk reduction measures can aim towards either reducing the likelihood of an occurrence, or reducing the severity of an occurrence. Some measures could conceivably do both.

The first priority should always be to seek measures that will reduce the likelihood of an occurrence (ie accident prevention).

When contemplating mitigating measures, it is always necessary to look to the intent of the requirement that is not (fully) complied with.

Examples of mitigating measures include, but are not limited to:

- Publication in the AIP as a minimum. (This is an Annex 15 Standard and is also necessary in order that the airlines can take their precautions, as they are obliged to do according to Annex 6.)
- Aerodrome operational procedures are in some cases relevant. One example is to restrict traffic on a parallel taxiway if runway/taxiway or taxiway/taxiway separation distance is insufficient.
- Infrastructure and/or additional visual and/or non-visual aids.

- Operational restrictions that might be necessary.
These may include restrictions on all-weather operations, increased spacing between aircraft (in the air or on the ground).
- Restrictions on aircraft operators that might be necessary, such as:
 - Operations restricted to operators/crew who can demonstrate special competence.
 - Requirements that aircraft carry special equipment or certifications
 - Requirements that operators set special wind limits

Mitigating measures usually means reduced usability for an aerodrome. Safety and usability is a balancing act!

5.7 Estimating the effect of mitigating measures

The mitigating measures should be fed back into the consideration listed earlier in order to evaluate their relevance and effectiveness in reducing risk.

5.8 Choice of mitigating measures

If one or more measures enable the risk to be sufficiently reduced, one can recommend a choice, bearing in mind that the preferred option should be accident prevention, and prepare the final report. Thus the final description should recommend mitigating actions and list the consequences and their probabilities when these are taken into account.

5.9 Presentation of results

The work shall be documented in such a way that it is possible to see what has been done. The steps referred to above should be identifiable.

Other key issues:

- What essential assumptions, presuppositions and simplifications have been made?
- Any uncertainty about the results due to the choice of and availability of methods, procedures and data sources should be discussed.

The results of the study should emphasise which undesired event contribute the most to risk, and factors influencing these undesired events.

Recommendations for measures to mitigate risk, their character and their estimated effect shall be stated.

6 Acceptance by regulator

The right to accept or reject the results of the Aeronautical Study rests fully with the regulator.