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GCAA ADVISORY CIRCULAR

AIRWORTHINESS
AC NO: GCAA AC/AIR/027

SUBJECT: **AERONAUTICAL STUDIES AND RISK ASSESSMENT FOR EXEMPTION/ EXCEPTION/DEVIATION**

DATE INITIATED: **APRIL 14, 2020**
INITIATED BY: **DIRECTOR AVIATION SAFETY REGULATION**

Advisory Circulars (ACs) are not mandatory in nature, but provide means such as guidance, methods, procedures and practices acceptable to the Authority for complying with regulations and other requirements in a systematic manner. These are not necessarily the only means of compliance. ACs may also contain explanations of regulations, other guidance material, best practices or information useful to the aviation community. Unless incorporated into a regulation by reference, ACs are not regulatory and do not create or change a regulatory requirement. A change of a regulatory requirement may come in the form of a Directive. An Advisory Circular is not a Directive.

1. PURPOSE

The purpose of this Advisory Circular (AC) is to provide guidance to Aviation Service Providers, such as, Air Operators (AOC Holders), Approved Maintenance Organisations (AMOs) and Approved Training Organisations (ATOs) on the procedures acceptable to the Authority for the conduct of Aeronautical Study and Risk Assessment when applying to the Authority for an ***EXEMPTION, EXCEPTION or DEVIATION*** from a ***REGULATION, STANDARD, RULE or DIRECTIVE***. Regardless of the differences in meaning, for simplicity, where the word **"EXEMPTION"** is used in this Advisory Circular it is representative of the terms **EXEMPTION, EXCEPTION** and **DEVIATION**, as the case may be. Where the word **"REGULATION"** is used in this Advisory Circular it is representative of the terms **REGULATION, STANDARD, RULE** and **DIRECTIVE**, as the case may be. Aviation Service Provider in this Advisory Circular refers to AOCs, AMOs and ATOs.

2. CANCELLATION

This Advisory Circular GCAA AC/AIR/027 is an initial issue and the effective date is April 1, 2020.

3. APPLICABILITY

This Advisory Circular applies to all AOCs, AMOs and ATOs certificated by the Guyana Civil Aviation Authority.

4. RELATED REFERENCES

4.1 Guyana Aviation Requirements (GARs) Part 1, Section 1.3 " Exemptions and Equivalent Safety Case" and GARs Part 6, Section 6.16 "Deviation Authority."

4.2 Safety Management Manual - ICAO Doc 9859, 3rd Edition.

5. CONTACT INFORMATION

Director General Civil Aviation
@ Address and contact information shown in the header, or
Director, Aviation Safety Regulation
Phone: (592) 225 0778, Ext. 226, E-mail: dasr@gcaa-gy.org

6. PREAMBLE

6.1 GENERAL INFORMATION

6.1.1 Potential areas of non-compliance may primarily be related to an AOC operations, an AMO maintenance procedure or an ATO procedure. In any case, it is the responsibility of the Aviation Service Provider to carry out aeronautical studies when necessary. An Aviation Service Provider who is unable to meet the established requirements of the Regulations may propose an alternative means of compliance or a deviation from the requirements. The alternative means of compliance or deviation must be acceptable to the Authority before it is approved.

6.1.2 Aviation Service Providers are expected to comply with the provisions of the Regulations, as currently in force. There may be some circumstances where compliance of a requirement may not be feasible by the Aviation Service Provider because of various constraints. In such circumstances the Aviation Service Provider may apply to the Authority for an ***Exemption, Exception*** or ***Deviation*** from the Regulations.

6.2 To address such situations, GARs Part 1, Section 1.3 "Exemptions and Equivalent Safety Case" and GARs Part 6, Section 6.16 "Deviation Authority" has made provision to issue exemptions and deviations on condition that an equivalent level of safety is maintained all times.

6.2.1 It is not the purpose of this Advisory Circular or the procedures contained therein to avoid or ease the compliance with the provisions of a Regulation. When non-compliance is present, the effects on safety need to be analysed and compensatory measures and/or limitations implemented to mitigate any non-compliance.

6.3 CATEGORIES OF EXEMPTIONS

6.3.1 ***Short Term Exemption***. Where the non-compliance is expected to be removed within a stipulated time frame as recommended by the manufacturer or competent authority of the Contacting State and inter-operability is the predominant aspect of the requirement such exemption will be considered as a ***Short Term Exemption***. However, in no case shall the exemption be longer than six (6) months.

6.3.2 ***Long Term Exemption***. Where the non-compliance is not reasonably expected to be removed and interoperability is not the predominant aspect of the exemption, it may be considered as a ***Long Term Exemption***. Such exemption will be typically related to the unique operational context of Guyana and take longer time to resolve than time frame specified in paragraph 6.3.1.

7. PROCEDURE FOR GRANTING OR DENYING AN EXEMPTION, EXCEPTION OR DEVIATION

7.1 The applicant shall submit to the Authority in writing and on the prescribed form along with the required processing fees the application for an exemption, exception or deviation sixty (60) days in advance. The Director Aviation Safety Regulation (DASR) upon receipt of the application will forward the application to the appropriate Inspectorate within 5 working days. The application shall be in the format prescribed in **Appendix A** of this AC.

7.2 The application along with the supporting documents will be processed by the assigned Inspector within 40 working days. However, in coordination with the relevant departments, the Inspector will assess the application to ensure that it contain the following particulars:

a. The applicant's name and address.

b. Details of any relevant authorisation.

c. A citation of the specific requirement from which the applicant seeks relief.

d. Description of the type of operations to be conducted under the proposed exemption, exception or deviation.

e. Details of any person, aircraft or aeronautical product, or type of aircraft or aeronautical product, or material or kind of material, or service or kind of service to be affected by the exemption, exception or deviation.

f. The proposed duration of the exemption, exception or deviation.

g. An explanation of how the exemption, exception or deviation would be in the public interest, that is, benefit the public as a whole.

h. A detailed description of the alternative means by which the applicant shall ensure a level of safety equivalent to that established by the Regulation in question.

i. A risk assessment to justify the application of the exemption, exception or deviation as well as the continuing need for the exemption, exception or deviation. Refer to **Appendix B** of this AC for ***Risk Assessment Procedure and Risk Assessment Matrices***.

j. If the applicant seeks to operate under the proposed exemption outside of Guyana's airspace, the application shall also indicate whether the exemption would contravene any provision of the standards and recommended practices of the International Civil Aviation Organisation (ICAO) and the applicable States.

7.3 The evaluation of the application for the exemption, exception or deviation shall take into account the following factors:

a. The recommendation of the manufacturer or the State of Manufacture/Design;

b. Redundancy of the system(s) in consideration;

c. Adequate safety risk assessment, safety and measure of safety risk mitigation to ensure an equivalent level of safety.

7.4 After being satisfied that an equivalent level of safety has been established, the Inspector shall recommend the approval of the exemption, exception or deviation, as the case may be, with the validity in terms of calendar days, cycles or flight hours, as applicable.

7.5 Where the Inspector is not satisfied with the safety risk assessment provided by the Applicant or where the Applicant has failed to establish an equivalent level of safety, the Inspector shall deny the application for an exemption, exception or deviation.

8. RECORDING OF EXEMPTIONS, EXCEPTIONS AND DEVIATIONS

8.1 Both the Applicant and the Authority shall keep a list of all exemptions, exceptions and deviations granted by the Authority.

9. PUBLICATION OF EXEMPTIONS, EXCEPTIONS AND DEVIATIONS

9.1 The number and nature of the exemptions, exceptions or deviations granted will be published as soon as soon as practicable in the Gazette and on official website of the Guyana Civil Aviation Authority.

9.2 If the request is for emergency relief, the Authority will publish the application and/or the Authority's decision as soon as possible after processing the application.

9.3 If the exemption, exception or deviation affects a significant population of the aviation community of Guyana, it will be published in summary in the AIP. This summary will be sent to the AIS through the Air Navigation Services Directorate for inclusion in the AIP.

Approved by:

Guyana Civil Aviation Authority
Director General

Lt. Col. (Ret'd) Egbert Field, A.A.
Director General Civil Aviation
Guyana Civil Aviation Authority

APPENDIX: A
EXEMPTION, EXCEPTION AND DEVIATION REQUEST FORM

Note: This Form shall be used when applying for an Exemption, Exception or Deviation from a Regulation, Standard, Rule or Directive.

GUYANA CIVIL AVIATION AUTHORITY	**EXEMPTION, EXCEPTION AND DEVIATION REQUEST/APPLICATION FORM FOR EXEMPTION, EXCEPTION OR DEVIATION FROM A REGULATION, STANDARD, RULE OR DIRECTIVE**	FORM NO: GCAA/DG-EXMT/001-R1

NAME/COMPANY:

ADDRESS:

TELEPHONE/FAX/EMAIL:

CONTACT PERSON:

DATE OF REQUEST:

REGULATION/STANDARD/ RULE/DIRECTIVE **PROVISION:**

(FROM WHICH EXEMPTION IS REQUESTED)

ISSUE/REQUEST:

BACKGROUND:

1. **PUBLIC INTEREST:** WHAT FACTORS WERE CONSIDERED IN THE DETERMINATION OF PUBLIC INTEREST? IDENTIFY CRITERIA:
   - A)
   - B)
   - C)

2. **AVIATION SAFETY:** WHAT AVIATION FACTORS WERE CONSIDERED TO BE AFFECTED? IDENTIFY CRITERIA:
   - A)
   - B)
   - C)

3. **PROPOSED CONDITIONS BY PARTY MAKING THE REQUEST:** **WHAT FACTORS WERE CONSIDERED TO ENSURE AVIATION SAFETY IS NOT AFFECTED? IDENTIFY CRITERIA AND FORMULATE AS CONDITIONS OF THE EXEMPTION:**
   - A)
   - B)
   - C)

FILE ATTACHMENTS: *(LIST ANY ATTACHMENT(S) TO THIS APPLICATION BELOW)*

_____ *(DATE)*

_____ *(SIGNATURE)*

APPENDIX: 6-B
RISK ASSESSMENT PROCEDURE

1. RESPONSIBILITY OF THE OPERATOR TO CONDUCT AERONAUTICAL STUDIES

1.1 It is the responsibility of the applicant (Aviation Service Provider) for an Exemption, Exception or Deviation from a Regulation, Standard, Rule or Directive to carry out an Aeronautical Study/Risk Assessment. The applicant who is unable to meet the established requirements of a Regulation, Standard, Rule or Directive may propose an alternative means of compliance and it must be acceptable to the Authority.

2. PARTICIPANTS OF AN AERONAUTICAL STUDY

2.1 Aeronautical studies require operational expertise, training and experience. However, depending on the complexity of the issue, specialists on risk analysis may be used to assess the degree of risk resulting from the aeronautical studies and proposed deviances.

3. MATTERS THAT CAN BE CONSIDERED FOR AERONAUTICAL STUDY

3.1 An aeronautical study should be carried out to determine the effect of the intended/proposed alternative means of compliance regarding the safety and efficient use of the product, e.g. the aircraft, and the safety of persons and property on the ground and anything else that will be affected by the deviation.

3.2 The aeronautical study shall consist of, but not limited to, the following:

a. The impact on the airworthiness and functionality of the system, procedure, policy or aeronautical product, e.g. The aircraft, and existing regulatory requirements, etc.;

b. The impact on safety of persons and property;

c. The adjustment of other aviation requirements that may be needed to accommodate the proposal; and

d. Possible revisions of the proposal that may be necessary to eliminate a hazardous or inefficient use of equipment.

4. MATTERS THAT CANNOT BE CONSIDERED FOR AERONAUTICAL STUDY

4.1 It is not the role of the Authority to deal with matters relating to noise or other environmental issues, the effect on lifestyle or property values, or the effect on other services in the area.

4.2 The applicant may consider any factor that will have an adverse effect on safety and management of risk. However, it is necessary that an aeronautical study be focused solely on matters that affect the safety and efficiency of its operation and the safety of persons and property on the ground.

5. RISK CALCULATIONS

5.1 Any calculation of risk to aircraft as a function may be fraught with problems and is probably intractable. Firstly, non-normal operations need not be confined to the safety of operation. Secondly, there is at present no objective method of determining a maximum or acceptable means of compliance. Finally, when preparing low-probability risk assessment, it is a mistake to consider the perceived likelihood of occurrence, rather than the severity of the consequences.

6. CONSEQUENCES OF AN ACCIDENT INVOLVING AN AERONAUTICAL STUDY

6.1 Accidents involving loss of lives can result in public enquiries or the equivalent legal processes. These enquires are normally conducted by a judge or magistrate, and being a legal process are more far reaching than the normal investigation carried out by the State accident investigation body. Such enquiries can and have resulted in significant financial, legal and operational consequences to the operator. Where the accident involves a dispensation from a Regulation or best practice, the logic associated with that departure becomes a critical issue. Thus, the remote probability associated with such events has to be balanced against the more serious consequences.

7. ESTABLISHMENT OF A PRECEDENT

7.1 One of the most important objections to allowing dispensation due to an exemption, exception or deviation from a Regulation via an aeronautical study is that it establishes a precedent. Once an exemption, exception or deviation has been granted, it becomes very difficult to resist the next request for a similar exemption, exception or deviation. This applies not only at that particular operator, but at other operators. It also becomes a lever for commercial and political pressures.

8. MITIGATING CIRCUMSTANCES

8.1 It is for the applicant requesting an exemption, exception or deviation via an aeronautical study to propose any associated mitigating circumstances, rather than for the Authority to justify the need for meeting safety of operation or functioning of the system or product. However, the applicant must always be given the opportunity to state any considerations he may have and those considerations must be covered in the report.

8.2 After identifying the safety aspects of an aeronautical study to the requested exemption, exception or deviation, there is need to be aware of the ploys that are used in an attempt to justify such dispensation(s). Those operators seeking exemption, exception or deviation frequently may claim "mitigating circumstances".

9. STEPS OF AN AERONAUTICAL STUDY

9.1 An aeronautical study implies a systematic and documented approach to a problem. Thus, it consists of certain steps, notably:

a. a description of problems and objectives;

b. selection of procedures, methods and data sources;

c. identification of undesired events;

d. an analysis of causal factors, severity and likelihood;

e. a description of risk;

f. identification of possible mitigating measures;

g. an estimation of the effectiveness of mitigating measures;

h. choice of mitigating measures; and

i. presentation of results.

10. A Description of Non-Compliance

10.1 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.

11. Procedures, Methods and Data Sources

11.1 It should be determined whether the study shall follow a quantitative or qualitative approach. The determination will be dependent on 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 conduct of hazard identification and risk analysis.

12. Identification of Hazards

12.1 Hazards are any situation or condition that has the potential to cause damage or harm. The basic question one must ask is: ***What can go wrong and where?***

a. Examples of "***what***" include, but are not limited to:

   i. Aircraft colliding with terrain, aircraft, vehicles or objects.

   ii. System or product failure due to the exemption or deviation, etc.

b. Examples of "***where***" include, but are not limited to:

   i. During flight (approach, landing, balked landing, take-off, climb-out).

   ii. On the ground (Runway, taxiway, apron, strips, RESAs, or outside these areas).

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

13. Safety Risk Management

13.1 Safety risk management is a generic term that encompasses the assessment and mitigation of the safety risks of the consequences of hazards that threaten the capabilities of an organisation, to a level as low as reasonably practicable (ALARP). The objective of safety risk management is to provide the foundation for a balanced allocation of resources to ensure that all identified risks that are associated with specified hazards are consistently managed to ensure that the safety of all operations is not compromised.

13.2 Figure 1 below depicts a broadly adopted generic visual representation of the safety risk management process. The triangle is presented in an inverted position, suggesting that aviation (just like any other socio-technical production system) is "top heavy" from a safety risk perspective: most safety risks of the consequences of hazards will be assessed as initially falling in the intolerable region. A lesser number of safety risks of the consequences of hazards will be assessed in such a way that the assessment falls straight in the tolerable region, and an even lower number will be assessed in such a way that the assessment falls straight in the acceptable region.

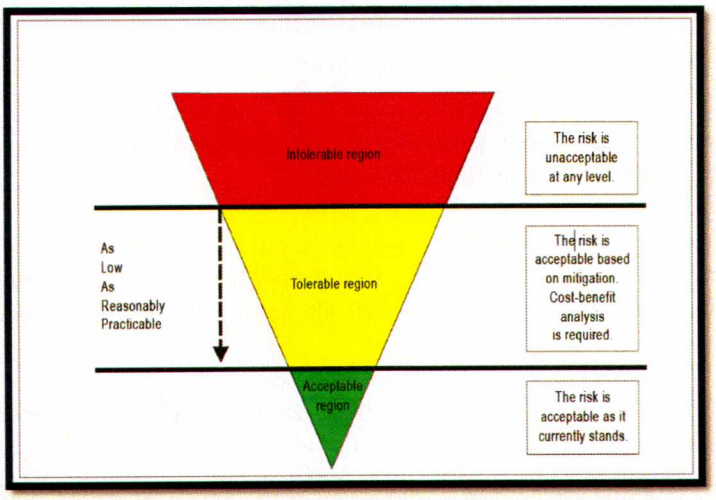

FIGURE: 1 SAFETY RISK MANAGEMENT

14. CAUSAL FACTORS, PROBABILITY, SEVERITY AND TOLERABILITY

14.1 ANALYSIS OF CAUSAL FACTORS

a. When analysing casual factors regarding safety risk management, the basic questions to be asked are:

   i. Why can it go wrong?

   ii. What are the likely consequences if it does go wrong?

   iii. How likely is it that it will go wrong?

b. Examples of "***Why it can go wrong?***" include, but are not limited to:

   i. Lack of proper or adequate guidance.

   ii. Confusing or conflicting guidance.

   iii. Inaccurate aeronautical data.

   iv. Insufficient maintenance programmes, etc.

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

d. "***What are the (potential) consequences if it goes wrong?***" The severity of the occurrence is better described by using the table in figure 3.

e. "***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?

14.2 SAFETY RISK PROBABILITY

14.2.1 The process of bringing the safety risks consequences of hazards under organisational control starts by assessing the probability that the consequences of hazards materialise during operations aimed at delivery of services. This is known as assessing the safety risk probability.

14.2.2 Safety risk probability is defined as the likelihood that an unsafe event or condition might occur. The definition of the likelihood of a probability can be aided by questions such as:

a. Is there a history of similar occurrences to the one under consideration, or is this an isolated occurrence?

b. What other equipment or components of the same type might have similar defects?

c. How many personnel are following, or are subject to, the procedures in question?

d. What percentage of the time is the suspect equipment or the questionable procedure in use?

e. To what extent are there organisational, management or regulatory implications that might reflect larger threats to public safety?

14.2.3 Any or all of the factors underlying these example questions may be valid, underlining the importance of considering multi-causality. In assessing the likelihood of the probability that an unsafe event or condition might occur, all potentially valid perspectives must be evaluated.

14.2.4 In assessing the likelihood of the probability that an unsafe event or condition might occur, reference to historical data contained in previous investigation findings, etc., is paramount in order to make informed decisions. In the absence of these, the investigator can only make probability assessments based, at best, on industry trends and, at worst, on opinion.

14.2.5 Based on the considerations emerging from the replies to questions such as those listed above, the probability that an unsafe event or condition might occur can be established and its significance assessed using a safety risk probability table.

14.2.6 Figure 2 below presents a typical safety risk probability table, in this case, a five-point table. The table includes five categories to denote the probability of occurrence of an unsafe event or condition, the meaning of each category, and an assignment of a value to each category. It must be stressed that this example is not binding.

LEVEL OF PROBABILITY	MEANING	VALUE
FREQUENT	Likely to occur many times (has occurred frequently)	5
OCCASIONAL	Likely to occur sometimes (has occurred infrequently)	4
REMOTE	Unlikely to occur, but possible (has occurred rarely)	3
IMPROBABLE	Very unlikely to occur many times (not known to have occurred)	2
EXTREMELY IMPROBABLE	Almost inconceivable that the event will occur	1

FIGURE: 2 SAFETY RISK PROBABILITY

14.3 **SAFETY RISK SEVERITY**

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

14.3.2 Once the safety risk of an unsafe event or condition has been assessed in terms of probability, the second step in the process of bringing the safety risks of the consequences of hazards under organisational control, is the assessment of the severity of the consequences of the hazard if its damaging potential materialises during operations aimed at delivery of services. This is known as assessing the safety risk severity.

14.3.3 Safety risk severity is defined as the possible consequences of an unsafe event or condition, taking as reference the worst foreseeable situation. The assessment of the severity of the consequences of the hazard if its damaging potential materialises during operations aimed at delivery of services can be assisted by questions such as:

a. How many lives may be lost (employees, passengers, bystanders and the general public)?

b. What is the likely extent of property or financial damage (direct property loss to the operator, damage to aviation infrastructure, third-party collateral damage, financial and economic impact for the State)?

c. What is the likelihood of environmental impact (spillage of fuel or other hazardous product, and physical disruption of the natural habitat)?

d. What are the likely political implications and/or media interest?

14.3.4 Based on the considerations emerging from the replies to questions such as those listed above, the severity of the possible consequences of an unsafe event or condition, taking as reference the worst foreseeable situation, can be assessed using a safety risk severity table.

14.3.5 Figure 3 below presents a typical safety risk severity table (risk assessment matrix) which is also a five-point table. It includes five categories to denote the level of severity of the occurrence of an unsafe event or condition, the meaning of each category, and the assignment of a value to each category. As with the safety risk probability table, this table is not binding.

SEVERITY OF OCCURRENCE	MEANING	VALUE
CATASTROPHIC	• Equipment destroyed • Multiple deaths	**A**
HAZARDOUS	• A large reduction in safety margin, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely • Serious injury • Major equipment damage	**B**
MAJOR	• A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating condition as a result of increase in workload, or as a result of conditions impairing their efficiency • Serious incident • Injury to persons	**C**
MINOR	• Nuisance • Operating limitation • Use of emergency procedures • Minor incident	**D**
NEGLIGIBLE	• Little consequences	**E**

FIGURE: 3 SAFETY RISK SEVERITY

14.4 SAFETY RISK TOLERABILITY

14.4.1 Once the safety risk of the consequences of an unsafe event or condition has been assessed in terms of probability and severity, the third step in the process of bringing the safety risk under organisational control is the assessment of the tolerability of the consequences of the hazard if its damaging potential materialises during operations aimed at delivery of services. This is known as assessing safety risk tolerability. This is a two-step process.

14.4.2 First, it is necessary to obtain an overall assessment of the safety risk. This is achieved by combining the safety risk probability and safety risk severity tables into a safety risk assessment matrix, an example of which is presented in Figure 4. For example, a safety risk probability has been assessed as occasional (4). The safety risk severity has been assessed as hazardous (B). The composite of probability and severity (4B) is the safety risk of the consequences of the hazard under consideration. It can be seen, through this example, that a safety risk is just a number or alphanumerical combination and not a visible or tangible component of the natural world. The colour coding in the matrix in Figure 4 reflects the tolerability regions in the inverted triangle in Figure 1.

14.4.3 Second, the safety risk index obtained from the safety risk assessment matrix must then be exported to a safety risk tolerability matrix that describes the tolerability criteria. The criterion for a safety risk assessed as 4B is, according to the tolerability table in Figure 5, "Unacceptable under the existing circumstances." In this case, the safety risk falls in the intolerable region of the inverted triangle. If the safety risk of the consequences of the hazard is unacceptable, the inspector may:

a. orchestrate the allocation of resources to reduce the exposure to the consequences of the hazards;

b. allocate resources to reduce the magnitude or the damaging potential of the consequences of the hazards; or

c. cancel the operation if mitigation is not possible.

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

RISK ASSESSMENT MATRIX					
RISK PROBABILITY	RISK SEVERITY				
	CATASTROPHIC A	HAZARDOUS B	MAJOR C	MINOR D	NEGLIGIBLE E
FREQUENT	5A	5B	5C	5D	5E
OCCASIONAL	4A	4B	4C	4D	4E
REMOTE	3A	3B	3C	3D	3E
IMPROBABLE	2A	2B	2C	2D	2E
EXTREMELY IMPROBABLE	1A	1B	1C	1D	1E

FIGURE: 4 SAFETY RISK ASSESSMENT MATRIX

SUGGESTED CRITERIA	ASSESSMENT RISK INDEX	SUGGESTED CRITERIA
INTOLERABLE REGION	5A, 5B, 5C 4A, 4B 3A	UNACCEPTABLE UNDER THE EXISTING CIRCUMSTANCES
TOLERABLE REGION	5D, 5E 4C, 4D, 4E 3B, 3C, 3D 2A, 2B, 2C	ACCEPTABLE BASED ON RISK MITIGATION. IT MAY REQUIRE MANAGEMENT DECISION.
ACCEPTABLE REGION	3E, 2D, 2E 1A, 1B, 1C, 1D, 1E	ACCEPTABLE

FIGURE: 5 SAFETY RISK TOLERABILITY MATRIX

15. SAFETY RISK CONTROL/MITIGATION

15.1 In the fourth and final step of the process of bringing the safety risks of the consequences of an unsafe event or condition under organisational control, control/mitigation strategies must be deployed. Generally speaking, control and mitigation are terms that can be used interchangeably. Both are meant to designate measures to address the hazard and bring under organisational control the safety risk probability and severity of the consequences of the hazard.

15.2 Continuing with the previous example, the safety risk of the consequences of the hazard under analysis has been assessed as 4B ("Unacceptable under the existing circumstances."). Resources must then be allocated to slide it down the triangle, into the tolerable region, where safety risks are ALARP. If this cannot be achieved, then the operation aimed at the delivery of services which exposes the organisation to the consequences of the hazards in question must be cancelled. Figure 5 presents the process of safety risk management in graphic format.

15.3 There are three generic strategies for safety risk control/mitigation:

a. ***Avoidance.*** The operation or activity is cancelled because safety risks exceed the benefits of continuing the operation or activity. Example of an avoidance strategy is operations into an aerodrome surrounded by complex geography and without the necessary aids are cancelled.

b. ***Reduction.*** The frequency of the operation or activity is reduced, or action is taken to reduce the magnitude of the consequences of the accepted risks. Example of reduction strategy is operations into an aerodrome surrounded by complex geography and without the necessary aids are limited to daytime, visual conditions.

c. ***Segregation of exposure.*** Action is taken to isolate the effects of the consequences of the hazard or build in redundancy to protect against them. Example of strategy based on segregation of exposure is operations into an aerodrome surrounded by complex geography and without the necessary aids are limited to aircraft with specific performance navigation capabilities.

15.4 In evaluating specific alternatives for safety risk mitigation, it must be kept in mind that not all have the same potential for reducing safety risks. The effectiveness of each specific alternative needs to be evaluated before a decision can be taken. It is important that the full range of possible control measures be considered and that trade-offs between measures be considered to find an optimal solution. Each proposed safety risk mitigation option should be examined from such perspectives as:

a. ***Effectiveness.*** Will it reduce or eliminate the safety risks of the consequences of the unsafe event or condition? To what extent do alternatives mitigate such safety risks? Effectiveness can be viewed as being somewhere along a continuum, as follows:

b. ***Control mitigations.*** This mitigation accepts the safety risk of the consequences of the unsafe event or condition but adjusts the system to mitigate such safety risk by reducing it to a manageable level, for example, by imposing more restrictive operating conditions. Both engineering and control mitigations are considered to be "hard." mitigations, since they do not rely on flawless human performance.

c. ***Personnel mitigations.*** This mitigation accepts that engineering and/or control mitigations are neither efficient nor effective, so personnel must be taught how to cope with the safety risk of the consequences of the hazard, for example, by adding warnings, revised checklists, MANOPs provisions and/or extra training. Personnel mitigations are considered to be "Soft actions." since they rely on flawless human performance.

d. ***Cost/benefit.*** Do the perceived benefits of the mitigation outweigh the costs? Will the potential gains be proportional to the impact of the change required?

e. ***Practicality.*** Is the mitigation practical and appropriate in terms of available technology, financial feasibility, administrative feasibility, governing legislation and regulations, political will, etc.?

f. ***Challenge.*** Can the mitigation withstand critical scrutiny from all stakeholders (employees, managers, stockholder's/State administrations, etc.)?

g. ***Acceptability to each stakeholder.*** How much buy-in (or resistance) from stakeholders can be expected? (Discussions with stakeholders during the safety risk assessment phase may indicate their preferred risk mitigation option.)

h. ***Enforceability.*** If new rules (SOPs, regulations, etc.) are implemented, are they enforceable?

i. ***Durability.*** Will the mitigation withstand the test of time? Will it be of temporary benefit or will it have long-term utility?

j. ***Residual safety risks***. After the mitigation has been implemented, what will be the residual safety risks relative to the original hazard? What is the ability to mitigate any residual safety risks?

k. ***New problems.*** What new problems or new (perhaps worse) safety risks will be introduced by the proposed mitigation?

15.5 The most effective mitigations are hard mitigations. Because hard mitigations are often expensive, soft mitigations (such as training) are usually the most popular methods used due to their cost effectiveness.

15.6 To summarise, safety risk control/mitigation strategies are mostly based on the deployment of additional safety defences or the reinforcement of existing ones. Defences in the aviation system can be grouped under three general categories:

a. Technology;

b. Training; and

c. Regulations.

15.7 As part of safety risk control/mitigation, it is important to determine why new defences are necessary or why existing ones must be reinforced. The following questions may pertain to such determination:

a. Do defences to protect against the safety risks of the consequences of the hazards exist?

b. Do defences function as intended?

c. Are the defences practical for use under actual working conditions?

d. Is the operational staff involved aware of the safety risks of the consequences of the hazards, and the defences in place?

e. Are additional safety risk mitigation/control measures required?

15.8 Figure 6 presents the full safety risk/mitigation process in graphic format. Hazards are potential safety vulnerabilities inherent to the aviation system. Such vulnerabilities manifest as an array of consequences. In order to manage safety, it is necessary to assess the safety risks of the consequences of hazards, by assigning each safety risk an index. Each hazard can generate one or many consequences, and each consequence can be assessed one or many safety risks. The first step in the safety risk mitigation/control process is, therefore, hazard/consequence identification and safety risk assessment.

15.9 Once hazards and consequences have been identified and safety risks assessed, the effectiveness and efficiency of existing aviation system defences (technology, training and regulations) relative to the hazards and consequences in question must be evaluated. As a consequence of this evaluation, existing defences will be reinforced, new ones introduced, or both. The second step in the safety risk mitigation/control process is, therefore, evaluation of the effectiveness of the existing defences within the aviation system.

15.10 Based on the reinforcement of existing defences and/or the introduction of new ones, initial safety risks are reassessed to determine whether they are now ALARP. The third step in the safety risk mitigation/control process is, therefore, control and/or mitigation action.

15.11 Following reassessment of safety risks, the effectiveness and efficiency of the mitigation/control strategies must be confirmed. The fourth step in the safety risk mitigation/control process is accepting the mitigation of the safety risk. The following questions pertain:

a. Does the mitigation address the safety risks?

b. Is the mitigation effective?

c. Is the mitigation appropriate?

d. Is additional or different mitigation warranted?

e. Do the mitigation strategies generate additional risks?

15.12 Once the mitigation has been accepted, the strategies developed and deployed must, as part of the safety assurance process, be fed back into the organisation's defences, upon which the mitigation strategies are based, to ensure integrity, efficiency and effectiveness of the defences under the new operational conditions.

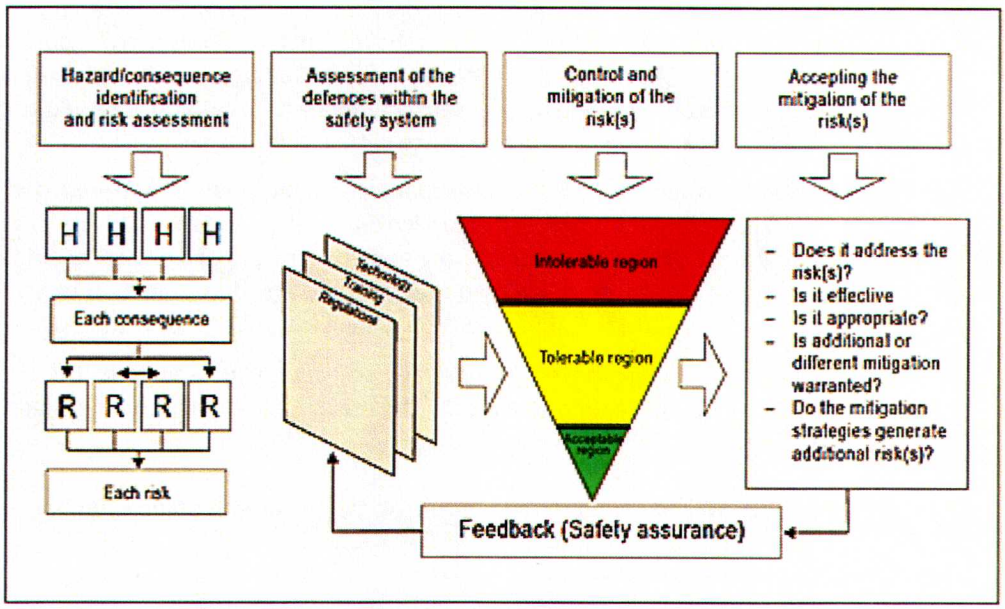

FIGURE 8-6 SAFETY RISK MITIGATION PROCESS

16. ESTIMATING THE EFFECT OF MITIGATING MEASURES

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

17. CHOICE OF MITIGATING MEASURES

17.1 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

18. PRESENTATION OF RESULTS

8.1 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.

8.2 Other key issues are as follows:

a. What essential assumptions, presuppositions and simplifications have been made?

b. Any uncertainty about the results due to the choice of and availability of methods, procedures and data sources should be discussed.

c. The results of the study should emphasize which undesired event contributes the most to risk, and factors influencing these undesired events.

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

19. DETERMINATIONS

19.1 Following completion of the aeronautical study the Director General Civil Aviation (DGCA) shall make a Determination.

19.2 Determinations will be one of the following:

a. ***Unobjectionable*** when the DGCA is satisfied that the proposed action will not adversely affect the safe and efficient operation of aircraft nor the safety of persons or property on the ground. Any determination of a variation from the notification or SARPs, the GCAA shall file a difference with ICAO.

b. ***Conditional*** when the study identifies objectionable aspects of a proposed action but specifies conditions which, if complied with, satisfy the DGCA that the proposed action will not adversely affect the safe and efficient use of airspace by aircraft, nor the safety of persons or property on the ground. Any determination of a variation from the notification or SARPs, the GCAA shall file a difference with ICAO.

c. ***Objectionable*** when the study identifies objectionable aspects of the proposed action. The Determination will specify the reasons for finding the proposed action objectionable.

19.3 The Determination will be issued to the proponent and those who made submissions.

20. EFFECTIVE PERIOD OF THE DETERMINATION

20.1 Unobjectionable and Conditional Determinations shall contain a void date. An extension to the void date may be granted if there are valid reasons for not completing the action by the void date.

21. REVISION OF THE DETERMINATION

21.1 An ***Unobjectionable or Conditional Determination*** can be revised if any new facts that change the basis on which the Determination was made are identified.

21.2 Interested persons may, at least 14 days in advance of the void date, petition the DGCA to revise a determination.

22. ACCEPTANCE BY THE GCAA

22.1 The right to accept or reject the results of the aeronautical study rests fully with the DGCA.

23. APPROVAL OF AN EXEMPTION, EXCEPTION OR DEVIATION

23.1 The DGCA, where satisfied with the results of the aeronautical study, equivalent level of safety and mitigating measures provided, may offer an Exemption, Exception or Deviation to the compliance within the provision of the applicable Regulation, Standard, Rule or Directive, as the case may be. The DGCA may, at his discretion, attach or not attach limitations to the Exemption, Exception or Deviation.

⇢ END ⇠