SIERRA LEONE CIVIL AVIATION AUTHORITY

ADVISORY CIRCULAR

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Policy and Procedures for the Management of Conflicts between Safety and Environmental Requirements

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1 GENERAL

The Sierra Leone Civil Aviation Authority's Advisory Circulars contains information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated Regulations.

An AMC is not intended to be the only means of compliance with a Regulation, and consideration will be given to other methods of compliance that may be presented to the Authority

Information considered directive in nature is described in this AC in terms such as "shall" and "must", indicating the actions are mandatory. Guidance information is described in terms such as "should" and "may" indicating the actions are desirable or permissive, but not mandatory

1.1 Purpose

This Advisory Circular provides methods, acceptable to the Authority, for showing compliance with the requirements of SLCAR Part 14A as well as explanatory and interpretative material to assist in showing compliance.

1.2 Description of Changes

This AC is the first to be issued on this subject

1.3 References

(a) SLCAR Part 14A – Aerodrome Design and Operations Standard

1.4 Cancelled Documents

Not Applicable

2   REVIEW OF SAFETY IN AND AROUND AIRPORTS

2.1   Emerging trends

Rapidly increasing traffic volumes and forecasts of continued growth into the next decades put a strain on airport capacity. At the same time, public tolerance of the environmental effects of air traffic around airports such as noise, air pollution and third party risk would appear to have decreased. These conflicting trends lead airports, airlines, air traffic control organizations and the aircraft manufacturing industry to devise new technologies and innovative ways of operating airports and aircraft in order to meet both the capacity demands and the environmental limitations. Consequently, new hazards emerge and existing hazards become difficult to contain unless adequate attention is given to safety aspects in this combination of emerging trends.

In addition, a new dimension, third party risk, presenting itself as a safety concern is growing. Airports are hubs in the air transport system. Consequently, their presence causes a convergence of air traffic over the area surrounding the airport. For the population living in the vicinity of an airport this implies involuntary exposure to the risk of aircraft accidents. Although the probability of an accident per flight is very small, risk levels around airports maybe higher than one might expect. This is caused by the fact that, while the probability of an accident per take-off or landing is very small, the number of landings and take-offs is often very large. The resulting annual probability of an accident at a typical large airport is therefore much greater than the small probability of being involved in an aircraft accident as a passenger. In addition, accidents tend to happen during the take-off and landing phases of flight and hence close to an airport. Safety data from studies show that approach and landing phase accidents account for a significant proportion of fatal air transport accidents. This environmental effect is of growing significance to airports safety responsibility and decision making on airport development and land-use planning for airport regions.

2.2   The safety evidence

(a) Airports play an important role in the safety of air traffic. An analysis of accidents globally, shows some of these accidents involved at least one airport related factor in the causal chain leading up to the accident. Airport related factors in this case are taken as those factors which are specific to the airport environment but are not necessarily owned by the airport.
To this end, the different airport related causal factors categorized are:

   (i)   Lighting and marking (approach lighting, sign lighting, stop bar lighting, etc.)

   (ii)   Runways and taxiways (runway length, obstructions, taxiway surface condition, etc.)

   (iii) Information (aerodrome hazard notifications, weather reports, runway information etc.)

   (iv)   External hazards (fog, turbulence, etc.)

   (v)   Apron and ramp (apron/ramp congestion, apron/ramp surface condition, etc.) ATC operations and procedures (approach procedures, communication phraseology use, separation judgment, etc.)

   (vi)   Aerodrome - other (aerodrome structures, VASI/PAPI, etc.)

(b) All parties interacting around the airport may be part of the problem and consequently part of the potential solution. Gaining further insight into the causal background of risk around airports is hampered by the fact that there is little systematic collection of accident and incident data concerning air transport incidents occurring or originating on the ground, either

in ground operations or maintenance. Within the accident information which is being collected, there may be a general lack of attention to the organisational factors and corporate culture factors in data collection categorizations which may further impede deeper insight. The evidence presented here sheds light on the safety problems associated with airports and provides information on the broad categories of accident causal factors which are currently a threat to safety at airports. It is expected however that new developments and changes in traffic volume will have an influence on the nature of these accident casual factors. This briefing will examine how these factors will change as a result of new developments, in particular technological and operational, and in view of the predicted growth in traffic volume.

2.3   The institutional framework

2.3.1   The regulatory framework

Airports are regulated in accordance with the standard in the applicable SLCARs. The SLCAR Part 14A prescribes, the relevant infrastructure and equipment expected at aerodromes. The Authority is also required to regulate the operator's adherence to these standards.

2.3.2   The organizational framework

Airports are complex multi-organizational systems, with diverse safety standards and practices. Frequently, there is a lack of integration amongst airport users with regard to these safety standards and practices. In view of the multi-organizational nature of risks in the operations of airports, the lack of a mechanism to integrate the safety standards and practices of the different actors in and around the airport has a detrimental effect on safety. Such a mechanism is difficult to establish since the respective actors in the overall airport organization are subject to different regulatory requirements. These include aircraft maintenance, flight operations, ground handling including fuelling, security services, airside services and air traffic control. Even where some of these processes are frequently done by the same organization, they are usually subject to different management systems, different training standards and exhibit different safety culture.

3   AIRPORT SAFETY PRIORITIES

The following critical safety issues needs to be addressed in order to prevent an increase in the airport-related safety deficiencies, which may result from operational and technological developments.

3.1   Safety concerns resulting from operational developments

3.1.1   The wind and turbulence environment of airports

The wind and turbulence environment at airports is a matter of growing concern. Airports tend to attract corporate real estate. Offices and other buildings are increasingly being located in the immediate proximity of runways. The wind turbulence caused by these buildings may be such that aircrew may temporarily lose control of the aircraft shortly before touchdown or shortly after lift-off resulting in serious incidents. Due to the large monetary value of building space at airports, the pressure to allow such building activities will continue to grow. A lack of understanding of the turbulence aerodynamics and aircraft dynamic responses to turbulence upsets, may hamper the development of the appropriate requirements.

3.1.2   Wake vortex

Wake vortex constraints govern the minimum required distance (separation) between aircraft lined up in sequence on the approach to the runway. During peak capacity operations, this distance effectively determines runway capacity and thus airport capacity. Capacity constraints may lead air traffic control organizations and airports to considering a reduction in separation minima from the current minima under certain conditions. At the same time, the future arrival of very large aircraft may give rise to a possibly worsening wake vortex environment at airports.

3.1.3   Safety of noise abatement procedures

Environmental constraints and in particular noise issues, may increasingly become the limiting factor in airport capacity. This, in turn, should lead the airport operator to develop advanced arrival and departure procedures such as; Continuous Descent Approaches, Reduced Flap Approaches, Delayed Gear Approaches, etc. Such procedures may bring about a reduction in safety margins and therefore need close scrutiny. In addition, there are workload concerns and error proneness concerns. Also, the pressure to maximize noise preferential runway utilization should lead to the consideration of relaxed crosswind limitations by airport operator's which may put aircrew close to controllability limitations. In addition, controller workload concerns with regards to the advanced procedures must be carefully considered, particularly when utilizing mixed modes.

3.2   The safety implications of new technologies

3.2.1   Enhanced and Synthetic Vision systems

Enhanced and Synthetic Vision Systems are increasingly finding their way onto civil flight decks to allow operations under reduced weather minima. Although such systems are attractive alternatives to conventional systems, verifiability may pose a safety concern. These systems offer a potential safety improvement, but when utilized to reduce operational minima may pose safety problems. A safety concern related to these technologies lies in the fact that emergency response units may have trouble locating an aircraft accident on the airport in zero visibility conditions.

3.2.2   Very Large Aircraft

The introduction of Very Large Aircraft will give rise to problems of compatibility with the existing design and infrastructure in airports. Such aircraft are likely to require more ground service equipment at stands than current aircraft. Problems of access to ground service equipment in congested airport apron environments may increase the risk of aircraft damage, which has the potential to compromise flight safety.

3.3   Disaster management plans

Air accidents frequently occur near, rather than at, airports. Therefore integrating the activities of local and airport emergency services becomes a major issue for planning. The SLCAR Part 14A, requires major accident simulations and exercises on regular annual basis. However this requirement does not encompass planning for potential accidents outside the airport limits. Furthermore, experience of major disasters has highlighted the importance of planning to manage the traumatic aftermath of major disasters for survivors, relatives and operational personnel. Consideration should be given to how such a scheme could be instituted in the AEP. Planning for an effective response to disaster at or near an airport places a particular requirement for co-ordination between emergency services, for both short term and long term response; it should encompass such aspects as the accessibility of potential accident sites near the airport to emergency vehicles. Experience has also shown the critical importance of effective and

comprehensive debriefing following emergency exercises. Such debriefing should include all staff who have a role in disaster response, and is essential if the organization is to evaluate its preparedness and to learn how to improve its disaster planning

4   MANAGING RISK

4.1   A common framework for risk management

A common high safety standard at an airport cannot be achieved by any single actor since the level of safety at the airport is to a large extent governed by the interaction of multiple organizations. An integrated safety management system involving all organizations operating at the airport is thus required. In this system, the airport, airlines, a representative of all other airline operators, ground handling providers, refuelling services, and the air traffic control, work together to improve safety. All relevant parties should establish an MOU, have regular meetings and use a common Operational Airport Information System. All participating organizations will be connected to this system and enter information on air and ground incidents into a common database. This information exchange, the regular meetings and common objectives provides the necessary premises for the early identification of safety bottlenecks, the design of achievable corrective measures and their effective implementation.

4.2   A common methodology for risk assessment

In order to promote fair competition and equally high levels of safety, there should be a common frame of reference for the assessment of new procedures and technologies with regards to safety. The applicable SLCARs provide adequate guidance for the airworthiness assessments of systems.

4.3   A common framework for managing the risks to third parties

Increasing traffic volumes stretch the air transport infrastructure to its limits and require a considerable increase in available airport capacity. Increases in airport capacity usually necessitate new or improved runways and terminals, and changes in route structures and traffic distributions. Such developments bring about the need to prepare environmental impact statements that also address the issue of third party risk. This has led to considerable progress being established in methods and models for the calculation of third party risk around airports. In order to secure the wellbeing of citizens, and support of fair competition among airports, the establishment of appropriate legislation in this regard is necessary. The establishment of risk tolerability criteria for land use planning purposes as well as common risk assessment methodologies should be pursued.

5   AREAS REQUIRING FURTHER STUDY

Effective policy making on several of the safety concerns identified in this AC is impeded by a lack of essential knowledge. In order to bridge those gaps in knowledge the following issues require further study:

(i)   The establishment of common methods and tolerability criteria for third party risk.

(ii)   The development of adequate methods and models to incorporate the role of human operator and procedural aspects in formal safety assessments.

(iii)   The safety aspects of new technologies such as enhanced and synthetic vision systems, "Head Up" displays for civil cockpits.

(iv)   Airport wind and turbulence environments and their dynamic effects on aircraft in take-off or landing

(v)   The operations of safety systems in a multi-organizational environment

(vi)   Methods of analysis of organizational precursors of accidents and incidents

(vii)   Evaluation of planning for disasters

6   MANDATORY ACTIONS

In order to effectively address the safety priorities discussed above, the following actions would be required.

(i)   Mandatory airport certification including a requirement to establish, maintain and ensure adherence to an integrated safety management programme.

(ii)   Mandatory collection of data on ground-based incidents with appropriate emphasis on organizational and corporate culture factors.

(iii)   Mandatory inclusion of third party risk in Environmental Impact Statements for airports.

(iv)   The development of common standards for the safety assessment of operations.