AIRPORTS AUTHORITY OF INDIA

Corporate
Safety Management System Manual
(C-SMSM)

Document Number: AAI-SAF-001

Accepted by:	*Approved by:*	*Prepared by:*
DGCA India	Chairman AAI	Executive Director (AVS) AAI

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AIRPORTS AUTHORITY OF INDIA

Corporate Safety Management Manual

C-SMSM (Version 3 / Issue 3)

2015

PREFACE

Airports Authority of India developed its first Corporate Safety Management System Manual based on best industry practices in 2005. It contained all the elements present in the then draft Safety Management Manual issued by ICAO.

ICAO published its first edition of Safety Management Manual (Doc. 9859) in 2006. Accordingly, Airports Authority of India revised its Corporate Safety Management Manual in 2009 as per ICAO SMS framework which was approved by AAI Board in its 130th meeting.

The DGCA issued a Civil Aviation Requirement Section – 1 General Series 'C' Part I on July 20, 2010 for the "Establishment of a Safety Management System" (SMS) based on the guidelines contained in the second edition of Safety Management Manual (Doc 9859), which was published by ICAO in 2009. It detailed the various requirements that need to be fulfilled for establishing a SMS and called for a phase wise implementation of SMS. The Safety Management Manual of AAI was then again revised and redesigned as per the DGCA CAR and was issued on 20th May, 2013 as third version or edition.

In 2013, ICAO published the third edition of Safety Management Manual (Doc 9859). Accordingly, Safety Management Manual of AAI has now been reviewed, to be in line with the latest edition of ICAO Doc 9859. Amendments have been made in AAI Safety Policy & Objectives, as well as in the Manual. The amended Safety Management Manual of AAI is now issued as Version 3 / Issue 3.

The first two phases of SMS implementation have been successfully completed by all licensed AAI airports and third & fourth phase of SMS implementation are in progress. Most of the elements required for these phases are already in place and some of the elements like 'Safety Performance Indicators & Targets' have now been established and AAI shall endeavor to meet these safety targets. The latest Issue of the Manual is further simplified and made more user friendly.

The purpose of this document is to assist AAI in complying with all the national and international regulations on SMS. It details practices and procedures to meet these regulations. The attachments to this Manual provide helpful tool and templates to complete this job.

I, therefore, call upon all the employees of AAI to comply with all the national regulations on SMS and follow the practices and procedures of SMS as given in our Manual to enhance safety in our organization.

(R. K. Srivastava)
Chairman
29/x/2015

DISTRIBUTION LIST - CORPORATE SMS MANUAL

A. Controlled Copy

Controlled Copy No.	Holder of the Controlled Copy	Date of Dispatch	Remarks
Master Copy	Executive Director(Aviation Safety)		
1	DGCA, New Delhi		
2	Chairman, AAI, New Delhi		
3	Member(ANS)		
4	Member (Ops.)		
5	Member(Planning)		
6	Member(HR)		
7	Member(Finance)		
8	Executive Director(ATM)		
9	Executive Director(CNS-OM)		
10	Executive Director(Planning)		
11	Executive Director(CNS-Planning)		
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15	Regional Executive Director (WR)		
16	Regional Executive Director (SR)		
17	Regional Executive Director (ER)		
18	Regional Executive Director (NER)		

B. Electronic Copy

An electronic copy of Corporate SMS Manual has been uploaded on AAI internal portal, Infosaarthee, under Aviation Safety Directorate and AAI website. A downloaded copy of Corporate SMS Manual from this portal shall be an uncontrolled copy and responsibility of its currency shall lie on the holder of that copy.

AMENDMENT RECORD

On receipt of each new amendment to this document, the holder must complete all details on the amendment record sheet below.

Amendment Number	**Section Amended**	**Amended by**	**Date**
Version 1-Issue 1	Initial Issue		25/11/2005
Version 2 – Issue 1	Second edition	ASD	20/05/2009
Version 3 – Issue 1	Third Version	ASD	12/06/2012
Version 3 – Issue 2	Issue-2	ASD	20/05/2013
Version 3 – Issue 3	Issue-3	ASD	28/10/2015 (submitted to DGCA for acceptance) 18/11/2015 (DGCA observations incorporated)

CORPORATE SAFETY MANAGEMENT DOCUMENTATION LIST

Document Number	Title	Description
000 Series 001-099	Safety Management System Manuals [Corporate Safety Management System Manual (C-SMSM) and Safety Management System Manuals (SMSM) of Licensed Aerodromes and/or Unit/Location]	To be Registered by Aviation Safety Directorate
100 Series 100-199	Corporate Safety Management Documents and Forms	To be Registered by Aviation Safety Directorate
200 Series 200-299	Other Corporate Documents	To be Registered by Aviation Safety Directorate

Series 001-099	SMSM	Description
AAI-SAF-001	Corporate SMS Manual	Corporate Safety Management System Manual
AAI-SAF-0XX	SSMM <<Unit/Location>>	Safety Management System Manual-<<Unit/Location>>

CORPORATE SAFETY MANAGEMENT DOCUMENTATION LIST (Cont'd)

Series 100-199 Corporate Safety Management Documents & Forms		
Document No.	**Title**	**Description**
AAI-SAF-100	AAI Air Traffic Incident Report Form	Incident report
AAI-SAF-101	AAI Voluntary Hazard / Event Report Form	AAI Voluntary Report
AAI-SAF-102	AAI Confidential Reporting Form	AAI Confidential Report
AAI-SAF-103	SCARS form	Safety Case Assessment and Reporting System Form
AAI-SAF-104	Safety Risk Assessment Preparation	SRA Preparation
AAI-SAF-105	Safety Risk Assessment Practices	SRA Practices
AAI-SAF-106	Aviation Safety Audit Manual	Audit Manual
AAI-SAF-107	Spare	Possibly Incident/ Event/Safety concern Reporting Procedures
AAI-SAF-108	HAZLOG Business Rules	HAZLOG Procedures
AAI-SAF-109	Spare	Possibly Human Factors Manual
AAI-SAF-110	Safety Plan All Phases	Safety Plan – all Phases
AAI-SAF-111	Safety Case Concept and Design	SC Concept/Design
AAI-SAF-112	Safety Case Implementation	SC Implementation
AAI-SAF-113	Safety case All Phases	SC All phases
AAI-SAF-114	ASD Review of Safety Plan	ASD Review of SP
AAI-SAF-115	ASD Review of Concept Design Safety Case	ASD Review of Concept Design SC
AAI-SAF-116	ASD Review of Implementation Safety Case	ASD Review of Implementation SC

CORPORATE SAFETY MANAGEMENT DOCUMENTATION LIST (Cont'd)

Series 100-199 Corporate Safety Management Documents & Forms		
Document No.	**Title**	**Description**
AAI-SAF-117	ASD Review of All Phases Safety Case	ASD Review of All Phases Safety Case
AAI-SAF-118	Issues Reporting Form	ASD Issues Report Form
AAI-SAF-119	Bird strike Form	Bird strike Form
AAI-SAF-120	Audit notification form	Audit notification form
AAI-SAF-121	Audit Meeting Opening form	Audit Meeting Opening form
AAI-SAF-122	Audit Summary of findings	Summary of audit findings
AAI-SAF-123	Audit Plan – Generic	Audit Plan – Generic
AAI-SAF-124	Audit Request for Corrective Action (RCA) form	Request for Corrective Action form
AAI-SAF-125	Audit Report	Audit Report
AAI-SAF-126	Audit Feedback Questionnaire	Audit Feedback Questionnaire
AAI-SAF-127	HAZLOG Template	HAZLOG Template

Series 200-299 Other Corporate Documentation		
Document No.	**Title**	**Description**
AAI-SAF-200	Spare	Possibly Corporate Document Control Manual
AAI-SAF-201	Spare	Possibly Issue Tracking Rules
AAI-SAF-202	Spare	Possibly Fault Reporting Rules

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GLOSSARY OF TERMS

AAI	Airports Authority of India
ADMN	Administration
AEMC	Aerodrome Environment Management Committee
AGM	Assistant General Manager
AIP	Aeronautical Information Publication
AMSS	Automatic Message Switching System
ANS	Air Navigation Services
ASD	Aviation Safety Directorate
ATCAS	Air Traffic Control Automation System
ATCO	Air Traffic Control Officer
ATM	Air Traffic Management
ALARP	As Low As Reasonably Practicable
ARFS	Aerodrome Rescue and Fire Services
ASMGCS	Advance surface Movement Guidance and Control System
BCAS	Bureau of Civil Aviation Security
CHQ	Corporate Headquarters
CISF	Central Industrial Security Forces
CNS	Communication, Navigation and Surveillance
DGCA	Director General of Civil Aviation
DGM	Deputy General Manager
DMS	Data Management System
EA	Engineering Authority
ED	Executive Director
ERP	Emergency Response Plan
FIR	Flight Information Region
GFS	Ground & Flight Safety
GM	General Manager
HAZLOG	Hazard Log or Data Base or Electronic Data Base of Hazards
HOD	Head of Department
HAZID	Hazard Identification
HR	Human Resources
ICAO	International Civil Aviation Organisation
IGI	Indira Gandhi International

Jt.GM	Joint General Manager
LOA	Letter of Agreement
LVP	Low Visibility Procedures
MATS	Manual of Air Traffic Services
NOC	No Objection Certificate
NOTAM	Notice to Airmen
OA	Operating Authority
OJT	On-the-job-training
OPS	Operations
ORA	Operational Risk Assessment
OT	Operational Training
PIR	Post Implementation Review
QA	Quality Assurance
RCA	Request for Corrective Action
RED	Regional Executive Director
RTC	Regional Training Centre
SARPS	Standards and Recommended Practices
SC	Safety Case
SDD	Situation Data Display
SR	Senior
SPI	Safety Performance Indicator
SPT	Safety Performance Target
SQMS	Standards, Quality Management & Safety
SCARS	Safety Case Assessment and Reporting System
SM	Senior Manager
SMSM	Safety Management System Manual
SMS	Safety Management System
SRA	Safety Risk Assessment
S-SMSM	Station Safety Management System Manual
SSP	State Safety Policy
SSO	Shift Supervisory Officer
VCCS	Voice Control and Communication System
VIP	Very Important Person
VVIP	Very Very Important Person
WSO	Watch Supervisory Officer

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BASIC FEATURES OF THE MANUAL

A. Purpose of the Manual

The purpose of this document is to provide guidance for the establishment of Safety Management System in Airports Authority of India in accordance with ICAO and DGCA regulations and guidelines. This manual sets "Safety Requirements" which must be met to achieve this objective. It also details the practices, processes and procedures to achieve these Safety Requirements, which are essential for the safe and efficient Air Navigation Services & Airport Operations in Indian administered air space and at airports, where services are provided by AAI. It is published for the use and guidance of AAI personnel.

B. Structure of the Manual

Each chapter in this Safety Management Manual is structured with the following sections:

Section 1	-	**Chapter Overview** *Brief explanation and overview of the chapter*
Section 2	-	**References and Definitions** *Applicable AAI, DGCA and ICAO References and definitions of the terms used in the chapter.*
Section 3	-	**Safety Requirements** *What must be done (In **RED** colour)*
Section 4	-	**Practices and Procedures** *How it should be done*
Section 5	-	**Attachments** *Guidance material, Helpful tools and templates to complete the job*

C. Scheme of Safety Manuals in AAI

An Air Traffic Service provider, a licensed aerodrome or an aerodrome applying for aerodrome licensing are required to establish and maintain Safety Management Manual as per DGCA CAR on SMS issued on 20th July, 2010.

Corporate SMS Manual has been developed for the Airports Authority of India and is applicable at all its locations/aerodromes and Air Navigation Services Units. The safety accountabilities, responsibilities and authorities of top management including Board Members of AAI have been documented in Corporate SMS Manual.

Each licensed aerodrome, aerodrome applying for Aerodrome license and Air Traffic Service provider units are required to develop their Safety Management System (SMS) Manual. SMS Manual should document Safety Accountabilities, responsibilities and authorities of top Management of the aerodrome/location including all HODs. It may also include all local practices to improve and enhance safety that are being practiced at aerodrome/location.

Where Airports Authority of India is providing both air navigation services and aerodrome operations, a single Safety Management System Manual covering both the aspects, may be developed.

For larger aerodromes / locations separate Safety management System Manuals, one for Air Navigation Services and another for Aerodrome operations may be developed. Since some of the functions in the both Safety management System manuals may overlap, it shall be advisable to make these manuals compatible to each other and to the Safety management System Manual of other stakeholders.

At Civil Enclaves managed by Airports Authority of India, the safety accountabilities, responsibilities and authorities of local management should be documented and Standard Operating Procedures (SOPs) may be developed for the operational area under the jurisdiction of Airports Authority of India. There is no need to prepare a separate Safety Management Manual; however, all guidelines contained in Corporate Management System Manual shall be followed.

D. Scope of the Manual

This Corporate SMS Manual of AAI is applicable at all locations/aerodromes and Air Navigation Services Units managed by Airports Authority of India (AAI). It applies to all Airports Authority of India (AAI) employees, and AAI's various directorates whose activities may directly or indirectly have a bearing on the safety of Air Traffic Services, Aeronautical Telecommunications Service or Aerodrome Operations.

E. Limitations to the Scope of SMS

This SMS Manual is NOT specifically designed to cover issues outside the scope of aviation hazards; such as occupational health and safety requirements, security requirements, or other non-airside activities such as terminals. However, any facet of Terminal Building e.g. Aerobridges, design or structure which may directly or indirectly affect aircraft safety, shall be covered by this SMS.

F. Review of the Manual

The Safety Management System (SMS) Manuals shall be reviewed every 24 months. However, any changes at station level, prior to review period, shall be incorporated in S-SMS manual by Accountable Executive of the airport, as per procedure established in the document management system.

This review shall be conducted by Aviation Safety Directorate and shall consider the following points:

- Is there any evidence that the processes and procedures in the SMS Manual have contributed to a less safe situation?
- Is there evidence which indicates that SMS Manual requires improvement in any aspect?
- Is there evidence that the SMS Manual has contributed to an improvement in the overall safety culture and safety achievements of the organisation?
- What needs to be incorporated in the next version of the SMS Manual in order to achieve the aim of constant incremental improvement in the organisation?
- What ‘housekeeping’ tasks are necessary for the Safety Management System Manual?
- What feedback has been received in the last year concerning the Safety Management System, the SMS Manual (including all its practices and procedures), and what needs to be done to improve the amount of feedback received?
- Assessment of impact upon introduction of any changes in ATS and Aerodrome system operations in the last year;
- Arrange for a review of the Safety Management System (SMS) Manuals of all licensed Aerodromes and other locations in coordination with their Safety Managers in order to identify:
    - any local safety issue in the SMS Manual that needs addressing;
    - any local deviation from the Corporate SMS Manual that is worthy of being incorporated into the Corporate SMS Manual; and
- Assess the validity of local differences between the Corporate SMS Manual and between other Unit’s SMS Manual’s nationally.

G. Upkeep of the Manual

The Safety Management System (SMS), detailed in the Corporate SMS Manual, is designed in accordance with ICAO Doc. 9859 and DGCA CAR on “Establishment of SMS”, with the objective of managing the risks for the safe operation of aircraft which are associated with provision of Air Traffic Services, Aeronautical Telecommunications Services, and the Aerodrome Operations provided by Airports Authority of India.

The Aviation Safety Directorate is responsible for the design, implementation, application, integrity and the ongoing maintenance of the Safety Management System in Airports Authority of India.

For other Safety Manual Issues, it is preferable to report problems to concerned Safety Manager or Unit/Location In-charge, and Jt.GM/DGM (Aviation Safety) at Regional level in the first instance.

It is the responsibility of all AAI personnel to notify the Aviation Safety Directorate of any errors, omissions or problems encountered with either the Corporate Safety Management System Manual (C-SMSM) or the Safety Management System Manual (SMSM) of a licensed Aerodrome or Location; or any problems encountered with the practical application of the Safety Management System (SMS).

It is preferable to report problems to the concerned safety manager or Jt. GM/DGM (Aviation Safety) at Regional level in the first instance and if required may be forwarded to:

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhawan, Block – C
Safdarjung Airport
New Delhi – 110 003

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CHAPTER 1 - SAFETY POLICY AND OBJECTIVES

1.1 Chapter Overview

1.1.1 This Chapter lays down the Safety Policy of AAI, which has been signed by the Accountable Executive of AAI. It shows the commitment of top management of AAI towards the goal of ensuring safety in all its core activities. The Safety Objectives linked to Safety Performance Indicators and Safety Targets have also been included in this chapter.

1.2 References and Definitions

1.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- ICAO Doc 9859 *Safety Management Manual*

1.3 Safety Requirements

1.3.1 Airports Authority of India shall define its Safety Policy including a clear statement about the provision of necessary resources for its implementation. The Safety Policy shall be signed by the Chairman of Airports Authority of India who is Accountable Executive of the organisation.

1.3.2 The AAI shall establish its Safety Objectives for the SMS which will be linked to the Safety Performance Indicators, Safety Performance Targets and Action Plans of AAI's SMS.

1.3.3 The Safety Policy and Objectives of AAI shall be reiterated in the Safety Management Manual of all AAI-owned aerodromes and/or locations.

1.3.4 Each AAI-owned aerodrome/location may establish its own Safety Objectives in addition to the Safety Objectives of AAI based on their local Safety issues or concerns.

1.4 Practices and Procedures

The Safety Policy and Safety Objectives of AAI have been reviewed in accordance with ICAO *Safety Management Manual (3rd Edition)* and has been approved / signed by Chairman, AAI who is the Accountable Executive of AAI, on December 21, 2010

1.4.1 Safety Policy

We, in Airports Authority of India regard safety as our first priority and shall provide highest reasonable standard of safety within Air Navigation Services and Airport operations. We shall adopt, plan and establish an explicit, proactive and systematic Safety Management System for our core activities and shall review it periodically.

All our employees without any exception are accountable and responsible for safety while delivering our service.

Our commitment is to:

- Comply with and wherever possible exceed international and national standards, regulations & requirements and adopt best industry practices on safety.
- Provide appropriate resources both human and financial necessary to support the implementation & management of safety.
- Define, document and communicate throughout the organization the safety accountabilities, responsibilities and authorities of all its employees including all members of management.
- Ensure that all our employees are adequately & appropriately trained for their roles & responsibilities, are competent in safety matters and continue to remain so, and are allocated only tasks commensurate with their skills.
- Foster positive safety culture in which our employees are encouraged to report their safety concern or errors without the fear of any punitive action, however, an act of gross negligence or deliberate or willful disregard of safety rules and regulations shall be subject to disciplinary action.
- Establish & Operate a comprehensive procedure for reporting, collection, analyzing and storing of data on Hazards, incidents and accidents to achieve continuous improvement in our safety performance.

- Continuously improve our safety performance through regular monitoring and measurement of realistic safety performance indicators and safety performance targets.
- Ensure that the facilities, equipments and services provided by external suppliers or contractors meet the safety performance standards and requirements of our organization.
- Share safety information generated by our internal reporting mechanism with all stake holders to improve aviation safety.
- Review periodically efficacy of our set Safety Performance Indicators & Targets, Safety Management System, and Safety Policy to enable our Organization to adapt to changing safety environment.

1.4.2 Safety Objectives

Airports Authority of India shall:

- Ensure that Air Navigation Service is delivered in a manner where risk of any aircraft accident/incident is reduced to and maintained at or below As Low As Reasonably Practicable irrespective of the volume of air traffic
- Ensure that all navigational, communications and surveillance aids function as per design specifications and meet the required level of reliability and availability as defined by appropriate authority
- Ensure that safety is maintained at appropriate level in airside operations, including cargo operations at all aerodromes and identify & manage hazards in the operational area to keep risks to aircraft operations at minimum acceptable level
- Strive for safe apron where an accident and incidents are kept at minimum in spite of increase in traffic
- Ensure that all visual aids are maintained as per established standards and procedures
- Deliver accurate aeronautical data and information to all the users as and when they require
- Maintain the environment around the aerodrome to keep it free from any birds and wildlife that may cause damage to the aircraft
- Conduct search and rescue coordination during emergency in an efficient and effective manner

- Provide an efficient Aerodrome Fire and Rescue response during emergencies
- Ensure the competency level all employees are maintained by adequate and appropriate refresher training

1.5 Attachments

Nil

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CHAPTER -2 SYSTEM DESCRIPTION

2.1 Chapter Overview

2.1.1 The “system” described for the purpose of SMS shall always be sub-system of some larger system. Even if it encompasses all services provided within all Indian FIR’s, this can still be considered a sub-system of a larger Regional system, which in turn is a sub-system of the Global system.

2.1.2 This chapter describes the purpose, functions and the boundaries of the system. It also shows the functional chart of the organization. It describes the external interfaces and the environment in which the system operates.

2.2 References and Definitions

- ICAO Safety Management Manual (Doc.9859)
- DGCA CAR sec, 1 General Series-C Part-I on ‘Establishment of safety management system’.

2.3 Safety Requirements

2.3.1 The system description shall include the following:

a) the system interactions with other systems in the air transportation system;
b) the system functions;
c) required human performance considerations of the system operation;
d) hardware components of the system;
e) software components of the system;
f) related procedures that define guidance for the operation and use of the system;
g) operational environment; and
h) Contracted, subcontracted and purchased products and /or services.

2.3.2 Airports Authority of India shall complete a system description as part of SMS documentation.

2.3.3 Each Aerodrome/location shall also complete a system description and shall include it in its Station SMS manual.

2.4 Practice and Procedures

2.4.1 Airports Authority of India is a Mini Ratna Public Sector Undertaking under the Ministry of Civil Aviation. It was formed by an Act of Parliament and came into existence on 1st of April, 1995. Airports Authority of India is entrusted with the responsibility of creating, upgrading, maintaining and managing civil aviation infrastructure both on ground and airspace in the country. The top management of Airports Authority of India consists of Chairman and five Whole Time Board Members.

2.4.2 The functions of AAI are:

- Design, Development, Operation and Maintenance of International / domestic airports and civil enclaves.
- Control and Management of Indian airspace extending beyond the territorial limits of the country, as accepted by ICAO.
- Construction, maintenance and development of operational area viz. Runways, Aprons, Taxiways etc. and Management of Airside Operations
- Construction, Modification and Management of passenger terminals.
- Provision of passenger facilities and information system at the passenger terminals at airports.
- Development and Management of cargo terminals at International and domestic airports.
- Provision of visual aids at aerodromes
- Provision of Communication, Navigation and Surveillance aids viz. ILS, DVOR, DME, RADAR etc. to facilitate Air Navigation Services.

2.4.3 AAI manages 129 Airports, which include 18 International airports, 78 domestic airports, 07 Customs airports and 26 Civil Enclaves at Defence airfields. Administration and operation of these airports is divided into five Regions i.e. North, West, East, South and North-East. Each Region is headed by a Regional Executive Director.

2.4.4 AAI in its endeavor to create capacity ahead of demand, takes up projects of construction, modification, maintenance of passenger & cargo terminals including passenger facilities and related amenities at its terminals and extension / strengthening of Operational infrastructures like Runways, Taxiways, Apron, etc. thereby ensuring safe and secure operations of aircraft, passenger and cargo in the country.

2.4.5 AAI provides Air Navigation Services in air space measuring over 2.8 million square nautical miles which cover entire Indian airspace. Air Navigation Services includes provision of Air Traffic services and installation/maintenance of DVOR, DME, ILS, ATC radars, visual aids, etc. The airspace under the jurisdiction of AAI has been divided into four FIR's.

2.4.6 AAI is also responsible for providing Air Navigation Services at Green Field Airports, developed and operated by Private Operators and limited Navigation Services at Defence Airfields used for public transport, in India.

2.4.7 In tune with global approach to modernization of Air Navigation infrastructure, AAI is striving towards its plan for transition to satellite based Communication, Navigation, Surveillance and Air Traffic Management, phased implementation of Performance Based Navigation (PBN) etc. AAI has also undertaken GAGAN project in technical collaboration with ISRO, where satellite based system will be used for navigation. The navigational signals thus received from GPS will be augmented to achieve the navigational requirement of aircrafts. GAGAN was certified by DGCA on 21/4/2015 and operationalized for aviation use on 13/07/2015 by AAI.

2.4.8 All major air-routes over Indian landmass are Radar covered (29 Radar installations at 11 locations) along with VOR/DVOR coverage (89 installations) collocated with Distance Measuring Equipment (DME) [90 installations]. 52 Runways are provided with ILS installations with Night landing facilities at most of these airports and Automatic Message Switching System (AMSS) at 15 airports.

2.4.9 Aeronautical information/data is provided by Aeronautical Information Services (AIS) department of Airports Authority of India, through integrated Aeronautical Information package consisting of Aeronautical Information Publication (AIP), AIP Amendments, AIP Supplements, AIC, NOTAMs and Pre-flight Information Bulletins (PIB). AAI is providing Aeronautical Information Service in respect of entire Indian Territory as well as in areas in which India is responsible for provision of Air Traffic Services outside its territory.

2.4.10 AAI provides Air Navigation Services and Airport Operations through a network of Communication, Navigation and Surveillance facilities throughout the country, by dedicated and appropriately trained and competent personnel, by following processes and procedures, as per the guidelines contained in National and International regulations on civil aviation.

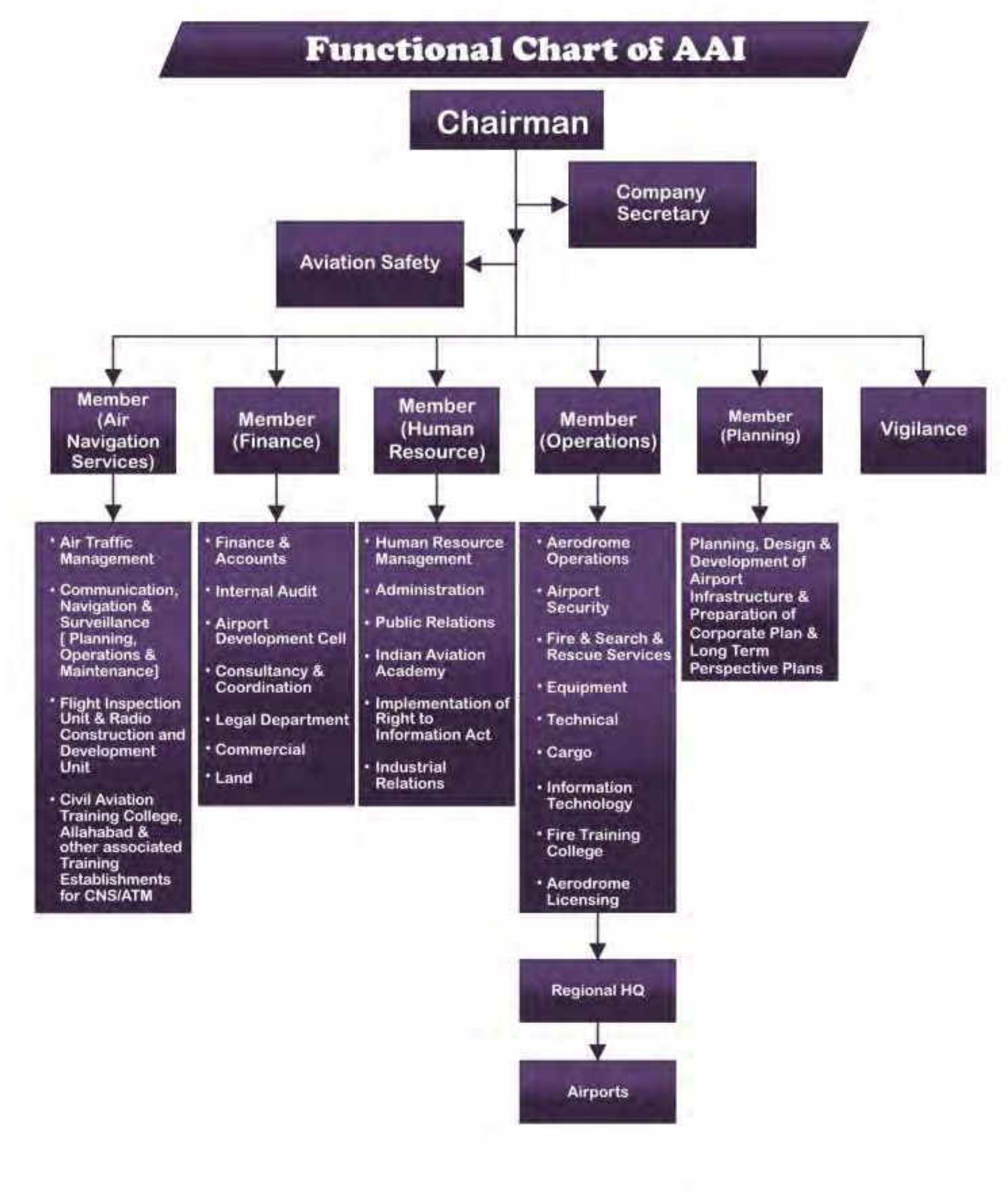
2.4.11 AAI imparts basic induction level as well as professional skill upgradation training through its own dedicated 06 training institutions, i.e. Civil Aviation Training College Allahabad, Training center Hyderabad, NIATAM Gondia, Indian Aviation Academy and two dedicated institutes for training of fire personnel i.e. Fire Service Training School at Kolkata and Fire Training Centre at New Delhi.

2.4.12 AAI has technical collaboration with number of National & International organizations, thereby regularly interacts with number of organizations, like ISRO, ICAO, FAA, Air Services Australia, NATS, CAAS, AeroThai, and European Union on civil aviation matters and to improve safety levels in our organization. AAI is also a member of global bodies, i.e. ACI (Airport Council International) and in CANSO (Civil Air Navigation Services Organization), we are founding Member & partner ANSP of Indian Ocean Strategic Partnership to Reduce Emissions (INSPIRE) Group.

2.4.13 AAI maintains coordination with Defence authorities for its Civil Enclave operations at Defence airfields, flexible use of Defence/Civil airspace and for Search & Rescue purposes.

2.4.14 Some of the non-core activities like maintenance, housekeeping etc. are outsourced to external agencies by following the due processes and ensuring that the safety is not compromised.

2.4.15 The functional chart of Airports Authority of India is given below:



2.5 Attachments

Nil

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CHAPTER 3 - SAFETY ACCOUNTABILITIES, RESPONSIBILITIES & AUTHORITIES

3.1 Chapter Overview

3.1.1 This chapter defines and documents the safety accountabilities, responsibilities and authorities of all members of management irrespective of their other functions as well as of all employees of AAI.

3.2 References and Definitions

3.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- ICAO Doc 9859 *Safety Management Manual*

3.2.2 Definitions

3.2.2.1 ***Accountability*** – A relationship that exists between two people or groups of people, the person held accountable and the person to whom they are accountable.

Accountability exists where:

- An outcome is defined
- Responsibility is clear; and
- Appropriate authority is granted.

3.2.2.2 ***Responsibility*** –The state of ownership resulting from the performance of an activity or action.

3.2.2.3 ***Accountability versus Responsibility*** – An employee is responsible for his/her actions in performing an activity whereas they are accountable to someone for the outcome of the activity being performed.

3.2.2.4 ***Authority*** – The power to give orders, directions and to make key decisions.

3.3 Safety Requirements

3.3.1 Airports Authority of India shall identify the safety accountabilities, responsibilities and authorities of all members of management as well as of all employees, irrespective of other responsibilities.

3.3.2 Safety accountabilities, responsibilities and authorities of management of AAI Aerodromes/Locations shall be documented in their Station SMS manuals.

3.3.3 In some cases, specific safety responsibilities shall be documented for executive positions, while in other more generic responsibilities shall be documented for operational personnel.

3.3.4 Safety related accountabilities; responsibilities and authorities shall not only be defined, documented but also communicated throughout the organisation.

3.4 Practices and Procedures

3.4.1 Safety Accountabilities, Responsibilities and Authorities of the Board Members

3.4.1.1 Chairman of the Board

Safety Accountability

The Chairman is accountable to the Government of India for the safety management of airports and Air Navigation Services provided by Airports Authority of India to the aviation industry.

Safety Responsibility

In discharging this accountability, the Chairman is responsible for

- Ensuring the provision of facilities to facilitate safe navigation of aircraft within Indian-administered airspace in which AAI is responsible for such services
- Ensuring the provision of facilities to facilitate safe operation of aircraft at airports controlled by AAI
- Ensuring the provision of services for effecting obligations under the Chicago Convention or otherwise in relation to the safety, regularity or efficiency of Air Navigation& Airport Operations

- Ensuring that in exercising its powers and performing its functions, AAI regards safety of air navigation & Airport Operations as the most important consideration
- Authorizing a safety management policy that indicates AAI's safety objectives and its commitment to safety
- Ensuring that a safety management system is maintained within AAI which achieves the safety management policy intent
- Assuming a leadership role to ensure commitment throughout the organization, particularly at senior management level, to the safety management policy intent and safety management system requirements
- Ensuring that AAI's managers and personnel are aware of and held accountable for their safety performance; and
- Ensuring that Safety Management System and operational performance of AAI are evaluated for effectiveness on a regular basis.

Authority

The Chairman has

- Full authority for human resources
- Authority for major financial issues
- Final authority over operations and appropriate refresher training.

3.4.1.2 Member (Air Navigation Services)

Safety Accountability

The Member (ANS) is accountable to the Chairman of the Board of AAI for the safe management of Air Navigation Services.

Safety Responsibility

The Member (ANS) is responsible for;

- Ensuring planning and management of airspace delegated to India and of Air Traffic Services for smooth traffic operations
- Assuming a leadership role to ensure commitment, to the safety management policy intent and safety management system requirements through the Air Navigation Services
- Ensuring that Air Navigation personnel are aware of and held accountable for their safety performance

- Ensuring the provision of air navigation services in accordance with the ICAO SARPS and national regulations
- Ensuring the planning, procurement, installation, maintenance and operations of air navigation services infrastructure to facilitate the safe operation of aircraft at airports
- Ensuring planning and provision of logistic support to air traffic operations
- Ensuring planning, recruitment and training of manpower to facilitate the safe navigation of aircraft within AAI-controlled airspace and for safe operation of aircraft at AAI-controlled airports
- Ensuring that effective liaison and coordination is conducted between AAI and the Defence, Telecommunication, Meteorology department and State authorities relating to civil air traffic operations
- Ensuring that effective liaison and interaction is conducted with various agencies connected with Air Traffic Control Services, Air Navigation, Air Transport Operations and related areas e.g. ICAO, European Union, FAA, CANSO, ITU, IATA, IFALPA, etc. and other Air Navigation Provider
- Organisation and operation of Aeronautical Information Services including maps and charts
- Planning, management and operation of Flight Inspection Unit
- Coordination and formulation of air navigation charges for the provision of air navigation and flight calibration services; and
- Management of Civil Aviation Training College and other associated training establishments.

Authority

As per delegation of power

3.4.1.3 Member (Operations)

Safety Accountability

The Member (Operations) is accountable to the Chairman of the Board of AAI for the safe management of AAI owned Airports and Civil Enclaves.

Safety Responsibility

In discharging this accountability, the Member (Operations) is responsible for:

- Ensuring upkeep and maintenance of infrastructure at airside including airport ground lighting services, terminal building and city side
- Assuming a leadership role to ensure commitment, to the safety management policy intent and safety management system requirements
- Ensuring that all Operational personnel are aware of and held accountable for their safety performance throughout the airport management
- Ensuring adherence of ICAO SARPS and national regulations in airport management
- Ensuring planning, provision, maintenance and operation of infrastructure and equipment for safety, fire and rescue services including vehicles for operational activities at the airports
- Management of fire training institutes
- Airport capacity assessment, slot allocation, airside management including apron control
- Ensuring control of obstacles in and around AAI-owned aerodromes
- Ground handling, cargo activities, commercial and land matters and security arrangements at AAI-owned aerodromes
- Ensuring effective interaction and liaison with State Authorities, Law and Order agencies, Airlines, Operators and agencies dealing with cargo operation
- Ensuring that effective interaction and liaison is conducted with various agencies connected with air transport operations and related areas including ICAO, ACI, etc. and other agencies; and
- Ensuring introduction and spread of information technology to improve safety level in AAI.

Authority

As per delegation of power

3.4.1.4 Member (Planning)

Safety Accountability

The Member (Planning) is accountable to the Chairman of the Board of AAI for the safety management of services provided both internally and externally by the Planning & Engineering Division of Airports Authority of India; including the following Departments:

- Aerodrome Planning
- Corporate Planning & Management Service
- Engineering Works

Safety Responsibility

In discharging this accountability, the Member (Planning) is responsible for;

- Ensuring that in exercising its powers and performing its functions, the Planning Division of AAI regards safety of air navigation and airports as the most important consideration
- Assuming a leadership role to ensure commitment to the safety management policy intent and safety management system requirements throughout the Planning & Engineering Division
- Ensuring that Planning & Engineering Division managers and personnel are aware of and held accountable for their safety responsibilities and performance
- Ensuring the Airport Services Planning & Engineering functions are conducted in accordance with the relevant government, industry and international standards and regulations
- Establishing the appropriate controls over project activities to ensure that the safety of air navigation of aircraft within Indian-administered airspace and at aerodrome which AAI is responsible, is not compromised by changes to the system
- Ensuring the provision of adequately trained and competent manpower within the Planning & Engineering Division to ensure that planning and project activities do not compromise the delivery of a safe ATS and Airports Service by the service delivery units; and
- Ensuring that effective liaison is conducted between the Planning & Engineering Division and other AAI Units, and relevant external organisations, to ensure that the safety

aspects for change are fully considered before a change is implemented.

Authority

As per delegation of power

3.4.1.5 Member (Finance)

Safety Accountability

The Member (Finance) is accountable to the Chairman of the Board of AAI for the safe and effective management of the financial resources and timely arrangement of the same; rendering sound financial advice on operations and investments at all levels; drawing up budget proposals; revenue generation; effective cash management systems including financial control for allocation and use of funds; analyzing the financial results of all operations and making necessary recommendations for future operations.

Departments under the jurisdiction of Member (Finance) include:

- Finance & Accounts
- Key Infrastructure Development Group; and
- Consultancy & Coordination.

Safety Responsibility

In discharging this accountability, the Member (Finance) is responsible for:

- Ensuring that in exercising its powers and performing its functions, the Finance Division of AAI regards safety of air navigation as the most important consideration
- Assuming leadership role to ensure commitment to the safety management policy intent and safety management system requirements throughout the Finance Division
- Ensuring that Finance Division mangers and personnel are aware of and held accountable for their safety responsibilities and performance
- Ensuring that the provision of Air Traffic and Airport financial functions are conducted in accordance with the relevant government, industry and international standards and regulations
- Establishing appropriate controls over financial activities to ensure the safety of air navigation of aircraft within AAI

controlled airspace and at aerodromes which AAI is responsible, is not compromised by changes to the financial system

- Ensuring the provision of adequately trained and competent manpower within the Finance Division to ensure that financial activities do not compromise the delivery of a safe ANS and Airport Service by the service delivery Units; and
- Ensuring that effective liaison is conducted between the Finance Division and other AAI units, and relevant external organizations, to ensure that the safety aspects for any change involving the Finance Division are fully considered before the change is implemented.

Authority

As per delegation of power

3.4.1.6 Member (Human Resource)

Safety Accountability

The Member (HR) is accountable to the Chairman of the Board of AAI for the safe and effective design, development and delivery of innovative and effective personnel policies.

Departments under the jurisdiction of Member (HR) include the following:

- Human Resources
- Law; and
- Public Relations.

Safety Responsibility

In discharging this accountability, the Member (HR) is responsible for:

- Ensuring that in exercising its powers and performing its functions, the Human Resources Division areas of AAI regards safety of air navigation as the most important consideration
- Assuming a leadership role to ensure commitment throughout the Human Resources Division to the safety management policy intent and safety management system requirements
- Ensuring that Human Resources Division managers and personnel are aware of and held accountable for their safety performance

- Ensuring the provision of Human Resources functions within ATS and Airport management are conducted in accordance with the relevant government, industry and international standards and regulations;
- Establishing the appropriate controls over Human Resources activities to ensure the safety of air navigation of aircraft within AAI controlled airspace and at aerodromes which AAI is responsible, is not compromised by any changes to the Human Resources system
- Ensuring the provision of adequately trained and competent manpower within the Human Resources Division to ensure that Human Resources Division do not compromise the delivery of a safe ATS and Airports service by the service delivery units, and
- Ensuring effective liaison is conducted between the Human Resources Division and other AAI units, and relevant external organisations, to ensure that the safety aspects for any change involving the Human Resources Division are fully considered before the change is implemented.

<u>Authority</u>

As per delegation of power

3.4.2 Safety Accountabilities, Responsibilities and Authorities of the Executive Directors

3.4.2.1 Executive Director (Aviation Safety)

<u>Safety Accountability, Responsibility & Authority</u>

The Executive Director (Aviation Safety) is accountable to the Chairman of the AAI Board and his Safety Accountabilities, Responsibilities and Authorities have been documented in Chapter 4 Key Safety Personnel.

3.4.2.2 Executive Director (ATM)

<u>Safety Accountability</u>

The Executive Director of the Air Traffic Management (ATM) is accountable to the Member (Air Navigation Services) to provide services and facilities, for customers and stakeholders, for the purpose of giving effect to the Chicago Convention and National legislation on aviation as applicable on issues related to provision of air traffic services or otherwise in relation to the safety, regularity and efficiency of air navigation to permit the safe navigation of aircraft within AAI controlled airspace and at aerodromes where AAI is responsible for such services including:

- airspace management
- air traffic control
- traffic and flight information
- aeronautical information
- search and rescue services
- implementation and completion of projects of operational or strategic importance; and
- identifying opportunities for adopting new ATS technologies.

Safety Responsibilities

In discharging these accountabilities, the ED ATM is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's Safety Management System within the ATM Directorate
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls, that are identified within the ATM system, in accordance with the procedures contained in AAI's Corporate Safety Management System Manual
- Overseeing the safety and operational performance of the ATM Directorate
- Ensuring collection and reporting of safety issues and safety data in a timely manner to the Directorate of Aviation Safety and the AAI Board
- Ensuring that all ATM executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all ATM executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all

plans, policies, procedures, processes and systems that affect ATM; and

- Ensuring that management of human resources is appropriate to facilitate safe operations, including the provision of sufficient numbers of competent personnel who are fit for duty.

Authority

As per delegation of power

3.4.2.3 Executive Director (Operations)

Safety Accountability

The Executive Director of Operations (Airports) [ED (OPS)] is accountable to the Member (Operations) to provide services and facilities, for customers and stakeholders, for the purpose of giving effect to the Chicago Convention or otherwise in relation to the safety, regularity and efficiency of air navigation to permit the safe navigation of aircraft at aerodromes where AAI is responsible for such services.

Safety Responsibilities

In discharging these accountabilities, the ED (OPS) is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system at AAI controlled aerodromes
- Ensuring that all executives and personnel of Operations directorate are trained, qualified and competent to discharge their safety related obligations
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls, that are identified within the airports system, in accordance with the procedures contained in AAI's Corporate safety management system manual
- Overseeing the safety and operational performance of the Operations directorate and formulate & issue policies, pertaining to it

- Ensuring collection and reporting of safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all Operations directorate executives and personnel are aware of, and held accountable for, their safety performance
- Planning and ensuring that all Operations directorate executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems that affect AAI controlled airports
- Ensuring that management of human resources is appropriate to facilitate safe operations
- Obtaining the prior approval from DGCA for all AAI projects at various licensed airports, affecting aircraft safety, as required by rule 83(2) of aircraft rules, 1937; and
- To grant approval of time slots for scheduled international and domestic airlines and permission for overnight aircraft parking stands for all AAI airports

Authority

As per delegation of power

3.4.2.4 Executive Director (CNS-Planning)

Safety Accountability

The Executive Director of CNS Planning [ED (CNS-P)] is accountable to the Member (ANS) to plan and procure facilities for the purpose of giving effect to the Chicago Convention or otherwise in relation to the safety, regularity and efficiency of air navigation to permit safe navigation of aircraft within AAI controlled airspace and at aerodromes.

Safety Responsibilities

In discharging these accountabilities, the ED (CNS-P) is responsible for:

- Planning ,procurement, installation and commissioning of communication, navigation and surveillance facilities conforming to safety requirements as contained in CNS manual

- Defining a base-line specification for operational components of the ATM system
- Ensuring change management process in concept, design, planning, implementation and completion of projects of operational or strategic importance including:
    - Coordination of operational projects throughout concerned directorates
    - Ensuring that policies, procedures and systems are in place to guide and support the delivery of operational projects; and
    - ensuring that project management skills and knowledge are developed across the directorate
- Ensuring the training of human resources is appropriate to facilitate safe operation of CNS equipment
- Identifying developments and opportunities for adopting new technologies
- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's Safety Management System within the area of responsibility
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls, that are identified within the system, in accordance with the procedures contained in AAI's Corporate Safety Management System Manual
- Overseeing the safety and operational performance of the CNS Planning group
- Asset management of physical assets (including land, buildings, and ATM systems) used to deliver aerodrome approach, departure and en-route air traffic services, aeronautical information services and aeronautical radio navigation services
- Definition of a base-line specification for those components of the ATM system
- The planning, initiation, implementation and completion of projects of operational or strategic importance

- Ensuring collection and reporting of safety issues and safety data in a timely manner to the Directorate of Aviation Safety and the AAI Board
- Ensuring that all CNS Planning executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all CNS Planning executives and personnel are trained, qualified and competent to discharge their safety related obligations; and
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems.

Authority

As per delegation of power

3.4.2.5 Executive Director (CNS-OM)

Safety Accountabilities

The Executive Director CNS-Operations and Maintenance (O&M) is accountable to the Member (ANS) to provide services and facilities for Air Navigation Services, and Airports Groups, and for other customers and stakeholders, to permit the safe navigation of aircraft within AAI controlled airspace and at aerodromes where AAI is responsible for such services including:

- The overall supervision and maintenance of the CNS and airport security equipment, including monitoring of performance parameters
- Ensuring the maintenance and logistics support to field units
- The management of CNS personnel to facilitate safe operations
- Ensuring that policies, procedures and systems are in place to guide and support the maintenance of CNS/ATM facilities
- Enhancing the knowledge and skill set of CNS personnel, through workshops and seminars on the operation and maintenance of CNS/ATM facilities
- The development of maintenance plans and projection of spare parts requirement of CNS/ATM equipment

- Training policy on CNS system
- Aeronautical frequency management
- Ensuring the management of maintenance support contract with original equipment manufacturers (OEM) for providing support in areas where adequate expertise is not available within AAI
- Developing policy guidelines for evaluation of competency of CNS personnel
- Ensuring availability, reliability, continuity and integrity of CNS/ATM system as per their performance target by monitoring and follow up action
- Co-ordination with ICAO and its Regional office in regard to CNS issues, for implementation of Regional plans
- Ensuring the maintenance of CNS/ATM system as per DGCA CARs.
- Projecting the replacement/ augmentation of CNS facilities based on the life cycle of equipment in coordination with ED (CNS-P); and
- The framing and implementation of maintenance philosophy including establishment of special maintenance units for component level repair of PCBS / modules.

Safety Responsibilities

In discharging these accountabilities, the ED CNS (O&M) is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the CNS directorate
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls, that are identified within the CNS system, in accordance with the procedures contained in AAI's Corporate safety management system manual
- Overseeing the safety and operational performance of the CNS directorate

- Ensuring collection and reporting of safety issues and safety data in a timely manner to the Directorate of Aviation Safety and the AAI board
- Ensuring that all CNS executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all CNS executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems that affect ATS; and
- Ensuring that management of human resources is appropriate to facilitate safe operations, including the provision of sufficient numbers of competent personnel who are fit for duty.

Authority

As per delegation of power

3.4.2.6 Executive Director (Civil Aviation Training College)

Safety Accountability

The Executive Director of the Aviation Training Centre [ED (CATC)] is accountable to the Member (ANS) for the provision of operational training related to ANS.

Safety Responsibilities

In discharging these accountabilities, the ED CATC is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the aviation training centre
- Overseeing the safety and performance of the aviation training centre

- Ensuring collection and reporting safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all aviation training centre executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all aviation training centre executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that all ANS operational training procedures and local instructions applicable to the area of responsibility are documented and applied in accordance with the relevant legislative, regulatory and organizational requirements
- Encouraging all personnel to identify and report situations of potential risk and to ensure that mechanisms exist which provide for full reporting and prompt and effective rectification
- Over viewing the performance of ANS operational training (OT) and to define and document the safety management responsibilities and safety accountabilities of personnel within this unit
- Ensuring that OT training resources, curricula and syllabi are appropriate for the required training within the area of responsibility and that these elements of training are reviewed on a regular basis to ensure reliability and validity
- Ensuring that whenever OT personnel are involved in planning and project matters within the area of responsibility - safety is always an agenda item and is accorded the highest priority; and
- Ensuring that appropriate partnerships exist within the structure and beyond for the delivery and assessment of safe and effective operational training within the area of responsibility.

<u>Authority</u>

As per delegation of power

3.4.2.7 Executive Director - Fight Inspection Unit (ED-FIU)

<u>Safety Accountability</u>

The Executive Director of the Flight Inspection Unit [ED (FIU)] is accountable to the Member (Operations) for the safe and effective management of the flight inspection Unit whilst carrying out its charter to conduct the flight inspection and calibration of Communication and Navigation surveillance facilities at all airports and air routes throughout India.

Safety Responsibilities

In discharging these accountabilities, the ED FIU is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the FIU
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls, that are identified within the FIU system, in accordance with the procedures contained in AAI's Corporate safety management system manual
- Overseeing the safety and operational performance of the FIU
- Ensuring collection and reporting of safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all FIU executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all FIU executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems that affect FIU; and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.2.8 Executive Director- Architecture [ED (Arch)]

Safety Accountability

The Executive Director Architecture [ED (Arch)] is accountable to the Member (Planning) for the safe and effective management of the Department of Planning. The functions of the Department of Planning include:

- Site selection for new airports
- Land use and master planning
- Data analysis and preparation of feasibility reports
- Geometric design of airfields and aprons
- Identification areas to meet commercial requirements
- Passenger and cargo terminals design
- Design evaluation of the proposals of user agencies
- Design of all infrastructure buildings at airports; and
- Consultancy for air terminal projects.

Safety Responsibilities

In discharging these accountabilities, the ED Arch is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the area of responsibility
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls that are identified within the system, in accordance with the procedures contained in AAI's Corporate safety management system manual.
- Overseeing the safety and performance of the department of planning.
- Ensuring collection and reporting of safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board.
- Ensuring that all Department of Planning executives and personnel are aware of, and held accountable for, their safety performance

- Ensuring that all Department of Planning executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems; and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.2.9 Executive Director- Engineering (Civil/ Electrical) [ED (Engg)]

Safety Accountability

The Executive Director Engineering (Civil/Electrical) [ED (Engg)] is accountable to the Member (Planning) to support the activities for the safe operation of ANS and Airports System, including:

- Planning and designing of airfield pavements projects, Airports Terminals and of other airports services
- Planning and provision of E&M services at Airports such as aero-bridges, escalators, elevators, baggage conveyors, air conditioning systems etc; and
- Provision of power supply to all airport installations including Communications & Navigational Aids.

Safety Responsibilities

In discharging these accountabilities, the Executive Director Engg (Civil/ Electrical) is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the area of responsibility
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls that are identified within the system, in accordance with the procedures contained in AAI's Corporate safety management system manual.

- Overseeing the safety and operational performance of the engineering area of responsibility
- Ensuring collection and reporting of safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all civil/electrical engineering executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all civil/electrical engineering executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.2.10 Executive Director (Aerodrome Planning)

Safety Accountabilities

The Executive Director (Aerodrome Planning) is accountable to the Member (Planning & Engineering) for planning of Aerodrome infrastructure including:

- Development and modernization of aerodromes; and
- Preparation of annual and five year plans for aerodrome works.

Safety Responsibilities

In discharging these accountabilities, the ED (Aerodrome Planning) is responsible for:

- Planning of aerodromes including pavements and facilities as per ICAO / national standards
- Ensuring co-ordination with Airlines, DGCA and other agencies for efficient implementation of projects
- Ensuring that safety considerations are given the foremost priority

- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's Safety Management System within the Aerodrome Planning Directorate
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls, that are identified within the system, in accordance with the procedures contained in AAI's Corporate Safety Management System Manual
- Overseeing the safety and operational performance of the Aerodrome Planning Directorate
- Ensuring collection and reporting of safety issues and safety data in a timely manner to the Directorate of Aviation Safety and the AAI Board
- Ensuring that all Aerodrome Planning executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all Aerodrome Planning executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems; and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.2.11 Executive Director - Project Monitoring and Quality Assurance

Safety Accountability

The Executive Director Project Monitoring and Quality Assurance (PMQA) is accountable to the Member (Planning) to support the activities for the safe operation of the ANS and Airports System including:

- Project monitoring
- Quality assurance; and
- Expenditure monitoring.

Safety Responsibilities

In discharging these accountabilities, the ED PMQA is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the area of responsibility
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls that are identified within the system, in accordance with the procedures contained in AAI's Corporate safety management system manual.
- Overseeing the safety and operational performance of the personnel within the area of responsibility
- Ensuring collection and reporting of safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all executives and personnel within the area of responsibility are aware of, and held accountable for, their safety performance
- Ensuring that all executives and personnel within the area of responsibility are trained, qualified and competent to discharge their safety related obligations;
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems; and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.2.12 Executive Director (Finance)

Safety Accountabilities

The Executive Director (Finance) is accountable to the Member (Finance) for:

- Development, implementation and monitoring of financial strategies
- Taxation and treasury management and advice
- Purchasing policy
- Corporate financial control
- Insurance management and policies; and
- Revenues collection policy.

Safety Responsibilities

In discharging these accountabilities, the ED (finance) is responsible for:

- Ensuring that safety considerations are given the foremost priority during the development of financial strategies, policies and planning processes
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the finance area
- Ensuring that any safety issues are reported in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all finance executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all finance executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that revenue raised by AAI is sufficient to maintain the safe operation of the air traffic services and airports system
- Providing advice to senior management on corporate financial management strategies that will enable them to manage the safe operation of the air traffic services and airports system; and
- Providing advice to senior management on aviation industry economics, including forecasts of industry activity that will enable them to implement strategies for the continued safe operation of the air traffic services and airports system.

Authority

As per delegation of power

3.4.2.13 Executive Director (Human Resources)

Safety Accountability

The Executive Director (Human Resources) is accountable to the Member (Human Resources) for:

- Personnel policies; personnel management and placement of personnel
- Career planning and welfare; and management of performance appraisal records
- Creation and review of manpower requirements; human resource development (recruitment and training); and redress of grievances
- Implementation of government policies; industrial relations; and control, discipline and appeal of employees
- General administration including vehicles and accommodation
- Management of stores; and security and maintenance of CHQ Library; and arrangements for seminars, meetings, conferences
- Advances to employees; residential accommodation; and medical facilities; and
- Implementation of official language policies; and receipt and issue of correspondence.

Safety Responsibilities

In discharging these accountabilities, the Executive Director Human Resource is responsible for:

- Ensuring that safety considerations are given the foremost priority in decisions involving personnel management
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the human resource department
- Overseeing the safety and operational performance of the human resource department
- Ensuring that any safety issues are reported in a timely manner to the directorate of aviation safety and the AAI Board
- Ensuring that all HR department executives and personnel are aware of, and held accountable for, their safety performance

- Ensuring that all HR department; executives and personnel are trained, qualified and competent to discharge their safety related obligations; and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.2.14 Regional Executive Director (RED)

Safety Accountability

The Regional Executive Director (RED) is accountable to the Member (Operations) for the effective management of all functions within the Region

These functions include:

- Safety
- Operations
- Security
- Commercial
- Engineering works; and
- Administration.

Safety Responsibilities

In discharging these accountabilities, the RED is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the area of responsibility
- Overseeing the safety performance of all disciplines within the area of responsibility, and ensuring that all executives and personnel are aware of and held accountable for their safety performance
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls that are identified within the system, in accordance with the procedures contained in AAI's Corporate safety management system manual.

- Ensuring collection and reporting of safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all executives and personnel within the area of their responsibility are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems; and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.2.15 Airport Director

Safety Accountability

The Airport Director is accountable to the Member (Operations) through REDs / ED (Ops) for:

- The effective application of the AAI's SMS within the area of responsibility
- Taking a leadership role in safety programmes and ensuring that safety is never compromised by commercial, environmental and social pressures
- Compliance with all safety related legislation applicable to the management of airside facilities
- Ensuring that the annual business plan and budget is adequately resourced to achieve compliance with the SMS
- Ensuring that identified safety improvement objectives are implemented
- Ensuring that full consideration is given to safety in considering changes to organizational structures and business practices; and
- Management of the response to an airport emergency.

Safety Responsibilities

In discharging these accountabilities, the Airport Director is responsible for:

- Ensuring that safety considerations are given the foremost priority
- Ensuring the application of the explicit safety management policy and procedures in accordance with AAI's safety management system within the airport
- Acceptance and overview of any hazards or residual risks, after treatment and mitigation of initial risk, and their associated controls that are identified within the system, in accordance with the procedures contained in AAI's Corporate safety management system manual
- Overseeing the safety and operational performance of the airport personnel and that airside facilities are provided, maintained and operated in accordance with ICAO SARPS and DGCA rules and requirements
- Ensuring collection and reporting of safety issues and safety data in a timely manner to the directorate of aviation safety and the AAI board
- Ensuring that all airport executives and personnel are aware of, and held accountable for, their safety performance
- Ensuring that all airport executives and personnel are trained, qualified and competent to discharge their safety related obligations
- Ensuring that fitness for service, including any necessary safety assessments, has been declared and accepted by the responsible authority, in relation to the development of all plans, policies, procedures, processes and systems that may affect the airport; and
- Ensuring that management of human resources is appropriate to facilitate safe operations.

Authority

As per delegation of power

3.4.3 All AAI personnel

All AAI personnel have the following safety responsibilities:

1. To comply with the relevant safety requirements and procedures outlined in:
    - AAI's Corporate Safety Management System Manual (C-SMSM) and any Station Safety Management System Manuals (S-SMSM)

- Manual of Air Traffic Services (MATS) Part 1 and 2
- CNS Manual
- Operations Directorate Manual
- Engineering Works Manual
- Aerodrome Manual; and
- Other duly authorised Corporate Manuals, Instructions and Notices

2. To apply system safety measures as required by safety management procedures and instructions
3. To advise their next level of management of any safety occurrence or system failure and to identify and report any situation of potential risk or concern affecting system safety via one of the following means:
   - Report directly to their supervisor
   - Via team meetings
   - Submitting either an Incident report, an Event report, or a Confidential Report
4. Supporting safety audits as and when they occur; and
5. Supporting safety investigations as and when they occur.

3.5 Attachments

Nil

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CHAPTER 4 - KEY SAFETY PERSONNEL AND SAFETY COMMITTEES

4.1 Chapter Overview

4.1.1 The Chairman of AAI delegates the responsibility of development and maintenance of SMS manual to ED (Aviation Safety). The ED (Aviation Safety) is designated as Safety Manager of the organization and is the nodal person to interact with all other external agencies on safety matters.

4.1.2 Communication, both internally and externally, regarding the safety health of our organization, is vital to the effective implementation of the SMS. We must not only communicate but also consult with external agencies and our customers about the safety concerns, which we identify, in order to take most effective remedial action.

4.1.3 This chapter also describes the constitution and functions of various Safety Committees at CHQ and field stations.

4.2 References and Definitions

4.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- ICAO Doc 9859 *Safety Management Manual*

4.3 Safety Requirements

4.3.1 Airports Authority of India shall identify Safety Manager, who shall be the individual and focal point, responsible for the implementation and maintenance of an effective SMS.

4.3.2 The Safety Manager shall report directly to the Accountable Executive on all safety matters, including performance and improvement of the SMS.

4.3.3 The Safety Manager shall ensure safety promotion throughout the organization.

4.3.4 The Executive Director (AVS) shall be the Safety Manager of the organization. There shall be a Safety Manager at Regional and Airport/Location level also. The Safety accountabilities, responsibilities and authorities of Safety Manager at each level shall be documented.

4.3.5 Safety Committees shall be established at Corporate, Regional and Airport/Location level. The constitution and term of reference of the Safety Committees at each level shall be documented.

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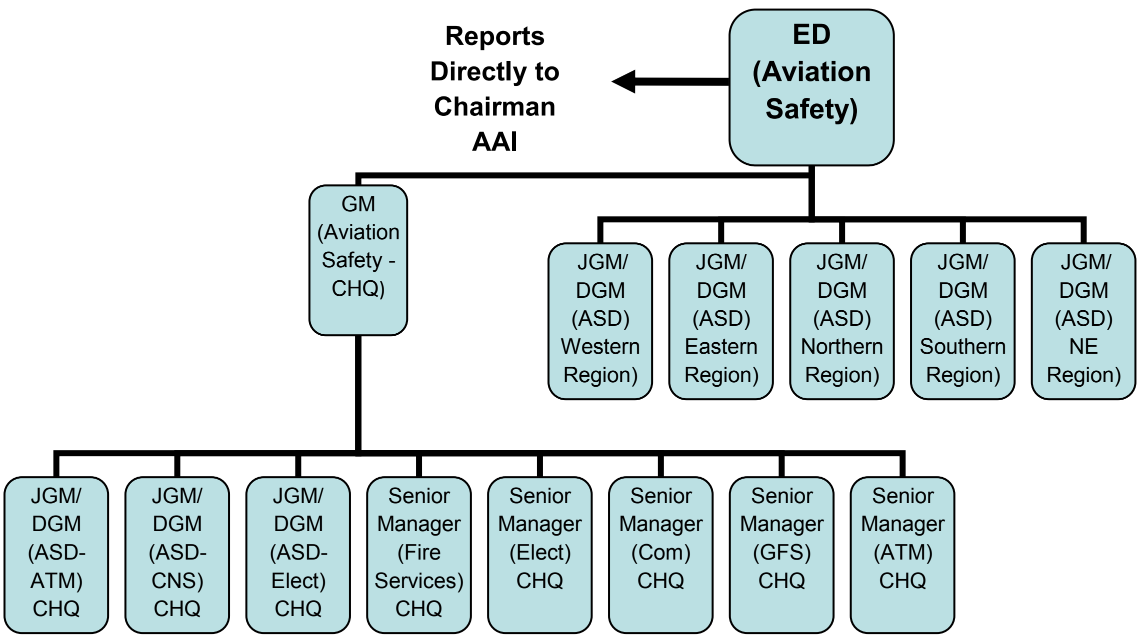
4.4 Practices and Procedures

4.4.1 Organizational Chart of Aviation Safety Directorate



4.4.2 Key Safety Personnel

4.4.2.1 Safety Accountabilities, Responsibilities and Authorities of Executive Director (Aviation Safety)

<u>Safety Accountability</u>

The Executive Director (Aviation Safety) is the Safety Manager of AAI and is accountable to the Chairman of the AAI Board for:

- Providing advice and assurance to the Chairman and Board of Directors of AAI relating to safety issues and performance; internal, external and international safety initiatives and requirements
- Maintenance of the safety policy and AAI's Safety Management System
- Establishing safety standards
- Establishing a system for safety management education and safety awareness
- Establishing a safety audit and surveillance system
- Effective interface with the Director General of Civil Aviation and industry liaison on safety matters.
- Establishing effective safety relations with international bodies and ICAO coordination.

Safety Responsibilities

In discharging these accountabilities, the ED (Aviation Safety) is responsible for:

- Developing and maintaining a safety management policy
- Establishing and maintaining a corporate safety management system including arrangements for identifying, reporting, tracking and correcting safety issues and for the initiation of preventive action where necessary
- Undertaking safety audits of all operational units and Head Office aspects related to safety management, at interval of 2 years but not exceeding 3 years.
- Undertaking ongoing review of the corporate safety management system to evaluate its effectiveness and ensuring that improvements are made where required
- Overseeing the performance of AAI's safety management activities and providing advice on potential improvements to safety performance
- Reviewing and reporting on compliance with safety management policies, plans, systems and procedures and regulatory arrangements and standards; ensuring safety issues are reported in a timely manner to the Board
- Designing, developing and managing an effective audit program directed toward the highest risk exposures to the safe operation of the airports and Air Traffic Services

- Designing, developing and managing an effective safety surveillance program
- Ensuring that Directorate of Aviation Safety managers and personnel are aware of and held accountable for their safety performance
- Ensuring that Directorate of Aviation Safety personnel are trained, qualified and competent to discharge their safety related obligations
- Developing and promoting safety management training across AAI; and
- Ongoing review of the interface between AAI, the regulator (DGCA), and other aviation organisations in the matter of Safety and ensuring improvements are made where required.

Authorities

The Executive Director (Aviation Safety)

- Reports directly to the Chairman, AAI on all safety related matters
- Is authorised, under the direction of Chairman, AAI, to conduct safety audits, surveys and inspections of any aspect of the operations
- Under the direction of Chairman, AAI, has the authority to conduct investigation on internal safety events, in accordance with the procedures prescribed in the manual

4.4.2.2 Joint GM/DGM (Aviation Safety) - Region

Safety Accountability

To support the activities for the safe operation of the ATS and Airports System, Jt. General Manager/Deputy General Manager (Aviation Safety) is accountable to the ED (Aviation Safety) for functional responsibilities for the effective functioning of:

- Safety policy and a safety management system
- Safety management education
- Safety systems audit
- DGCA interface on safety matters; and
- Industry liaison on safety matters.

Safety Responsibilities

In discharging these accountabilities, the Jt.GM / Deputy General Manager (Aviation Safety) is responsible for:

- Maintaining a safety management policy
- Identifying, reporting & tracking safety issues for taking preventive action where necessary
- Undertaking periodic safety audits of regional aerodromes
- Overseeing the performance of AAI's safety management activities and providing advice on potential improvements to safety performance
- Reviewing and reporting on compliance with safety management policies, plans, systems and procedures and regulatory arrangements and standards
- Managing an effective safety surveillance program
- Ensuring that Directorate of Aviation Safety personnel in the region are trained, qualified and competent to discharge their safety related obligations
- Ensuring that directorate of aviation safety personnel in the region are aware of and held accountable for their safety performance; and
- Ongoing reviews of the interface between AAI, the regulator (DGCA), and other aviation organisations in the region and ensuring improvements are made where required.

Authorities

Joint GM/DGM (Aviation Safety) - Region

- Reports directly to the Regional Executive Director on all safety related matters
- Is authorised, under the direction of E. D. (Aviation safety) / Regional Executive Director, to conduct safety audits, surveys and inspections of any aspect of the operations
- Under the direction of E. D. (Aviation safety) / Regional Executive Director, has the authority to conduct investigation on internal safety events, in accordance with the procedures prescribed in the manual

4.4.2.3 Safety Manager of Location/Airport

The Accountable Executive of each location/airport shall designate a Safety Manager who shall be the focal point responsible for implementation and maintenance of SMS at that location/airport. Safety Manager can be designated from any operational directorate, provided he/she meets the desirable qualification as prescribed in para 4.4.4 and has received training in Safety Management principles. If the designated Safety Manager is not trained in SMS, then he/she must receive SMS training preferably before taking over as Safety Manager or, if not possible, within reasonable time after taking over as Safety Manager to enable him/her to carry out the duties/responsibilities effectively.

Ideally the Safety Manager should have no responsibility, other than Safety, but at small location/airport, Safety Management responsibilities may be assigned to an official, who also has other operational duties/responsibilities. In such cases, preferably the Safety Manager should not have direct operational responsibility, to avoid possible conflict of interest.

Safety Accountability

To support the activities for the safe operation of the ATS and Airports System at location/airport, Safety Manager is accountable to the Airport Director for:

- the effective implementation of Safety policy and a Safety Management System at the location/airport
- Safety management education and safety awareness at location/airport
- Proving information and advice to Airport Director on local safety issues

Safety Responsibilities

In discharging these accountabilities, the Safety Manager is responsible for:

- Promoting an organisational culture that fosters exemplary safety practices by demonstrating excellent safety behaviour.
- Managing phasewise Implementation of safety Management system.
- Communicating information regarding safety issues to organization's staff, contractors and stakeholders

- Assisting and monitoring continuous improvement in hazard identification and safety risk assessment process and review of corrective actions.
- Collection, storage and analysis of safety data for trends related to hazards, events and occurrences
- Convening monthly station safety committee meeting, for addressing local safety issues and review of hazards of the airport/location.
- Ensuring that airport personnel are trained, qualified and competent to discharge their safety related obligations
- Guiding/assisting airport in safety assessment and Change management procedures.

Authorities

Safety Manager of the airport

- Reports directly to the Airport Director on all safety related matters
- Is authorised under the direction of Airport Director, to conduct internal safety audits and inspections of any aspect of the operations
- Is authorised under the direction of Airport Director, to conduct investigation on internal safety events, in accordance with the procedures prescribed in the manual

4.4.3 Safety Committees and Safety Groups

4.4.3.1 Corporate Safety Committee

A Corporate Safety Committee shall be established at CHQ level, with the objective of making recommendations, concerning safety and reviewing safety performance of the organisation. It shall meet, once in six months and the Safety Manager of AAI i.e. ED (Aviation Safety) shall be the convenor of that meeting. The terms of reference and the constitution of the Corporate Safety Committee are given below.

Constitution of Corporate Safety Committee

1. Chairman - Accountable Executive
2. Member (ANS)
3. Member (Ops)

4. Member (Planning)
5. Member (HR)
6. Member (Finance)
7. ED (AVS) - Convenor/Safety Manager
8. ED (ATM)
9. ED (CNS)
10. ED (Ops)
11. ED (ANS-Planning)
12. ED (ARA-Planning)
13. ED (Engg)-Civil/Elect.
14. ED (Finance)
15. ED (HR)
16. Any other member co-opted

Terms of Reference of Corporate Safety Committee

- Safety performance monitoring against the Safety Policy and Objectives
- Safety issues impacting the entire organisation and their resolutions
- Allocation of appropriate resources to achieve safety performance beyond that is required by regulatory compliance
- Effectiveness of safety supervision of contracted operations
- Strategic directions on safety matters
- Safety issues referred by Regional and Airport Safety Committees

4.4.3.2 Regional Safety Committee

A Regional Safety Committee shall be established at all the five Regional HQ with the objective of analysing and reviewing safety performance of their respective Region and shall give recommendations concerning safety issues in their region. It shall meet, once in every three months and the Safety Manager of the Region, i.e. Joint GM (AVS)/DGM (AVS) shall be the convenor of that meeting. It shall send safety report of every three months to AAI

CHQ for compilation, analysis to enable them to set safety performance indicators and targets of the organisation.

The terms of reference and the constitution of the Regional Safety Committee are given below.

Constitution of Regional Safety Committee

1. Regional Executive Director
2. General Manager (ATM)
3. General Manager (CNS)
4. General Manager (OPS)
5. General Manager (Finance)
6. General Manager (HR)
7. Jt. GM / DGM (Aviation Safety)-Region - Convenor
8. All HODs

Terms of Reference of Regional Safety Committee

- Safety issues impacting the region and their resolutions
- Issues arising out of safety data analysis of the region and their timely corrective action
- Review of previous safety recommendations
- Safety promotion in the region
- Review of mitigation strategies of identified risks
- Escalating major safety issues to the Corporate Safety Committee.

4.4.3.3 Station Safety Committee

A Station Safety Committee shall be established at each location/airport, with the objective of analysing and reviewing safety performance of their respective location/airport and shall give recommendations concerning safety issues in their location/airport. It shall meet, once every month and the Safety Manager of the location/airport, shall be the convenor of that meeting. It shall send safety report of every month to Regional HQ for compilation and analysis to enable them to set safety performance indicators and targets of the Region and for onward submission to AAI CHQ.

The terms of reference and the constitution of the Station Safety Committee are given below.

Constitution of Station Safety Committee

1. Airport Director — Accountable Executive
2. Safety Manager — Convenor
3. All HODs

Terms of Reference of Station Safety Committee

- Local safety issues of the airport and their resolutions
- Collection, storage and analysis of safety data, trend analysis and safety risk assessment of identified hazards
- Review and effectiveness of mitigation measures
- Overseeing change management
- Escalating major safety issues to Regional and/or Corporate Safety Committees

4.4.4 Desirable Qualification of Safety Manager

- Broad knowledge of organization's operations, procedures & activities and full time experience in aviation safety with appropriate SMS training.
- Sound knowledge of managing safety management system and understanding of risk management principles & techniques
- Sound knowledge of aviation regulatory framework, ICAO (Standard and Recommended Practices) and relevant civil aviation regulations.
- Well-developed communication skills and demonstrated interpersonal skills.
- Computer literacy and good analytical skills.
- Leadership skills and an authoritative approach; and
- Worthy of respect from peers and management, promote just culture.

4.5 Attachments

Nil

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CHAPTER 5 - DOCUMENTATION CONTROL

5.1 Chapter Overview

5.1.1 This element of SMS requires that a Document Management system is in place to record operational and safety related documents, including:

- Policies
- Procedures
- Standards
- Instructions and Directives; and
- Actions and the results.

5.1.2 Such documentations allow us to define what we do, standardize the services provided and review our operations

5.2 References and Definitions

5.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System*'
- ICAO Doc 9859 *Safety Management Manual*

5.2.2 Definitions

5.2.2.1 **Controlled copy –** is a current copy of the document that is managed through a Document Management System.

5.2.2.2 **Master –** is the signed approved hardcopy of the document, to be stored on an official AAI file.

5.2.2.3 **Master electronic copy -** is the electronic copy of the master document that is stored on the network, in the format in which it was developed to be available to facilitate future revisions.

5.2.2.4 **Document Index –** A document index is a formally controlled and maintained document or database, which holds at minimum:

- Document Number
- Document Title

- Current Version
- Document Status
- Issue Date
- Review Date
- Document Originator
- Approval Authority
- Document Owner (to appropriate level): - Directorate, Region, Location and Unit
- Master Copy location – Hard Copy File Number; Electronic Copy/Location (PC or Network Drive, Path and File name.

5.3 Safety Requirements

5.3.1 The Safety Management System documentation in Airports Authority of India has been derived from legislation relevant to Airports Authority of India in Aircraft Act 1934, the Aircraft Rules, 1937 and Airports Authority of India Act, 1994. The Corporate safety documentation also includes government policies, ministerial directions, board directions, corporate governance guidelines, corporate policies and guidance. The National regulations such as DGCA CAR, Standards, Circulars, ICAO Standards and Recommended Practices and other documents also form basis of AAI SMS documentation.

5.3.2 Airports Authority of India shall develop a Corporate Safety Management Manual, which shall be uniformly applicable throughout the organisation and shall also develop Station Safety Management Manual for all licensed aerodromes and other ANS locations. The Corporate Safety Management manual shall communicate organization's approach to safety throughout the organization while a Station Safety Management Manual shall; in addition, communicate the local safety practices prevalent at the station. The CHQ and Stations are also required to complete a gap analysis with SMS regulatory requirements and maintain an SMS Implementation Plan and centralized HAZLOG, to meet organization's safety objectives.

5.3.3 Each Directorate shall implement a method of document management for operational and safety-related documents which are prepared or distributed by Airports Authority of India. These documents shall be managed in a manner that ensures:

a) The document is approved by the relevant authority prior to being issued

b) The document is reviewed periodically, updated and re-approved as necessary

c) Changes and the current revision status of documents are identified

d) Users are advised when changes have been made (this requirement may be satisfied by maintaining a record of official users in the metadata and notifying these users of revisions)

e) Current versions of all applicable documents are available at their points of use

f) Documents remain legible and readily identifiable

g) Unintended use of obsolete and superseded documents is prevented, and suitable identification is applied to them if they are retained for any purpose

h) Appropriate metadata must be collected and displayed (e.g. version, date and document approval details) on the document

i) The master copy is held on an official Airports Authority of India file; and

j) Documents of external origin are identified and their distribution controlled.

5.3.4 Pending the introduction of a national document management system, Regions or Local Units shall establish a document register and management process which meets the above requirements for documents that are placed under formal control.

5.3.5.1 The location of the local document index shall be listed in the Station SMS Manual, and made known and accessible to all AAI personnel requiring access to controlled documentation in execution of their duties.

5.4 Practices and Procedures

5.4.1 Document Management System

- Each Directorate shall establish and maintain an index of operational and safety-related documentation relevant to management and operations of the directorate at CHQ, RHQ and Station levels.
- The existence, location, and the officer responsible for maintenance of such document indexes shall be intimated to the relevant

Executive Director, who shall ensure that a master index or list of indexes is maintained for the Directorate.

- Document indexes maintained by each Directorate should be consolidated into a single national index, allowing corporate wide visibility of the existence of operational and safety-related documentation.
- Document indexes shall be maintained in real time, and made available either in real time via electronic means, or via hard copy revised and distributed on a monthly basis.
- Management of such a national document index should be carried out as a corporate service, but establishment of documents and their content shall remain with the relevant directorate and approval authority.
- No changes to indexed documents shall be published without formal approval of the concerned authority.
- Once each directorate is able to document their document management process, it shall be consolidated and national distributed as corporate management system.
- Where neither a corporate nor a directorate based DMS is in place, location or concerned unit shall document their document management practice and include in their station Safety Management Manual.

5.4.2 User Guidelines

- Users shall have immediate access to operational and safety-related documents and indexes relevant to their activities.
- Users shall have the means to assure the currency of any document prior to use.
- Users have the responsibility to ensure the currency of documentation prior to use.
- Where a document is distributed electronically, the electronic version becomes the approved version for use.
- Once an electronic document has been printed it must be considered to be an uncontrolled document, as once printed it may become out of date.

5.4.3 Document Owner Guidelines

- A master electronic copy must be kept on a network directory by the document controller so that, if required, it is available to form the basis of the next version.

- Where necessary, a hardcopy control system of document distribution can be run in parallel to the electronic distribution, or as the sole system of distribution.

5.4.4 Distribution Control

- Controlled documentation may be distributed by hard copy or electronic means.
- Where documents are distributed electronically, printed documents must be clearly labeled as:

  "UNCONTROLLED HARDCOPY. Currency of this document must be checked against master index prior to use"

- A hardcopy control system must include a means by which:

  a) users can verify that their version is the most recent (e.g. a master list current versions); and

  b) document dispatch and receipt is formally notified and tracked/recorded.

5.4.5 Documents of Aviation Safety Directorate

- Corporate Safety Management System Manual developed and maintained by Aviation Safety Directorate, AAI CHQ.
- Formatting scheme of C-SMS Manual shall be as under:
  - C-SMS Manual shall have following contents
    - **Front page** having Document number, document Acceptance/Approval/custodian authority, Issue no. & issue date
    - **Distribution list**
    - **Preface**
    - **Amendment record**
    - **Document list**
    - **Table of contents**
    - **Glossary of terms**
    - **Basic features** of Manual, where purpose/scope/limitation/structure/Review & maintenance of manual is documented
    - **Attachments** – Safety documents, forms, templates & Safety circulars

- Each page except front page shall contain 'AAI logo – Document No. – Chapter name' in "**Header**" in the sequence as given and 'Issue no. – Issue date – page no.' in Footer in sequence as given.
- Chapter name shall be of font Arial (Bold) & size 16
- Section headings shall be of font Arial (Bold) & size 14
- Sub-section head shall be of Arial (Bold) & size 13
- Remaining text shall be of Arial (Normal) & size 12

▪ Station Safety Management System Manual of Station/Licensed Aerodromes developed and maintained by the concerned station/Licensed airports. S-SMS Manual shall follow same scheme of formatting as prescribed for C-SMS Manual. Front page shall contain Airport Name.

▪ Aviation Safety Circulars are issued under the signature of Chairman, AAI. They shall contain information, guidance, directions and instructions on following items:

a) Safety Management System structure and policy

b) Development of safety culture

c) Directions to implement safety plan/policies

▪ Formatting scheme of Aviation Safety circular shall be as under:

- Aviation Safety circular shall have following contents
    - **Introduction**
    - **Purpose**
    - **Scope**
    - **Reference**
    - **Definitions**
    - **Regulatory requirements**
    - **Process & Procedures**
    - **Clarifications**
- Front page of Aviation safety circular shall have AAI logo, circular number, file number & Subject of the circular.
- Each page except front page shall contain 'Subject – Issue date' in "**Header**" in the sequence as given and 'Aviation

Safety Dte. CHQ – page no.' in **Footer** in sequence as given.

- Aviation Safety circular No. & File No. shall be of Arial (normal) & size 12; **Subject** shall be of Arial (bold) & size 16; **Section heading** shall be Arial (bold) & size 13; **Sub-section** heading Arial (bold) & size 12 and **text** shall be of Arial (normal) & size 11.

▪ Aviation Safety Advisory Circulars are issued under the signature of Executive Director (Aviation Safety). They shall contain recommendations, safety awareness and safety education material on following items:

a) Reiteration of existing rules, standards, policies which are not being fully followed

b) Case studies of accident/incidents

c) Recommendations of Court of Inquiries

d) General areas of weakness discovered during audit/investigation and recommendations thereon.

▪ Formatting scheme of Aviation Safety advisory circular shall be as under:

- Aviation Safety advisory circular shall have following contents
  - **Introduction**
  - **Purpose**
  - **Scope**
  - **Reference**
  - **Definitions**
  - **Organizational requirements**
  - **Documentations**
  - **Clarifications**

- Remaining formatting scheme of Aviation Safety Advisory circular shall be same as laid down for Aviation Safety circular above.

▪ Formatting scheme of Safety Manuals and safety circulars are subjected to change and review as per requirement.

- Aviation Safety Directorate may also issue Newsletters and Safety Bulletins to highlight safety issues concerning our organization.

5.4.6 Documents required for Aerodrome Licensing

1. Application in the prescribed format
2. Aerodrome Manual
3. Station Safety Management Manual
4. Compliance/non-compliance Check list as per CAR Section 'B', Series 4, Part-1 dated July 2006 on Aerodrome Design & Operations
5. Attachment II [Form CA 96 (A)]
6. Attachment IV + Annexure 1,2 and 3
7. Relevant documents with Attachment IV
8. Latest Survey map (scale 1:10,000, showing exact boundary of aerodrome)
9. Type A obstacle chart, showing all obstacles lighted/marked
10. Lighting plan for all lighting system including Runway, Taxiway etc.
11. Details of Runway lighting intensity control panel system
12. Marking plan of runway
13. Document of proof for ARP and Aerodrome elevation
14. Latest PAPI calibration certificate
15. ACN/PCN certificate for Runway, Taxiway and Apron (cross-sectional drawing of pavement)
16. Drawing of aerodrome showing details of Runway, Taxiway, Apron, Runway Threshold etc.
17. ATR on Non-compliances identified in CAR Check List
18. Application of Exemptions with Action Plan
19. List of Exemptions

For details refer Manual of Aerodrome Licensing and relevant DGCA CAR and circulars

5.5 Attachments

Nil

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CHAPTER 6 - EMERGENCY RESPONSE PLANNING

6.1 Chapter Overview

6.1.1 In an ideal world, equipment would work effectively 100% of the time, there would be no emergency, adverse weather and our service quality would never be compromised. However, the realities are that on occasions, we do encounter abnormal events which require us to modify the manner in which we operate.

6.1.2 This chapter outlines what actions should be taken following an accident and who is responsible for each action. It also includes the delegation of emergency authority and assignment of emergency responsibilities. The overall objective is safe continuation of operation or the return to normal operation as soon as possible. The aim is to minimize error in these unusual events and thereby maximizing safety

6.2 References and Definitions

6.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- ICAO Doc 9859 *Safety Management Manual*

6.3 Safety Requirements

6.3.1 Air Traffic services providers must develop contingency plans and Airports must develop an Airport Emergency Plan (AEP)

6.3.2 The purpose of an emergency response plan is to ensure that there is:

a) orderly and efficient transition from normal to emergency operations and return to normal operations, as soon as possible
b) delegation of emergency authority
c) assignment of emergency responsibilities
d) documentation of emergency procedures and processes

e) authorization by key personnel for actions contained in the plan

f) coordination of emergency efforts internally and with external parties; and

g) Safe continuation of essential operations, while crisis is being managed.

h) Proactive identification of all possible emergency events/scenarios and their corresponding mitigation actions etc.

6.4 Practices and Procedures

6.4.1 Operational Control Room at CHQ

An operational control room has been established at CHQ and works under Member (ANS) and Member (Ops) to deal with exigent situations and other unusual occurrences. It is normally activated on the instructions of the top management. However, it functions round the clock to gather the following information

- Unserviceability report of aerodrome/CNS/Met facilities
- Delayed flight reports
- Aviation Safety Sensitive Events

The following facilities are available at the Operational Control Room:

- Auto telephone Nos. 24610843 and 24610848 without STD/ISD
- Fax machine with auto telephone No. 24693963 with STD/ISD
- One VOIP Phone No. 154

6.4.2 Airport Emergency Plan and Contingency Plans

The following plans have been developed at Stations/Aerodromes for managing abnormal operations:

- Aircraft Accident
- Aircraft emergencies (local standby, visibility standby and full emergency)
- Bomb threat
- Unlawfully seized aircraft
- Building fires
- Disaster management

- ATS contingencies
- Disabled aircraft removal
- Degraded mode operations

Delegation of emergency authority and assignment of emergency responsibility have been documented in the concerned Airport Emergency/Contingency plan.

To be effective, an Emergency Response Plan should:

a) be relevant and readily accessible to all relevant personnel and other organizations where applicable
b) be appropriate to the size, nature & complexity of the organization
c) include checklists and procedures relevant to specific emergency situations.
d) Have quick reference contact details of relevant personnel
e) be regularly tested through exercises; and
f) be periodically reviewed & updated when details change.

'Checklists' and 'Training & exercises' shall be integral part of Emergency response manual. Periodic review and exercises shall be carried out by Airports to test the adequacy of the plan.

6.4.3 Plans for Unusual Occurrences

The following plans, procedures or Standard Operating Procedures (SOPs) may also be developed, depending upon the local conditions prevalent at the field station or airports:

a. Runway safety programs
b. Aircraft and airport emergencies
c. Equipment faults and their restoration time
d. Routine maintenance of equipment
e. Schedule construction and major maintenance in operational area
f. Minor airside maintenance
g. Emergency maintenance work
h. Low visibility procedure

6.4.4 Contents of Airport Emergency Plan

An Emergency Plan would normally documented in the format of a manual that set forth the responsibilities, roles and actions of various agencies & personnel involved in dealing with specific emergencies. AEP should be developed taking into such consideration as:

- Governing policies
- Organization role & directions
- Notification of emergency
- Initial response
- Additional assistance
- Emergency management center (EMC)
- Records
- Accident site
- News media
- Formal investigation
- Family assistance (ICAO circular 285)
- Post occurrence review

Detailed guidance is available in Appendix-3 to Chapter 5 of ICAO Doc. 9859 – ‘Safety Management Manual’

6.5 Attachments

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CHAPTER 7 - HAZARD IDENTIFICATION AND SAFETY RISK MANAGEMENT

7.1 Chapter Overview

7.1.1 Hazard identification is one of the core processes in the management of safety. Hazards are not bad or negative component of the system. It is only when hazards interface with the system that their damaging potential may become a safety concern.

7.1.2 Consequences of hazards are addressed through various mitigation strategies.

7.1.3 This chapter introduces hazards and their consequences, safety risk assessment and management.

7.1.4 It details safety risk assessment matrix and the residual risk accepting authorities of Airport Authority of India.

7.2 References and Definitions

7.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- ICAO Doc 9859 *Safety Management Manual*
- DGCA SSP Division circular 01 of 2012 on *'Hazard Log Template'*
- Aviation Safety Advisory circular 03 of 2014 on *'HAZLOG Template'*

7.2.2 Definitions

7.2.2.1 **Hazard** – A hazard is defined as a condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function (ICAO Doc 9859).

7.2.2.2 **Consequence of Hazard** - The potential outcome (or outcomes) of a hazard.

7.2.2.3 **HAZLOG** - An electronic application or a paper-based format for the storage of hazard, their consequences and safety risk assessment materials.

7.2.2.4 **Safety Risk** - The assessment, expressed in terms of predicted probability and severity of the consequence of hazard taking a reference, the worst foreseeable situation.

7.2.2.5 **Safety Risk Control** - Measures to address the hazard and bring the assessed risk under organizational control.

7.2.2.6 **Safety Requirement** - A risk control identified as essential to safe operations. A Safety Requirement is something which MUST be fulfilled before the system can be operated reasonably safely.

7.2.2.7 **Risk Register** - A register where hazards, their consequences, risks and controls of a project are recorded. A risk register may be opened for each phase of the project and may contain any number of hazards and controls.

7.2.2.8 **Operational Risk Assessment (ORA) Register** - A Risk Register for the operational phase of the project where the residual risks of concept, design and implementation phase are transferred and kept for onward maintenance.

7.3 Safety Requirements

7.3.1 Hazard Identification

7.3.1.1 Hazard Identification is a continuous, ongoing and daily activity. The hazard can be reported from any source. The need for hazard identification is essential in the following conditions:

- Unexplained increase in safety related incidents
- During major operational changes
- Significant organizational changes

7.3.1.2 Hazard identification shall be based on a combination of reactive, pro-active and predictive method of safety data collection. All identified hazards should be assigned a hazard number and recorded in a hazard log along with its consequences.

7.3.1.3 Hazards may be identified through various data sources, which can be either internal or external.

Some examples of internal hazard identification data sources include voluntary and mandatory reporting system, safety survey, safety auditing and follow-up reports on accidents / incidents.

Some examples of external hazard identification data sources include State voluntary and mandatory reporting systems, State oversight audit and safety information sharing system.

7.3.1.4 Each aerodrome / location must establish a single compiled HAZLOG / Hazard register, which contain all active hazards of the airport. The guidance for establishment of HAZLOG / Hazard register is provided in attachment AAI-SAF-108 of this manual. HAZLOG / HAZARD register shall be maintained in the standard format (AAI-SAF-127) as prescribed in Aviation safety Advisory circular 03 of 2014. The Safety Manager is responsible for establishment and management of HAZLOG / Hazard Register.

7.3.1.5 Each consequence of identified hazard must be assessed in terms of probability and severity to determine the risk.

7.3.1.6 All relevant stakeholders are required to participate in hazard Identification workshops.

7.3.1.7 All personnel should receive Safety Management Training to enable them to identify and report hazards. Hazard identification is everybody's responsibility.

7.3.1.8 SMS Safety Committee will ensure that aerodrome staff, tenants and contractors are made aware that they will not be penalized for reporting about hazard incidents, which occurred without intention.

7.3.1.9 Any aerodrome staff, tenants and contractors who report hazards or incident with his personal details will be given feedback by SMS Safety Manager.

7.3.1.10 Employees are not compelled to disclose their identity while filing the incident/hazard reporting forms, with the purpose to ease fear of punishment.

7.3.1.11 Safety Risk Management is the assessment and mitigation of the safety risks of the consequences of hazards to a level As Low As Reasonably Practicable (ALARP)

7.3.1.12 Safety Risk Assessment must be conducted throughout the project lifecycle. These activities must commence at the concept phase and continued through the design, implementation and operation phase.

7.3.1.13 Safety Risk Assessment may be carried out for Aeronautical Information Services (AIS) also, to minimise the contribution to the risk of an aircraft accident / incident arising from data errors as far as reasonably practicable.

7.3.1.14 The need for conducting risk assessments for Search and Rescue (SAR) activities arises in two main ways:

1. A general risk assessment conducted as a tabletop review of hazards and risks associated with anticipated operations.

2. An on scene risk assessment conducted when the SAR Group arrives on scene of an exercise, training or operational task.

7.3.2 Safety Assessment

7.3.2.1 **All changes** to ATS, CNS or Airport operations with respect to:

- Service levels
- Procedures
- Equipment; or
- Organizational structures

Which will affect the:

- Performance
- Functional or
- Technical specification of a system or service or facility; and
- Organizational changes affecting safety accountabilities

MUST be assessed to determine the safety magnitude of the change with the help of SCARS form (AAI-SAF-103)

Where a proposed change will not result in any change to the items mentioned above, or the change is of a routine maintenance or administrative nature, the normal routine change process may be used in lieu of the SCARS form.

7.3.2.2 Safety Reports

- Where the SCARS form indicates a **Minor** change, a Safety Statement must be recorded in the SCARS form.
- Where the SCARS form indicates a **Moderate** change, a Safety Statement must be recorded in the SCARS form and a HAZLOG Register must be developed.
- Where the SCARS form indicates a **Major** change, a Safety Plan and a Safety Case must be prepared and a HAZLOG Register for this change must be developed.

7.3.2.3 The following shall be carried out as part of the Safety Assessment process:

- All changes that may affect aviation safety must be assessed for safety
- All safety assessment activities must be recorded

- All potential hazards and their consequences must be identified, assessed in terms of probability and severity to determine risk and all risks must be treated
- All residual risks must be accepted or rejected by the appropriate authority
- All hazard controls/mitigators that are determined to be a 'Safety Requirement' must be monitored and in place; and
- Regular review of the risks is to be conducted.

7.3.2.4 Risk Assessment

Risk assessment matrix is given in Figure 7-1.

7.3.3 Risk Register / Operational Risk Assessment (ORA) Register

7.3.3.1 Where new services, units or systems are introduced into the operational environment, a consolidated Risk Register i.e. ORA register for all the phases must be established as part of the implementation and following a Post Implementation Review (PIR) of an operational change, any Hazards that remain "active" must be transferred from the project Risk Register into the relevant Hazard register / HAZLOG for ongoing management.

7.3.3.2 A single Hazard register / HAZLOG in standard HAZLOG template shall be maintained for the airport, which will contain all active hazards, extracted from individual Risk/ORA register of all operational service units.

7.3.3.3. The ORA Register management cycle activities must be completed at least annually and prior to any Change implementation affecting the service.

7.3.3.4 A Risk Register is complete when an appropriate Post Implementation Review (PIR) process has been completed for a project that has been inducted into the operational service and all residual risks are transferred to the single HAZARD Register / HAZLOG or relevant ORA register.

Figure 7-1 Risk Assessment Matrix

Risk Probability	**Risk Severity**				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent (5)	**5A**	**5B**	**5C**	**5D**	**5E**
Occasional (4)	**4A**	**4B**	**4C**	**4D**	**4E**
Remote (3)	**3A**	**3B**	**3C**	**3D**	**3E**
Improbable (2)	**2A**	**2B**	**2C**	**2D**	**2E**
Extremely Improbable (1)	**1A**	**1B**	**1C**	**1D**	**1E**

7.4 Practices and Procedures

7.4.1 Hazard Analysis

7.4.1.1 Hazard analysis is a three-step process: -

- Identify the generic hazard.
- Break down the generic hazard into specific hazard(s).
- Link specific hazard to potential specific consequence i.e. consequence of Hazard.

7.4.2 Documentation of Hazards and their Consequences

7.4.2.1 Each hazard and its consequences must be documented in the template provided in the attachment AAI-SAF-105 and each consequence of hazard must be assessed in terms of probability and severity (follow safety risk probability and safety risk severity table given in 7.4.11 and 7.4.12) to determine the initial risk.

7.4.2.2 Once the current or initial risk with existing control is established, the next step is to consider whether we need to treat the risk by following the As Low As Reasonably Practical (ALARP) diagram (Follow the safety risk assessment matrix given in 7.4.13).

7.4.2.3 Safety Risk Management is the assessment and mitigation of safety risks of the consequence of hazard to a level of ALARP.

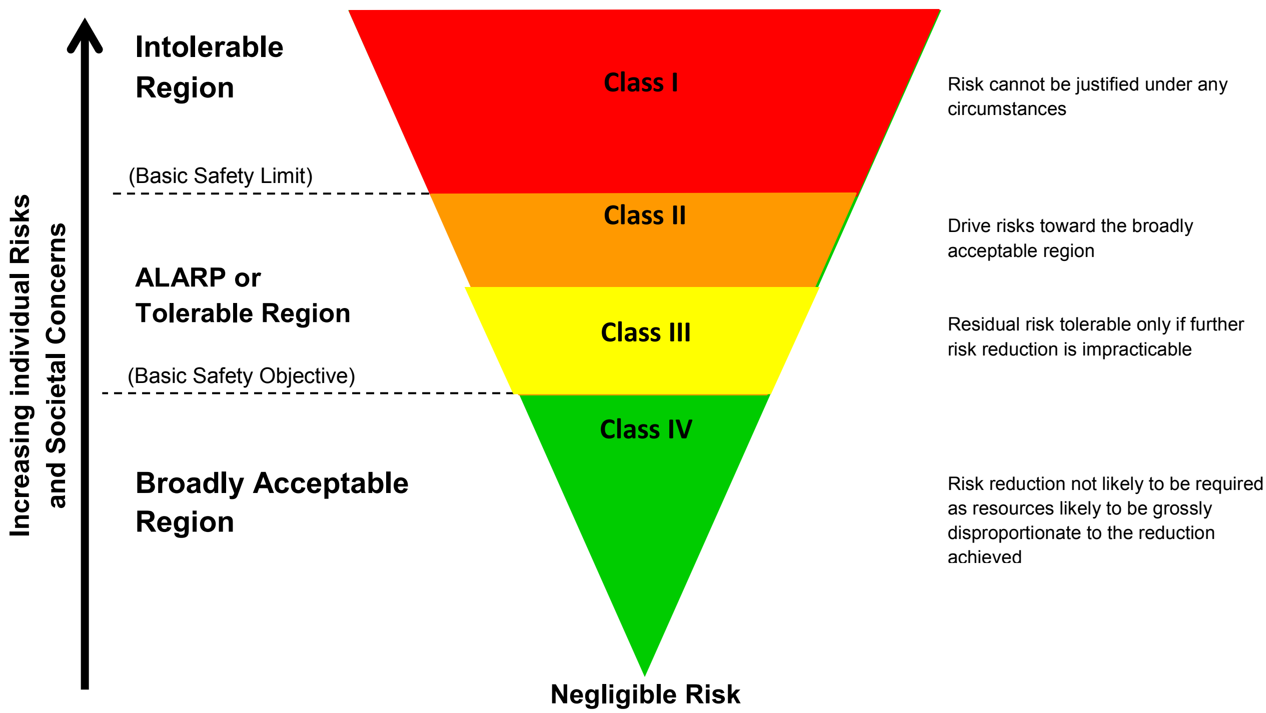
7.4.2.4 Develop control measures and mitigation strategy to keep risk to ALARP level.

7.4.2.5 Figure 7-2 describes the Risk Management process

7.4.2.6 Hazards shall be stored by collection of all HAZID forms of AAI-SAF-105 and transferring all informations of HAZID forms to a standard HAZLOG template (AAI-SAF-127) Thereby creating a HAZLOG of the airport.

7.4.2.7 This single HAZLOG in standard template will provide summarized information about all active hazards of the airport.

Figure 7-2 Risk Management Process



7.4.3 Techniques for Hazard identification

7.4.3.1 Some of the techniques of identifying the hazards include checklist, brain storming session, field inspection, log book extracts and Voluntary hazards / Event report forms (AAI-SAF-101).

7.4.3.2 The hazard reporting form shall be kept at such locations, so that they are readily available for all users and employees of the aerodrome.

7.4.4 Hazard Status

Hazard status is of two types:

1. **Active**: A hazard is defined as active when it requires ongoing management of controls and has the potential to or currently is, affecting the operational environment. An active hazard can exist in an ongoing project.
2. **Closed**: A Hazard is defined as closed when is no longer affects the operational environment. This status can be assigned to a hazard through an appropriate PIR process or hazard transfer process. A Hazard cannot be closed if there are still controls associated with it that cannot be closed as well.

7.4.5 Changes and Activities Requiring a Risk Assessment

7.4.5.1 CNS

- any change which has potential to impact safety
- change of category of equipment
- changes to operational CNS equipment (including links, location of navigational aids)
- changes to support services e.g. maintenance support, electrical supply
- change in maintenance philosophy or standards (CHQ) (technical or training/competency)
- changes to organizational structure or staffing arrangements
- major software upgrades; and
- any change which results in changes in functionality or performance (including physical facilities or software based).

7.4.5.2 ATS

- changes to ATS procedures

- changes to airspace structures, routes and procedures (national or local)
- changes to operational equipment/systems
- changes to training
- changes to performance /rating system
- changes to organizational structure or staffing arrangements
- any change which results in changes in functionality or performance (including physical facilities or software based)
- any changes which may impact an ATS Units handling capacity; and
- changes in shift cycle or work environment of ATCOs.

7.4.5.3 Airports

- any change which has potential to impact safety
- change of category in facilities or equipment
- changes in a procedure documented in the Aerodrome Manual
- changes to organizational structure or staffing arrangements
- introduction of new entrant airlines
- introduction of new aircraft types; and
- delivery of major projects.

7.4.6 When is a Risk assessment done?

7.4.6.1 Risk assessment for the change process shall be carried out as early as possible and prior to implementation of any change.

7.4.6.2 Risk assessment is an iterative process and should also be conducted periodically throughout the project life cycle.

7.4.6.3 Changes must not be implemented until:

- All safety requirements have been satisfied; and
- Residual risks have been accepted by the appropriate authority.

7.4.7 How is a Risk Assessment Done?

7.4.7.1 Risk Assessments should be conducted in accordance with the detailed guidance provided in "AAI-SAF-105 *Safety Risk Assessment Practices"*

7.4.7.2 All risk assessments must be recorded in corporate records and regardless of the method used to identify and analyze the risks, the following must be recorded:

- The initial risk
- The residual risk after controls have been applied
- The controls applied with justification that how initial risk is reduced to the residual risk level and which of the controls are mandatory safety requirements and
- Responsibility for implementation of potential risk control to be fixed and documented with date of completion of work.
- The residual risk must be accepted by the relevant authority (refer section 7.4.16) in HAZID form of AAI-SAF-105

7.4.7.3 Initially, AAI's HAZID form of AAI-SAF-105 should be used to capture the details of each risk assessment. Thereafter all informations in HAZID forms shall be transferred to a standard template (AAI-SAF-127) to create HAZARD register (HAZLOG) of the airport, which will represent the summary / collection of all active hazards of the airport, along with Risk assessment process. It should be supplemented by written records on official files as necessary and shall preferably be maintained by Safety Officer of the airport.

7.4.7.4 During Safety Risk Assessment in respect of Aeronautical Information services, the following requirement shall be considered as safety requirements and shall be taken into consideration as minimum:

- Public availability of most current update cycles applicable to AIP amendments and AIP supplements,
- Data quality with set specification
- Aeronautical data exchange formats

7.4.7.5 During Safety Risk assessment in respect of Search and Rescue (SAR) Activities following points must be taken into consideration:

- A careful examination of worksites and anticipated hazards so procedures and practices can be implemented to eliminate or risks and prevent harm to the SAR personnel.

- Written work procedures should be reviewed regularly and, whenever a changed or new task/assignment occurs.
- Importance of maintaining complete and accurate safety records, including training and exercise records. These records can be used to identify trends, unusual conditions, and problem areas.
- Effective & prompt communication of safety related information within Search and Rescue (SAR) is critical and two-way.
- Initiation of traffic control.

7.4.8 Who does a Risk assessment?

7.4.8.1 Who initiates a safety assessment?

- the directorate proposing a change, or its delegate, or
- the directorate who is managing the proposed change

7.4.8.2 Who sponsors and manages the safety assessment?

- The directorate initiating the change
- Officer(s) as directed by the head of the concerned directorate

7.4.8.3 Who must attend Risk Assessment workshops?

- Representative of all Units/directorates affected
- External stake holders, if affected, by the change.

7.4.8.4 Who manages an Individual Risk Register?

As a general guidance, the officer who manages the risk register, is the one who has the lead accountability for safety outcomes.

Project/change life cycle phases and the defacto Project Risk Register Managers are:

- <u>Design & Implementation:</u>

  Project Manager

- <u>Transition to Commissioning:</u>

  Joint responsibility of Project Manager and Operational Authority (Operational/Technical Authority must accept risk carried over from design and implementation phase to operational use prior to start of transitioning).

- Post Commissioning

  Concerned Operational/Technical Authority of service delivery units ((e.g. ATM, CNS or Engineering.)

Project Risk registers shall be maintained throughout the life cycle of a project/change. The manager of the risk register may change as a project/change moves through its life cycle.

Finally, when the change is introduced into operational environment, the active hazards of the project phase shall be transferred to ORA / Risk register of the relevant operational service delivery units and should be maintained by suitable officer of that unit.

7.4.9 Operational Risk Assessment (ORA)

This section describes the requirements for Operational Risk Assessment (ORA) for AAI's operational services provided by the ATM, CNS, Engineering and Airports Operations Directorates.

7.4.9.1 Maintenance of ongoing Hazard information

The initial identification of hazards plus the ongoing maintenance of hazard and risk information should continue throughout the entire life cycle of each project/change or service provided by AAI that may affect operational safety.

7.4.9.2 Operational Risk Assessment (ORA) Process

Operational Risk Assessment is the process by which the hazard baseline is established and managed for the ATM, CNS, Engineering and Airports Operations Directorates.

The ORA process requires the identification, assessment, control and management of existing and potential safety hazards for operational services during post implementation review and that all types of control continue to achieve their intended objectives. It also provides for the identification of the need for new safety risk controls because of changes in the operational environment.

All operational service delivery units (e.g. ATM, CNS or Engineering) must establish an Operational Risk assessment Process, which must be recorded in respective ORA register in AAI HAZLOG data base.

ORA Registers must be assigned to an appropriate Manager and maintained for the operational life of the service.

7.4.9.3 ORA Register

Establishing an ORA register in HAZLOG is divided into two phases i.e. initial and final phase:

- **Initial Phase:** During the initial phase a consolidated ORA register is established at each aerodrome or location where all the residual risks are recorded for ongoing maintenance.
- **Final Phase:** During the final phase an ORA register in HAZLOG shall be established after the completion of following three separate stages:
  - Stage 1: A local hazard assessment for the service; (e.g. Tower Unit, Enroute or TMA Group, Maintenance Group, or AAI controlled Airport)
  - Stage 2: An integrated hazard assessment within the service; (e.g. Tower Unit and Enroute Group, or Enroute Group and TMA Group, or Tower Unit and TMA Group, SYSTEMS/NETWORKS; and
  - Stage 3: An integrated hazard assessment across the services; (e.g. ATM and CNS and Airports at a location level).

7.4.9.4 ORA Register Management Cycle Activities

Operational Risk Assessment (ORA) process includes periodic review of the identified hazards, and the assessed levels of risk associated with the hazards, the suitability and effectiveness of existing controls, and consideration of whether new hazards can be identified, or if new controls are needed to keep risks in the ALARP region.

The ongoing management cycle of ORA Register requires completion of the following activities:

- Reviewing the existing hazards and controls in the ORA Register
- Conducting a hazard identification process to identify any additional safety hazards, record and manage these in the ORA Register and
- Updating information in the ORA Register that may have changed since the last review, including comments noting the last completed review and entering the next scheduled review date.

The ORA Register management cycle activities must be completed at least annually and prior to any change implementation affecting the service.

7.4.9.5 ORA Responsibilities

The relevant Service Delivery Manager is responsible for establishing processes that:

- Ensure each operational service Unit or Location establishes a ORA Register, which is maintained by suitable officer from the directorate.
- All hazards from different Risk (ORA) registers of the airport should be transferred and summarized to single Hazard register (HAZLOG) of the airport along with the operational risk assessment steps
- Ensure the ongoing management of the ORA Register ; and
- Ensure ORA Register is assigned to an appropriate Manager.

The ORA Register Manager is responsible for:

- The ongoing management and maintenance of the ORA Register; and
- The integrity of the HAZLOG data entry.

7.4.10 Safety Risk Controls

A Safety Risk Control may apply to any number of hazards; however it must be recorded independently for each hazard. This ensures the contextual relationship between hazard and control is retained and the effectiveness of the control can be determined appropriately for each hazard.

If a control is marked as a Safety Requirement, it is **MANDATORY** that the control be met prior to the activity generating the hazard being placed in to active service.

Safety Requirements which are “NOT MET” cannot be transferred to Operational Registers.

7.4.10.1 Control Status

There are three control statuses. These apply to all controls and are described below:

a) **Yet to be met:** A control that is planned to be implemented, but has not been completed.

b) **Not met:** A control that was considered for implementation, but will not be adopted. Justification for this decision must be entered into the comments/History field. If the control was also a Safety Requirement, the justification must include the alternative measures taken to control the risk and verification of the residual risk classification.

c) **Met:** A control that has been implemented. How this was achieved must be entered into the Reference field.

7.4.11 Safety Risk Probability Table

Probability	Meaning	Value
Frequent	Likely to occur many times	**5**
Occasional	Likely to occur some times	**4**
Remote	Unlikely to occur, but possible	**3**
Improbable	Very unlikely to occur	**2**
Extremely Improbable	Almost inconceivable that the event will occur	**1**

7.4.12 Safety Risk Severity Table

Severity of Occurrence	Meaning	Value
Catastrophic	• Equipments destroyed • Multiple deaths	**A**
Hazardous	• A large reduction in safety margin, physical distress or a workload that operator cannot be relied upon to perform their task accurately or completely • Serious injury • Major equipment damage	**B**
Major	• A significant reduction in safety margins, a reduction in the ability of operator to cope with adverse operating conditions 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 limitations • Use of Emergency procedures • Minor incident	**D**
Negligible	• Little consequences	**E**

7.4.13 Safety Risk Assessment Matrix

Risk Probability	**Risk Severity**				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent (5)	**5A**	**5B**	**5C**	**5D**	**5E**
Occasional (4)	**4A**	**4B**	**4C**	**4D**	**4E**
Remote (3)	**3A**	**3B**	**3C**	**3D**	**3E**
Improbable (2)	**2A**	**2B**	**2C**	**2D**	**2E**
Extremely Improbable (1)	**1A**	**1B**	**1C**	**1D**	**1E**

7.4.14 Risk Category

Class	Risk
I	5A, 5B, 5C, 4A, 4B, 3A
II	5D, 5E, 4C, 3B, 3C, 2A, 2B
III	4D, 4E, 3D, 2C, 1A, 1B
IV	3E, 2D, 2E, 1C, 1D, 1E

7.4.15 Authority to Approve Changes / Accept Safety Assessments

- Airport Operations (Design change) ED (Engg.) / ED (OPS)
- Airport Operations (Local change) Airport Director
- ATM (National change) ED (ATM)
- ATM (Local change) Airport Director
- CNS (National change) ED (COM)
- CNS (Local change) Airport Director

7.4.16 Risk Acceptance Authority

Class	Authority
Cat I	Risk unacceptable, action required to treat the risk
Cat II	Risk undesirable, may be accepted in ***exceptional circumstances*** by the appropriate Executive Director
Cat III	Risk tolerable, may be accepted by the appropriate General Manager
Cat IV	Risk acceptable with conditions, may be accepted by the Airport Director

7.5 Attachments

- AAI Safety Assessment Practices (AAI-SAF-105)-HAZID
- AAI HAZLOG Template (AAI-SAF-127)

CHAPTER 8 - SAFETY PERFORMANCE MONITORING

8.1 Chapter Overview

8.1.1 The ICAO Safety Management SARP introduces the notion of safety performance as a way of measuring the safety performance of a service provider and its SMS. The term service provider encompasses Air Traffic Service providers, certified/licensed aerodromes, authorized air operators, approved aircraft maintenance organization and approved training organizations that are exposed to safety risk during the provision of their services.

8.1.2 It is necessary for an SMS to define a set of measurable performance outcomes in order to determine whether the system is truly operating in accordance with design expectations and not simply meeting regulatory requirements. Safety performance expresses the safety objective of a service provider, in the form of measurable safety outcomes of selected low-level low-consequences processes of the SMS. e.g., Foreign Object Debris (FOD), events of unauthorized vehicles on the taxiway, etc.

8.1.3 This chapter details Acceptable Level of Safety Performance (ALoSP) and the safety performance indicators (SPIs) and safety performance targets (SPTs) of SMS. Whatever is the criterion of the associated targets, they provide a base from which we can assess the safety health of the system and determine if our management and risk strategies are effective.

8.2 References and Definitions

8.2.1 References

- ICAO Doc 9859 *Safety Management Manual*
- SSP-India
- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- Manual of Air Traffic services, Part-1(4th edition)
- Air Traffic Circular No. 1/1998 – *Accident Prevention Through Voluntary / Anonymous Incident and Hazard Reporting*

- Air Traffic Safety Circular No. 1/1999 – *Reporting of Aircraft Accidents*
- Aviation Safety Circular No. 1/2001 – *Reporting & Investigation of Incidents*
- Air Safety Circular 5/1982 - *Notification of Incidents*
- DGCA circular No. DDG/MISC/2005-AS dated 19/04/05 on *Procedure for Reporting and Investigation of Air Traffic Incidents*
- Safety Performance Indicators of Airports Authority of India (Booklet)
- Aviation safety Circular no. 1/2015 – *Safety Performance indicators & targets of AAI*

8.2.2 Definitions

8.2.2.1 **Acceptable level of Safety Performance (ALoSP)** is the minimum level of safety performance of civil aviation in a State, as defined in its State safety Programme, or of a service provider, as defined in its safety management system, expressed in terms of safety performance targets and safety performance indicators.

8.2.2.2 **Safety Performance Indicators (SPI)** are data-based safety parameters used for monitoring and assessing safety performance.

8.2.2.3 **Safety Performance Targets (SPT)** are the planned or intended objectives for safety performance indicator(s) over a given period.

8.2.2.4 **State Safety Programme (SSP) -** An integrated set of regulations and activities aimed at improving safety.

8.2.2.5 **Safety performance** – A State's or service provider's safety achievement as defined by its safety performance targets and safety performance indicators.

8.2.2.6 **High-Consequence Indicators –** Safety performance indicators pertaining to the monitoring and measurement of high consequence occurrences, such as accidents or serious incidents. High consequence indicators are sometimes referred to as reactive indicators.

8.2.2.7 **Lower-consequence indicators –** Safety performance indicators pertaining to the monitoring and measurement of lower consequence occurrences, events or activities, such as incidents, non-conformance findings or deviations. Lower consequence indicators are sometimes referred to as proactive/predictive indicators.

8.2.2.8 **Accident and Incident Reports – (External Reports)**

An accident is an occurrence during the operation of an aircraft that entails:

- A fatality or serious injury
- Substantial damage to the aircraft involving structural failure or requiring major repair of the aircraft; or
- The aircraft is missing.

An incident is an occurrence, other than an accident, associated with the operation of an aircraft that affects or could affect the safety of operation. A serious incident is an incident involving circumstances indicating that an accident nearly occurred.

8.2.2.9 **Event Report – (Internal Report)**

An event is defined as an occurrence that is not an accident or incident which if left untreated:

- could lead to an accident or incident; or
- has the ability to compromise the integrity of the ATS and Airports system.

8.2.2.10 **Confidential Report- (Internal Report)**

Confidential reporting systems aim to protect the identity of the reporter. This is one way of ensuring that the voluntary reporting system is non-punitive. Confidentiality is achieved by de-identification of the report.

Confidential reports return to the user without the identifying part of the reporting form and no record are kept of these details.

Confidential reporting system facilitates the disclosure of human errors, enabling others to learn from mistakes made, without fear of retribution or embarrassment.

8.3 Safety Requirements

8.3.1 The Acceptable Level of Safety Performance (ALoSP) to be achieved is defined in the State Safety Plan of the State (DGCA). Safety Performance Indicator (SPI) package of Airports Authority of India (AAI) shall be in align with State's SSP aggregate safety indicators. These Indicators shall consists of both High & Low level consequence SPIs and shall be drawn from Safety critical sectors of AAI. AAI shall endeavor to meet these sector specific targets.

8.3.2 All mandatory reportable safety occurrences mentioned in various DGCA, ATM or Aviation Safety Circulars shall be reported as per procedures prescribed in these Circulars. Investigation of Incidents and measuring of annual safety performance of AAI requires following safety occurrences to be reported:

- Airprox Incidents
- Breach of separation
- Bird hit of an aircraft
- Failure of Navigational / Landing Aids
- Failure of Surveillance Systems
- Failure of Communication Services
- Failure of Aerodrome lighting systems
- Failure of any facility and procedure forming part of ATS system
- Incorrect transmission, receipt or interception of radio telephone message (air to ground, ground to air, ground to ground)
- Misidentification of aircraft in the use of radar
- Setting of an incorrect SSR code
- Runway obstructed by foreign object
- Runway Incursion
- TCAS RA
- Ground Proximity Warning
- Presence of blue bull / cattle or any wild animal/ dog in the operational area and likely to affect safe operations
- Going around of an aircraft on final approach due runway not being available
- Aborted takeoff
- Major deterioration of services in aerodrome manoeuvring area
- Collision between moving aircraft and vehicles or any other ground equipment
- Apron jet blast incident

- Any incident of fire which either necessitates use of fire extinguishers or causes failure of any equipment or facility or disturbs smooth flow of air traffic or passengers or visitors
- Any incident that has jeopardized safety of passengers / public and was avoided being an accident only by exceptional handling or by good fortune; and
- Any incident that causes trauma to passengers / visitors or third party.

8.3.3 All AAI personnel shall be encouraged to report other safety occurrences through either voluntary or confidential reporting system.

8.3.4 Each airport or location may encouraged to set up their own low-level and low-consequence safety indicators and targets; collect them and analyse them to improve safety levels.

8.3.5 Operational Directorates (i.e. ATM, CNS & Aerodrome Operations) must ensure collection of all air safety occurrence reports, SPI related safety data as per Aviation safety circular 1/2015. Safety related reports are also to be sent quarterly to the Aviation Safety Directorate.

8.3.6 Aviation Safety Directorate is responsible for collecting, collating and analyzing all safety related data and for disseminating annual safety performance report based on established SPIs/SPTs and safety analysis information throughout the organization.

8.3.7 Airports Authority of India shall establish a safety library at Corporate Headquarters and also at all the five regions. It shall also establish safety library at all aerodromes and other locations. They shall be managed by Aviation Safety Directorate.

8.3.8 Just Culture

8.3.8.1 Consistent with our individual safety responsibilities, all AAI personnel are hereby required to report instances of human error (or near-misses) that they are personally involved in and on the understanding that errors are the outcome of being human, the existing system and / or our individual behavioral choices.

8.3.8.2 Re-enforcement of this underlying safety responsibility is made in the context of our continuing commitment to achieving enhanced safety outcomes. In order to achieve this, it is imperative that we learn from our mistakes, strive to reduce instances of human error in the future and to develop systems that are more error-tolerant.

8.3.8.3 Through the universal reporting of human errors (and near-misses), the organization will be able to learn more about the risks existing within the business and through analysis / investigation, identification of contributing factors and the implementation of strategies to strengthen our systems and prevent future events, will be able to eliminate, reduce or manage such risks more effectively. The effective dissemination of learning outcomes arising from the enhanced level of reporting will also provide for a more informed and safer organization and workplace.

8.3.8.4 In the context of human error management, it is recognized that the achievement of enhanced safety outcomes will be materially facilitated through the uninhibited reporting of all incidents and occurrences that compromise safety within our operating environment.

8.3.8.5 To assure this outcome, all AAI personnel are hereby advised that under the terms of this '***Just Culture'*** policy, no disciplinary action will be taken against personnel who reports an incident or occurrence involving human error and / or who openly participates in the investigation and subsequent development of error-prevention strategies.

8.3.8.6 This policy will not apply to employees that have behaved in a 'reckless' or illegal manner or who have committed a series of human errors that indicates a general lack of care and professionalism.

8.3.8.7 This Just Culture Policy is complimentary to the existing Safety Policy.

8.4 Practices and Procedures

8.4.1 Reporting of Incidents

8.4.1.1 Air traffic Incidents

Air traffic incidents are designated in three categories as defined in Table 3-2 of MATS, Part-1 (4^{th} edition) i.e. AIRPROX, Procedural & Facility. AIRPROX is further classified in Table 3-3 of MATS, Part-1 (4^{th} edition).

The term Air traffic Incident generally will include the following occurrences, but list is not exhaustive:

- Near collision, Airmiss, Airprox, TCAS (RA) warning, Runway incursion
- Serious difficulty caused by faulty ATS procedures

- Lack of compliance with applicable procedure or instructions
- Failure of ground facilities resulting in a hazard to aircraft i.e. failures of all channels of VHF or HF, Failure of Instrument Landing system or Radar system, Failure of Automation system etc.
- All complaints/reports including voluntary report received of safety hazards pertaining to ATS & Navigation facilities

8.4.1.2 Air Traffic Safety incidents are reported by:

- any ATS / CNS personnel
- airline operator; or
- Pilots.

8.4.1.2 Air traffic safety incidents are reported to any or all of the following:

- WSO / SSO
- GM (Aero) / ATS-in-charge
- GM (CNS) / CNS-in-charge
- ED (ATM)
- ED (CNS-O&M)
- Regional Controller of Air Safety (DGCA)
- GM (Aviation Safety); and
- ED (Aviation Safety).

8.4.1.3 Air traffic safety incidents are reported:

- by the fastest means within 48 hours of the occurrence; and
- by use of appropriate Report form i.e. Preliminary report form of Air Traffic incident (Annexure-1 of MATS, Part-1 (4th edition) / Voluntary Hazard/Event report form (AAI-SAF-101)

8.4.1.4 An air traffic incident known to have occurred shall be recorded in the ATC unit with associated information by the concerned ATCO and immediately brought to the notice of WSO/SSO/ATS-in charge/CNS-in-Charge, as applicable.

8.4.1.5 All necessary measures shall be taken to preserve relevant documents evidence such as ATC and telephone tapes, log books, flight messages, flight progress strips, meteorological reports and forecasts etc. Where applicable, recorded radar data and technical statements concerning the operating status of equipments may also be obtained and preserved. Statements of ATM/ CNS personnel are to be recorded.

8.4.1.6 An air traffic incident shall be reported to the Regional Director/Controller of Air Safety immediately following its occurrence. Information regarding the incident will also be forwarded to the DGCA, Member (ANS), Member (OPS) and ED (ATM)/ GM (ATM) by fastest means of communication.

8.4.1.7 Air Traffic incident report form shown in Annxure-1 of MATS, Part-1 (4th Edition) will be used by ATS units while initially recording and reporting an air traffic incident. The format may also be used for the text of a message to be transmitted over the AFTN network. As such, copies of the form should be made available in all ATS units including air traffic service reporting office.

8.4.1.8 Non-recording and/or non-reporting of a known air traffic incident will be considered, as an attempt to suppress lapses and the same shall be avoided under all circumstances.

8.4.2 Preliminary Investigation and Review of ATS Incidents

The following is the process undertaken during preliminary investigations:

- Collection/ preservation of evidence e.g. tapes/FPS/Logs/Met reports/ technical statements / statements of ATM/CNS personnel etc.
- off rostering of ATM/CNS personnel(s)
- investigation by a committee comprising DGCA Rep (Convenor), DGM (SQMS) (Member Sec), DGM (CNS) (Member), Jt.G.M. / DGM (AVS-RHQ), Airlines Representative (if required) and any Member (if required)
- analysis of evidence by committee
- preparation of Investigation reports
- findings, cause and safety recommendation
- report to be signed by all members of the committee
- report to be sent to DGCA, CHQ & copy to ED (ATM) within four weeks of occurrence; and
- Acceptance of report by DGCA in consultation with ED (ATM) or send back investigation report for reinvestigation for reason such as inadequate investigation / lack of factual data /evidence.

8.4.3 Post Investigation (once report is accepted)

The following is the process during the post investigation phase, after the report has been accepted:

- ATM/CNS personnel to be allowed to perform duties in the concerned ATM/CNS Unit by DGCA if no prima-facie case is established against the officer
- in other cases DGCA in consultation with ED ATM will take a decision on quantum of training and /or any punitive action against the concerned officer
- ensure that no officer is de-rostered for more than six weeks for want of investigation or review thereof
- once report is accepted, all evidence will be deemed to be released
- follow up action and action taken reports to be sent to DAS, DGCA HQs within 15 days of acceptance of report; and
- in case of any unresolved issues / disagreement pertaining to the incident, the decision of DGCA will be final.

8.4.4 CNS safety incident reporting

To be developed separately in future, till such time any CNS incident involving aircraft may be reported and investigated through above defined process.

8.4.5 Operations safety incident reporting

To be developed separately in future, till such time any Operations incident involving aircraft may be reported and investigated through above defined process.

8.4.4 "Event" Reporting

All AAI personnel have an obligation and shall be encouraged through just / non-punitive safety culture in AAI, to report any occurrence, unsafe practice, or safety concern that may, if left untreated, lead to an accident or incident occurring. Unsafe Event shall be reported through 'Voluntary Hazard / Event Report Form' (AAI-SAF-101).

The "Event" reporting process is an internal AAI process enabling all personnel to voluntarily report occurrences and safety concerns that are not defined as an incident, thus striving for continuous improvement of safety in AAI.

8.4.5 Voluntary Event Reporting

All AAI airports / units shall establish a voluntary reporting system, to enable concerned operational personal in ATM /CNS/ Airport/CHQ, to report the prescribed unsafe events voluntary. These reports shall be submitted to the concerned Safety Manager or Executive Director (Aviation Safety) as the case may be.

The concerned Safety Manager will either investigate the event or take appropriate action to avoid reoccurrence of such event or he/she shall send event report to ED (Aviation Safety) for further action if required.

Any hazard identified in the event report shall be treated as per the process mentioned in Safety Management System Manual and shall be included in the relevant HAZLOG.

Initially, Voluntary event reporting system at AAI airports / Units may be established by putting a box at an appropriate place in the airport, with simple Voluntary Hazard / event reporting form (AAI-SAF-101). In future, the voluntary reporting system can be managed electronically.

8.4.6 Confidential Reporting System

There are situations where the person reporting a hazard may not like to disclose his/her identity. In such cases, a Confidential Report (Confidential Report form (AAI-SAF-102) attached to this manual) regarding a potential aviation hazard or occurrence of an incident may be forwarded in writing, without signature, name or address of the person reporting to:

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block-C
Safdarjung Airport
New Delhi – 110003

If any person is not confident in using confidential reporting form, he / she can report on a plain paper in his / her own vernacular language. On receipt of such a report, the report shall be de-identified before investigation. Any hazard identified during the investigation shall be treated as per the process mentioned in Safety Management System Manual and shall be included in the relevant HAZLOG.

8.4.7 Safety Library

The objective of a safety library is to analysis the safety data received from various sources to arrive at a meaningful conclusion which is cost effective for resolution of safety issues confronting the organization.

The safety data should preferably be stored in an electronic data base which facilitates query and generation of analysis output in a variety of useful formats.

Safety Data compiled and analyzed shall be used only for the purpose of advancing aviation safety. Its access shall be limited to the persons who are essentially required to know it. However, safety recommendations issued based on the analysis of safety data shall be disseminated to all concerned stakeholders to improve safety.

8.4.8 Safety Measurement Process

8.4.8.1 Data received

Aviation Safety Directorate receives aviation safety data in the form of:

- mandatory occurrence reports
- event reports
- confidential reports
- other safety related reports, such as facility failure data
- overview of unit and project HAZLOG
- safety audit reports; and
- Customer (airline) feedback.

Aviation Safety Directorate also extract following aviation activity data from Airport Information Management System (AIMS):

- number of arrivals and departures per aerodrome; and
- overflights within a given block of airspace.

8.4.8.2 Safety Performance Indicator (SPI) package of AAI

Safety Performance Indicators (SPIs) of AAI have been developed, taking into account safety critical elements of three safety critical operational sectors of AAI viz. ATM, CNS and Aerodrome Operations. These Safety Performance Indicators (SPIs) are also in align with State SSP aggregate safety Indicators and comprising of both high level as well as low level consequence safety indicators.

Safety Performance Targets (SPTs) of corresponding Safety Performance Indicators (SPIs), for which historical data is available, have been defined. A detailed booklet containing SPIs/SPTs of three main stream Operational Directorates and methodology to determine annual SMS performance summary, has been published as 'Safety Performance Indicators (SPIs) of AAI' and an Aviation Safety circular 01 of 2015 on the subject is also issued for guidance of all AAI airports.

8.4.8.3 Data Produced

Aviation Safety Directorate couples the safety data with the movement data in order to produce a safety RATE, i.e. incident per number of movements or per time period.

It should be noted that this safety data is only as good as the data received. Consequently, the following points are critical for the production of accurate and meaningful safety data:

- Just Culture: A just culture is established where AAI must encourage the filing and recording of the required reports.
- Incident investigation: All reported incidents must be investigated in order to determine any AAI causal factors involved in the incident. This investigation may be very brief or may be lengthy depending upon the circumstances of the incident. The critical outcome is that Aviation Safety Directorate must know what reported incidents are attributable to AAI and those that are not.

8.4.9 Safety Reports

Aviation Safety Directorate is responsible for the production and distribution of the corporate safety information and annual safety performance summary of AAI based on established Safety Performance Indicators (SPIs) & Safety Performance Targets (SPTs). Annual SMS performance shall be summarized as prescribed in the SPI booklet of AAI with the help of 'SMS performance summary' format in Annexure-2 of the booklet.

A variety of safety reports will be produced over time in order to best present and distribute safety information; however the following key principles should be followed:

- Safety is no secret. One part of the organisation needs to understand the safety issues in other parts of the organisation.
- The overriding goals are to manage risks in order to prevent incidents and accidents.
- When incidents and accidents occur, the organisation needs to fully understand:
  - What happened
  - How it happened
  - Why it happened; and
  - How to prevent it from happening again.
- Lessons learnt need to be widely distributed
- Safety analysis and reporting needs to occur frequently and not spasmodically.
- Trend analysis is important to determine in which areas are risks increasing and in which are risks decreasing
- An understanding of the current level of risk, as measured against meaningful safety indicators such as Acceptable Level of Safety or Target Levels of Safety.

8.4.10 Statistical Reports

8.4.10.1 ATM

ATM Directorate shall send following statistical reports to the ED (Aviation Safety) on quarterly basis.

- Number of arrivals and departures
- Overflights;
- Number of bird hits
- Duration of runway closures (e.g. due to maintenance)
- Details of runway incursions
- Level bust
- Communication error
- Details of airprox occurrences
- Details of breach of separation

- Details of TCAS RA occurrences; and
- Other reportable incidents as per MATS Part 1.

8.4.10.2 CNS

CNS Directorate shall send following statistical reports to the ED (Aviation Safety) on quarterly basis:

- Unserviceability data of CNS which includes Navaids/Landing aids (ILS, DVOR, NDB, DME etc.) and surveillance aids (ASR, ARSR, ASMGCS & ADS-B)
- Failures of VCCS (VHF) and HF.
- Degradation of Automation system
- Calibration reports (Navaids); and
- Performance reports of CNS Facilities against benchmark.

In case redundant systems, even the unserviceability/failure of one the systems should be considered.

8.4.10.3 Airports (Operations)

The Operations Directorate shall send the following statistical reports to Executive Director (Aviation Safety) on quarterly basis:

- aircraft accident
- aircraft incident;
- full emergency
- local standby
- Runway excursion
- fire incident
- bird / wildlife hit
- bomb threat
- hijack threat
- forced landing
- failure of Aerodrome Lighting or ground aids
- other reportable incidents like FOD etc. ; and
- Apron violations.

8.5 Attachments

- AAI-SAF-100 Air Traffic Incident Report Form
- AAI-SAF-101 Voluntary Hazard / Event Report Form
- AAI-SAF-102 Confidential Report Form
- AAI-SAF-119 Bird strike Form

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CHAPTER 9 - SAFETY AUDITS

9.1 Chapter Overview

9.1.1 Surveillance of operations provides AAI management with information concerning the safety of current operations, and areas where some form of corrective action may be required. It is one of the means by which risk assurance is provided to management and the Board.

9.1.2 Occurrence analysis and systemic reviews are media by which the Aviation Safety Directorate conducts surveillance. Information gathered from surveillance is provided to management and the Board on a regular basis.

9.2 References and Definitions

9.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- ICAO Doc 9859 *Safety Management Manual*

9.2.2 Definitions

9.2.2.1 **Safety Audit:** A systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled.

9.3 Safety Requirements

9.3.1 Surveillance Activities by Aviation Safety Directorate

9.3.1.1 One of the roles of the Aviation Safety Directorate is safety oversight and conducting surveillance activities of the entire AAI system.

9.3.1.2 Surveillance activities shall be conducted for the purpose of:

- Providing assessment to the AAI Chairman and Board of the levels of compliance with legislative and regulatory requirements, together with levels of compliance with current policy, standards and recommended practices

- Adding value to the organization by providing locations/units with feedback in relation to their level of conformance to applicable legislation and standards
- Assessing the effectiveness of the service being provided together with an early identification of any systemic safety issues; and
- Evaluating the need for improvement or corrective action.

9.3.1.3 Safety Audit is one of the proactive means of identifying potential problems before they have impact on safety.

9.3.1.4 The range of surveillance activities conducted by Aviation Safety Directorate shall include:

- Conducting surveillance of day-to-day operations and conducting random inspections
- Conducting investigations
- Conducting systemic evaluations
- Hazard identification and analysis; and
- Safety occurrence analysis and reporting.

9.4 Practices and Procedures

9.4.1 Audit Schedule

9.4.1.1 All AAI owned aerodromes and Civil Enclaves – once in two years

9.4.1.2 Surveillance Audits by Aviation Safety Directorate, CHQ – It may concentrate only on those aspects of operation where urgent corrective action was identified or unexplained increase of safety incidents.

9.4.1.3 The Aviation Safety Directorate at CHQ shall prepare a National Safety Audit Schedule, in the beginning of every financial year, i.e. April to March. It should also make allowance for the possibility of unscheduled audits, which may be necessitated by an undesirable trend in safety performance.

9.4.2 Audit Scope

Safety audit shall examine units and facilities pertaining to:

- ATM
- CNS

- Airport Rescue & Fire Fighting
- Airport Operational areas
- Terminal Buildings
- Cargo; and
- Other safety related areas.

9.4.3 Safety Audit Objectives

Objectives of safety audits include:

- Identification of operational and system deficiencies which may lead to an incident or accident, or present a hazard to safe operation of aircraft;
- Based on monitoring incident trends, advice management on prevention methods and safety promotion.

9.4.4 Audit Programme

9.4.4.1 Prior to the audit, the auditee is given at least two weeks advance notice with the audit programme, which indicates:

- The audits team members
- Duration of the audit
- Date and time of area Units to be visited
- Date and time of entry and exit meetings; and
- Checklists which are used for the audit.

9.4.4.2 The audit duration shall not exceed four days for major aerodromes and three days for other aerodromes, excluding journey time.

9.4.5 Conducting the Audit

- Safety audits are conducted as per AAI Audit Manual
- Audit Team meeting is conducted prior to safety audit
- Entry Meeting is held with Airport Director before commencing safety audit
- Safety audit of units and facilities are conducted; and
- Exit Meeting is held with the Airport Director after safety audit.

9.4.6 Audit Report

9.4.6.1 The audit report usually includes:

- Units, facility/area audited
- Details of audit team members
- Date and duration of audit
- Summary of the audit findings
- Non-conformity/deficiencies observed
- Recommendations/observations
- Details of corrective action; and
- Any outstanding issues.

9.4.6.2 The audit report should be an objective presentation of the results of the safety audits. A draft safety audit report should be forwarded to the Airport Director or Manager of the Unit for review and comments within two weeks of audit. Any comments received should be taken into considerations, in the preparation of Final report, which is considered, as the official report of audit. Final report shall be prepared and distributed within three weeks of audit.

9.4.6.3 Audit reports are sent to:

- RED of concerned region
- Airport Director of concerned Airport/Station
- Jt.GM/DGM (Aviation Safety) of concerned region
- HODs of relevant Directorates at CHQ

9.4.6.4 A consolidated Safety Report is prepared for every quarter, highlighting the major non-conformities by Aviation Safety Directorate at CHQ and is sent to Chairman and Members of the Board, AAI and all Heads of Directorates.

9.4.7 Issue Tracking & Resolution

- Issues resulting from Safety Audits shall be tracked.
- Previous audit results and actions are to be reviewed.
- List of problems to be addressed are included in the audit report.
- Action Taken Reports are to be developed by units, and submitted to Aviation Safety.

- Timeframe for action taken reports are as follows:
  - 4 months for major airports
  - 2 months for others airports/stations
- Long term outstanding actions to be reported to ED (Aviation Safety) by Jt.GM / DGM (Aviation Safety) of the region.

9.4.8 Limitation of Audit

9.4.8.1 Undoubtedly, there are benefits from audit activities but there are also a few limitations which must be recognized:

- An audit cannot review possibly each and every activity and therefore, it may not be able to highlight all shortcomings in the system; (Audits take ‘sample’ of the system only).
- Auditors are not infallible.

9.5 Attachments

- AAI Aviation Safety Audit Manual (AAI-SAF-106)
- AAI Audit Notification Form (AAI-SAF-120)
- AAI Audit Meeting Opening Form (AAI-SAF-121)
- AAI Audit Summary of Findings (AAI-SAF-122)
- AAI Audit Plan (AAI-SAF-123)
- AAI Audit Request for Corrective Action Form (AAI-SAF-124)
- AAI Audit Report (AAI-SAF-125)
- AAI Audit Feedback Questionnaire (AAI-SAF-126)

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CHAPTER 10 - CHANGE MANAGEMENT

10.1 Chapter Overview

10.1.1 Changes are inevitable as global activities and complexity continue to grow with increase of traffic. Changes to system configuration, procedure, the organization roles and structure, expansion of aerodromes have the potential to introduce new hazards or modify existing risk.

10.1.2 A key component of SMS is to document the procedure and processes by which the safety impact of change is assessed, hazards are identified and risks mitigated.

10.1.3 The aim is to provide assurance, to the organization, the regulator and the public that the risk to operation is As Low As Reasonably Practicable.

10.1.4 Safety management practices require that hazards that are a byproduct of change, be systematically and proactively identified and strategies to manage the safety risks of the consequences of hazards be developed, implemented and subsequently evaluated.

10.1.5 Changes may be external to the organization or internal. An example of external change is changes in regulatory requirements. Example of internal change includes management (organizational) changes, new equipment or new procedures.

10.2 References and Definitions

10.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- DGCA Advisory circular AD AC 01 of 2012 on ' *Process for communicating with DGCA on planning construction & commissioning of changes to airport infrastructure and major maintenance programmes'*
- ICAO Doc 9859 *Safety Management Manual*
- ICAO Doc 9426 *ATS Planning Manual*

- Aviation Safety Advisory circular 01/2014 on *'Guidelines for safety assessment of new projects and change'*
- Aviation Safety Advisory circular 02/2014 on *'Guidelines for completing SCARS form'*
- Aviation Safety Advisory circular 03/2014 on *'HAZLOG Template'*

10.2.2 Definitions

10.2.2.1 **SCARS -** Safety Case Assessment Reporting System

10.2.2.2 **HAZLOG –** an electronic application or a paper-based system for the storage of hazard, their consequences and safety risk assessment material. In AAI, it is HAZID form of AAI-SAF-105.

10.2.2.3 **HAZLOG Register –** A compilation of HAZID form of AAI-SAF-105 along with summary of all hazards in a spread sheet of standard HAZLOG template (as prescribed in Aviation safety Advisory circular 03/2014), where summary of all hazards & safety risk assessment process are documented.

10.2.2.4 **Safety Plan -** A written plan of all the safety management activities that are planned to occur prior to introducing the change

10.2.2.5 **Safety Case -** A structured document that provides an argument supported by evidence that a major change will be safe to implement

10.3 Safety Requirements

10.3.1 Change Management Requirements

10.3.1.1 The Safety Requirements for "Change Management" are applicable to all:

- Services and products provided by AAI that may affect operational safety
- Organizational changes
- All AAI employees; and
- Contractors working for or on behalf of AAI, who undertake activities, which may directly or indirectly affect the safe operations of air navigation services or airport systems.

10.3.1.2 These Safety Requirements define the minimum requirements for Change Management and outline the processes to be used to conduct safety assessments required for change management.

10.3.1.3 All changes to ATM, CNS and Airside Operations of airport (as prescribed in para 7.4.5 of Chapter 7 of C-SMS manual):

- service levels
- procedures
- equipment or
- Organizational structures

Which will affect the:

- Performance
- Function or
- Technical specification of a system or service; or facility; or
- Organizational changes affecting safety accountabilities

MUST be assessed to determine the safety magnitude of the change by using SCARS Form (AAI-SAF-103)

Where a proposed change will not result in any change to the items mentioned above, or the change is of a routine maintenance or administrative nature, the normal routine change process may be used in lieu of the SCARS form.

10.3.1.4 Where the SCARS form indicates a **Minor** change a Safety Statement must be recorded in the SCARS form.

10.3.1.5 Where the SCARS form indicates a **Moderate** change, a Safety Statement must be recorded in the SCARS form and a HAZLOG Register must be developed.

Guidance material is attached to this manual on:

- hazard identification processes;
- hazard analysis processes; and
- HAZLOG application

10.3.1.6 Where the SCARS form indicates a **Major** change a Safety Plan and a Safety Case must be prepared and a HAZLOG Register for this change must be developed.

Guidance material is attached to this manual on:

- Safety Plans
- Safety Cases; and
- Review of Safety Plans and Safety Cases by Aviation Safety Directorate

10.3.1.7 It is a requirement that all safety activities are formally documented and that the documentation is kept for a period as defined by the Corporate Document Management System.

An official file must be maintained:

- For all SCARS forms
- To record activities associated with HAZLOG registers; and
- To record all Safety Plans and Safety Cases prepared and associated correspondence.

10.3.1.8 All Safety Plans and Safety Cases must be sent to and reviewed by Aviation Safety Directorate, CHQ prior to implementation of any change.

10.3.1.9 The lifecycle of the Project/Change has four distinct phases. These lifecycle phases are:

1. **Change Initiation, Concept, & Design**– covering the task associated with a new project or change to existing Projects/Changes and includes concept development, requirements specification and project/task initiation.
2. **Project Implementation & transition** – covering the tasks associated with transitioning a new system/facility or changes to an existing Project/Change while maintaining operational integrity and standards applicable to the existing Project/Change.
3. **Operations and Support** – which are all tasks needed to operate the system, facility or service to the agreed performance and functional standards.
4. **Withdrawal / Decommissioning** – activities associated with withdrawal of facilities systems or services. These activities must include requisite safety consultation and transitioning activities.

10.3.1.10 As per DGCA Advisory circular AD AC No. 01 of 2012 dated 19/12/2012 on 'Process for communicating with DGCA on planning, construction & commissioning of changes to airport infrastructure and major maintenance programmes' licensee should communicate to DGCA for approval of any change in infrastructure with the documentation in following three stages:

Stage-I (Design / Concept level) - refers documentation related to proposed design & concept stage of the project.

Stage-II (Execution level) – refers documentation related to **e**xecution part of the project i.e. work in progress

Stage-III (Commissioning level) - refers documentation related to the new, upgraded or replaced/refurbished facility or system, before it is commissioned into service.

This is especially important for 'Changes' concerning the Airside Operations of Airport

Safety assessment shall be carried out at each stage of the Project/Change as prescribed in para 10.3.1.10, for any new / change / major maintenance of Airport infrastructure as detailed in DGCA Advisory circular AD AC No. 01 of 2012. The Change Management process given in this chapter and the attachments to this manual shall be followed. Guidance for safety assessment of new projects & change is provided in Aviation safety advisory circular 01/2014.

For other New / Change activities in ATS & CNS domain, Safety assessment shall be carried out for each lifecycle phase of the Project/Change as prescribed in para 10.3.1.9, following the change management process given in this chapter and the attachments to this manual.

10.3.2 Design Requirements

10.3.2.1 The design of airports, facilities, systems, software, airspace, maps and procedures used in the delivery of services or maintenance of equipment, must be in compliance with relevant DGCA CAR & AAI safety requirements, and should aim to reduce the potential for error and risk.

10.3.2.2 A Statement of Requirement or Specifications shall be produced when systems are being developed, reviewed, or when a system is modified.

10.3.2.3 The Statement of Requirement shall be approved and signed-off by the stakeholders.

10.3.2.3 Designs must be duly authorized / approved by the relevant authority against a clearly defined operational and/or functional specification. Design can include:

- Facilities
- Procedures and Practices
- Data and Documentation

- Support; and
- Work stations.

10.3.2.4 Functional, operational, performance and technical specifications must be:

- Defined and known
- Developed in consideration of safety objectives
- Formally coordinated agreed by all stakeholders; and
- Documented, and maintained in a manner that meets legislative, regulatory and other statutory requirements.

The above mentioned requirements also apply to procurement policy in developing tender specifications, and in selecting the lowest compliant tender.

10.3.3 Role of Various Directorates, Airports or Stations

10.3.3.1 Role of Airports/Stations

Projects are often initiated at Corporate Headquarters level, however a critical element of any Safety Management System is the ability of the ‘field operators and managers’ to assess the possible impact on safety BEFORE the change becomes operational.

Consequently, the SMS is designed so that all lower level residual risk associated with the small and medium changes are assessed and accepted at the Unit/Local level, and all higher level residual risk of major changes are accepted at the CHQ level.

The appropriate “Service Delivery Manager” or Project Manager is responsible for:

- compliance with the safety requirements
- the integrity and quality of safety documents
- ensuring that the required approvals are obtained prior to any implementation; and
- ensuring that the risk controls detailed in the documentation are appropriate and in place, and that the risks identified are reviewed and updated following the project/change implementation.

10.3.3.2 Role of Service delivery/Operational Directorates

It is the role of the applicable service delivery Directorates (ATM, CNS, Aerodrome Operations, Engg. and Planning etc.) to resource, conduct the necessary safety assessments, approve the changes and wherever applicable, obtain prior permission of the work from DGCA, by submitting necessary documents.

10.3.3.3 Role of Aviation Safety Directorate

It is the role of the Aviation Safety Directorate to assist other Directorates by the provision of safety subject matter expertise (SME) and to review the safety processes conducted, but it is responsibility of individual Directorates to ensure Safety and follow Safety management processes / procedures in their respective domain, as prescribed in the manual.

The ED (Aviation Safety) is responsible for:

- Reviewing Safety Plans and Safety Cases; and
- Endorsing Safety Plans and Safety Cases following satisfactory review.

10.4 Practices and Procedures

10.4.1 Safety Assessment Process

10.4.1.1 The SCARS form is used to determine the safety magnitude of the change by assessing the likely impact of the change in terms of size and safety outcome of the change.

10.4.1.2 If the safety magnitude is **Minor:**

A Safety Statement is completed in the SCARS form by the initiator of the change and it is accepted (signed off) by the Manager having the safety accountability for that area, e.g.:

- GM (Aerodrome) / ATS-in-Charge / Airport Director for an ATS change
- GM (CNS) / CNS-in-Charge / Airport Director for a CNS equipment change
- GM (Operations) / GFS-in-Charge / Airport Director for changes in airside operations of the airport.

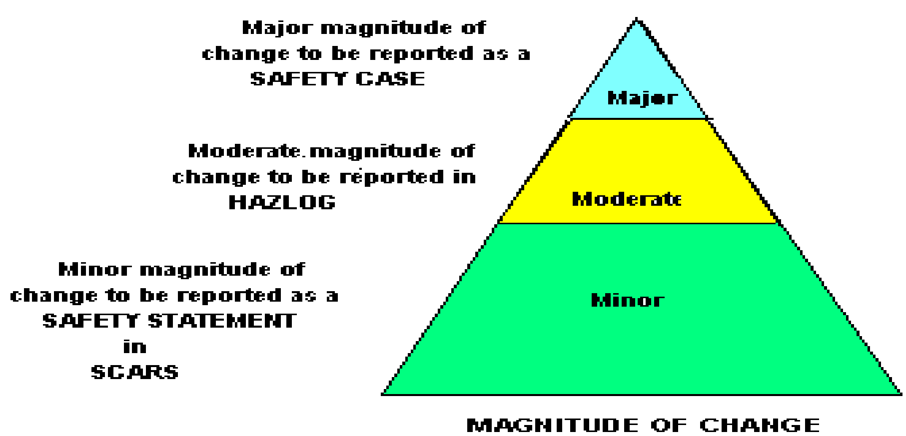
10.4.1.3 If the safety magnitude is assessed as **Moderate:**

A Safety Statement is completed in the SCARS form by the initiator of the change and it is accepted (signed off) by the Manager having the safety accountability for that area (refer 10.4.1.2); and

The HAZLOG Register is also completed and the report from HAZLOG is attached to the SCARS form for residual risk to be sign-off by relevant Manager.

10.4.1.4 If the safety magnitude is assessed as **Major:**

A Safety Plan and a Safety Case must be prepared and a HAZLOG Register for this change must be developed.



MAGNITUDE OF CHANGE DIAGRAM

10.4.2 SCARS Form

10.4.2.1 The SCARS form must be used for changes to service levels, procedures or equipment, airport infrastructure / operations which will affect the performance, functional or technical specification of a system or service; and organizational changes affecting safety accountabilities.

10.4.2.2 Where the proposed change will not result in any of the items mentioned above or the change is of a routine maintenance or administrative nature, the applicable change process may be used in lieu of the SCARS.

10.4.2.3 Where a change process is used in lieu of the SCARS, a Safety Statement must be prepared. The Safety Statement must provide AAI management with sufficient information to demonstrate that safety has been considered, and the change presents minimal or no safety issues.

10.4.2.4 The SCARS form is designed to assist users to evaluate the change proposal, in order to determine what type of safety assessment and reporting is required. This form is not safety assessment report but first step in the safety analysis of change.

10.4.2.5 The SCARS form must be completed at the start of a change process, to ensure that the safety assessment requirements of the change are identified and the relevant documents are prepared. SCARS form template is provided in attachment AAI-SAF-103.

10.4.2 SCARS Outcome

10.4.3.1 Where the outcome of the SCARS form indicates a **Minor** change, a Safety Statement must be included in the SCARS form.

- The Safety Statement or justification included in the SCARS must provide AAI management with sufficient information to demonstrate that safety has been considered, and the change presents minimal or no safety issues.
- The appropriate Manager may direct a Safety Case to be developed even though the outcome of the SCARS indicates a **Minor** Change.

10.4.3.2 Where the SCARS indicate a **Moderate** change, a HAZLOG Register for this change must be developed.

10.4.3.3 Where the SCARS indicate a **Major** change, the HAZLOG Register for this change must be developed and a Safety Case should also be prepared.

10.4.3.4 A detailed guidance on filling up SCARS form is provided in Aviation Safety Advisory circular 02/2014

10.4.4 Safety Plan

10.4.4.1 Where the outcome of the SCARS indicates that a Safety Case is required, a Safety Plan must first be prepared.

10.4.4.2 Safety Plan preparation must commence early in the project/change life cycle, and be updated as appropriate during the course of the project/change implementation. Safety Plan template of all phases are available as attachment AAI-SAF-110.

10.4.4.3 A Safety Plan may be a stand-alone document or incorporated into a Project Plan.

10.4.4.4 The Safety Plan (or Project Plan if Safety Plan is incorporated) must detail the:

- scope of the change in operational and organizational context
- assumptions, constraints and dependencies influencing the safety outcome of the project/change
- responsibilities, titles and names of the people managing the project/change
- consultation and communication arrangements for the project/change
- safety management activities to provide the safety assurance of the project/change
- timelines and milestones
- resources and facilities required
- training and education requirements
- review process; and
- approval authorities and requirements for the resultant safety documentation.

10.4.5 Safety Case

10.4.5.1 Officials preparing Safety Cases should have completed AAI's Safety Management Training course, or an equivalent safety management training course, or be approved by the ED (Aviation Safety).

10.4.5.2 Safety Cases must provide AAI management and the regulator, when required, with the safety management arrangements necessary to assure the safety of the change.

10.4.5.3 Safety Cases must be updated during the course of the project/proposal implementation. Safety Case template of Concept & Design, Implementation and all phases are available as attachment AAI-SAF-111/112/113.

10.4.5.4 Safety Cases must detail the:

- scope of the change in operational and organizational context
- validation of any assumptions, constraints and dependencies affecting the safe outcome of the project/change

- responsibilities, titles and names of the people managing the project/change
- consultation and communication arrangements for the project/change; and
- outcomes of the safety management activities prescribed in the Safety Plan including the:
  - hazard identification and risk management activities, tools, procedures and standards used to provide safety assurance, for normal and abnormal modes of operation
  - HAZLOG Register Report detailing the identified hazards and risk controls/safety requirements, including their status
  - acceptance by the appropriate level of management of the various levels of risk associated with each hazard
  - arrangements for any training and education requirements
  - timelines and milestones for the ongoing safety management of the change pre and post implementation
  - argument that, when implemented with the identified controls, the proposed change will be adequately safe; and
  - arrangements and timing for the Post Implementation Review (PIR) of the change following implementation.

10.4.6 Safety Document Review

10.4.6.1 All Safety Plans and Safety Cases must be reviewed by Directorate of Aviation Safety.

10.4.6.2 Where recommendations from the review(s) are not included in the final documentation, justification for this must be provided to the reviewer.

10.4.6.3 Where the Safety Plan forms part of the Project Plan, the review must demonstrate the above requirements have been met.

10.4.6.4 Safety Plans and Safety Cases must be presented for review to Directorate of Aviation Safety sufficiently in advance to allow changes to be made to the document where required from the review. ASD Review of Safety Plan and Safety Case of 'Concept & Design', 'Implementation' and All phases are available as attachment AAI-SAF-114/115/116/117.

10.4.7 Post Implementation Review (PIR)

10.4.7.1 A Post Implementation Review of the safety aspects of a change detailed in a Safety Case must be completed and documented.

10.4.7.2 The Post Implementation Review must be conducted in accordance with the timeline specified in the Safety Case and no later than **twelve months** after the change becoming operational.

10.4.7.3 The Post Implementation Review must include:

- the review of the HAZLOG Register(s) relating to the change
- the arrangements for the ongoing management of hazards / controls
- details of any new safety issues identified resulting from the change; and
- details of any safety lessons learnt.

10.4.8 Document Management

Safety Plans and Safety Cases must be managed as controlled documents and organizational records.

10.4.9 Control of Contracted Activities

10.4.9.1 To ensure that the level of safety of Airports Authority of India is not eroded or compromised by the products, inputs and supplies provided by external agencies or contractors including sub contractors, the Airports Authority of India shall:

- Establish SMS requirement for contractors or sub contractors
- Establish a procedure to write SMS requirement into the contracting process
- Establish SMS requirement in the bidding documentation; and
- If necessary, write requirements on hazard identification and risk management processes into bid documentation and notify contractors and sub contractors in writing.

10.4.9.2 The above requirement shall also be included in the contract agreement and tender specifications. Using ISO Certification ensures that organization's supplier or contractors have appropriate quality management system in place.

10.4.9.3 Contractor or external workers undertaking activities which may impact on operational integrity or safety shall prior to commencement of work, be provided with induction training which at minimum identifies the safety related considerations of the work, and/or their safety accountabilities by concerned Directorate, which is entering into contract.

10.4.9.4 Detailed contracting procedures for control of contracted activities as mentioned above, should be documented in the section manual of respective directorates involved in this activity.

10.4.10 Change Management at Licensed Airports

10.4.10.1 Rule 83 (2) of Aircraft Rules 1937 requires that while an aerodrome license is in force, no alteration to the landing area or to the building or to the other structure of the aerodrome, which may affect the safety of aircraft operation shall be undertaken without prior approval of the regulator (DGCA).

10.4.10.2 The following information and documents are required to be submitted to DGCA to obtain prior approval of the project or change:

- Brief description of Project or Change
- A copy of Aerodrome License
- Project/Change initiator or originator
- Civil Aviation Requirements affected by the project or change
- Duration of the project and effect on the operations
- Construction agencies details
- Relevant project designs/drawings
- Relevant CAR compliance check list
- Safety Assessment Report
- Certificate from Engineering Directorate to ensure that building does not:
    - generate wind shear across runway
    - create anomalies in radiated signal; or
    - create light distractions to pilots and air traffic controllers

10.4.11 Change Management at Unlicensed Airports

All process and procedures for Change Management as detailed in this chapter shall be followed and all documents shall be kept for a period as defined by the Document Management System; however there is no need for seeking prior approval from DGCA before making a change. These documents should be available for examination and records if the aerodrome at a later date decides to obtain Aerodrome License.

10.4.12 Change Management at Civil enclaves

For Areas under the exclusive jurisdiction of AAI, follow the guidelines as laid down in 10.4.11.

10.4.13 Change Management of ATM Systems

10.4.13.1 Para 2.27.5 of DGCA CAR, Section 9, Series 'E', Part I, Issue II on 'Air Traffic Services' requires that Any significant safety-related change to the ATC system as detailed in Chapter 7, para 7.4.5 of C-SMS manual, including the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. It shall be ensured that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met.

When, due to the nature of the change, the acceptable level of safety cannot be expressed in quantitative terms, the safety assessment may rely on operational judgment.

10.4.13.2 All processes and procedures for Change Management detailed in this chapter shall be followed and all documents shall be kept for a period as defined by the Document Management System.

10.4.14 Procedure for commissioning of CNS Aids

10.4.14.1 Para 7 (Certification) of DGCA CAR Section 9, Series 'D', Part I, Issue II on 'Requirements of Maintenance / inspection of Communication, Navigation, Landing & other equipment installed at Airports and Enroute' requires that any new equipment or system procured and installed, by the operator for providing facility as listed below, shall be declared operational only after it is found fit for operation on satisfactory completion of the necessary inspection / checks and calibration from air and ground as required and after obtaining concurrence of the DGCA for the same.

The requirements stipulated in the Civil Aviation Requirement will apply to all Communication, Navigation and landing facilities including the following:

1. Visual Landing Aids-VASI/PAPI etc.
2. Approach lighting
3. Non-Directional Beacon
4. VHF Direction Finding System
5. Locator Beacon
6. Instrument landing System
7. VOR/ T-VOR Doppler VOR
8. Distance Measuring System
9. Communication Facilities like VHF and HF Radio Telephone, AFTN, Satellite based Voice and Data Communication System, Direct Speech Circuits, VHF Data Links etc.
10. Airport Surveillance Radar
11. Air Route Surveillance Radar
12. SSR and MSSR
13. Advance Surface movement Guidance and control system (ASMGCS)
14. Computer based ATC - ADS etc.
15. Airport Recorder and Replay System
16. GAGAN system and connected equipment
17. RVR Measuring equipment
18. Meteorological equipment

10.4.14.2 All processes and procedures for Change Management detailed in this chapter shall be followed for any New / Change activities as prescribed in Chapter 7, para 7.4.5 of C-SMS manual and all documents shall be kept for a period as defined by the Document Management System.

10.4.15 Procedure for commissioning of New Infrastructure at Airport

- Inspection of new project or facility by a team of concerned executives of project and/or user department to ensure that the design, functional, operational and technical specifications have been met for the project or facility.

- Ensure compliance with national regulatory requirements for the new project or facility and document deficiencies, if any and complete the relevant CAR compliance check list and action plan to remove those deficiencies.
- Carry out "**All-Phases Safety Assessment**", if not carried out earlier or **"Implementation phase safety assessment"** using the attachments and following the guidelines contained in the Corporate Safety Management Manual and transfer all residual risk duly accepted by the relevant authority in the Operational Risk Assessment (ORA).
- Develop a transition plan considering the complexity of the project or facility taking in accounts the transitioning risk and mitigating them. Also ensure that the integrity of the system is not compromised during transition, while maintaining the current standard. Document the role and responsibility of all stake holders in the transition plan.
- Conduct trial operation under the supervision of key officials. Both normal and abnormal mode of operations should be tested during the trial operations.
- Submit all relevant documents about the new project or facility to DGCA for their approval (For Licensed Aerodromes only) for commissioning of the facility or project.
- The project or facility is notified in AIP India, after DGCA's approval and necessary changes are also made in the Aerodrome Manual.
- The project or facility is commissioned and is monitored by the key officials for the first 48 hours for teething troubles, if any.
- After 48 hours, the facility or project should be specially monitored by the user department for a period of 90 days for any new hazard and the functioning and efficacy of existing controls. Suitable risk control should be implemented of any identified hazard.
- Conduct post implementation review after six months, but not later than 12 months, to provide assurance that the safety requirements continued to be met in the operation.
- Project or facility is put into the use for normal operations and routine monitoring and maintenance procedures shall be followed.

10.5 Attachments

The following templates for producing safety documents are attached to the Safety Management Manual:

- AAI Safety Risk Assessment Preparation (AAI-SAF-104)
- AAI SCARS Forms (AAI-SAF-103)
- AAI Safety Plan All Phases (AAI-SAF-110)
- AAI Safety Case - Concept and Design (AAI-SAF-111)
- AAI Safety Case - Implementation (AAI-SAF-112)
- AAI Safety Case - All Phases (AAI-SAF-113)
- ASD Review of Safety Plan (AAI-SAF-114)
- ASD Review of Concept Design Safety Case (AAI-SAF-115)
- ASD Review of Implementation Safety Case (AAI-SAF-116)
- ASD Review of All Phases Safety Case (AAI-SAF-117)

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CHAPTER 11 - SAFETY TRAINING, COMPETENCY AND EDUCATION

11.1 Chapter Overview

11.1.1 Airports Authority of India, the government, the industry and the public expect that AAI personnel with safety-critical roles are trained to the highest level and continue to remain so in their job. The Regulator (DGCA) also requires that AAI personnel are trained and competent to perform their SMS duties.

11.1.2 This element of SMS reflects the commitment of AAI to provide appropriately trained and competent personnel, who are able to work at the highest level of safety, efficiency and effectiveness.

11.1.3 This is achieved through the implementation of this SMS, education and surveillance to allow the organization to identify how the system can be improved.

11.2 References and Definitions

11.2.1 References

- DGCA CAR Section 1 General Series-C Part-I on '*Establishment of Safety Management System'*
- ICAO Doc 9859 *Safety Management Manual*
- AAI *Manual of Air Traffic Services Part 1*
- Manual on Station Level Training for Acquiring Rating
- Air Traffic Management Circulars
- AAI *CNS Manual*
- AAI *Directorate of Operations Manual*

11.3 Safety Requirements

11.3.1 Safety Training Contents

Safety training and education should consist of the following:

a) a documented process to identify training requirements

b) a validation process that measures the effectiveness of training

c) initial job-specific training

d) indoctrination/initial training incorporating SMS, including human factors and organizational factor; and

e) recurrent safety training

11.3.2 Training and Competency Arrangements

11.3.2.1 AAI shall ensure that its personnel carrying out operational or safety-critical roles are appropriately trained, their knowledge regularly updated, competence assessed at regular intervals and that their competency to discharge their duties is assured.

11.3.2.2 To ensure that safety obligations and accountabilities are met, and that safety is not compromised:

- Each Directorate that undertakes activities which may impact operational integrity or safety of the Air Navigation Services and Airports Systems shall implement a system which ensures that relevant personnel or accountable supervisors are:
  - aware of their operational and safety accountabilities
  - appropriately trained and competent to discharge their duties; and
  - able to work at the highest level of safety, efficiency and effectiveness
- All AAI personnel, contractors, or AAI personnel supervising external workers undertaking activities which may impact up on operational integrity or safety shall, prior to commencement of work, be provided with an induction training which at minimum identifies the safety-related considerations of the work, and/or their safety accountabilities.

11.3.2.3 Safety Management training shall only be delivered by officials who have been specifically approved by Executive Director (Aviation Safety).

11.3.2.4 The Records of AAI operational personnel trained in Safety, shall be maintained in Aviation Safety Directorate and records of professional training shall be maintained in respective Directorate.

11.4 Practices and Procedures

11.4.1 Safety Training for Accountable Executive

Duration	-	Half day
Contents	-	Safety Policies and Objectives SMS Roles and Responsibilities SMS Standards Safety Risk Management Safety Assurance
Frequency	-	Once

11.4.2 Safety Training for Safety Managers/Safety Practitioners

Duration	-	Four days
Contents	-	Basic Safety Concepts Safety Accountabilities and Responsibilities Hazard identification and Reporting Safety Risk Management Change Management Operating and Safety Procedures AAI Safety Policies and Objectives Safety Reporting System Safety Data analysis Safety Assurance and Promotion Establishing Acceptable Level of Safety

11.4.3 Safety Training at Induction Level

Duration	-	Two Days
Contents	-	Basic Safety Concepts Safety Accountabilities and Responsibilities Hazard identification and Reporting Safety Risk Management; Operating and Safety Procedures AAI Safety Policies and Objectives Safety Reporting System

11.4.4 Safety Training of All Operational Personnel

Duration	-	One Day
Contents	-	Hazard identification and Reporting Safety Risk Management AAI Safety Policies and Objectives

11.4.5 Refresher / Recurrent Training

It should be conducted once in two years, and the contents and duration shall be decided, as per the target audience.

11.4.6 Safety Training Of Non-Operational Personnel

All AAI personnel other than those involved in operations shall also receive half day training on basic safety concepts and their role and responsibilities in safety management system. This training can be imparted by any AAI personnel, who are trained in Safety Management System conducted by ICAO, DGCA or AAI.

11.4.7 Safety Training Of Contracted Persons

All AAI contractors undertaking activities, which may impact upon operational integrity or safety, shall, prior to commencement of work be provided Induction Training, which at minimum identifies the safety-related consideration of work, and/or their safety accountability. This training can be imparted by any AAI personnel, who are trained in Safety Management System conducted by ICAO, DGCA or AAI.

11.4.8 ANS Personnel Competency

Training and Competency Assurance of ATM and CNS personnel are conducted in accordance with MATS Part 1 and CNS Manual respectively.

11.4.9 Airside Personnel Training

AAI provides induction level training to all AAI Operations personnel who are required to work in the airside operational area in accordance with Directorate of Operations Manual.

Airside driver training is provided for all staff required to operate a vehicle on airside operational areas. The candidate is required to clear a proficiency test before being issued with an Airport Driving Permit (ADP)

11.5 Attachments

Nil

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CHAPTER 12 - SAFETY PROMOTION AND CULTURE

12.1 Chapter Overview

12.1.1 Safety promotion encompasses all those activities which the organization carries out in order to ensure that all personnel understand why safety management procedures are being introduced and what safety management means. It is the mechanism by which the organization's safety policy is communicated to all employees. It also provides a means of encouraging the development of a positive safety culture and ensuring that, once established, the safety culture is maintained.

12.1.2 Safety promotion activities are particularly important during the initial stage of implementation of safety management system. However, safety promotion also plays an important ongoing role in the maintenance of safety, as it is the means by which safety issues are communicated within the organization.

12.1.3 Safety culture is seen as an integral part to assure safety and an organizational culture will influence what behaviors are accepted, and behaviors in turn influence performance.

12.2 References and Definitions

12.2.1 References

Nil

12.2.2 Definitions

Nil

12.3 Safety Requirements

12.3.1 All personnel of Airports Authority of India must try to assist the organization in promoting a culture which foster safety and actively supporting all activities associated with it. They should also enthusiastically participate in safety promotion activities to enhance safety.

12.3.2 Safety communication should flow freely between Safety Manager and operational personnel throughout the organization.

12.4 Practices and Procedures

12.4.1 Safety Promotion Activities

Airports Authority of India promotes safety throughout the organization by conducting a number of activities which include:

- Introduction and implementation of Safety Management System and development of SMS Manual at both Corporate Level and Station Level
- Conducting locally SMS awareness workshops for dissemination of safety process and procedures by Safety Manager of the airport.
- Organizing annual "Aviation Safety Awareness Week" in the last week of November nationally
- Display of Safety Banners and posters
- Publishing Aviation Safety Circulars and Aviation Safety Advisory Circulars
- Publishing safety newsletters and bulletins
- Maintaining Aviation Safety website and through emails

12.4.2 Desired Characteristics of Positive Safety Culture

The characteristics of an organization with a positive safety culture include:

- Senior management places a strong emphasis on safety as part of the strategy of controlling risks
- Decision makers and operational personnel hold a realistic view of the short-term and long-term hazards involved in the organization's activities
- Managers in top positions do not use their influence to force their views or to avoid criticism
- Managers in top positions foster a climate with a positive attitude towards criticism, comments and feedback from lower levels of the organization

- Awareness of the importance of communicating relevant safety information at all levels of the organization is present (both within it and with outside entities)
- Promotion of appropriate, realistic and workable rules relating to hazards, safety and potential sources of damage, with such rules being supported and endorsed throughout the organization
- Personnel are well trained and understand the consequences of unsafe acts
- There is a low incidence of risk-taking behaviour, and
- A safety ethic which discourages such behaviour.

12.5 Attachments

Nil

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ATTACHMENTS

PRELIMINARY REPORT OF ATS INCIDENT

REPORT NUMBER

1. CLASSIFICATION ☐ AIRPROX ☐ PROCEDURAL ☐ FACILITY	2. DATE OF INCIDENT: 3. TIME OF INCIDENT:	4. ATS UNIT IN WHICH THE INCIDENT TOOK PLACE
5. INCIDENT REPORTED BY ☐ CONTROLLER ☐ SUPERVISOR ☐ PILOT 6. INCIDENT RECEIVED VIA ☐ RADIO ☐ TELEPHONE ☐ AFTN ☐ OTHERS	7. ALTITUDE OR FLIGHT LEVEL IN WHICH THE INCIDENT OCCURED	

1. LOCATION OF THE INCIDENT	IN AIR				
	FIX	DIRECTION	DISTANCE	CLOSEST DISTANCE	
				HORIZONTAL	VERTICAL
	ON GROUND				
	RUNWAY:	TAXIWAY:	INTERSECTION:		

9. AIRCRAFT INFORMATION	AIRCRAFT NO. 1			AIRCRAFT NO. 2		
A. IDENTIFICATION						
B. TYPE OF AIRCRAFT						
C. PLACE OF DEPARTURE						
D. DESTINATION						
E. ATS ROUTE						
F. LEVEL FLIGHT	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
G. CLIMBING	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
H. DESCENDING	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
I. EVASIVE ACTION	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
J. TAKE-OFF ROLL	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
K. LANDING ROLL	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
L. UNDER RADAR SERVICE	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
M. RADAR VECTORED	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
N. TRANSPONDER FUNCTIONING	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
O. MODE C FUNCTIONING	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN
P. RECEIVED TCAS/ ACAS RA	☐ YES	☐ NO	☐ UNKNOWN	☐ YES	☐ NO	☐ UNKNOWN

10. CONTROLLER INFORMATION

A. NAME: ____________________

B. SECTOR/POSITION: ____________________

C. TIME OF TAKING OVER CHANNEL BEFORE THE INCIDENT: ____________________

D. NO OF AIRCRAFT CONTROLLER WAS HANDLING AT THE TIME OF INCIDENT: ____________________

E. WAS THE POSITION/SECTOR COMBINRD: ☐ NO ☐ YES (EXPLAIN) ____________________ F. WAS TRAINING IN PROGRESS: ☐ NO ☐ YES (EXPLAIN) ____________________
11. WHETHER INCIDENT TOOK PLACE WITHIN SHORT TIME AFTER TAKING OVER CHANNEL: ☐ NO ☐ YES (EXPLAIN)
12. WAS THERE A TRANSITION FROM RADAR TO PROCEDURAL OR VICE VERSA: ☐ NO ☐ YES (EXPLAIN)
13. WHETHER CONFLICT ALERT WAS GENERATED BY THE SYSTEM: ☐ NO ☐ YES (EXPLAIN)
14. WHETHER MSAW WAS GENERATED BY THE SYSTEM: ☐ NO ☐ YES (EXPLAIN)
15. WHETHER EQUIPMENT/ NAV AIDS A FACTOR: ☐ NO ☐ YES (EXPLAIN)
16. BRIEF DESCRIPTION OF THE INCIDENT
17. PERSON MAKING NOTIFICATION: NAME: POSITION: SIGNATURE WITH DATE & TIME:
18. PERSON RECEIVING REPORT (WSO/ATS IN-CHARGE): NAME: POSITION: SIGNATURE WITH DATE & TIME:

Report Number:
It should be written in a way that may help in keeping a track on number on ATC incident at a particular airport. The format should be: XXXX-YYY-00-01
XXXX is airport designator e.g. VABB, VIDP, etc
YYY is ATC unit e.g., TWR, ACC, APP, ACC, TAR, RSR, ADS, OCC, FIC etc.
00 is the last two digit of the year
01 is the incident number in sequence by year

VOLUNTARY HAZARD / EVENT REPORTING FORM

The information supplied in this form will only be used to enhance safety. You may choose to not provide your details. If you do provide the details, your name and other details will be removed and discarded upon receipt of this form. Under no circumstances will your identity be disclosed to any person in the airport or to any other organization, agency or person without your express permission.

Please complete your part of the form and drop it in the box. You may also send your report to Safety Manager at zzzz.safety@aai.aero

PART A

TO BE COMPLETED BY THE PERSON IDENTIFYING THE HAZARD

Please describe the Hazard / Unsafe Event

Date of Occurrence: ____________________ Time: __________________

Location: __________________________

Description:____

____

____

____

____

____

ASSESSMENT BY THE REPORTER

In your opinion, what is the probability of a similar occurrence happening again?

- Frequent
- Occasional
- Remote
- Improbable
- Extremely Improbable

What do you consider could be the worst possible severity if this occurrence did happen again?

- Catastrophic
- Hazardous
- Major
- Minor
- Negligible

DETAILS OF THE REPORTER

Optional

Name ___________________________ Position ___________________________

Organisation ________________________ Phone no: __________________________

Email ___________________________

(Please note that feedback will be provided only if your contact details are provided to us)

PART B

TO BE COMPLETED BY THE SAFETY OFFICER

Unique Hazard Identification Number: ______________________________

Hazard ____

____

Major Consequence

____

____

Existing Controls (Defences)

____

____

Risk Probability ☐ Risk Severity ☐ Risk Index ☐ Risk Class ☐

Proposed Controls (Defences)

____

____

____

____

Referred for further action to: ____

Appropriate Feedback given to the reporter: YES / NO

Signature: _______________________ Date: ____________________

Name ____

DE-IDENTIFICATION RECORD

Unique Hazard Identification Number: ______________________________

The report has been de-identified and entered into the Airport Risk Register

Signature: _______________________

CONFIDENTIAL REPORTING SYSTEM

The Confidential Reporting System is a form by which all AAI Employees can raise safety concerns with the Directorate of Aviation Safety. The system has been endorsed by the Board.

Should you submit a report, I give my guarantee that your **confidentiality** will be maintained. I recommend that you support this system.

Chairman of the Board

Your Details

Classification (eg. ATC Technical Officer/ Airports		**Location** (eg. Mumbai, Delhi)	
Unit (eg. CNS, ATM, Airports		**Directorate** Tick appropriate box	CNS ☐ ATM ☐ Airports ☐ Corporate Office ☐

Description
(Please describe the safety issue or concern in as much detail as possible. If the issue is related to a specific event, please give the time and date on which the event occurred).

In relation to the concern which you have raised, please indicate the contribution, if any, of the issues presented below:

Involvement							Involvement						
	None					Significant		None					Significant
Organisational structure	0	1	2	3	4	5	**Procedure/ Processes**						
People Management	0	1	2	3	4	5	ATS/ Maintenance/ Aerodromes	0	1	2	3	4	5
Hardware/ equipment	0	1	2	3	4	5	Supervision	0	1	2	3	4	5
Training	0	1	2	3	4	5	Staff Attitudes	0	1	2	3	4	5
Selection	0	1	2	3	4	5	Planning	0	1	2	3	4	5
Operational pressures	0	1	2	3	4	5	Management	0	1	2	3	4	5
Staffing	0	1	2	3	4	5	Change Management	0	1	2	3	4	5
Rostering	0	1	2	3	4	5	Ineffective QA	0	1	2	3	4	5
Standards	0	1	2	3	4	5	Software	0	1	2	3	4	5
Equipment	0	1	2	3	4	5	Data Management	0	1	2	3	4	5
Staff Communications	0	1	2	3	4	5							

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Airports Authority of India

Safety Case Assessment and Reporting System (SCARS)

The SCARS form must be used to assess permanent as well as temporary changes to service levels, procedures or equipment, which will affect the performance, functional or technical specification of a system, facility or service and for organisational changes affecting safety accountabilities.

This form must be completed by the process owner possessing specialist knowledge about the proposed change with inputs from other group members (stakeholders) through a process of discussion and then be reviewed and approved by the appropriate Manager.

Introduction:
This form must be used to determine the overall safety magnitude of a project/change and the type of safety report required to be produced and the associated requirements for sign-off acceptance. This completed form is NOT a safety assessment report but the first step in the safety analysis of change.

Project Number	File Number

Project Title		
Location	**Unit**	
Brief Description of the Project / Change		

Step 1: Assess the SIZE OF THE CHANGE

Complete the following questions to determine the size of the change. For each question, choose a rating from 1 to 7 as defined below and provide justification.
1 – Extremely Low; 2 – Very Low; 3 – Low; 4 – Moderate; 5 – High; 6 – Very High; 7 - Extremely High

NOTE: These questions are not definitive and are aimed at providing a generalised framework for the initial assessment of the overall safety magnitude of the change.

No.	Description	Ratings
1	**Assess the significance (scope/scale) of the project/change within AAI.** Consider the number of work areas affected: ATM, CNS, Airport Airside Operations, ARFS, etc. Also consider disciplines, systems, locations, business processes and organisation structures.	1 2 3 4 5 6 7
Justification:		

2	**Assess the significance of the project/change outside AAI.** Consider the number of services users and/or stakeholders affected, including the interfaces between these parties, eg government departments, customers and other ANSPs.	1 2 3 4 5 6 7
Justification:		

3	**Assess the level of new functionality introduced, or removed, by the proposed project/change, as opposed to the existing system, facility or service.** Does the new system enhance/reduce existing functionality or provide different functionality? Consider new technology.	1 2 3 4 5 6 7
Justification:		

4	**Assess the safety significance of the systems, facilities or services affected by the project/change?** Consider for example radar systems, communication systems, data systems, AFTN, Runways, Taxiways and any organisation systems such as safety reporting etc (People/Procedures/Technology)	1 2 3 4 5 6 7
Justification:		

5	**Assess the training component associated with implementing the project/change?** Consider type of training required, classroom or simulation, time lines, resources, recency requirements, etc.	1 2 3 4 5 6 7
Justification:		
6	**Assess the complexity of the transition from the existing system, facility or service?** Consider resources available, documentation, time lines, approvals, contingency arrangements, organisational changes, multiple locations etc.	1 2 3 4 5 6 7
Justification:		
7	**Size of Project/Change Rating.** Total the scores from questions 1 to 6 and compare to the values below.	**TOTAL**
	Select the resultant size.	
Small = 6 to 18	Medium = 19 to 30	Large = 31 to 42

Step 2: Assess the SAFETY OUTCOME OF THE CHANGE

To assess the safety outcome of the project/change, conduct a **preliminary hazard analysis** to determine the likely hazards that may result from the project/change and complete the table below. Giving consideration to the effect of consequences of the likely hazards with existing Controls, assign the ratings from 1 to 7 [1 (No effect), 2 (little effect), 3 (Some effect), 4 (reasonable effect), 5 (high effect), 6 (very high effect), 7 (extremely high effect)], estimate the Safety Outcome as Minimal, Reasonable or Substantial and enter this below

Hazard (as defined in Doc 9859):

A condition or an object with the potential to cause injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function

Hazard no	**Hazard Description**	**Consequences of Hazard**	**Existing Controls**	**Assign Rating based on effect on Safe operations with existing Controls**							**Brief justification for assigning Rating**
Hazard 1				1	2	3	4	5	6	7	
Hazard 2				1	2	3	4	5	6	7	
Hazard 3				1	2	3	4	5	6	7	
Hazard 4				1	2	3	4	5	6	7	
Hazard 5				1	2	3	4	5	6	7	
				TOTAL:							

List all persons assisting in the analysis process:

***Must include representatives from all significant Stakeholder Groups (eg ATM/CNS, GFS, Aviation Safety)**

Name:	Position:	Signature with Date:
Name:	Position:	Signature with Date:
Name:	Position:	Signature with Date:
Name:	Position:	Signature with Date:
Name:	Position:	Signature with Date:

Enter the estimated Safety Outcome of the change.	Result:

Equation for Percentage:

$$\frac{\textbf{Total score}}{\textbf{(7x No. of Hazards)}} \times 100 = xxx\%$$

Safety Outcome Result:

Substantial: 73% or more
Reasonable: 45% - 72%
Minimal: Up to 44%

Step 3: Assess the OVERALL SAFETY MAGNITUDE OF THE CHANGE
The Overall Safety Magnitude of the Change is a combination of the size of the change **and** the safety outcome of the change. Apply the results obtained from Steps 1 and 2 to the matrix below and tick the appropriate box to determine the Overall Safety Magnitude of the Change.

Overall Safety Magnitude of the Change			
Overall Change Magnitude	**Safety Outcome of the Change**		
Size of the Change	**Substantial**	**Reasonable**	**Minimal**
Large	Major ☐	Major ☐	Moderate ☐
Medium	Major ☐	Moderate ☐	Minor ☐
Small	Moderate ☐	Minor ☐	Minor ☐

Step 4: Safety Reporting Determination
Tick the box in the table below to indicate the type of safety report to be prepared for the change.

Overall Safety Magnitude of Project/Change		**To be reported as…..**
Major	☐	Safety Case + Safety Plan + HAZLOG
Moderate	☐	Safety Statement + HAZLOG
Minor	☐	Safety Statement

Step 5: Safety Statement (For Minor or Moderate Change)

Name:	**Position:**	**Date:**
Statement: I confirm that using the processes described above that I am satisfied that the proposed project/change is of a minor or a moderate safety magnitude. I am satisfied that the safety implications of the proposed change will be identified and adequately addressed via AAI's safety management and project management procedures.		

NOTE: Please attach HAZLOG report as required.

Step 6: HAZLOG Register (For Moderate or Major Change)

HAZLOG Register Title:	
Dated	
Location:	
Unit:	

Step 7: Safety Case (For Major change)

(Tick ☐ **Required box)**

Preparation of Safety Case assigned to:

Name:	**Position:**	**Signature/Date:**

Step 8: Sponsor
To be completed by the person, or Project Manager, who initiated the change.

Name:	**Position:**	**Signature/Date:**

Step 9: Certification
To be completed by the person who facilitated the Safety Assessment.

I certify that the Safety Assessment was conducted, fulfilling the requirements of the SMS.

Name:	**Position:**	**Signature/Date:**

Step 10: Approvals
Relevant Service Delivery Unit Manager-GM (Aerodromes/ATM/CNS/Ops & ASM) or APD.

I approve the change and accept the Safety Assessment.

Name:	**Position:**	**Signature/Date:**

Step 11: Review
Reviewed and agreed by CHQ (if deemed necessary):

Name:	**Position:**	**Signature/Date:**

Airports Authority of India

Safety Risk Assessment Preparation
Document Number : AAI-SAF-104

Approved by:	Prepared by:
Chairman, Airports Authority of India	Executive Director, Directorate of Aviation Safety

Reference Standard: **AS /NZ 4360:2004 - Risk management Guidelines**

Issue Number: **2**	Issue Date: 20th May, 2013

i. Amendment Record

Amendment Number	Sections Amended	Amended by	Date
Initial Issue			

ii. Abbreviations

ASD	Aviation Safety Directorate
ANS	Air Navigation Services
ATM	Air Traffic Management
ATS	Air Traffic Services
CAR	Civil Aviation Requirement
DGCA	Director General of Civil Aviation
FMEA	Failure Modes And Effects Analysis
HazID	Hazard Identification
HAZLOG	Hazard Log (software application)
ICAO	International Civil Aviation Organisation
PANS	Procedures for Air Navigation Services
PIR	Post Implementation Review
SCARS	Safety Case Assessment and Reporting System
SMS	Safety Management System
TNA	Training Needs Analysis

1.0 Safety Risk Assessment Preparation

Background

All changes that have an impact on the safety of the systems, facilities or services provided by AAI require a formal safety assessment to be conducted, documented and reported, prior to any change implementation. This document details the practices to complete these safety assessments.

Overview

The safety assessment process has three alternate steps depending on the safety magnitude of the change, these are:

- Completion of the relevant SCARS form and Safety Statement,
- Development of the HAZLOG and Safety Statement, or
- Development of a Safety Plan, a Safety Case and associated HAZLOG.

Each of these steps will be broken down into individual components in this document, providing a clear understanding of the SMS requirements and how these may be met through the appropriate safety document development.

A **SCARS form** is designed to assist users to qualitatively evaluate the overall safety magnitude of a project or change proposal, in order to determine what type of safety assessment and reporting is required. The SCARS form includes the **Safety Statement.**

HAZLOG shows the processes and outcomes of systematic hazard identification and risk assessment by operational and technical management. It identifies the hazards, assesses the risks, details what control measures are needed, and demonstrates that their stage of implementation.

A **Safety Plan** is used to communicate essential information to stakeholders about the proposed project or change. A Safety Plan details:

- the background and scope of the proposed change;
- assumptions, constraints or dependencies relating to the change;
- who is responsible for the change;
- the safety activities planned; and
- the methodology used for the safety assessment.

A **Safety Case** is a report that presents a structured and comprehensive argument, together with evidence, that a project or change proposal can be safely implemented into the ANS and Airports system. It is one of the primary mechanisms used by AAI Managers to demonstrate that they are effectively managing the safety implications of their project/change process. A Safety Case may be passed onto DGCA to gain their approval of a proposed change.

<u>Steps to preparing a Safety Statement, HAZLOG or Safety Case</u>

Step	Activity	Form
1	Determine what type of safety assessment is required using the Safety Case And Reporting System (SCARS) form:	SCARS
2	Where the SCARS form indicates that only a Safety Statement is required: • complete the Safety Statement detailing the justification why the change is safe and obtain the necessary sign-off on the form.	
3	Where the SCARS form indicates that a HAZLOG is required: • complete a HazID exercise and a HAZLOG Register for the change. • print a copy of the HAZLOG report and attach it to the SCARS form. • complete the Safety Statement in the SCARS form detailing the justification why the change is safe and obtain the necessary sign-off on the form.	
4	Where the SCARS indicates that a Safety Case is required, decide what type of Safety Case to use: • prepared as a single document, or • a number of parts that are aligned to the project/change phases	
5	Establish an Official File on this Safety Case and file all the related safety documents.	
6	Prepare the necessary Safety Plan (Concept/Design, Implementation, or All Phases) Note: Allow sufficient time in the planning phase for the relevant review and approval processes by ASD	Safety Plan Template
7	Safety Plan review: Arrange for a review of the Safety Plan by ASD, and send the approved copy to all stakeholders.	
8	Consider the project/change lifecycle and Safety Case development phases. Collect and collate evidence of the completed activities described in the Safety Plan, ie the workshop proceedings and results, FMEA and HazID results etc. from each project phase. See document "Safety Risk Assessment Practices"	
9	Obtain the relevant Safety Case template and commence preparing the relevant type of Safety Case, as determined in Step 4 and described in the Safety Plan.	Relevant Safety Case Template
10	Arrange for a local/peer review of the Safety Case using the Safety Case review template. Arrange for an official review of the Safety Case by ASD.	Safety Case Review Template
11	Obtain the Safety Case approvals.	
12	Following approval, file the Safety Case in the Official File and proceed with the change implementation.	
13	Before putting the change into operation, conduct a pre-commissioning check that all the Safety Requirements are met.	
14	Following commissioning into operation, maintain and update the Safety Case with information from the Post Implementation Review	

Step 1, Step 2 and Step 3:

Safety Case and Reporting System form (SCARS)

The SCARS form is the first step in the safety analysis of change. It is designed to assist users to qualitatively evaluate the overall safety magnitude of a change proposal, in order to determine what type of safety assessment and reporting is required.

The SCARS form is to be completed at the start of a change proposal, to ensure that the safety reporting requirements of the change are identified early in the project/change lifecycle.

The SCARS form must be used for changes to service levels, procedures or equipment, which will affect the performance, functional or technical specification of system, facility or service and for organisational changes affecting safety accountabilities.

Where the result of the SCARS process indicates a **Minor** change, a Safety Statement must be included in the SCARS.

The Safety Statement must provide AAI management with sufficient information to demonstrate that safety has been considered, and detailing the justification that the change presents minimal or no safety issues.

Where the result of the SCARS process indicates a **Moderate** change a Safety Statement must be included in the SCARS and additionally a HazID exercise must be conducted and the results registered in a HAZLOG Register for this change. A copy of the HAZLOG report must be attached to the SCARS form.

Where the result of the SCARS process indicates a **Major** change then a Safety Plan and a Safety Case must be produced.

If there is any confusion about the type of safety report required for a specific change, assistance is available from the ASD.

Full-time Safety Case preparer

At the start of the safety process it is appropriate for the relevant Manager to consider whether the preparation of the Safety Case will be best achieved by a dedicated full-time person. Consideration should be given to:

- magnitude and timeframe of the change,
- effort and resources required to achieve the change,
- experience of the Safety Case preparer,
- political and business risk of the change,
- the support and assistance available to the Project Manager, and
- the amount of coordination and consultation required.

Training

Safety Case preparers, Project Sponsors and other people involved in Safety Cases and accepting associated risks must have completed appropriate safety management training.

Step 4 What type of Safety Case to use?

Two main types of Safety Cases are available. These are associated with phases in the project lifecycle:

- Design/Concept Phase Safety Case,
- Implementation Phase Safety Case, and
- All Phases Safety Case.

Each of these phases has slightly different emphasis in the objectives for the safety case report and the types of issues involved. These phases are not necessarily clear cut, and can overlap. For example, design development may continue into the implementation phase as more is learned about the practicalities of trying to implement the change. In some circumstances it will be appropriate to combine the two types into a single All Phases Safety Case.

The following table provides guidance on how to structure a safety case:

Project aspect	Safety Case types
Large project scope	Concept/Design and Implementation
Long project time frames involved	Concept/Design and Implementation
Significant stakeholder interest	Concept/Design and Implementation
Significant design component	Concept/Design and Implementation
Small to medium project scope	All phases
Short time frames involved	All phases

Separate project phase safety cases offer advantages with regard to management oversight, review and approval, during the course of the project.

For large projects or significant changes it may be useful to split the Concept/Design into separate Concept and Design phase Safety Cases. This may help ensure that design effort is not wasted on an unsatisfactory concept. This is well worth considering for projects with major safety implications, projects with national or system wide implications, and projects with long development timeframes.

For large projects and significant changes to systems, facilities and services, a Design Safety Case may benefit by treating the different elements of the change in separate sections or chapters of the document, brought together by an overall Design Safety Case.

For projects impacting on multiple sites it may be beneficial to have site-specific Implementation Safety Cases, brought together by an overall Implementation Safety Case.

Step 5 Establish an Official File

Arrange for an Official File to be raised on this Safety Case and file all safety related documents (evidence) in this file.

This should include:

- the Safety Plan,
- the Safety Case,
- HAZLOG Register,
- details of all meetings, testing, and other safety activities (such a simulation); and
- all correspondence.

Step 6 Prepare a Safety Plan

A Safety Plan must be prepared before proceeding to develop a Safety Case.
A Safety Plan is used for communicating essential information to stakeholders about the proposed change. The Safety Plan details:

- the background and scope;
- assumptions, constraints and dependencies;
- who is responsible and what resources are required;
- the safety activities planned with the corresponding schedule; and
- the methodology to be used for the safety assessment.

A Safety Plan may be written for each stage of the project lifecycle, for example a Design Safety Plan followed by an Implementation Safety Plan. Where a single Safety Plan is used, it must be updated for each phase of the project lifecycle.
Guidance is provided within the Safety Plan Template.

Step 7 Safety Plan Review

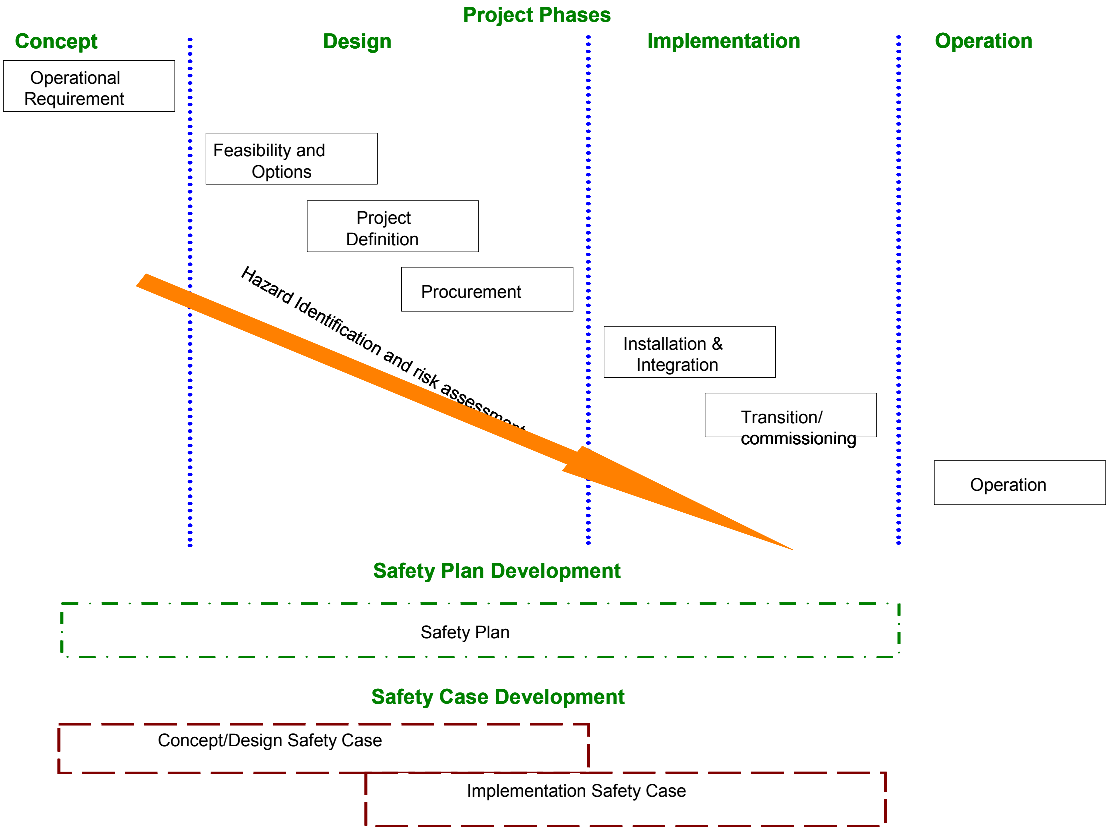
Safety Plans must be reviewed by the ASD.

After the Safety Plan has been approved, it should be communicated to all stakeholders and the original copy filed on the Official File.

Step 8 Consider the project phases and safety case development

Project Lifecycle

The following diagram shows the phases of a typical project lifecycle, overlayed with the phases of safety case development



Concept/Design Phase Safety Case

The Concept/Design Phase of a project is when the broad functionality of a new system, service, standard or process is determined.

The purpose of a Concept/Design Phase Safety Case is to show that the new concept, new system, facility or service, a new standard, or a new way of operating will be adequately safe "in principle" before trying to implement it. The Safety Case should describe the process used to develop the design solution. This should include information on the standards and design methods employed for error and hazard avoidance, detection and elimination during the development of the design, and present arguments as to why these are appropriate.

A Concept/Design Safety Case should record:

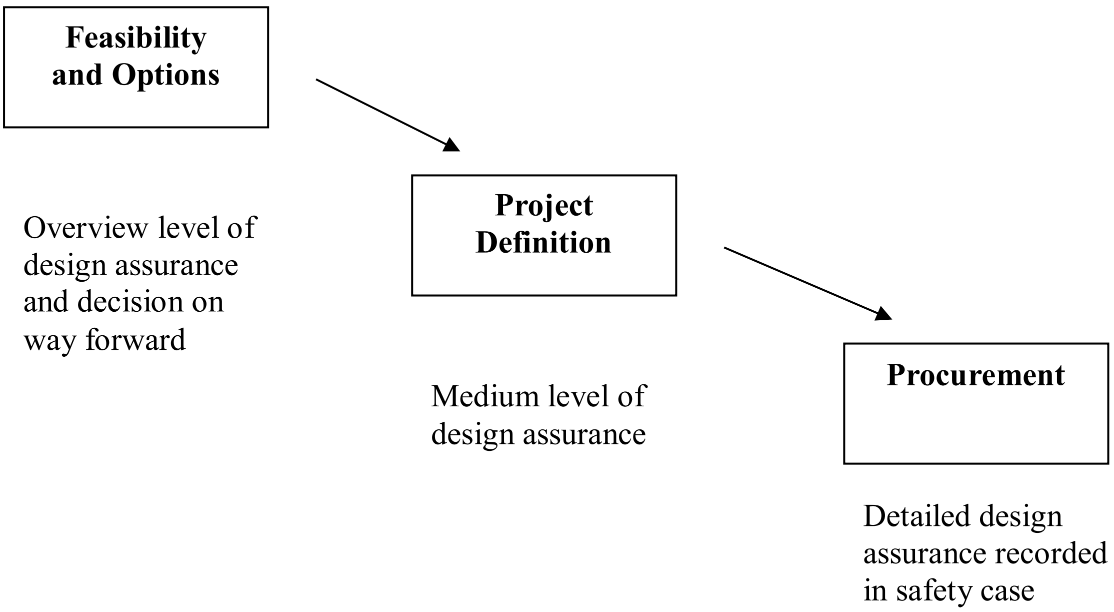
- functions and operation of the new system, facility or service;
- process by which the design of the new system, facility or service was determined– this may include compliance with statutory or regulatory requirements, functional and performance requirements, etc;
- systematic processes to identify the risks and determine the risk controls;
- risk controls and mechanisms identified in these processes;
- Safety Requirements identified as "essential" in these processes; and
- arguments that, when implemented with the identified controls, the proposed change will be adequately safe.

Assurance of the design integrity may come from, for example:

- design maturity - proven reliability and integrity;
- experience of similar systems, facilities or services;
- proven system architectures;
- design calculations - reliability and integrity; or
- safety assessment of the design solution including safety analysis, verification and validation etc.

Typical Project Design Phase

A typical project design phase can be shown as:



Feasibility and Options

During the Feasibility and Options phase different design options are developed and assessed. Establish for each option whether it is possible and practical to meet the Safety Requirements. Collect evidence for assurance that the option has the potential to meet the Safety Requirements. Record and verify constraints and assumptions identified during the consideration of options.

Project Definition

Establish with evidence that all performance objectives and Safety Requirements will be met by the system, facility proposed, the design processes will be adequate and the system or facility can be installed, constructed, commissioned and introduced into service safely. If the project has a number of different system or facility elements, apportion the safety requirements to those elements. Record and verify constraints and assumptions identified during project definition which are necessary to maintain safety.

Ensure that competing contractors are producing sufficient information and evidence concerning safety.

Contractors and contracts

AAI is ultimately accountable for Safety Cases and the overall Safety Plan. Contractors can be made responsible for discharging activities within the Safety Plan, but only within their scope of delivery. AAI may require contractors do their own Safety Plan, as a requirement within the contract. This may assist in quality assurance by allowing third party assessment of the design process. The ability to conduct third party audit and assessment should also be considered for inclusion in the contract.

The contract needs to define arrangements for the contractor to provide evidence that the procured system or facility when constructed will meet its Safety Requirements. AAI project managers should monitor and control the contractor to ensure the design process is adequate and the design implements the Safety Requirements.

Prior to delivery of a system or facility element, AAI needs to be assured that construction, installation and commissioning activities will not adversely affect the safety of the ANS and Airports system. Design Safety Case should be prepared and approved before transitioning to operation.

Design Authorities

It is important that we know who is responsible for the design integrity. The Concept/Design Safety Case should identify the design authorities for the systems facilities or services as appropriate. All Design Authorities associated with the safety case should be identified.

Functional and Performance Safety Requirements

The Concept/Design Safety Case should specify any functional and performance characteristics for the design. The characteristics are known performance requirements that do not need to be determined through hazard identification activities. Include targets for accuracy/resolution, audibility, definition, response times, ergonomics, availability and reliability, alerts, levels of service, design life, procedures and training requirements where these affect the safety of the system or facility or service in operation. Describe how these will be confirmed before implementing the change.

Potential Controls and Safety Requirements

Detail the Safety Requirements and the potential risk controls which were determined from the hazard identification activities, and their current status. Where practicable, try to describe the Safety Requirements and controls, in relation to identified failure modes and the tolerable likelihood of their occurrence.

Implementation Phase Safety Case

The Implementation or "Transition" phase of a project is when we actually move to implement a design which has already been determined to be adequately safe.

The purpose of an Implementation Phase Safety Case is to show the:

- integrity of an existing system has not been compromised
- design integrity of the new system, facility or service has been preserved by the Implementation process; and
- the new system, facility or service can be operated safety.

An Implementation Safety Case should record:
- the process by which operational and engineering readiness is achieved and signed off;
- the systematic processes used to determine the risk controls for the implementation;
- the risk control mechanisms identified in these processes including simulation, mimicking, ghosting, and roll-back plans;
- the Safety Requirements identified as "essential" in these processes;
- confirmation that the design has met its Safety Requirements; and
- the arguments that, when implemented with the identified Safety Requirements and controls, the proposed change can be safely operated.

The Implementation Safety Case should record any limitations on the use, or maintenance, of the system, facility or service identified in the design. Reliance on other systems, facilities or services should be explained. Any unresolved shortcomings which could result in a hazard should be declared, along with any temporary design fixes and workarounds.

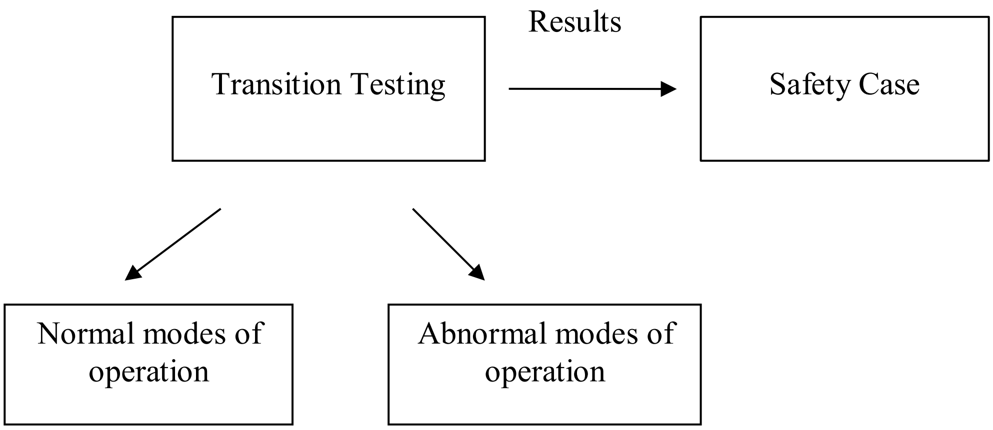
Training

Training aspects of a project/change become important during the implementation phase, as sufficient training is required to be completed prior to operation. Conversely training can be impacted if commissioning delays are experienced, which impact on the recency of training provided. The safety case should detail the outcomes of:
- training needs analysis (TNA);
- requirements determination;
- development;
- delivery;
- Performance and Assessment Check;
- capture and management of training records.

Transition Testing

A test strategy ideally should be initiated after the Safety Requirements have been achieved. In ATM system design, it is usual to functionally decompose the requirements into sub-systems of manageable complexity, which when combined provide the total system functionality. Associated with this is the progressive integration of tested sub-systems into a fully validated system.

Normal and Abnormal Modes of Operation



Normal and abnormal modes of operation should be tested in the implementation phase. Compared with normal operation all sorts of other modes may exist which pose threats to safety and need to be considered. When a system, facility or service is in its normal operating mode it can become degraded, either intentionally or unintentionally. Intentionally, could be for routine maintenance, enhancement or modification.

Unintentionally, it is most likely to be due to failure, but could be the result of sabotage. Historically, the degraded modes pose some of the greatest threats to safety.

Abnormal modes of operation may include:

- total failure;
- partial failure (degraded mode); or
- anomalous operation (not working as intended).

The Implementation Safety Case should describe the development of:
- reversion strategies in case of problems during transitioning; and
- contingency plans in case of problems during operation

Safety Performance Monitoring

It is important that the operating authority can confirm the operational safety performance of the system, facility or service. The Implementation Safety Case should specify any aspects of performance that should be monitored in service to provide assurance that the Safety Requirements continue to be met in operation.

Post Implementation Review

The levels of risk will change after the system, facility or service has been operating for a period. Some issues may not have been resolved at the time of commissioning. There may be some good safety lessons to be learnt from this change. Hence the Implementation Safety Case should describe the arrangements and timing for a review of the change following commissioning. This should include:
- how the review will take place;

- what measure(s) will be used to determine success or otherwise;
- who will be involved; and
- how the issues will be managed so that lessons can be learnt.

Step 9 Safety Case Templates

The templates listed below provide guidance for authors of Safety Cases:

Preparation	- Concept/Design Phase Safety Case Template - Implementation Phase Safety Case Template - All Phases Safety Case Template

Other templates used in the process include:

Determination	- SCARS Forms
Safety Planning	- Safety Plan Template
Review	- Concept/Design Phase Safety Case Review Template - Implementation Phase Safety Case Review Template - All Phases Safety Case Review Template

Step 10 Safety Case review – Peer, ASD and external

Safety Cases must be reviewed by Aviation Safety Directorate prior to being approved.

Depending on the magnitude of the risks, the Project Sponsor, possibly in conjunction with ASD, may decide that an external third party review is needed.

Step 11 Approvals and roles

Safety Case approval

The Safety Case approval process may vary depending on the size of the project/change and the number of units affected. The actual process to be used and who is responsible for the approving a specific project/change must be established during the initial planning and detailed in the relevant Safety Plan/s relating to the change.
Where changes have national implications the relevant Executive Director (ED) is the approval authority, with other relevant Directorate General Managers (GM) (i.e. Operating / Engineering Authorities) responsible for endorsing the Safety Case.

Where changes do not have national implications the relevant Directorate General Managers (GM) (i.e. Operating / Technical / Engineering Authorities) is responsible for approving the Safety Case.

Risk acceptance and approval

All Safety Cases must be properly approved and endorsed by the appropriate management positions as described above.

The person who **approves** a Safety Case signifies that they agree with the systematic hazard identification process, risk evaluation, and risk management plans.

Endorsement of Safety Case

Endorsement of Safety Cases by the relevant authority signifies commitment to achieving the safety performance documented in the Safety Case.

Approval to proceed

A project can only proceed if its Safety Case is approved. Of course other approvals are needed before a project can proceed, and these include budget approvals, and policy approvals based on inputs from industry, Government and elsewhere.

Project Manager

The Project Manager is the person responsible for management and completion of the project within the approved constraints of time, cost and scope. This includes preparation of a Concept/Design Safety Case, an Implementation Safety Case or an All Phases Safety Case for the change and the associated risk analysis.

Although responsible for these activities, Project Managers will probably not perform all the activities themselves. Rather the Project Manager will arrange for competent staff to perform some of the activities on his/her behalf.

Operating Authority

The Operating Authority is the person accountable for the safe operation of the system, facility or service delivered by the project or change proposal. It is generally the relevant Branch Executive Director (ED) or General Manager (GM).

Engineering/Technical Authority

The Engineering / Technical Authority is the person accountable for the engineering integrity of the system during operation, and it is generally the relevant CNS Branch Executive Director (ED) or General Manager.(GM)
A person approving a Safety Case is signifying that they agree that the document has adequately assessed and controlled the risks, and that the system, facility or service is authorised for use and complies with Statutory and Regulatory Requirements.

Step 12 File the final safety documentation

Where the Safety Plan, Safety Case and HAZLOG Register have all been amended throughout the project lifecycle, ensure that a copy of the final versions is filed in the Official File.

<u>Step 13 Putting the change into operation</u>

When all the required approvals have been obtained, proceed with the change implementation in accordance with the requirements detailed in the HAZLOG or Safety Case.

All hazards and the corresponding Safety Requirements and controls must be reviewed for their status prior to any implementation. Where it is likely that a safety requirement will not be met prior to implementation, action must be taken immediately to address this and communicted to the approving authority of the safety document.

<u>Step 14 Maintaining the Safety Case</u>

Living document or rolled into operating systems?

Some Safety Cases for a project/change will have a limited active life (up to project commissioning and Post Implementation Review (PIR). These Safety Cases will however remain part of AAI's accountability mechanisms and must be retained on file.

Other Safety Cases for changes such as the introduction of new systems, facilities or services may continue to be maintained in operation. Managers need to decide if the Safety Case will continue to be a living document, or whether the information will be transferred into any ongoing risk management systems. These decisions should have been made in the preparation of the Safety Plan, but may need to be revisited following commissioning into operation.

Post Implementation Review (PIR)

The PIR is an important step in the change management cycle, signifying the point at which a project/change process is complete, and becomes part of the operational system. The PIR information should describe the arrangements and timing for a review of the change following commissioning. Describe how the review will take place, what measure(s) will be used to determine success or otherwise, who will be involved and how the issues will be managed so that lessons can be learnt.

Updating a Safety Case

Safety Cases should be kept up to date to contain all the risks identified during the design and implementation project phases.

Guidance note: risk reduction

If controls have been introduced, or the risk REDUCED in other ways, the responsible person may leave incorporating these in the Safety Case until the time of the next cyclical review of the Safety Case.

Guidance note: risk increase

The responsible operational or Project Manager must update the Safety Case before any change is implemented which may increase risk or unassessed risks that have not been assessed.

A Safety Case should not claim that something is being done if this is no longer the case, such as a Safety Requirement or risk control that has been discontinued, a procedure that is no longer used, or monitoring activity that is no longer done.

Management review of risks, hazards, or other parts of the Safety Case

A person approving a Safety Case or accepting the risk associated with a particular hazard may add, reject or modify part or all of a hazard, and/or its associated risk evaluation, controls and Safety Requirements. Such actions must be documented and justified within the safety case. HAZLOG entries must be updated accordingly.

Audit of Safety Cases

Safety Cases are subject to audit, and should feature periodically on ASD's audit programmes to ensure that the status of Safety Requirements and risk controls continues to be valid, the identified monitoring activity is taking place, and the content remains current.

Airports Authority of India

Safety Risk Assessment Practices	
Document Number : AAI-SAF-105	
Approved by: Chairman Airports Authority of India	Prepared by: Executive Director, Directorate of Aviation Safety
Reference Standards: **ICAO Doc. 9859** **AS /NZ 4360:2004 - Risk Management Guidelines**	
Issue Number: Version 3 Issue 1	Issue Date: 20th May, 2013

i. Amendment Record

Amendment Number	Sections Amended	Amended by	Date
Initial Issue			25/11/2005

ii. Abbreviations

ALARP	As Low As Reasonably Practicable
ARFS	Aerodrome Rescue and Fire Services
ATC	Air Traffic Control
ATS	Air Traffic Services
ATM	Air Traffic Management
CNS	Communication. Navigation Surveillance
CBA	Cost Benefit Analysis
FMEA	Failure Modes And Effects Analysis
GFS	Ground and Flight Safety
HazID	Hazard Identification
HAZLOG	Hazard Log (software application)
ORA	Operational Risk Assessment
PHA	Preliminary Hazard Analysis
QRA	Quantitative Risk Assessment
SDD	Situation Data Display
SMS	Safety Management System
SMM	Safety Management Manual
SSMM	Station Safety Management Manual

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1.0 Safety Risk Assessment

1.1 Background

AAI regards safety as the most important consideration.

To ensure we discharge this obligation, we must carefully and systematically manage our effect on the safety of people who fly in the ATS and Airports System and ensure that the risk to these people remains As Low As Reasonably Practicable (ALARP). This effort must be documented in order to show our senior management, the regulator and others that we have acted diligently to achieve this outcome.

AAI-SAF-104 Safety Risk Assessment **Preparation**, as attached to the SMM details the specific requirements and processes in preparation for conducting a safety risk assessment.

This document AAI-SAF-105 Safety Risk Assessment **Practices** provides detail to support the conduct of a safety assessment throughout a project/change lifecycle.

1.2 Project Lifecycle

A project is initiated whenever AAI identifies the need for a new system, facility or service or an upgrade/enhancement to an existing system, facility or service.

A project begins with a concept and proceeds through design and implementation to operations. These phases are referred to as the project lifecycle. Most present day activities fall into the operations phase of earlier projects implemented by AAI eg in the airport context, the control of aircraft parking and ground handling activities represents the operations phase of the project which originally determined and implemented the existing aircraft parking arrangements.

A further and final phase in the life of some projects occurs when the system, facility or service is abandoned or decommissioned.

The activities involved in each phase of the project lifecycle must be subject to a risk assessment.

Because projects deliver change – either in terms of a new or upgraded/enhanced system, facility or service – the terms project and change are often used with the same meaning.

1.3 Safety Risk Assessment Principles

The following principles underlie the AAI's approach to safety risk assessment:

- the core of a safety risk assessment is a systematic risk assessment by operational and technical management which identifies hazards, assesses risk, and decides what control measures are needed;
- safety risk assessments should be expressed concisely and in plain English, with enough information that people outside the industry can also understand the safety issues involved - where jargon and acronyms cannot be avoided they should be explained;
- the risk to the travelling public resulting from the services provided in the ANS and Airports System is reduced to and remains at a level that is as low as reasonably practicable (ALARP);

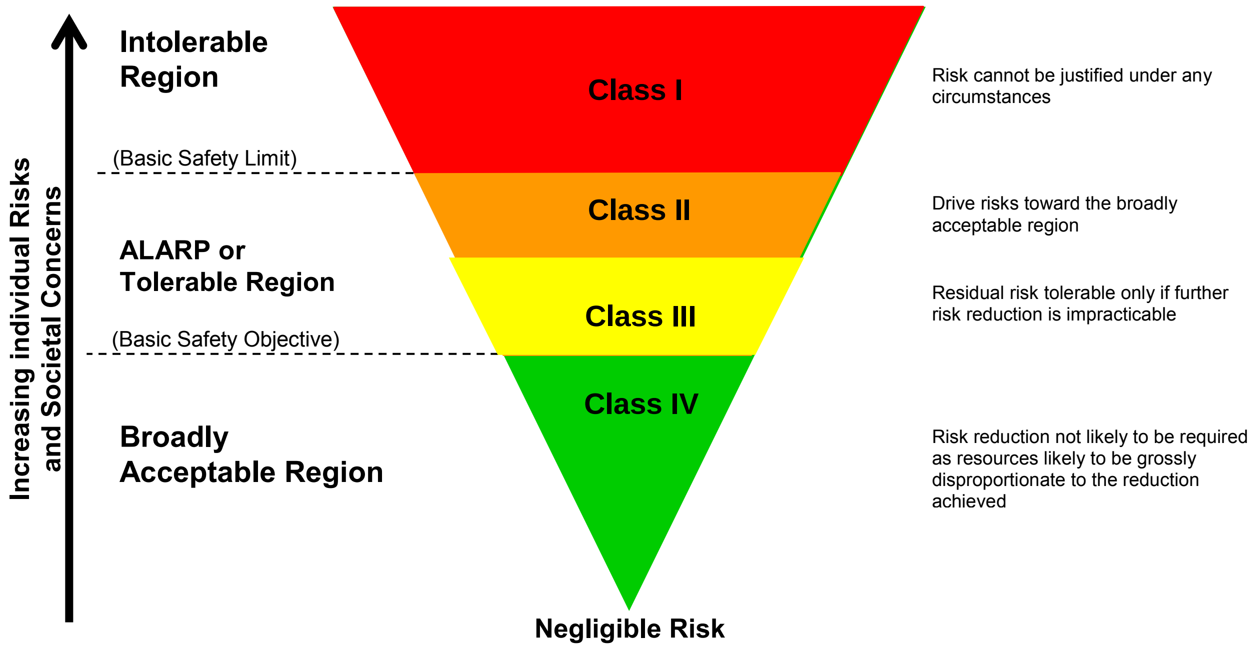
- risk controls should be described in terms of the management systems rather than just individuals or hardware;
- risk controls should be described in ways in which achievement can be measured;
- technical performance, maintenance and management issues should be incorporated into safety risk assessments where they relate to operational safety; and
- the safety risk assessment should be carried out by people with appropriate knowledge and experience and include representatives from all affected areas (internal and external).

Safety risk assessments must be conducted throughout a project/change lifecycle.

1.4 Risk Criteria and As Low As Reasonably Practicable (ALARP)

As noted in section 1.3, a key AAI safety risk assessment principle is that the risk to the travelling public resulting from the services we provide remains at a level that is ALARP. As this is a basis of our system, it is appropriate to explain the ALARP principle before detailing how we go about measuring and assessing whether hazards are ALARP.

The ALARP principle is illustrated below:



The cone is divided into four levels of safety risk with the width of the cone representing the magnitude of these risks.

There is an upper level of risk that is deemed to be intolerable. If a risk is found to be intolerable, risk reduction measures are essential, regardless of cost, or the system, facility or service in question must be decommissioned or withdrawn.

There is a lower level of risk that is deemed to be broadly acceptable. At this risk level (and below), current systems are maintained and monitored and the risk is periodically reviewed. Further risk reduction may be made, but only if the cost is insignificant.

The remaining two levels in the ALARP region lie between the upper and lower levels of risk. If risk falls into this region, it should be reduced as much as is reasonably practicable. Risk reduction measures must be identified and evaluated in terms of cost and possible risk benefit.

If the risk is assessed as falling into the ALARP region, this does not mean that the risk can be declared as ALARP. The risk can only be said to be ALARP when it can be demonstrated that all justifiable risk reduction measures have been selected and the remaining options cannot be justified because the costs of further reducing the risk are far greater than the expected benefit. As this principle requires risks to be reviewed over time it essentially amounts to operation in an environment of continuous improvement.

The ALARP concept was developed in an effort to illustrate societal expectations of infrastructure and industry. It grew out of legal evaluations of accidents, looking back to see what an employer should reasonably have done to prevent people from being injured or killed in their workplace. The evaluation of the cost/benefit balance was originally a qualitative one supposedly judged by reference to a reasonable person exercising the particular responsibility or duty of care. Over recent years, the concept has been adopted by Quantitative Risk Assessment (QRA) practitioners, with the boundaries between the risk level bands sometimes defined as numeric values.

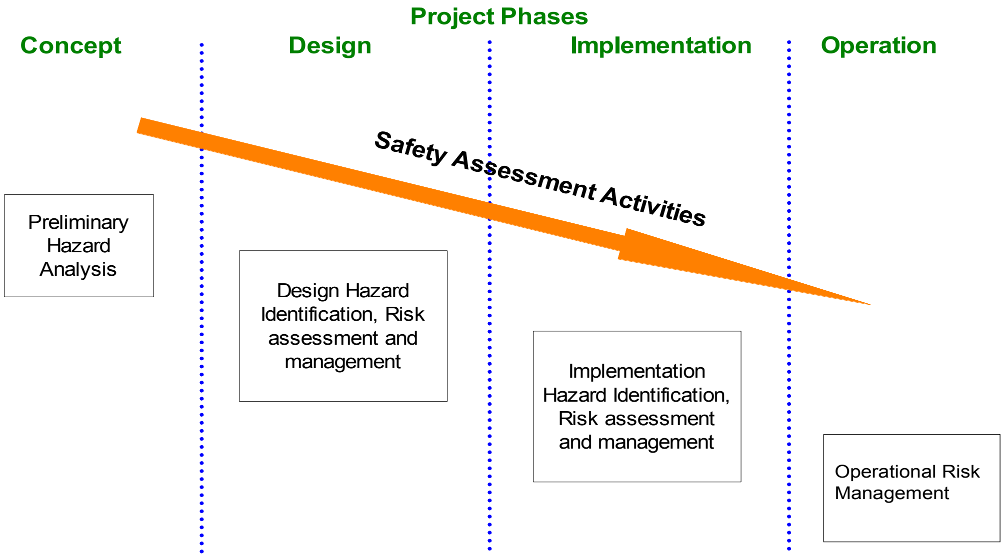
For any activity involved in a project, the overall judgement that risk is ALARP should be based on broad considerations such as:

- availability of and compliance with relevant codes and standards in design and operation i.e. whether the project is novel or very standard;
- safety record of similar systems within AAI or elsewhere;
- current state of SMS controls;
- any vulnerability to organisational error, i.e. whether this type of project something we have historically done well or otherwise; and
- safety risk assessment results as described in this document.

Section 3.5 provides more information about how ALARP relates to the results of safety risk assessment studies.

2.0 Safety Risk Assessment through the Project Lifecycle

Another key safety risk assessment principle detailed in section10 is that risk and safety risk assessment must be conducted throughout a project lifecycle. The diagram below shows the safety risk assessment activities applicable for each phase of a project commencing at the concept phase, and continuing through the design and implementation phases through to operation of the system, facility or service.



It is important to start identifying the safety requirements and risk controls early in the project lifecycle. Early feedback of safety requirements into functional specifications can save considerable time and money in design.

The following provides a brief summary of safety risk management issues and objectives at each phase of a project. Further details on the techniques mentioned are contained in later sections of this document.

2.1 Concept Phase

The purpose of risk assessment at the concept phase is to ensure that safety is taken into account in selection of the best concept and to ensure that all major safety risks are managed appropriately from the beginning of the work.

The typical technique for risk assessment at the concept stage is Preliminary Hazard Analysis (PHA). The PHA examines the broad functionality of the new system, facility or service, and considers the effects of losses of that functionality on the operating system or service. This enables the setting of high level safety objectives or safety performance requirements. A PHA Template is provided in Appendix C.

2.2 Design Phase

The purpose of safety risk assessment activities in the design phase of a project is to ensure that the design addresses safety performance requirements identified at the concept stage and that any new hazards introduced as the design has developed are also addressed appropriately.

For complex projects, a range of different safety risk assessment studies may be required for various aspects of the project e.g. a numerical reliability study for some equipment components, plus one or more facilitated workshops using Hazard Identification (HazID), Failure Mode and Effects Analysis (FMEA) or a combination of these. As a guide, the HazID technique has been found useful in many Air Traffic Control (ATC), Aerodrome Rescue and Fire Services (ARFS) and Ground and Flight Safety (GFS) situations and FMEA approach in most others, particularly in technical systems to pinpoint the likely impact on safety as a result of failure anywhere in the system. HazID and FMEA templates are provided in Appendix C.

It is important to remember that these techniques should be used in design development, not just as an add-on check at the end of the work.

Selection of a design solution should be based on the potential for the design to satisfy the safety objectives. In other words, select a design that has the best potential to meet the safety requirements established from the hazard identification activities.

Develop risk controls to reduce the risk to safety to acceptable levels and incorporate these into the design. Record and track the hazards, safety requirements and controls in the AAI Hazard Log (HAZLOG) application.

2.3 Implementation Phase

As in the design phase, facilitated workshops using HazID, FMEA or a combination of these are often used. Hazard identification and risk assessment during this phase is primarily focused on transitioning risks, that is, the risks associated with implementing a safe design. Hazards may be related to:

- integrity of the operating system during transition to operation;
- implementation of the design as intended to assure safe ongoing operation of the original and new system, facility or service.

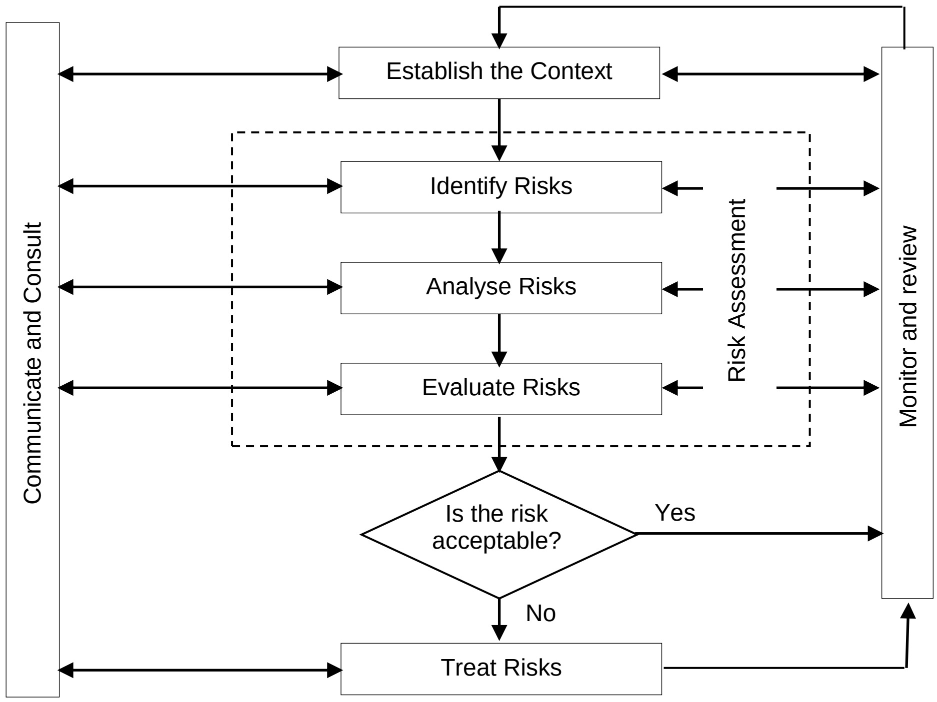
Choose a transition strategy that minimises the safety issues during the implementation phase. Develop risk controls to reduce the risk of transitioning to operation to an acceptable level.

2.4 Operations Phase

Hazard and risk information should be maintained throughout the operation of a system, facility or service. Operational Risk Assessment (ORA) includes periodic review of the identified hazards, and the assessed levels of risk associated with the hazards, the suitability and effectiveness of existing controls, and consideration of whether new or unanticipated hazards can be identified, or if new controls are needed to keep risks in the ALARP region.

3.0 The Safety Risk Management Process

The general structure for systematic risk management is contained in the International Standard AS/NZS 4360:2004 [ref 1]. The overall process is shown in the figure below.



The following sections describe the application of this process to AAI operations and activities.

The specific methodology used to identify hazards and assess risk may vary depending on the nature of a particular project/change, or the phase in the project lifecycle.

Both qualitative and quantitative methods of risk assessment are acceptable, but in either case, the same basic risk management steps are required.

3.1 Communicate and Consult

Communication and consultation are important considerations at each step of the risk management process. It is important to develop a communication plan involving all stakeholders, so there is a need to identify the stakeholders involved at an early stage.

Stakeholders are those who are potentially impacted by a particular project/change and those who have a role in controlling the related hazards and risks.

Stakeholder consultation should be designed to ensure that:

- the assessment of hazards and risks associated with the proposed project is an accurate reflection of actual field practices; and
- personnel are aware of the potential risks to which they may be exposed and their role in controlling those risks.

Part of the mechanism for communication and consultation may be to undertake parts of the risk assessment process in a workshop setting. Workshop attendees may include:

- those responsible for design of the system, facility or service under consideration;
- employees with current knowledge and experience of the system, facility or service under assessment;
- an engineering/maintenance specialist - to provide expert opinion on facility or equipment performance;

- a safety/risk specialist - to guide the application of the methodology; and
- human factors specialist.

Whilst workshops with people from different disciplines are a good way to ensure that the risk assessment process is realistic, wider stakeholder engagement may be necessary in order to communicate risk results and increase awareness.

Consideration should be given to stakeholders external to AAI, in addition to people from the various operating areas. Relevant external stakeholders may include:

- Air Navigation Services and Airports users;
- government groups;
- equipment suppliers;
- construction and maintenance contractors; and
- other third party service providers.

3.2 Establish the Context

3.2.1 Objectives and Scope

It is important to identify the scope and objectives of the project or intended change. From this, appropriate work can be planned.

The objective of the study may be one or more of the following;

- to conduct a high level review of a proposed change to identify major risk issues for consideration as part of project scoping activities; or
- to rank a series of options from a safety risk viewpoint to assist in concept selection; or
- to review a design for a change to engineering and/or ATS and/or Airport systems in detail and develop any further project safety requirements in order to ensure that the risk is ALARP; or
- to review a management system change such as a change to a procedure, organisation structure, staffing etc. to develop any further project safety requirements in order to ensure that the risk is ALARP; or
- to determine if the reliability of a system, facility or service as designed will meet proposed reliability targets.

The scope of the examination follows directly from this objective and also from considering the complexity of a proposed project/change. Appropriate techniques include:

- workshop-based risk assessments such as HazID and FMEA;
- analytical techniques such as fault tree based reliability calculations or QRA.

It should be noted that a workshop-based safety risk assessment is NOT simply a review against standards, nor is it a design development meeting. The risk assessment must have a specific design, operation or change under consideration and the focus of the session must be to identify the associated hazards.

The physical scope of the project/change under consideration should also be defined. Don’t forget to include any abnormal or emergency operating modes in addition to one or more normal operation cases.

Whilst this document focuses on techniques specifically used to assess safety risk, there are many other project activities that contribute to risk minimisation. These activities include, but are not limited to:

- the use of data or experience with similar changes to systems, facilities or services undertaken by overseas or other respected providers of air traffic services and airport facilities;
- simulation;
- the application of expert knowledge, experience and objective judgment by specialist staff, to ensure that all relevant hazards have been identified, addressed and reviewed;
- trial implementation of the proposed change in an "off-line" or "non-operational" mode, or under surveillance and with sufficient backup to revert to the existing system, facility or service before the planned change.

3.2.2 Planning

Workshop-based risk assessments

Many risk assessment activities are workshop-based. Careful workshop planning is the key to a successful session. Issues to consider are:

- who should be invited? - stakeholder considerations are discussed in section 3.1, however it is vital that a full cross section of stakeholders are represented;
- venue? - ensure there is sufficient space and facilities for a productive session;
- what technical material is required? - ensure that copies of appropriate drawings and procedures are available to the group;
- can an information pack be sent to attendees in advance? - as a minimum, an agenda and some project background information should be sent in advance of the session;
- is any training required? - it is often useful to start a session with a short briefing to get attendees to focus on the task at hand or, if some people have a low experience level with risk assessment workshops, - training may be needed before or at the start of the session.

For any session, a facilitator should be nominated. For a major project, someone external to the project should be considered to ensure that the process of the risk assessment is objective, and stays on track. The facilitator's task is to:

- keep the discussion focused on the subject system, facility or service objective(s);
- assist in stimulating a thorough and systematic search for hazards; and
- guide the meeting through the different steps of the risk assessment process.

A recorder should also be assigned to record the process undertaken and the outcomes.

The facilitator and recorder should each have sufficient system knowledge to understand the technical discussions, but they should not be the technical expert for the system under discussion, as this is a different and separate role-.

Another important issue in workshop planning is to decide how a complex project/change should be divided up for the purposes of hazard identification. The hazards in question are typically loss of service provision or unserviceability and the subsequent potential for an aircraft accident or incident. Considering hazards on a service basis, e.g. by reviewing a flight thread or aircraft ground operation, may give a better result.

If a particular system component or individual facility has been identified as particularly important in service delivery, it may be appropriate to adopt a component/facility focus to identify risks, eg an electrical power system may be identified as critical in service delivery, so a component-by-component review of that system is appropriate. In other cases considering hazards on a service basis, eg by reviewing a flight thread or the complete aircraft ground operation may give a better result.

See section 3.3 for more details on how to use qualitative techniques.

Quantitative techniques

Risk quantification (in the form of QRA or reliability calculations) can be a good way to ensure safety in design.

Numerical risk studies often involve complex mathematical models and hence can be very complex and time-consuming to undertake. Careful planning is therefore recommended before commencing the work to ensure that the results will be useful in the short and longer term.

Questions to consider are listed below. The appropriate answers will vary from study to study.

- How will the numerical inputs and results be validated or verified? Can final or interim results be benchmarked against historical data?
- How will the result be judged, i.e. what criteria will we use to decide if the result is acceptable or otherwise?
- If the modelling is to be done by external consultants, who owns the model (as distinct from the results)?
- Does AAI have the software and knowledge to run the model in the future?
- Once the project is complete, what should happen to the model, ie does it have a role in on-going risk management?
- Does the technique allow for human error in addition to technical failures?
- Does the scope include the requirement for an explicit list of modelling assumptions and input data, plus review and signoff by appropriate people?
- Does the scope of the study include sufficient time for testing the sensitivity of the results to the various assumptions made?

As a rule of thumb, approximately half the time spent on a quantitative study is spent on achieving the initial base-case figures. The other half is taken up with model sensitivity testing and review of risk reduction options.

3.3 Identify Hazards

The next step in a new safety risk assessment is to identify the hazards. As described above, in the planning stage consideration should be given to how the overall project should be divided up for consideration. This is particularly relevant to an ATC project where- typical divisions are made by:

- flight stage;
- procedural step;
- service provided; or
- system component.

Hazards are then identified for each division.

People planning and attending workshops should remember that whichever hazard identification technique is used, the desired outcome should be close to identical - a list of hazards covering all the credible things that could present a safety risk. The need for such a technique is common amongst many industries and countries and hence many terms have been coined for techniques that are essentially identical.

Hazards identified by workshop-based brainstorming can be used as input to a numerical process, or the workshop can continue to analyse the risks qualitatively (see section 3.4).

Two specific techniques are discussed below (HazID and FMEA) along with some specific guidance on consideration of human error and geometry, a critical factor in understanding potential risk of an aircraft in flight or during ground manoeuvres colliding with another aircraft, vehicle or fixed object.

3.3.1 Hazard Identification (HazID)

The method followed is in two stages. The first step is freeform brainstorming of hazards asking questions such as “What can go wrong?” and “What if...?” It is important that all suggestions are recorded and displayed prominently on a white board or similar without editing at this stage and that broad discussion is encouraged.

Once a list of hazards has been generated, a checklist of some kind is usually used as a cross check to make sure that all relevant issues have been considered. The checklist should not be used directly to generate a list of hazards. The entire purpose of workshop based techniques is to generate hazards based on the interaction of various jobs, tasks and activities in a real field setting. A HazID template is provided in Appendix C.

Checklists are available in Appendix A and B, and should be used when relevant for a particular project/change. For example, a checklist for external influences (meteorological, topographical, environmental, and man-made) is shown at Appendix A. Internal influences can be identified using the active/latent failures framework developed by Prof. James Reason [ref 2] which has been used to develop the following table.

Operationally Hazardous Scenario - Initiating Events/Causes	
Active Failures	**Latent Failures**
Human Error • Pilot • ATC • AIS • GFS • ARFS Equipment Failure • Aircraft • ATC • GFS • ARFS Workload Procedure Design Operational Failures Unserviceable Facility(ies) Unapproved Obstacles	Management and organisational Regulatory and standards Airside induction procedures Unreported air safety or airside incidents Inappropriate inspection or maintenance schedules

Workload on its own is not usually an initiating event. A high or low workload can affect the likelihood of human error however these errors are generally identified in other active failures.

Keywords or prompt words are used to systematically identify possible deviations. Appendix B contains a prompt list and example of keywords. The potential flight path deviations are noted.

Once a complete hazard list has been developed, each hazard is subject to analysis as described in section 3.4.

3.3.2 Failure Modes and Effects Analysis (FMEA)

If the focus of the workshop is equipment-based hazards, then a focus on possible equipment faults and failures may be the best way to generate a list of hazards. This is called a Failure Modes and Effects Analysis or FMEA [ref 6, 7].

FMEA differs from HazID in that for each component or procedural step in question, the group first considers the desired system state and then looks at how that may not be achieved i.e. how the system might fail.

For a step-by-step process, the facilitator might ask the group “If this step is successful, what will the system look like at the end of the step?” then “How might that not be achieved?” For a continuous system, the analogous questions might be, “What is the normal operating state of this part of the system?” and “How might the system fail?”

Similar to HazID, the workshop group should brainstorm failure modes before resorting to the checklist. An FMEA Template is provided in Appendix C.

Typical FMEA failure mode prompts
Total system failure, partial system failure, anomalous system behaviour
The possibility of common mode failures
The simultaneous occurrence of more than one fault
Human errors
External variations or failures affecting the integrity of external data, services, security, power supply, or environmental conditions

Similar to HazID, each identified scenario should be subjected to the remainder of the risk assessment process as described below. Without a process to assess risk and hence judge the relative importance of the issues found, the results are of limited value. An FMEA that goes on to assess each scenario using the risk matrix is known as a Failure Modes, Effects and Criticality Analysis or FMECA.

3.3.3 Human Error

No matter which technique is used for identifying hazards, special attention should be paid to the potential for human errors of various types. The following table describes slips, lapses, mistakes and violations [ref 2].

CLASSIFYING HUMAN ERROR		
Error Type	**Description**	**Examples**
Slips	Error of commission: The action is executed in an inappropriate way. eg. "I did something I shouldn't have done".	A GFS officer exceeding the speed limit on the airside operational area.
Lapses	Error of omission: Failure to perform the required action. eg. "I didn't do something I should have done".	Leaving a system in "test" after maintenance. Failing to change radio frequency.
Mistake:	Occur when a course of action is selected (that might be correct in some circumstances), but not in the current circumstance.	
CLASSIFYING HUMAN ERROR		
Error Type	**Description**	**Examples**
Rule based	The wrong rule is selected or it is misapplied.	An ATC who normally works on facility A being temporarily at facility B and doing what…
Knowledge based	Occur in novel situations – no stored rules or procedures exist. These errors are problem-solving or analytical errors, where experience or knowledge of the situation is limited.	A GFS officer displaying incorrect markings on an unserviceable part of the movement area.
Violations:	A deliberate decision (for whatever reason) to ignore established safety rules, codes of practice, etc.	Although a previous operator error had reduced reactor power to well below 10 percent of maximum, and despite strict safety procedures prohibiting any operations below 20 percent of maximum power, the combined team of operators and electrical engineers continued with the planned test program. This and the subsequent violations of safety procedures resulted in a double explosion within the core that breached the containment, releasing a large amount of radioactive material into the atmosphere (Chernobyl, 1986).
Routine	Tend to occur on a regular basis.	
Exceptional	Tend to be one off events.	

Both slips and lapses are skill-based errors. This means that the person has formulated the right intention (chosen the correct action to take) but executed it incorrectly. On the other hand, a mistake occurs when the decision or choice of action is incorrect.

The risk control and mitigation strategies vary considerably depending on the error type. Slips and lapses may be caused by high workload or design issues. Mistakes are more likely to be mitigated by training and procedures.

A simple model recognises the differences in the "normal" error rates between knowledge-based, rule based and skill-based decisions as follows:

If decision is…	**it is generally described as a…**	**with an error rate of…**
Knowledge-based	Mistake	1 in 10
Rule-based	Mistake	1 in 100
Skill-based	slip or lapse	1 in 1000

3.3.4 Geometry

For ATC, flight geometry is another factor that may need to be taken into account in considering the full hazard description. For a loss of service to result in an outcome with potential for fatality or injury, the geometry must be such that the aircraft may impact another aircraft, object or the ground. For two aircraft in flight, this is known as the geometry of encounter. Geometry of encounter is split into two variables:

- the likelihood of lateral encounter;
- the likelihood of vertical encounter at the defined lateral point.

The lateral encounter point is the plan view of where the flight paths cross. The likelihood of lateral encounter varies with the angle between the lateral encounter points and the flow of traffic along the flight path..

Air traffic procedures and any deviation from the required navigation tracking determine the size and time of the overlap between aircraft involved in an encounter.

For GFS, the geometry of aircraft ground movement determines the design of runways, taxiways and aircraft parking positions taking account of:

- the probability and magnitude of lateral deviation from the nominated taxi route; and
- the required wing tip separation to other aircraft, vehicles or fixed objects.

3.4 Analyse Hazards

In this step of the process the probability and severity of consequence of each hazard are identified. The range of risk controls in place is identified and the resultant risk determined.

Consequences are those conditions that could lead or arise from the hazards. Controls are those systems in place that prevent the consequences of hazard leading from the identified hazard. They essentially form a “barrier” between the consequences of hazard and the hazard.

The consequence, effect or outcome of the hazard is the ultimate undesired event that may result from the hazard. There are also often risk controls at this point that may be designed to mitigate the effect of the hazard or to assist in recovery.

Note that the purpose of this step in the process is to gain an understanding of the current (initial) level of risk associated with each consequence of the identified hazards. For each consequences of hazard, this is a combination of probability and severity, which is in itself a function of the inherent risk of the activity plus the state of the various risk controls.

The output of this step is a list of hazards and their consequences plus the risk associated with each one.

3.4.1 Controls

Out of the systematic processes used to identify hazards and develop potential risk controls, managers will identify some controls as essential to safe operations.

These are defined as “System Safety Requirements”, and must be recorded in the HAZLOG this way.

A Safety Requirement is something which **MUST** be fulfilled before the system can be operated with safety risk deemed acceptable or ALARP. Risk assessors should be judicious in defining potential controls as Safety Requirements, especially when it is not clear that the identified potential controls can be feasibly or economically implemented.

Risk controls for each consequences of hazard should be considered individually and as a group. Risk controls are often described in terms of a hierarchy such as:

- elimination,
- prevention,
- reduction and mitigation, and
- recovery.

A good risk control strategy will be biased towards the top of the list but will cover all aspects.

This means that the most effective strategy is to eliminate the hazard if possible.

If this is not possible, then the hazard should be prevented from occurring, or have the probability reduced by providing more effective means of controlling some of the consequences. Next, there should be a reduction in the severity of consequences of the hazard, for example by improving detection systems or providing additional redundancy. Finally, further measures should be taken to recover from the hazard and hence reduce the overall risk, for example by shortening repair times.

3.4.2 Severity

The purpose of this step in the process is to determine the worst credible severity that could result from consequence of the hazard under consideration.

Since the safety hazard under consideration is the safety of the flying public, the severity category definitions have also been adjusted to reflect that.

Severity of Occurrence	Meaning	Value
Catastrophic	• Equipments destroyed • Multiple deaths	A
Hazardous	• A large reduction in safety margin, physical distress or a workload that operator cannot be relied upon to perform their task accurately or completely • Serious injury • Major equipment damage	B
Major	• A significant reduction in safety margins, a reduction in the ability of operator to cope with adverse operating conditions 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 limitations • Use of Emergency procedures • Minor incident	D
Negligible	• Little consequences	E

3.4.3 Probability

Probability is the chance of the undesired outcome occurring within a specified time frame. The time frame may be over the duration of the project or over a number of years for hazards that are (or will become) part of ongoing activities.

In workshop-based methods, is determined based on the experience of the group. Reference to specific incident data may be useful.

Note that the severity and probability for each consequence of hazard must refer to the same outcome i.e. do not plot on the matrix the probability of the hazard plus the worst possible outcome. The probability used to determine the matrix location must be the probability with which that outcome is expected for that consequence of hazard, taking into account current risk controls and exposure factors.

The following table depicts the probability classification to be used for qualitative analysis based on service provision.

Probability	Meaning	Value
Frequent	Likely to occur many times	**5**
Occasional	Likely to occur some times	**4**
Remote	Unlikely to occur, but possible	**3**
Improbable	Very unlikely to occur	**2**
Extremely Improbable	Almost inconceivable that the event will occur	**1**

3.4.4 Safety Risk Matrix

When the probability and severity of the consequence of the hazard have been estimated using the previous tables, the following risk matrix shows the associated risk level ranging from 5A to 1E. These risks have been divided into four classes from class I to class IV This classification is used to determine if changes to the risk control strategy are required i.e. if the current controls should be improved or if more controls should be provided.

Risk Probability	**Risk Severity**				
	Catastrophic A	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
Frequent (5)	5A	5B	5C	5D	5E
Occasional (4)	4A	4B	4C	4D	4E
Remote (3)	3A	3B	3C	3D	3E
Improbable (2)	2A	2B	2C	2D	2E
Extremely Improbable (1)	1A	1B	1C	1D	1E

Class	Risk
I	5A, 5B, 5C, 4A, 4B, 3A
II	5D, 5E, 4C, 3B, 3C, 2A, 2B
III	4D, 4E, 3D, 2C, 1A, 1B
IV	3E, 2D, 2E, 1C, 1D, 1E

It is important to remember that the risk matrix is simply a tool that an experienced person (or group) can use to assist in structuring their experience. It allows risks from various parts of the organisation to be compared on a common basis to ensure that risks are managed appropriately i.e. that effort focus and expenditure are targeted to the most appropriate places.

There are some weaknesses inherent in a process that simplifies complex risk scenarios down to a single probability or severity categorisation.

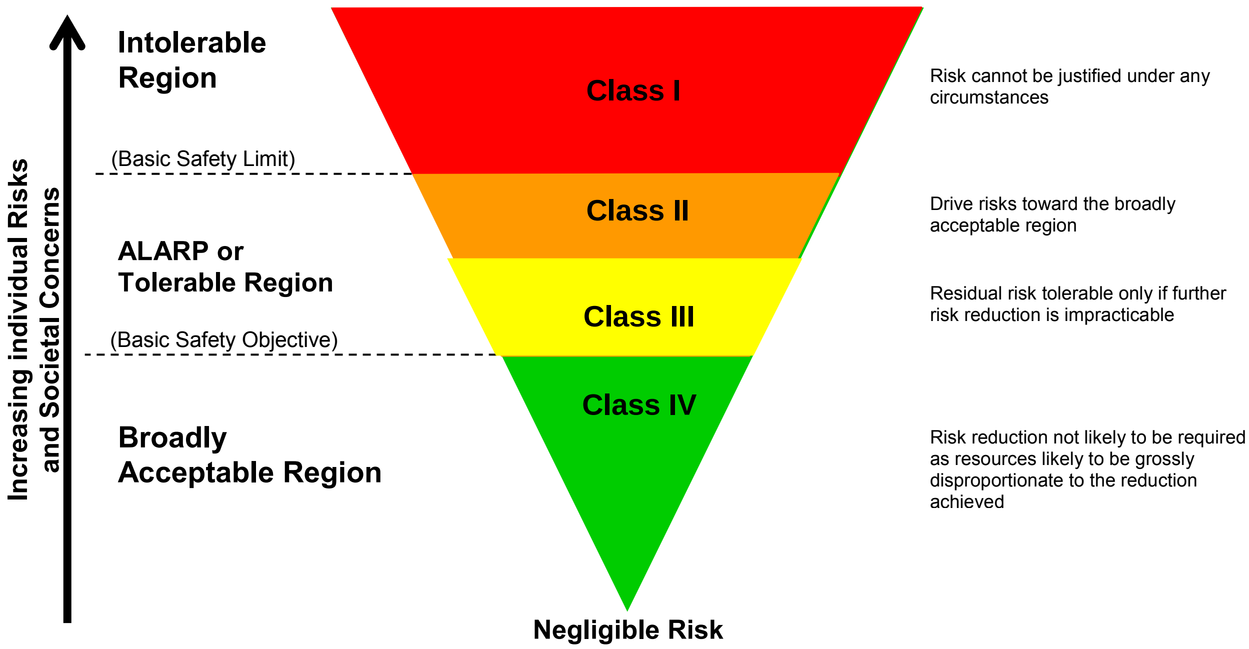
The first is in defining the scenario for which the risk is determined. Broad scenarios are likely to have a higher probability, and the probability of a particular scenario can be artificially reduced by subdividing it into parts. For example a risk that is present evenly over a one week period could be evaluated on a per day basis reducing the probability by a factor of 1/7; however this will have no real effect on the original risk.

Some scenarios can have a range of severity depending on the effectiveness of the various controls in place. Usually, there is one particular severity (the worst credible case) that is of concern. This is the risk that is plotted on the risk matrix. Sometimes there is more than one case of concern (where there is a second outcome that is less severe, but still significant, which occurs at a higher probability). In this case it is appropriate to record more than one risk for a particular hazard. The general guideline is to define the hazard to include all cases for which the specific risk controls are the same.

3.5 Evaluate Risks Against Criteria

Having established the current (initial) risk level for the hazard, the next stage is to consider is whether we need to treat the risk? Further risk control strategies may be required or preferred in order to reduce risk to a level that is ALARP.

Relating these risk classes back to the ALARP diagram, Class I risks are intolerable, Class IV risks are broadly acceptable and Class II and III risks are in the ALARP region.



Risk assessments based on qualitative methods use the table on the following page to determine what action is required, whereas quantitative studies may use quantitative criteria.

3.5.1 Matrix-Based Risk Criteria

This table describes the actions required for the various classes of risk and the level of sign off required. Operational risks classified using the risk classification matrix must only be accepted by the persons specified in the following table:

Class	Actions required and Sign Off Authority
I	Risk intolerable and cannot be justified on any grounds.
II	Risk must be reduced unless the cost of reducing the risk is grossly disproportional to the benefits gained. Only accepted in exceptional circumstances with the approval of the relevant Executive Director (ED).
III	Risk must be reduced unless the cost of reducing the risk is disproportional to the benefits gained. May be accepted by the relevant General Manager (GM)
IV	Acceptable. Maintain current systems, monitor and review. Further risk reduction is warranted only if cost is insignificant. Signing off authority is Airport Director (APD)

3.6 Treat Risks

For all identified risks, consideration must be given to additional or improved risk controls. This may include any or a combination of the following:

- system or facility redesign, modification or replacement;
- process or procedures redesign;
- reliability improvement schemes;

- personnel education or training to avert or deal with the hazards;
- various controls to improve the availability of resources, or management controls on personnel, facilities, equipment and procedures - these may be “soft” controls (procedures, training, etc.), or “hard” controls such as design fixes.

Risk controls should be developed to reduce the level of risk to a Class IV level where it is reasonably practicable to do so. The higher the level of risk, the more we should be prepared to do to reduce the level of risk.

All identified potential controls must be tracked in the HAZLOG database. If potential controls are later found to be impractical, the reasons for this should be documented in the HAZLOG and the person making the decision should be identified. Controls should remain identified in HAZLOG for the life of the system, facility or service.

It is possible to undertake formal numerical cost benefit analysis (CBA) to assist in deciding on the appropriate balance between expenditure and risk reduction. CBA requires a numerical estimate of the risk reduction associated with a particular risk control measure. The statistical lives saved over the life of the system, facility or service in question and the total cost (capital and operating over system life) can then be compared with a numerical value of a statistical life.

The level of expertise and the amount of modelling/calculation required for a CBA study is significant and hence such studies are expensive and time-consuming to undertake. In the end the result only provides one more input to the judgement required to determine if risk is ALARP. CBA is more likely to be justified if;

- the risk to be mitigated is a Class II risk;
- the proposed risk control measures are expensive;
- the issues involved are complex, making qualitative judgements difficult, but can be modelled mathematically;
- the severity involved is A (i.e. there is potential for fatalities or a large number of serious injuries).

Following the review of additional or improved risk reduction measures, the risk matrix with associated consequence and likelihood tables is used to assess the remaining or residual level of risk. This risk level should then be considered against the table in section 3.5.1.

Risk levels above a Class IV require a higher level of approval if they are to be accepted, as managers need to be aware of these risks in their areas of responsibility.

All risk assessments should be properly approved and endorsed by the appropriate design, engineering and operating authorities.

In considering whether it is appropriate to sign off on a particular hazard, managers should consider the following four guiding principles:

- risk limitation;
- risk optimisation;
- risk justification; and
- risk monitoring.

3.6.1 Risk Limitation

Risk limitation requires that the operational risk exposure is below the target level of safety set as policy. Should initial comparison determine that the risk is greater than the target level of safety, the risk must be reduced.

3.6.2 Risk Optimisation

Risk optimisation means considering how the probability or frequency of the consequences of hazard could be reduced, and implementing all reasonably practicable reductions. This includes:

- examining the possible causes of the initiating events to determine how the likelihood of these causes eventuating might be reduced;
- introducing additional recovery factors; or
- examining recovery factors failures to determine how the likelihood of these failures might be reduced.

Management then assesses the cost and practicality of each possible control and decides whether or not to implement the controls based on the results of this assessment. All steps must be recorded.

Essential controls to be implemented, once they are agreed, are recorded as System Safety Requirements in the HAZLOG and are incorporated into the SMM and relevant SSMM for relevant units.

3.6.3 Risk Justification

The risk must be justified in terms of the population exposed to the risk and the benefits derived from exposure.

3.6.4 Risk Monitoring

The risk must be monitored to ensure that the risk level is maintained. Implicit in the monitoring is the need to identify the events of interest, parameters, the reporting system, the analysis requirements and the change mechanism.

3.7 Monitor and Review

It is important to specify risk controls as clearly as possible, and in a way that their effectiveness can be measured.

Traditional equipment measures include reliability, availability, continuity, maintainability, accuracy, mean time to repair, etc. Be careful to ensure that the measures target real progress towards meeting the total operational safety requirement. For example, specifying only availability without also specifying a limit on the rate of occurrence of failures, or how quickly the system must be restored, may be unsatisfactory from a safety perspective. A very rare occurrence with a fairly long downtime may be less hazardous than frequent failures with shorter downtimes.

A good way to express a safety performance item in a contract may be:

"..the likelihood that…(the failure mode of the basic requirement)…for longer than…(the allowable time)…must be no greater than…(the likelihood of the event)…"

An ATM example might be: The probability that Radar Data Processor failure causes total loss of secondary surveillance coverage within Sector 2 for longer than 2 updates must be no greater than 10^{-7} per year.

3.8 Record the Risk Management Process

A safety risk tracking system is essential to ensure that the hazards and risks identified in the risk assessments are documented, tracked and their controls implemented.

The AAI HAZLOG has been developed for this purpose.

Any person approving a Safety Case or accepting the risk associated with a particular hazard may add, reject or modify part or all of a hazard, and/or its associated risk evaluation, controls and safety requirements.

PHA studies can be recorded on the PHA Template.

FMEA studies can be recorded on the FMEA Template.

HazID studies can be recorded on the HazID Template.

These templates are included in Appendix C.

All risk techniques must be assessed using the severity and probability criteria detailed in this document.

4.0 References

1. ICAO Safety Management Manual (Doc 9859)
2. AS/NZS 4360:2004 Risk Management
3. Reason, J (1997) Managing the Risks of Organisational Accidents, Ashgate, Aldershot
4. Rasmussen J, (1983), “Skill, Rule, Knowledge. Signals, Signs, Symbols and Other Distractions in Human Performance Models” IEEE Transactions on Systems, Man and Cybernetics Vol Sec/13
5. ICAO Doc 9689-AN/953 Manual on Airspace Planning Methodology for the Determination of Separation Minima
6. UK NATS Safety Management Manual.
7. IEC 60812:1985-07,
8. AS/NZS 3931:1998 Risk Analysis of Technological Systems

Appendices

Appendix A - External Influences – Checklist of Typical Sources

Meteorological			
Property	**Example**	**Property**	**Example**
Light	night dawn - sunrise dusk - sunset full daylight	Electromagnetic	lightning, thunderstorms sunspot St Elmo's fire solar winds
Wind	wind direction /speed wind gusts frontal movements boundary layer effects microbursts downdrafts/updrafts geographic waves windshear, cyclone	Water	drizzle rain hail snow ice fog
Temperature, Pressure and Density	High - reduced rate of climb Low - increased rate of climb	Visibility	Rain Sleet Drizzle Snow Fog Hail
Topographical			
Oceanic	icebergs tidal waves sea level	Terrain	mountains/hills valleys
Environmental			
Organic	birds animals	Inorganic	volcanic ash, bushfires smoke, dust storms thunderstorms, lightening, interference background lighting electromagnetic pulse
Man-Made			
Free Moving (not under ATC control)	Other aircraft activities Gliders, Airships, Ultra lights, Helicopters Aircraft, Parachutists Balloons, Unmanned airborne vehicles	Mobile obstacles	Other aircraft activities Airside vehicles Unmanned tugs Baggage carts Containers
Ground controlled	Laser lights Kites, Fireworks Tethered balloons Radio controlled aircraft Rockets, Firearms Construction cranes	Airside Works	Contractor activities Unserviceable facilities and/or equipment Marking of works areas

Appendix B - Deviation Prompt Lists and Keywords

ATC EQUIPMENT	Surveillance Air-ground-air communications Ground-ground communications Data communications Navigation aids Information systems	Complete loss Partial loss Corruption Degradation Incorrect information
ATC OPERATIONS	Planning Radar control Flight plan information ATC-ATC coordination ATC-pilot communications Handovers	Not done Less than required More than required Repeated Sooner than required Later than required Partly done Misordered Other action done
AIRCRAFT EQUIPMENT	Surveillance and TCAS Transponder Communications Navigation systems Flight management systems Flight systems	Complete loss Partial loss Corruption Degradation Incorrect information
AIRCRAFT OPERATIONS	Height change Course change Speed change Pilot-ATC communications System configuration Evasive action Cockpit workload	Not done Less than required More than required Repeated Sooner than required Later than required Partly done Misordered Other action done
AIRPORT FACILITIES AND EQUIPMENT	Runways Taxiways Aprons Airport lighting Visual aids Aerobridges and NIGS	Unavailable Partial failure or unserviceability Incorrect markers or markings

AIRPORT OPERATIONS	Movement area inspections Obstacle monitoring Works planning and co-ordination Bird/animal monitoring or harassment Airside access controls Emergency planning Lighting inspections and routine maintenance Aircraft parking control Surveillance of airside activities NOTAMS or permanent change to AIP	Not done Less than required More than required Repeated Sooner than required Later than required Partly done Misordered Other action done

Example keywords, property words and deviations for HazID study of ATS operations

Property key words	Flight level or altitude	Rate of descent	Heading	Airspeed or groundspeed
NOT DONE	flight level or altitude change not done	rate of descent change not done	heading change not done	speed change not done
LESS THAN	at lower flight level or altitude than required/requested	rate of descent lower than required/expected	track course change less than expected	slower than required/requested/expected
MORE THAN	at higher flight level or altitude than required/requested	rate of descent higher than required/expected	track course change more than expected	faster than required/requested/expected
AS WELL AS	change more than one parameter at the same time			
OTHER THAN	wrong aircraft changes flight level or altitude	wrong aircraft changes rate of descent	wrong aircraft changes heading	wrong aircraft changes speed
SOONER THAN	flight level or altitude change earlier than expected	flight level/altitude is lower/higher than expected	heading change earlier than expected	speed changes earlier than expected
LATER THAN	flight level or altitude change later than expected	flight level/altitude is higher/lower than expected	heading change later than expected	speed changes later than expected
MISORDERED	flight level or altitude, rate of descent, heading and speed changes misordered			

Appendix C - Templates

Preliminary Hazard Analysis (PHA)

Hazard	Consequence of Hazard	Existing Mitigation	Effect on safe operator	Proposed Mitigation	Responsibility

Failure Mode and Effects Analysis (FMEA)

Ref No.		Failure Mode:	

Effects on ANS & Airport Operations	Safeguards	Potential Additional Actions	Comments/Responsibility
Effects on Aircraft, Flight Crew/Passengers	**Safeguards**	**Potential Additional Actions**	**Comments/Responsibility**

Hazard Identification (HazID)

Project:	**Date**:

Hazard:	**Hazard #:**

Consequences of Hazard:

Existing Risk Controls:		
Severity:	**Likelihood:**	**Initial Risk Classification**:

Potential Risk Controls (may include improving existing controls) to achieve ALARP:		
Severity:	**Likelihood:**	**Residual Risk Classification:**
Comments: **Signature of Residual Risk Accepting Authority**		

Airports Authority of India

Aviation Safety Audit Manual	
Document Number: **AAI-SAF-106**	
Approved by: Chairman, Airports Authority of India	Prepared by: Executive Director, Directorate of Aviation Safety
Issue Number: **2**	Issue Date: 20th May 2013

Table of Contents

Chapter 1 – Audit Terminology

Audit	A systematic and objective review to verify compliance with the provisions of the Chicago Convention or national regulations, conformance with or adherence to SARPS, procedures and good aviation safety practices.
Audit activities	Those activities and procedures by which information is obtained to verify conformance with a SARPs, procedures, etc. Such activities may include interviews, observations, inspections and the review of documents.
Audit findings	The determination with respect to the compliance with the established standards and procedures.
Audit Follow-up	To determine progress in implementing recommendations or the corrective action plan which resulted from an audit.
Audit report	A standardized means of reporting the audit findings to designated authorities.
Corrective Action	Action to eliminate the cause of non-conformity or other undesirable potential situation.
Entry Meeting (Briefing)	A meeting of the audit team and the representatives of the station to be audited before the commencement of the audit to provide the station with information on audit process and scope of audit.
Exit Meeting (De-briefing)	A meeting of the audit team and representatives of the audited station at the end of the audit to provide the station with a brief on audit findings and proposed recommendations.
Non-Conformity	Failure to comply with identified requirement
Observation	Statement of fact made during an audit and substantiated by objective evidence.
Safety Assurance	A component of Safety Management focused on providing confidence that the safety requirement are fulfilled.

Chapter 2 – Planning of Safety Audits

SAFETY AUDITS

Audit Principles

The Audit Team shall operate using the following principles:

- be pro-active and positive;
- be system-focussed;
- be impartial and examine facts in an objective manner;
- identify non-conformance with applicable standards and procedures
- analyze procedures leading to non-conformance;
- indicate strength and weakness in key areas;
- provide positive feedback, by highlighting the good points observed during the audit.
- Identified deficiencies but negative criticism should be avoided in so far as possible;
- provide clear guidelines for improvement; and
- provide feedback on audit findings

Composition of the Audit Team

The audit is conducted by the Audit Team. The Audit team members should be independent of the area being audited. The Audit Team shall be comprised of officers from the different disciplines listed below –

- ATM;
- CNS;
- Engineering (Electrical);
- GFS; and
- ARFS.

Audits are conducted annually under normal circumstances but are also conducted whenever procedures or performance levels change.

Qualification of Auditors

The personnel selected to conduct an audit should have practical experience in disciplines relevant to the area to be audited, a good knowledge of the relevant regulatory requirements, a good knowledge of AAI's Safety Management System, and have been trained in auditing procedures and techniques.

SAFETY AUDITS (CONTINUED)

Notification of Audit

Advance notification of the audit shall be issued and will outline the following:

- audit dates and duration;
- name of officers in the Audit Team
- name of the Audit Team Leader; and
- general areas of intended audit.

The Audit Team Leader should create an audit working file containing:

- Audit Report of previous year for the station;
- summary of findings;
- correspondence audit work sheet;
- audit programme; and
- agenda for audit visit.

Audit Plan

The Audit Plan should:

- indicate time and venue, and duration of opening and closing meetings;
- cover evidence and information collected;
- cover questioning techniques;
- cover observation of activities, facilities and records; and
- cover Audit Team work.

Entry Meeting

At the Entry Meeting the Audit Team Leader should briefly present the background of the audit, its objectives, scope and any specific issue that shall be addressed by the audit team. He should also introduce the audit team and discuss about the availability of staff for interview/interaction.

Exit Meeting

At the exit meeting, the audit team leader should present the audit findings and provide written summary of findings. The meeting should also review all audit observations against relevant rules and regulations and give an opportunity to the audittee to correct misunderstanding, if any.

The date of issue of draft audit report and for receiving response should also be mutually agreed.

Safety Audits (CONTINUED)

Request for Corrective Action

The audit team leader in consultation with the audit team will raise the request for corrective action on non conformances or audit issues, as appropriate.

Draft Audit Report

The draft audit report shall be produced by audit team leader and provided to auditee within ten working days from the date of the audit. All feedback on the draft audit report must reach the audit team leader within 15 working days from the final date of the audit.

Final Audit Report

The final audit report shall be produced by the audit team leader and provided to the auditee within 20 working days from the final date of audit.

Chapter 3 – Checklists for Aviation Safety Audits at Airports

Safety Audit – Air Traffic Management (ATM)

Safety Audits - Air Traffic Management (ATM)

The Officers from ATM wing will carry out the Safety Audit of all the facilities which are related to ATS operations. The list in detail is given below:

- checking the availability and performance of signal lamp, Binocular, Aerodrome Beacon;
- performance of ATIS / DATIS;
- verification of Log Books (HOW / TOW procedures) and entries about whether VHF, DSC, NOTAM, etc. (MATS-1 Para 3.9 & 3.10);
- performance of VHF system including range;
- time check / system;
- alarm system (siren / crash bell);
- display of aerodrome data / emergency action/ grid map/ obstruction charts;
- record of Runway inspection (MATS-1 3.15)
- availability of ICAO documents – Annex 2, Annex 6, Annex 10, Annex 11, Annex 12, Annex 14, Annex 17, Annex 18 and Doc 4444, Indian Aircraft Manual, Air Radio Manual / Aerodrome Manual/ MATS-1 & 2/ Relevant SOP and Aviation Safety Circulars;
- co-ordination procedures in documented form;
- status Indicator for Nav.-aids/ Landing aids in ATS unit;
- availability of NOTAMs / AIP/ AIP Supplements in ATS units;
- emergency frequency / search and rescue frequencies as per ATM circular;
- communication facilities in ATC units like telephone, AMSS, DSC, Mobile Phone, Computer with internet (Refer MATS-1), Automation, etc;
- training cell – Documents / Training records / Training registers / Training facilities, etc;
- display of appropriate charts (IAL procedures, holding, etc);
- radar (performance, range and the records maintained for unserviceability;
- Search & Rescue Room and the facilities available for achieving the objectives;
- staff strength; and
- documents about Aircraft emergency, bomb threat / unlawful interference / danger goods occurrences / building fire / water rescue plan / natural disaster plan / Relevant DGCA CARS, AICs/ ATMCs/ SSMS Manual/ AIS Manual/ Standing Instructions/ SAR Manual/ Various SOPs e.g VVIP Flights/ Previous DGCA/ Aviation Safety Dte. Audit Report and ATRs/ disable aircraft removal and ATC contingency plan (Communication failure / frequency jammed / emergency separation).

Safety Audits (Continued) – ICAO Annex 11 Chapter 2.26

DGCA CAR, Section 9, Series E, Part I

ATS Safety Management
A safety programme shall be established in order to achieve an acceptable level of safety in the provision of ATS.

The acceptable level of safety applicable to the provision of ATS within airspaces and aerodromes shall be as per memorandum of understanding signed between service provider and Ministry of Civil Aviation / DGCA, as revised from time to time.

An Air Traffic Service provider shall implement a Safety Management System acceptable to DGCA that has a minimum:

a) identifies safety hazards;
b) ensure that remedial action necessary to maintain an acceptable level of safety is implemented;
c) provides for continuous monitoring and regular assessment of the safety level achieved; and
d) Aims to make continuous improvements to the overall level of safety.

A Safety Management System shall clearly defines lines of safety accountability throughout the Air Traffic Service provider, including a direct accountability for safety on the part of senior management.

Any significant safety-related change to the ATC system, including the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. It shall be ensured that adequate provision is made for post implementation monitoring to verify that define level of safety continues to be met.

SAFETY AUDITS (CONTINUED) – ICAO DOC 4444 SAFETY REVIEWS OF ATS UNITS

ICAO Doc.4444 – Safety Reviews of ATS units

Safety reviews of ATS units must be conducted on a regular and systematic basis by personnel qualified through training, experience and expertise and having full understanding of relevant Standards and Recommended Practices (SARPS), procedure for Air Navigation Services (ANS), Safe Operating Practices and Human Factor principles.

The scope of the ATS unit safety reviews should include at least the following:

Regulatory issues to ensure that :

a) ATS operations manual, ATS unit instructions and ATC coordination procedures are complete, concise and up-to-date;
b) ATS route structure, where applicable, provides for:
   - adequate route spacing; and
   - crossing points for ATS routes located so as to reduce the need for controller intervention and for inter and intra-unit coordination:
c) separation minima used in airspace and/or at aerodromes are appropriate and all provisions applicable to those minima are being complied with;
d) Where applicable, provision is made for adequate observation of the manoeuvring area and procedures & measures aimed at minimise the protential for inadvertent runway incursions are in place. This observation may be performed visually or by means of an ATS surveillance system;
e) appropriate procedures for low visibility aerodrome operations are in place;
f) traffic volumes and associated controller workloads do not exceed defined, safe levels, and that procedures are in place for regulating traffic volumes whenever necessary;
g) procedures to be applied in the event of failures or degradations of ATS systems, including communication, navigation and surveillance systems, are practicable and will provide for an acceptable level of safety; and
h) procedures for the reporting of incidents and other safety-related occurrences are implemented, that the reporting of incidents is encouraged and that such reports are reviewed to identify the need for remedial action.

SAFETY AUDITS (CONTINUED) – ICAO DOC 4444 SAFETY REVIEWS OF ATS UNITS

ICAO Doc.4444 – Safety Reviews of ATS units (Continued)

Operational and technical issues to ensure that

a) environmental working conditions meet established levels for temperature, humidity, ventilation, noise and ambient lighting and do not adversely affect controller performance;
b) automation systems generate and display flight plan, control and coordination data in a timely, accurate and easily recognisable manner and in accordance with Human Factors principles;
c) equipment including input and output devices for automation system are designed and positioned in the working position in accordance with ergonomic principles;
d) communication, navigation, surveillance and other safety significant systems and equipment:
    - are tested for normal operations on a routine basis;
    - meet the required level of reliability and availability as defined by appropriate authority;
    - provide for timely and appropriate detection and warning of system failures and degradation;
    - include documentation on the consequences of system, sub-system and equipment failures and degradations;
    - include measures to control the probability of failures and degradations;
    - include adequate back-up facilities and/or procedures in the event of system failures or degradations; and.
e) detailed records or systems and equipment serviceability are kept and periodically reviewed.

Licensing and Training Issues to ensure that

a) controllers are adequately trained and properly licensed with valid ratings;
b) controller competency is maintained by adequate and appropriate refresher training, including handling of aircraft emergencies and operations under conditions with failed and degraded systems;
c) controllers, where ATC unit/control sector is staffed by teams, are provided relevant and adequate training in order to ensure efficient teamwork;
d) the implementation of new or amended procedures, and new or updated communications, surveillance and other safety significant systems and equipment is preceded by appropriate training and instruction;
e) controller competency in the English language is satisfactory in relation to providing ATS to international air traffic; and
f) standard phraseology is used.

SAFETY AUDITS (CONTINUED) – ICAO DOC 4444 SAFETY ASSESSMENTS

ICAO Doc.4444 – Safety Assessments

Need for safety assessments

A safety assessment shall be carried out in respect of proposals for significant airspace reorganizations, for significant changes in the provision of ATS procedures applicable to an airspace or an aerodrome, and for introduction of new equipment, systems or facilities, such as:

a) reduced separation minimum to be applied within an airspace or at an aerodrome;
b) new operating procedure, including depature and arrival procedures, to be applied within an airspace or at an aerodrome;
c) reorganization of the ATS route structure;
d) re-sectorisation of an airspace;
e) physical changes to the layout of runways and/or taxiways at an aerodrome; and
f) implementation of new communication, surveillance or other safety-significant systems and equipment, including those providing new functionality and / or capabilities.

Proposals shall be implemented only when the assessment has shown that an acceptable level of safety will be met.

Safety-significant factors

The safety assessment must consider relevant all factors determined to be safety-significant, including:

a) types of aircraft and their performance characteristics, including aircraft navigation capabilities and navigation performance;
b) traffic density and distribution;
c) airspace complexity, ATS route structure and classification of the airspace;
d) aerodrome layout, including runway configuration, runway lengths and taxiway configurations;
e) type of air-ground communication and time parameters for communication dialogues – including controller intervention capability;
f) type and capabilities of surveillance system, and the availability of systems providing controller support and alert functions. Where ADS-B implementation envisages reliance upon a common source for surveillance an/or naviagaiton, the safety assessment shall take account of adequate contingency measures to mitigate the risk or either degradation or loss of this common source(i.e common mode failure); and
g) any significant local or regional weather phenomena.

SAFETY AUDITS (CONTINUED) – ICAO DOC 4444 SAFETY ENHANCING MEASURES

ICAO Doc.4444 – Safety Enhancing Measures	Safety Enhancing Measures a) any actual or potential hazard related to the provision of ATS within an airspace or at an aerodrome, whether identified through an ATS safety management activity or any other means, shall be assessed and classified by appropriate ATS authority for its risk acceptability; b) except when the risk can be classified as acceptable, the ATS authority concern shall, as a matter of priority and as far as practicable, implement appropriate measures to eliminate the risk or reduce the risk to a level that is acceptable; c) if it becomes apparent that the level of safety applicable to an airspace or at an aerodrome is not, or may not be achieved, the appropriate ATS authority shall, as a matter of priority and as far as practicable, implement appropriate remedial measures. d) implementation of any remedial measures shall be followed by an evaluation of the effectiveness of the measure in eliminating or mitigating the risk.

SAFETY AUDITS (CONTINUED) - COMMUNICATION, NAVIGATION & SURVEILLANCE (CNS)

Safety Audit – Communication, Navigation & Surveillance (CNS)

The audit is carried out taking into consideration the following broad aspects relevant to the facility:

- make/model;
- date of installation/ commissioning;
- environment (Internal and External);
- critical area clearance (As per Annex 10);
- status of power supply: (a) Essential (b) Non-essential;
- availability of battery backup: routine checkup records;
- availability of inter-units communication facility;
- availability of log books (site and fault-cum-history log-books) and their maintenance;
- periodic preventative maintenance schedules records;
- major breakdown maintenance: whether AMC or CMC or locally;
- equipment status and stability (main/ standby);
- monitoring system status;
- remote operation status;
- alarm system status;
- major incident involving equipment in the past one year;
- system of receiving complaints;
- system of responding to the complaints;
- types of complaints frequently reported;
- spare parts availability;
- service manuals availability;
- test equipments (Availability & Calibration);
- training requirement/ Infrastructure;
- flt. calibration reports;
- periodic reports to CHQ / RHQ;
- annual serviceability record, and
- any other parameters related to CNS facilities.

SAFETY AUDITS (CONTINUED) - COMMUNICATION, NAVIGATION & SURVEILLANCE (CNS)

Safety Audit – Communication, Navigation & Surveillance (CNS) (Continued)

The communication facilities at the following major units are audited:

- ATM – Control Tower / ACC/ APP/ Radar;
- Anti-Hijacking Control Room;
- Equipment Room / Workshop;
- AMSS and SSS;
- Automation;
- Communication Briefing and message room;
- HF RT room;
- EPABX;
- Radar Display Room;
- Glide Path;
- Localizer;
- Outer marker;
- DVOR / DME;
- Radar site;
- Transmitting station; and
- Security equipment installations.

SAFETY AUDITS (CONTINUED) – ENGINEERING – ELECTRICAL / CIVIL

Safety Audit – Engineering – Electrical / Civil

During the safety audit, the following areas maintained by Electrical and Civil wing are covered:

- general guidelines;
- electrical hazards;
- don'ts and do's;
- static electricity and spark hazards;
- electrical safety tips;
- common misconceptions;
- precautions and procedures;
- electrical shock training;
- safety practices;
- first aid for electricity injury;
- electrical emergency;
- electrical safety law;
- technical instructions, Circulars and guidelines related with safety issued by Directorate of Engineering and CNS-Ops;
- ICAO Recommendations and Standard related with Ground lighting systems such as runway light, taxi lights, approach light, PAPI system and apron flood lighting system, etc;
- electrical safety guidelines given in National Building code and Indian Electricity Rules 1956 with latest amendment;
- training on maintenance of E & M installations;
- spares of E&M installations;
- availability of testing instruments;
- functional / maintenance status of the safety devices provided by the manufacturers in the major equipments / systems such as:
  - power transformers, HT / LT breakers;
  - standby generators;
  - conveyor belts;
  - escalators & elevators;
  - passenger boarding bridge;
- earthing system provided in all the locations near terminal building, Nav-Aids, Ground Lighting systems and Power House, etc;
- lightning protection system provided in all locations;
- airconditioning system in Terminal building and other operational building;
- water supply and drainage system around the terminal building;
- maintenance status (Civil) of Terminal Building & allied building and surface condition of runway, taxiway and approach road; and
- any other facilities related to operation and Passenger Facilities is also covered.

SAFETY AUDITS (CONTINUED) – GROUND AND FLIGHT SAFETY

Safety Audit – Ground and Flight Safety (GFS)

- Aerodrome Reference Point – Establishment and notification
- Aerodrome Elevation – Notification
- Aerodrome Reference Temperature – Notification
- Aerodrome Dimensions and related information –
    - Runway: Characteristics of Runway – Runway strip, Runway End Safety Area and Stopway – Length, width and surface type, etc
    - Taxiway – Designation, width, surface type, etc
    - Apron – Surface type, aircraft stand and Apron Management
    - Clearway – length, ground profile
    - Markings of – runways, taxiways and aprons
    - VOR check-point
    - Pre-flight altimeter check points
    - Designation of standard taxi-route
- Strength of pavements – Notification
- Declared distances – Notification
- Condition of the movement area – notification
- Removal of disabled aircraft – information concerning the capability to remove an aircraft disabled on or adjacent to the movement area.
- Visual aids – wind direction indicators, landing direction indicators, signaling lamp, signal area, markers, etc
- Displacement of obstruction lights – objects to be marked/ lighted.
- Aerodrome vehicle operations procedures
- Emergency plans
- Bird hazard reduction – bird hits, measures to control bird menace
- Mandatory instruction signs and information signs

SAFETY AUDITS (CONTINUED) – AVIATION RESCUE AND FIRE SERVICES

Safety Audit – Aviation Rescue and Fire Services

The audit is carried out taking into consideration the following broad aspects relevant to fire services:

- rescue and fire services – building / cargo complex, etc;
- infrastructure / work environment;
  - housing for fire appliances; and
  - fore court area;
- human resources management;
  - deployment of staff; and
  - training – station level / FTC etc;
- documentation of co-ordination with different agencies like City fire brigade;
- assessment of fire crew performance / competency;
- calibration test for all pressure gauge / pressure regulators;
- documentation of different activities like Log books, Airport emergency plan, Joint inspection register, etc;
- fire extinguisher;
- water supply at fire station;
- communication facilities;
- hydraulic test machine / compressor for breathing apparatus set / air compressor;
- personal protective equipment / rescue equipment;
- reserve storage of media;
- grid map;
- crash fire tender;
- ambulances;
- first aid room;
- movement area; and
- terminal building/ cargo complex.

Airports Authority of India

HAZLOG Business Rules

Document Number:	AAI-SAF-108
Approved by: Chairman, Airports Authority of India	**Prepared by:** Executive Director, Aviation Safety Directorate
Issue Number:2	Issue Date: 20th May, 2013

Note

The electronic copy of this manual is controlled through

Aviation Safety Directorate CHQ.

Any hard copy of information from within must be considered to be uncontrolled.

The onus is on the user of the information to verify currency.

Amendment Record

On receipt of each new amendment to this document, the holder must complete all details on the amendment record sheet below.

Amendment Number	Section Amended	Amended by	Date
1	Initial Issue		25 Nov 2005

Table of Contents

General Information

Purpose of this Manual	This document defines the requirements for the use of the Airports Authority of India (AAI) Production Version of the HAZLOG (hazard log) application. A demonstration Version is available for user practice and familiarisation.
What is HAZLOG?	HAZLOG is an electronic data base application for recording and tracking safety related hazards and risk control information within AAI.
Why HAZLOG?	To effectively manage safety risks, a system of documentation is necessary that allows the subject matter, identified risks and risk controls to be easily accessible, interacted with, and reportable. The HAZLOG application is the tool AAI uses for this system of documentation.
References to HAZLOG	All references to the HAZLOG in the safety documents AAI-SAF-104 and AAI-SAF-105 refer to the HAZLOG application described in this document.
Scope	This document applies to all HAZLOG users.
Changes to this document	Changes to this document can only be made and approved by Aviation Safety Directorate.

Definitions:

For the purpose of this document, the following definitions apply:

Service Delivery Unit	Operational areas of each Directorate.
Consequence[1]	Outcome or impact of an event: there may be more than consequence from one event; consequences can range from positive to negative; be expressed qualitatively or quantitatively; are considered in relation to the achievement of objectives.
HAZLOG Data Fields	Fields defined as "compulsory" in this document refer to those that must be filled in as part of the HAZLOG application processes. Fields defined as "mandatory" in this application refer to those that must be filled in as part of the Service Delivery Unit requirements.
Hazard[1]	A source of potential harm.
Likelihood[1]	Used as a general description of probability or frequency, can be expressed qualitatively or quantitatively.
Risk[1]	The chance of something happening that will have an impact upon objectives. It is measured in terms of a combination of consequence and likelihood.
Risk Acceptance	An informed decision to accept the consequences and the likelihood of a particular risk.
Risk Control[1]	An existing process, policy, device, practice or other action that acts to minimize negative risk or enhance positive opportunities.
Risk Management[1]	The culture, processes and structures that are directed towards realizing potential opportunities whilst managing adverse effects.
Risk Management[1] Process	The systematic application of management policies, procedures and practices to the tasks of communicating, establishing the context, identifying, analysing, evaluating, treating, monitoring and reviewing risk.
Risk Reduction[1]	Actions taken to lessen the likelihood, negative consequence, or both, associated with a risk.
Safety Requirement	A risk control identified as essential to safe operations. A Safety Requirement is something which MUST be fulfilled before the system can be operated reasonably safely.
Operational Risk Assessment (ORA)	A Unit/System Operational Risk Register.

[1] *Reference: AS/NZS-4360: 2004 Risk Management Standard*

HAZLOG Overview

Overview

The HAZLOG application uses a three tier data structure:

1. **Register**: A Register describes the project or risk management activity and is where the hazards and controls relating to this are recorded. A Register may contain any number of hazards and controls.

2. **Hazard**: Details the hazard and the corresponding control information. A hazard may have any number of controls.

3. **Control**: Details the control or safety requirement information relating to a specific hazard. A control may apply to any number of hazards; however it must be recorded independently for each hazard. This ensures the contextual relationship between the hazard and control is retained, and the effectiveness of the control can be determined appropriately for each hazard.

Each of these data levels is accessed through separate screens, which enable the user to enter the required information directly into the application. The diagram below represents this data structure.

The following chart diagrammatically represents the three tier data structure.
Note: A Register may contain any number of hazards, and a Hazard may contain any number of controls.

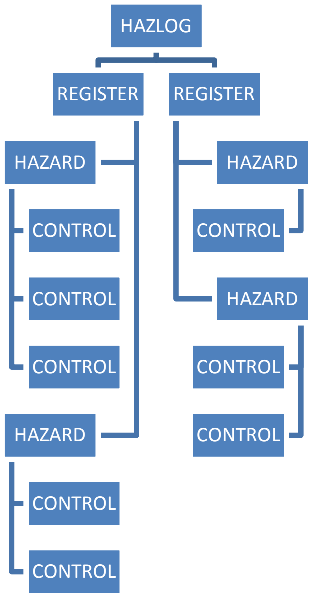


Fig. 1 – Three Tiered Data

HAZLOG Overview (Continued)

Authorities

Register Manager:
Each Register must be assigned a Project Manager who is responsible for the overall management of the Register and associated hazards and controls. E.g. GM GFS, GM Automation Airport Director, ED -XYZ. The Register Manager may appoint a Hazard Manager and Coordinator to assist with this process.

Hazard Manager:
Each hazard must be assigned a Manager who is responsible for managing that specific hazard and associated controls. The Register Manager oversights the risk management activities of the Hazard Manager.

Action Officer:
Each control must be assigned an Action officer who is responsible for completing the activities necessary to implement the control.

Note: The same person may appointed to any number of the above positions within a Register.

HAZLOG Access and Management

HAZLOG Access

HAZLOG currently can only be accessed through standalone installations of the application on selected PC's. There is no networking capability, and consequently, no ability to share data between standalone instances of the HAZLOG application.

Local users are responsible for local back-up and archive of the database on a periodic basis determined by the level of HAZLOG activity, but not exceeding 1 month.

The current HAZLOG application has no user log-in or access control. Access to the application, data and reports is controlled by access/log-in to the PC.

User Categories

All users have full Read-Write access. This includes access to all reports.

HAZLOG Application Manager

The HAZLOG Application Manager is nominated by the ED ASD.

When To Use HAZLOG

When HAZLOG must be used	The HAZLOG application must be used to record all SAFETY related hazards identified through safety management processes, hazard identification processes, or through any Operational Risk Assessment activities.

How To Use HAZLOG

How to use HAZLOG

The HAZLOG User Guide is currently a standalone document installed in the same directory as the application. This document will be maintained and updated by Aviation Safety Directorate CHQ. This is a controlled document. Updates will be indexed despatched by ASD-CHQ.

User assistance can be obtained through the Regional Aviation Safety Unit, or through Aviation Safety Directorate CHQ.

A shortcut to the HAZLOG application is placed on the PC Desktop during the installation process.

To start HAZLOG, double-click on the Desktop shortcut icon.

HAZLOG Register

HAZLOG Project Register

The HAZLOG Project Register details the hazards and controls recorded for a project or risk management activity. An example of the Project Details creen is depicted below.

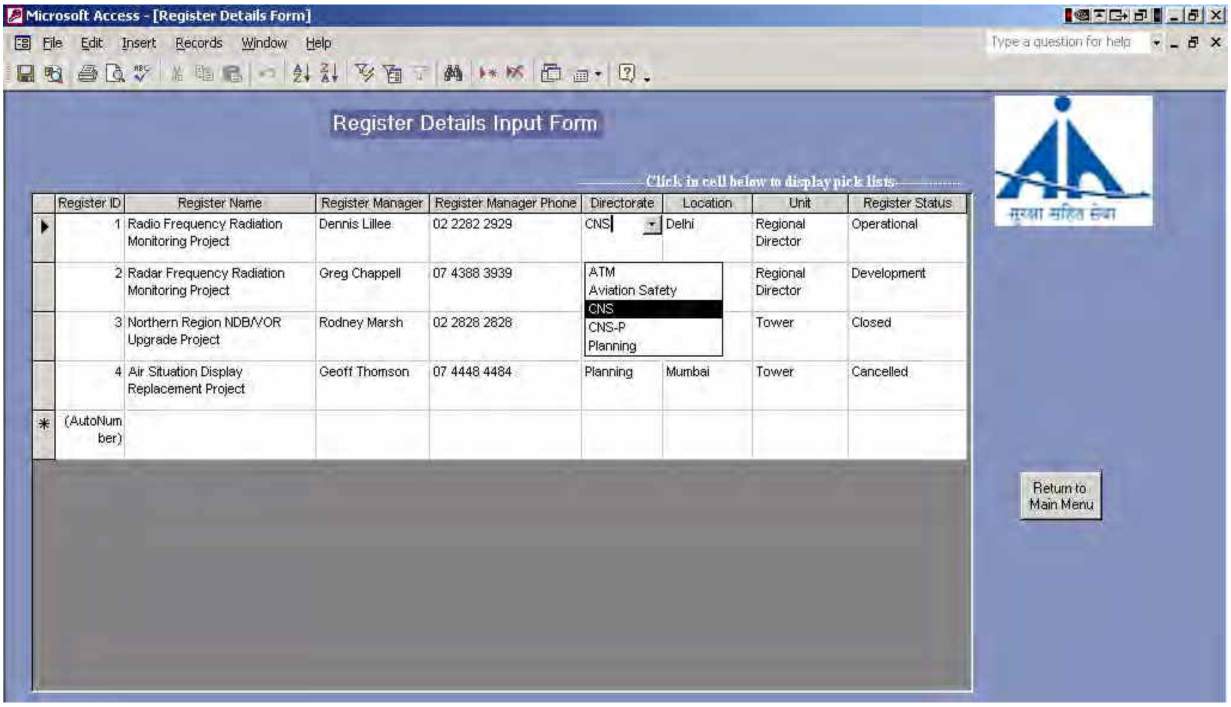


Fig. 2 – Register Details Input

Project Register Requirements

Mandatory fields are the:

- Register Name;
- Register Status;
- Register owner (Directorate, Location, unit);
- Register Manager (Name, Phone, Address); and
- Date Opened date.

A Register can be saved without these mandatory fields containing information if it is not available when the Register is opened. Users may choose to enter "information not yet available".

HAZLOG Register (Continued)

Unit Pick-lists

Register owner data is selected from Drop-down Pick lists in Fig. 2 above.

These lists need to be built and maintained for each HAZLOG Installation.

Click on "Update Unit Information" on main screen to access these lists.

Development Register

The Register has been established, however the project or risk management activity is still in the development stage and has not been placed into operational service.

Development registers must be reviewed prior to a change being placed into operational service, and all outstanding issues re-assessed from an operational perspective. Development risks carried over into the operational phase must be accepted by the relevant operational authority.

Manager Requirements:

The Register Manager is responsible for the management of the hazards and controls in accordance with the requirements of the safety documentation relating to the Register. E.g. Safety Assessment Report or Safety Case.

Operational Register

There are two types of Operational Registers.

1. The Register is an ongoing Service Delivery Unit/System Operational Risk Assessment (ORA), with the Next Review date for each Hazard representing the next time the Register Manager is expecting to review the hazard and controls recorded within it.

2. The Register relates to a project or risk management activity that has been implemented into operational service; however a Post Implementation Review (PIR) has not been conducted or the Project not been completed.

Manager Requirements:

The Register Manager is responsible for the ongoing management of the Register, Hazards[1] and Controls.

[1] The responsibility for managing specific hazards within a Register may be assigned to a person other than the Register Manager. Where this occurs, the Register Manager must ensure that the hazards are managed in accordance with the procedures detailed in this document.

HAZLOG Register (Continued)

Complete Register

A Register is Complete when an appropriate PIR process has been completed on an Operational Register that relates to a project or risk management activity that has been implemented into operational service.

The Register hazards have been closed, with any remaining active hazards and the associated controls, being transferred into to a Unit/System ORA. (Refer Hazard requirements for close and transfer).

Manager Requirements:
The Register Manager must approve the change of status from Operational to Complete, provide justification for the change in the Details field of the Register, and ensure the Register fields for status and date are updated.

The Register Manager must also ensure that any outstanding issues carried over into operational service are included in the appropriate Unit/System ORA, and accepted by the register manager.

Cancelled Register

A Register may be Cancelled after a decision has been made to end a project or risk management activity still in Development, which will not be implemented into operational service.

Manager Requirements:
The Register Manager must approve the change of status from Development to Cancelled, provide justification for the change in the Details field of the Register, and ensure the Register fields for status and date are updated.

HAZLOG Hazard

HAZLOG Hazard

The Hazard screen has a number of fields available to describe in detail the hazard, initial and residual risks, controls, and related information.

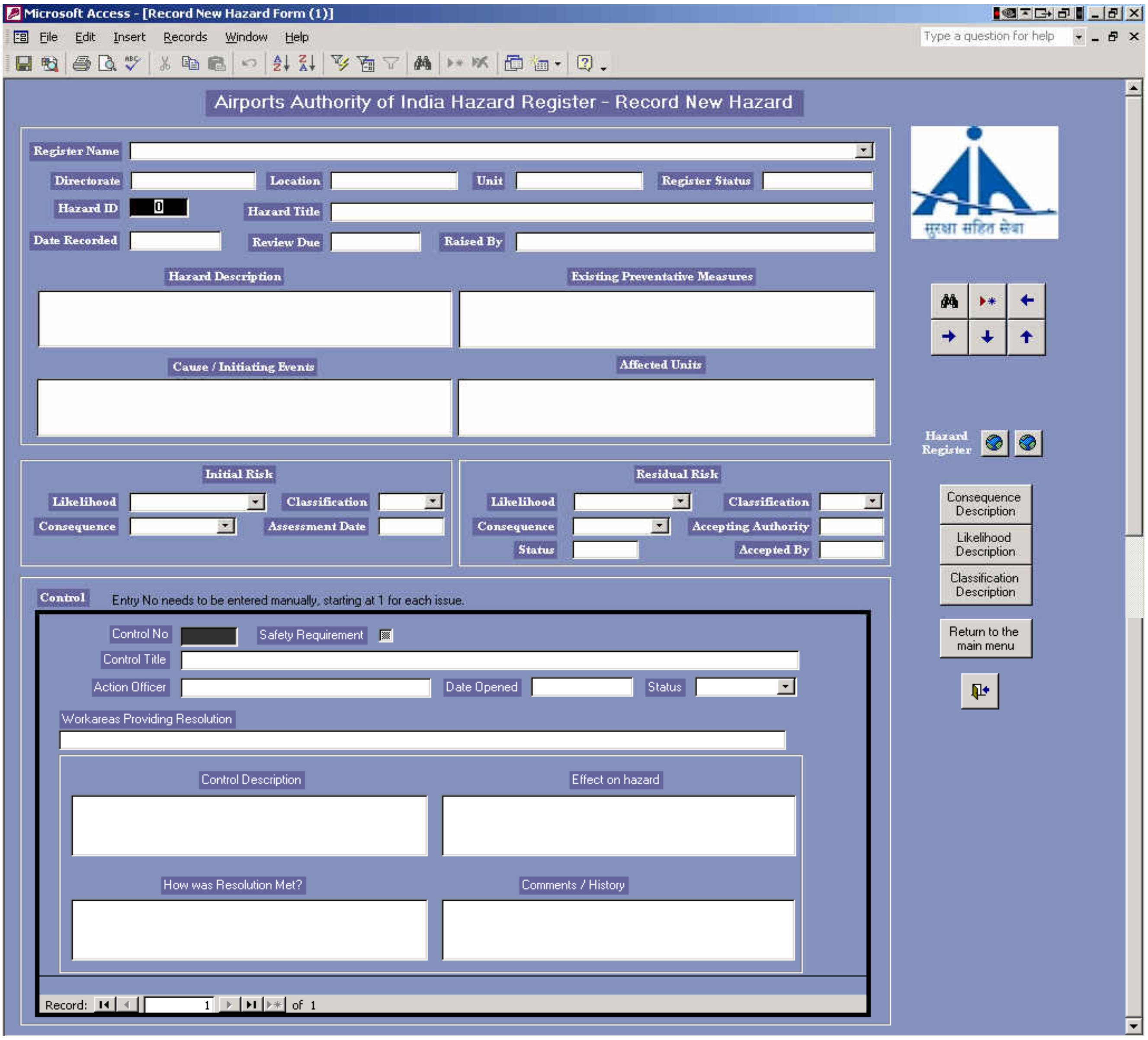


Fig. 3 – New Hazard Screen

HAZLOG Hazard (Continued)

Hazard Requirements

Mandatory fields are:
- Register Name (selected from Dropdown list);
- Owner (Directorate, Location & Unit (defaulted from Register details);
- Hazard ID (system generated);
- Hazard Title;
- Recorded date;
- Review date;
- Description;
- Cause/Initiating Events;
- Affected Working Units;
- Initial Risk section (see Hazard Risk section below); and
- The residual risk section (see Hazard Risk section below).

A hazard can be saved without these mandatory fields containing information if it is not available when the hazard is opened. Users may choose to enter "information not yet available".

The following fields should be completed where relevant information is available:
- Hazard Description;
- Existing Preventative Measures;
- Cause / Initiating Events; and
- Affected Units.

Hazard Status

There are two hazard Statuses to select from:
1. Active; and
2. Closed.

These are described below.

Active Hazards

A hazard is defined as Active when it requires ongoing management of controls; and has the potential to, or currently is, affecting the operational environment. An active hazard can only exist in a Development or Operational Register.

Manager Requirements:
The Register Manager is responsible for the ongoing management of the hazard and associated controls.

HAZLOG Hazard (Continued)

Closed Hazards	A hazard is defined as Closed when it no longer affects the operational environment. This status can only be assigned to a hazard through an appropriate PIR process, a hazard transfer process, or a management review of a Service Delivery Unit/System ORA. Closed hazards must still be reviewed until they are Archived. A hazard cannot be closed if there are still controls associated with it that cannot be closed as well. **Manager Requirements**: The Register Manager must approve the change of a hazard status from Active to Closed and provide justification for the change in the Hazard Description field of the hazard. The Register Manager must ensure the hazard fields for status and date are updated.
Hazards in Operational Registers	Operational hazards must have all of the mandatory fields completed. **Manager Requirements:** Register Managers must ensure compliance with the requirements detailed above.
Hazards in Development Registers	Hazards may be identified at different stages during the development phase. As hazard information becomes known, it must be recorded in the Register and reviewed as part of the ongoing project management. The Review date represents the target date for implementation, or a date prior to this as determined by the relevant Manager. **Manager Requirements**: The Register Manager must ensure that the hazards and controls recorded in Development Registers are proactively managed and reviewed prior to any implementation into operational service. The Register Manager must also ensure that any active hazards or controls TRANSFERRED to an operational register or ORA are accurately recorded, and that the Register Manager accepts the transferred Hazards and associated risk assessment (See Transferring a Hazard section below).
Hazards in Complete Registers	Hazards in Complete Registers must be closed (see the requirements for a Register to be Complete and hazard to be Closed). **Manager Requirements:** The Register Manager must ensure compliance with the Manager Requirements for a Complete Register and a Closed Hazard.

HAZLOG Hazard (Continued)

Transferring a Hazard to another Register
(Hazard includes all associated controls in the originating Register)

The hazard transfer process allows hazards that were introduced into the operational environment through change management processes (Development Register to Operational Register), to be integrated into the ongoing operational risk management process. This procedure enables the Register Life Cycle to progress (Operational Register to Complete Register), promoting more effective and efficient management of identified risks.

An Active hazard(s) may be transferred from an Operational Register to a Service Delivery Unit/System ORA(s) as part of the commissioning process. When a hazard is transferred, the originating Register must Close the hazard, and the receiving Service Delivery Unit/System ORA must record the hazard as Active.

Hazard Transfer Procedure

The originating Register Manager must coordinate the transfer of the hazard(s) with the receiving Register Manager, approve the change of a hazard status from Active to Closed, provide justification for the change in the Comments/History field of the hazard, and ensure the hazard fields for status and date are updated. When all hazards are Closed, the Register status must change from Operational to Complete. (See Complete Register requirements).

Manager Requirements:
The receiving Register Manager must ensure that ALL of the hazard(s) fields are updated accordingly.

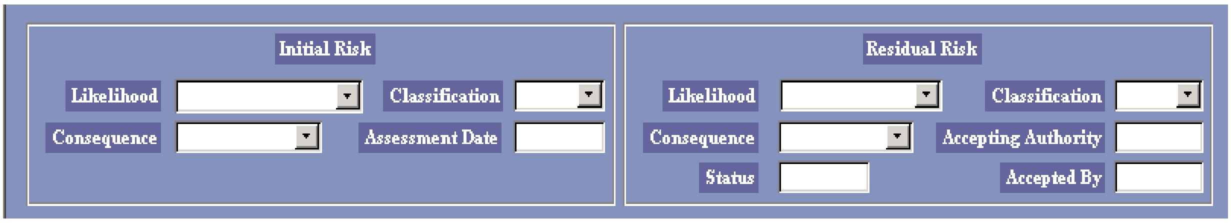
Transferring Hazards by changing Register Status

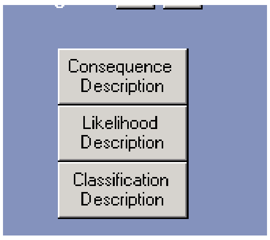
Hazards may also be transferred from Development to Operational by changing the Register status in the Update Register screen. In this case, it is the responsibility of the originating development register manager to co co-ordinate with the receiving operational register manager to ensure that all active hazards transferred are accepted. A note that this has been done shall be entered into the details field in the register update screen.

Hazard Risk Section

Risk Section

The risk section forms part of the mandatory fields for hazards. It has a number of fields available to describe the risk assessment of the hazard.





Click these buttons to see description of Likelihood, Consequence and Classification

Fig. 4 – Risk Section

Risk Requirements

The risk section mandatory fields are:

- Initial Risk:
  - Likelihood;
  - Consequence; and
  - Classification.

- Residual Risk:
  - Likelihood;
  - Consequence;
  - Risk Status; and
  - Accepting Authority.

These fields must be completed in accordance with AAI-SAF-105.

The Date and Comments fields should be completed where relevant information is available.

Manager Requirements:
The Hazard Manager must ensure compliance with the requirements detailed above.

Hazard Controls

HAZLOG Controls

The Control screen has a number of fields available to describe in detail the control and other related information.

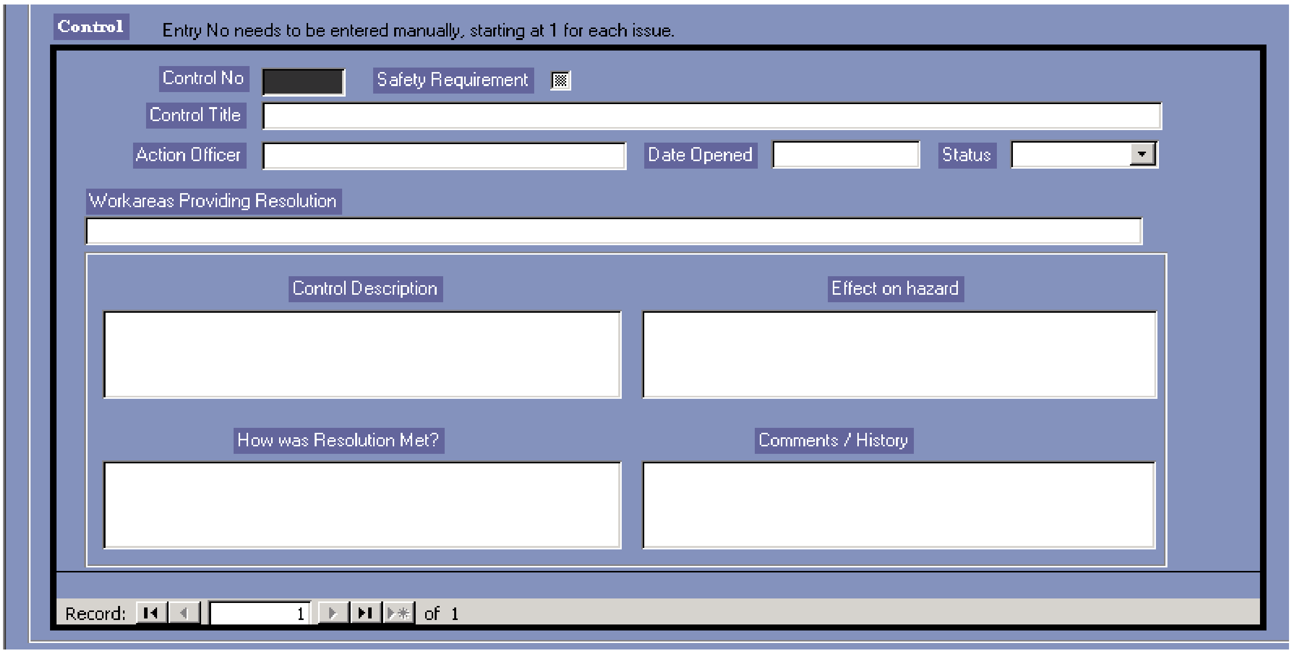


Fig. 5 – Control Screen

Hazard Controls (Continued)

Control Requirements

Mandatory fields are:

- Control ID (entered manually);
- Safety Requirement flag;
- Control Title;
- Action Officer;
- Opened date;
- Control Status;
- Work area providing resolution;
- Control Description; and
- Effect of control on hazard.

The Comments/History[1] should be completed where relevant information is available.

A control can be saved without these mandatory fields containing information if it is not available when the control is opened. Users may choose to enter "information not yet available".

Is the Control a Safety Requirement Yes or No

Where a control is determined to be a "Safety Requirement" through the safety management process; YES must be selected in this field.

Manager Requirements:
The Register and Hazard Manager must ensure that this field selection is correct, and is updated should this change.
If a control is marked as a safety requirement, it is MANDATORY that the control be met prior to the activity generating the hazard being placed in to active service.
NOT-MET SAFETY REQUIREMENTS CAN NOT BE TRANSFERRED TO OPERATIONAL REGISTERS.

Control Status

There are three control statuses to select from:

1. Yet to be met;
2. Not Met; and
3. Met.

These apply to ALL controls and are described below.

Hazard Controls (Continued)

Yet to be met	A control that is planned to be implemented, but has not been completed.
Met	A control that has been implemented. How this was achieved must be entered into the Reference field.
Not Met	A control that was considered for implementation, but will not be adopted. Justification for this decision must be entered into the Comments/History field. If the control was also a Safety Requirement, the justification must include the alternative measures taken to control the risk, and verification of the Residual Risk classification. **Manager Requirements**: The Hazard Manager must ensure that the control information recorded complies with the requirements details above, and is updated whenever a change is made.
Controls in Active Hazards and Operational Registers	Controls in Active hazards and Operational Registers must have all the compulsory and mandatory fields completed. Safety Requirements must be "met", if not, the justification must be detailed in the control Comments/History field, including the alternative measures taken to control the risk, and verification of the Residual Risk classification. **Manager Requirements:** The Hazard Manager is responsible for the ongoing management of the hazard and associated controls.
Controls in Active Hazards and Development Registers	Controls in Active hazards and Development Registers may still be under development, and therefore unable to contain all the information required. All controls must be completed in accordance with the requirements of the safety documentation relating to the Register prior to implementation. E.g. SCAR or Safety Case. **Manager Requirements:** The Register Manager is responsible for the management of the hazards and controls in accordance with the requirements of the safety documentation relating to the Register. E.g. SCAR or Safety Assessment.

Hazard Controls (Continued)

Closed Controls

A control may be Closed when it no longer affects the operational environment. This status can only be assigned to a control through an appropriate PIR process, a hazard transfer process, or a management review of a Service Delivery Unit/System ORA. Closed controls must still be managed until they are Archived.

Manager Requirements:
The Register Manager must approve the closing of a control and provide justification in the Comments/History field of the control. The Hazard Manager must ensure the control date field is updated.

Closed Hazard Controls

A hazard cannot be closed if there are still controls associated with it that cannot be closed as well. Controls in closed hazards must still be managed until the control and the associated hazard are Archived.

Manager Requirements:
The Hazard Manager is responsible for the ongoing management of the hazard and associated controls.

Transferring a Control

When a hazard is transferred, all controls associated with it must be transferred also.

Manager Requirements:
The same Manager Requirements apply as those detailed for the transfer of a hazard.

Airports Authority of India

AVIATION SAFETY DIRECTORATE

<PROJECT TITLE>

<Design/Implementation/All Phases>
Safety Plan Template

The following signature block is required to be completed, by the person:

- **Preparing** the Safety Plan.
- **Proposing** the Safety Plan: as the means of communicating and managing the safety aspects of the project. This person is responsible for the management of the project.
- **Accepting** the Safety Plan: as the means of communicating and managing the safety aspects and their effect on operations during the course of the project. This person(s) is responsible for the ongoing safety of operations during all phases of the project. Where the project impacts multiple Directorates, signatures are required from each Directorate.
- **Approving** the Safety Plan: where changes have national implications, the relevant Directorate ED is the approval authority.
- **Endorsing** the Safety Plan: the ED Aviation Safety directorate will endorse Safety Plans supporting the development of Safety Cases, following a successful review.

NAME AND POSITION	SIGNATURE	DATE
Prepared by: <insert name> **Position: <insert position>**		
Proposed by: <insert name> **Project Manager**		
Accepted by: <insert name> **Operating Authority**		
Accepted by: <insert name> **Engineering Authority**		
Approved by: <insert name> **Position: <insert position>**		
Endorsed by: <insert name> **Aviation Safety Directorate**		

About this Template:

This template is designed to assist staff with the development of a Safety Plan. The headings and information (italics) contained within the template are for guidance.
Document authors may find it necessary to add or omit information from the template, depending on the project being proposed. Additional information about Safety Plans can be found in AAI-SAF-104: Safety Risk Assessment Preparation.

Non project related information should be removed (all blue italic text).

i. Document control information

Document Owner	
File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

Amendment Record			
Issue Number	**Section(s) Amended**	**Amended by**	**Date**
1	Initial issue		25/11/2005

ii. Table of contents

1. Background

Why has the change come about? Describe the reasons for undertaking this project. Include reference to the relevant SCARS where applicable.

2. Purpose

What does this document do? Describe the purpose of this document and what it is expected to achieve. Is this a Design, Implementation or All Phases Safety Plan?

3. Scope of the change

What is the change? Describe the present system, facility or service and the change(s) proposed.

Consider the affect on:

- service(s) provision under ICAO;
- service delivery lines;
- systems*/facilities/services including design, operations and maintenance; and
- people and associated procedures.

* Note: System includes the data and networks aspects of the system

4. Assumptions, Constraints and Dependencies

What do I need to state up front that could influence the safety outcome of the change?

4.1 Assumptions

Describe any assumptions being made which could affect the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which could restrict the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which could impact the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities. For example:

Title and Name	Primary Responsibilities
Project Sponsor:	• Go/No-Go decision on Project
Project Manager:	• Completion of the project within the constraints of safety, time, cost and scope • Development, monitoring and approval of Project Plan • Monitoring and review of Hazard Log
Subject Matter Experts: (All Directorates)	• Development of operational documentation and procedures • Development and delivery of Training • Participation in HazID Workshops • Endorsement of Staff
ATS Systems Specialist:	• Development of plans for and implementation of the agreed technical proposal, including Engineering Readiness and Delivery and Transition Plan • Identification of technical hazards and development of controls and safety requirements • Liaison with CNS/other ATM areas/Airport Operations • Facilitate development of the Safety Case
CNS Specialist:	• Development of an Engineering proposal • Development of plans for and implementation of the agreed technical change including works plans and safety considerations • Facilitate development of the Safety Case
Airport operations Specialist:	• Development of plans for and implementation of the agreed facility change including works plans and safety considerations • Identification of operational hazards and development of controls and safety requirements • Liaison with CNS/ATM/other airport operations • Facilitate development of the Safety Case
Safety Specialist:	• Preparation of this Safety Plan and Safety Case • Facilitate HazID workshops

6. Consultation and Communication

Who do I need to consult and communicate with? Describe the consultation and communication arrangements to be undertaken by the project team throughout the project phases. This includes both internal and external stakeholders, and may include, but is not limited to:

- Planning Branch,
- ATM,
- CNS,
- Airport Operations,
- Defence – local and/or National,
- Airlines and other Aviation Bodies,
- External and/or international ATS providers,
- ICAO representatives, and DGCA.

7. Safety Management Activities

What am I going to do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for each area of change indicated in the scope, and for each phase of the project. For example: changes to the design, operation or maintenance of services, facilities, or equipment, and the associated procedures and people. These may include, but are not limited to:

- HazID Workshops – use relevant competence and experience for facilitation and participation in workshops. Participants must include a broad representative range of stakeholders, including external parties where necessary. If there is a potential need to hold additional workshops, these should be flagged.
- testing, verification and validation;
- simulation and training exercises;
- trial implementation – under surveillance and with sufficient backup or reversion strategy, until sufficient data and experience has been acquired;
- preliminary studies - evaluation of overseas or other experience;
- reviewing past and current hazard information; and
- quantitative modelling - based on sufficient data, using a validated model and analysed assumptions.

8. Timelines and Milestones

What are the timelines and milestones for the safety activities and ongoing safety process? Detail the target dates and locations for the planned safety management activities. Milestones should include subsequent safety document development, e.g. Safety Case, and allow time for the peer review and ASD approval processes.

Date	Location/Activity

9. Resources

What people and facilities will be required to conduct the safety assessment work for this change? Identify the resources that will be required to carry out the safety management activities from the operational, support and technical areas.

10. Training and Education

What are the training/education requirements, and how will they be addressed? Describe the proposed arrangements for the:

- training needs analysis (TNA);
- requirements determination;
- development and delivery; and
- Performance and Assessment Check.

11. Review

Does the plan adequately describe the safety management activities required for this change?

Has the process been followed? Is the content valid? Describe the arrangements for the review of the Safety Plan. Detail how recommendations resulting from the review process may be included.

12. Approvals

Who accepts responsibility for the safe outcome of the project? Detail the Approval Authorities and requirements for the resultant Safety Case. State whether DGCA approval of the change is required prior to the change being implemented.

13. Related documents

List any related documents.

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Airports Authority of India

AVIATION SAFETY DIRECTORATE

<PROJECT TITLE>

Concept/Design Safety Case Template

The following signature block is required to be completed by the person:

- **Preparing** the Safety Case.
- **Proposing** the Safety Case: as the means of communicating and managing the safety aspects of the project. This person is responsible for the management of the project.
- **Accepting** the Safety Case: as the means of communicating and managing the safety aspects and their effect on operations during the course of the project. This person(s) is responsible for the ongoing safety of operations during all phases of the project. Where the project impacts multiple Directorates, signatures are required from each Directorate.
- **Approving** the Safety Case: where changes have national implications, the relevant Directorate ED is the approval authority.
- **Endorsing** the Safety Case: the ED Aviation Safety directorate will endorse Safety Plans supporting the development of Safety Cases, following a successful review.

NAME AND POSITION	SIGNATURE	DATE
Prepared by: <insert name> **Position: <insert position>**		
Proposed by: <insert name> **Project Manager**		
Accepted by: <insert name> **Operating Authority**		
Accepted by: <insert name> **Engineering Authority**		
Approved by: <insert name> **Position: <insert position>**		
Endorsed by: <insert name> **Aviation Safety Directorate**		

About this Template:

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Document authors may find it necessary to add or omit information from the template, depending on the project being proposed. Additional information about Safety Plans can be found in AAI-SAF-104: Safety Risk Assessment Preparation and AAI-SAF-105: Safety Risk Assessment Practices.

Non project related information should be removed (all blue italic text).

The information in sections 1 to 5 of this document may be obtained from the associated Safety Plan. In using this information, the document preparer should first review the information in the Safety Plan to check that it remains valid. Safety document preparers should ensure the document is clear and concise. Statements should be supported by evidence..

Elements of a Concept/Design Safety Case:

The Design Phase of a project is when the broad functionality of a new system/facility/process is determined.
A Concept/Design Safety Case should record the safety assurance activities and their outcomes, including the:

- *functions and operation of the new system;*
- *process by which the design of the new system was determined– this may include compliance with statutory or regulatory requirements, functional and performance requirements of the new system etc;*
- *options considered and rejected;*
- *systematic processes to identify the risks and determine the risk controls;*
- *risk control mechanisms identified in these processes including the safety requirements identified as "essential";*
- *argument that the concept/design is fundamentally safe.*

i. Document control information

Document Owner	
File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

Amendment Record			
Issue Number	**Section(s) Amended**	**Amended by**	**Date**
1	Initial issue		25/11/2005

ii. Table of contents

1. Background

Why has the change come about? Describe the reasons for undertaking this project. Include reference to the relevant SCARS where applicable.

2. Purpose

What does this document do? Describe the purpose of this document and what it is expected to achieve.

3. Scope of the change

What is the change? Describe the present system, facility or service and the change(s) proposed for that system.

Consider the affect on:

- Service(s) provision under ICAO;
- Directorates, Aerodromes, ATS Centres and Units;
- Service Delivery Lines;
- Systems*/Facilities/Processes including design, operations and maintenance; and
- People and associated procedures.

* Note: System includes the data and networks aspects of the system

4. Assumptions, Constraints and Dependencies

What did I state up front that influenced the safety outcome of the change? Detail any additional assumptions, constraints and dependencies not included in the Safety Plan. Validate all the assumptions, constraints and dependencies affecting the safe outcome of the change.

4.1 Assumptions

Describe any assumptions made which affected the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which restricted the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which impacted the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities.

6. Consultation and Communication

Who did I consult and communicate with? Describe the consultation and communication arrangements that were undertaken by the project team throughout the project phases. This includes both internal and external stakeholders.

7. Design Process

7.1 Design Integrity

How did I develop a good design? Describe the process used to develop the design solution. This section should provide information on the standards and design methods employed for error avoidance, detection and elimination during the development of the design and present arguments as to why these are appropriate.

Assurance of the design may come from, for example:

- design maturity - proven reliability and integrity;
- experience of similar systems/facilities/services;
- proven system architectures; and
- design calculations - reliability and integrity.

In some cases, design development may not be completed until the system has been operated and evaluated in its intended environment. Outstanding work affecting safety assurance of the design should be highlighted.

7.2 Functional and Performance Requirements

What are the "underived" or "given" functional and performance requirements? Specify any functional and performance characteristics for the design. Include targets for accuracy/resolution, audibility, definition, response times, ergonomics, availability and reliability, alerts, levels of service, design life, procedures and training requirements where these affect the safety of the system, facility or service. Describe how these will be confirmed before implementing the change.

7.3 Design Confirmation

How have I confirmed that I have developed a good design? Provide evidence (such as test results) that the design meets the intended requirement and fulfills the safety objectives, and that the functional and performance requirements have been achieved.

7.4 Design Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

7.5 Design Limitations and Shortcomings

Does the system or facility not do anything that it was intended to do? Does its use need to be limited in some way? State any limitations on the use, or maintenance, of the system or facility, or shortcomings identified in the design. Reliance on other systems, facilities and services should be explained.

Any unresolved system shortcomings which could result in a hazard should be declared.
Temporary design fixes and short term procedures or workarounds should be declared.

7.6 Design Authorities

Who is responsible for the design integrity? Identify the Design Authorities for the systems, facilities and services as appropriate. All Design Authorities associated with the Safety Case should be identified.

7.7 Design Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the design phase of the project.

Provide information on:

- how the hazards were identified for the design phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (e.g. Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);
- why was this process selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls; and
- timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

7.8 Design Hazards, Controls and Safety Requirements

What are the outcomes of the design hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

7.9 Design Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

8. Conclusion

A Safety Case should contain both the evidence and ARGUMENT that a concept/design is adequately safe "in principle". Use the evidence gathered during the safety assessment process to make the ARGUMENT that this concept/design is adequately safe "in principle".

9. Document Review

Has the process been followed? Is the content valid? Provide a summary statement that there was a local/peer review and the review comments have been considered and acted on where appropriate in the safety document. Review feedback should be available on file, the reference should be provided.

10. Appendices

Include any appendices referred to in the text.

11. Related documents

List any related documents (eg. Safety Plan, etc.) and provide internal links where appropriate.

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Airports Authority of India

AVIATION SAFETY DIRECTORATE

<PROJECT TITLE>

Implementation
Safety Case Template

The following signature block is required to be completed by the person:

- **Preparing** the Safety Case.
- **Proposing** the Safety Case: as the means of communicating and managing the safety aspects of the project. This person is responsible for the management of the project.
- **Accepting** the Safety Case: as the means of communicating and managing the safety aspects and their effect on operations during the course of the project. This person(s) is responsible for the ongoing safety of operations during all phases of the project. Where the project impacts multiple Directorates, signatures are required from each Directorate.
- **Approving** the Safety Case: where changes have national implications, the relevant Directorate ED is the approval authority.
- **Endorsing** the Safety Case: the ED Aviation Safety directorate will endorse Safety Plans supporting the development of Safety Cases, following a successful review.

NAME AND POSITION	SIGNATURE	DATE
Prepared by: <insert name> **Position: <insert position>**		
Proposed by: <insert name> **Project Manager**		
Accepted by: <insert name> **Operating Authority**		
Accepted by: <insert name> **Operating/Engineering Authority**		
Approved by: <insert name> **Position: <insert position>**		
Endorsed by: <insert name> **Aviation Safety Directorate**		

About this Template:

This template is designed to assist staff with the development of a Safety Case. The headings and information (italics) contained within the template are for guidance.
Document authors may find it necessary to add or omit information from the template, depending on the project being proposed. Additional information about Safety Plans can be found in AAI-SAF-104: Safety Risk Assessment Preparation and AAI-SAF-105: Safety Risk Assessment Practices.

Non project related information should be removed (all blue italic text).

The information in sections 1 to 5 of this document may be obtained from the associated Safety Plan. In using this information, the document preparer should first review the information in the Safety Plan to check that it remains valid. Safety document preparers should ensure the document is clear and concise. Statements should be supported by evidence.

Elements of an Implementation Safety Case:

The Implementation or "Transition" phase of a project is when we actually move to implement a design which has already been determined to be adequately safe. An Implementation Safety Case should record the safety assurance activities and their outcomes, including the:

- *process by which operational and engineering readiness is achieved and signed off;*
- *systematic processes to identify the risks and determine the risk controls for the implementation;*
- *risk control mechanisms identified in these processes including simulation, mimicking, ghosting, and roll-back plans;*
- *safety requirements identified as "essential" in these processes;*
- *confirmation that the design has met its safety requirements through implementation;*
- *argument that, when implemented with the identified controls, the system/facility/service can be operated or provided safely.*

i. Document control information

Document Owner	
File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

Amendment Record			
Issue Number	**Section(s) Amended**	**Amended by**	**Date**
1	Initial issue		25/11/2005

ii. Table of contents

1. Background

Why has the change come about? Describe the reasons for undertaking this project; include reference to the relevant SCARS where applicable.

2. Purpose

What does this document do? Describe the purpose of this document and what it is expected to achieve.

3. Scope of the change

What is the change? Describe the present system, facility or service and the change(s) proposed for that system facility or service.

Consider the affect on:

- service(s) provision under ICAO;
- directorates, aerodromes, ATS centres and units;
- service delivery lines;
- systems*/facilities/services, including design, operations and maintenance; and
- People and associated procedures.

* Note: System includes the data and networks aspects of the system

4. Assumptions, Constraints and Dependencies

What did I state up front that influenced the safety outcome of the change? Detail any additional assumptions, constraints and dependencies not included in the Safety Plan. Validate all the assumptions, constraints and dependencies affecting the safe outcome of the change.

4.1 Assumptions

Describe any assumptions made which affected the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which restricted the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which impacted the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities.

6. Consultation and Communication

Who did I consult and communicate with? Describe the consultation and communication arrangements that were undertaken by the project team throughout the project phases. This includes both internal and external stakeholders.

7. Design Process

7.1 Design Confirmation

Describe the process used to confirm that the design solution has not been compromised during the implementation process. Provide evidence (such as test results) that the design meets the intended requirement and fulfills the safety objectives, and that the functional and performance requirements have been achieved.

7.2 Design Limitations and Shortcomings

Does the system or facility not do anything that it was intended to do? Does its use need to be limited in some way? State any limitations on the use, or maintenance, of the system or facility or shortcomings identified in the design. Reliance on other systems, facilities or services should be explained.

Any unresolved system or facility shortcomings which could result in a hazard should be declared. Temporary design fixes and short term procedures or workarounds should be declared.

7.3 Design Risk Management

Describe the process for managing the hazards previously identified in the concept/design phase of the project. Describe the process for reviewing the design HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

8. Implementation Process

8.1 Transition to Operations

What process will be followed for installation, integration and transitioning to operations? Detail the process by which operational and engineering readiness is achieved and signed off.

8.2 Implementation Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

8.3 Implementation Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the implementation phase of the project.

Provide information on:

- how the hazards were identified for the design phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (eg Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);
- why was this process selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls;
- timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

8.4 Implementation Hazards, Controls and Safety Requirements

What are the outcomes of the design hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

8.5 Implementation Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

8.6 Pre-Implementation Risk Assessment

Describe any activities for review of the risks just prior to commissioning, and their outcomes.

9. Procedures and Engineering Support

What procedures and support arrangements have I had to develop or change? Confirm that the relevant ATS/ engineering/airside operations procedures and instructions, Service Level Agreements, maintenance agreements, contacts etc developed as a result of the change are in place.

10. Safety Performance Monitoring

How am I going to confirm the ongoing operational safety performance of the system, facility or service? Specify any aspects of the system, facility or service performance that should be monitored in service to provide assurance that the safety requirements continue to be met in operation.

11. Training and Education

How have the training/education aspects been addressed? Detail the outcomes of:

- training needs analysis (TNA);
- requirements determination;
- development;
- delivery;
- Performance and Assessment Check; and
- capture and management of training records.

12. Business Continuity

What do we do if we encounter problems that could affect the safety during transitioning or in operation? Describe the development of:

- reversion strategies in case of problems during transitioning; and
- contingency plans in case of problems during operation.

13. Conclusion

A Safety Case should contain both the evidence and ARGUMENT that a change can be safely implemented and operated. Use the evidence gathered during the safety assessment process to make the ARGUMENT that this change can be safely implemented and operated.

14. Post Implementation Review

What are the levels of risk after the system, facility or service has been operating for a period? Are there any other safety issues to be managed? Are there any safety lessons to be learnt from this change? Describe the arrangements and timing for a review of the change following commissioning. Describe how the review will take place, what measure(s) will be used to determine success or otherwise, who will be involved, how the issues will be managed so that lessons can be learnt. Describe the process to be used for the review and ongoing management of the HAZLOG contents.

15. Document Review

Has the process been followed? Is the content valid? Where appropriate in the safety document provide a summary statement that there was a local/peer review and the review comments have been considered and acted on. Review feedback should be available on file, the reference should be provided.

16. Appendices

Include any appendices referred to in the text.

17. Related documents

List any related documents (e.g. Safety Plan, etc.) and provide internal links where appropriate.

Airports Authority of India

AVIATION SAFETY DIRECTORATE

<PROJECT TITLE>

All Phases Safety Case Template

The following signature block is required to be completed by the person:

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. NAME AND POSITION	SIGNATURE	DATE
Prepared by: <insert name> **Position: <insert position>**		
Proposed by: <insert name> **Project Manager**		
Accepted by: <insert name> **Operating Authority**		
Accepted by: <insert name> **Engineering Authority**		
Approved by: <insert name> **Position: <insert position>**		
Endorsed by: <insert name> **Aviation Safety Directorate**		

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Elements of an All Phases Safety Case:

An All Phases Safety Case should record the safety assurance activities and their outcomes from the concept phase of a change through to operation. This includes the:

- process by which the design of the new system was determined;
- process by which operational and engineering readiness is achieved and signed off;
- systematic processes to identify the risks and determine the risk controls for the concept, design and implementation phases;
- risk control mechanisms identified in these processes;
- safety requirements identified as “essential” in these processes;
- confirmation that the design has met its safety requirements through implementation;
- argument that, when implemented with the identified controls, the system/facility/service can be operated or provided safely.

i. Document control information

Document Owner	
File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

Amendment Record			
Issue Number	**Section(s) Amended**	**Amended by**	**Date**
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Consider the affect on:

- service(s) provision under ICAO;
- directorates, aerodromes, ATS centres and units;
- service delivery lines;
- systems*/facilities/services including design, operations and maintenance; and
- people and associated procedures.

* Note: System includes the data and networks aspects of the system

4. Assumptions, Constraints and Dependencies

What did I state up front that influenced the safety outcome of the change? Detail any additional assumptions, constraints and dependencies not included in the Safety Plan. Validate all the assumptions, constraints and dependencies affecting the safe outcome of the change.

4.1 Assumptions

Describe any assumptions made which affected the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which restricted the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which impacted the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities.

6. Consultation and Communication

Who did I consult and communicate with? Describe the consultation and communication arrangements that were undertaken by the project team throughout the project phases. This includes both internal and external stakeholders.

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7.1 Design Integrity

How did I develop a good design? Describe the process used to develop the design solution. This section should provide information on the standards and design methods employed for error avoidance, detection and elimination during the development of the design and present arguments as to why these are appropriate.

Assurance of the design may come from, for example:

- design maturity - proven reliability and integrity;
- experience of similar systems/facilities/services;
- proven system architectures;
- design calculations - reliability and integrity.

In some cases, design development may not be completed until the system has been operated and evaluated in its intended environment. Outstanding work affecting safety assurance of the design should be highlighted.

7.2 Functional and Performance Requirements

What are the "underived" or "given" functional and performance requirements? Specify any functional and performance characteristics for the design. Include targets for accuracy/resolution, audibility, definition, response times, ergonomics, availability and reliability, alerts, levels of service, design life, procedures and training requirements where these affect the safety of the system, facility or service. Describe how these will be confirmed before implementing the change.

7.3 Design Confirmation

How have I confirmed that I have developed a good design? Describe the process used to confirm that the design solution has not been compromised during the implementation process. Provide evidence (such as test results) that the design meets the intended requirement and fulfills the safety objectives, and that the functional and performance requirements have been achieved.

7.4 Design Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

7.5 Design Limitations and Shortcomings

Does the system or facility not do anything that it was intended to do? Does its use need to be limited in some way? State any limitations on the use, or maintenance, of the system or facility or shortcomings identified in the design. Reliance on other systems, facilities and services should be explained.

Any unresolved system or facility shortcomings which could result in a hazard should be declared. Temporary design fixes and short term procedures or workarounds should be declared.

7.6 Design Authorities

Who is responsible for the design integrity? Identify the Design Authorities for the systems, facilities and services as appropriate. All Design Authorities associated with the safety case should be identified.

7.7 Design Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the design phase of the project.

Provide information on:

- how the hazards were identified for the design phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (eg Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);
- why was this process selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls;
- timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

7.8 Design Hazards, Controls and Safety Requirements

What are the outcomes of the design hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

7.9 Design Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

8. Implementation Process

8.1 Transition to Operations

What process will be followed for installation, integration and transitioning to operations? Detail the process by which operational and engineering readiness is achieved and signed off.

8.2 Implementation Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

8.3 Implementation Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the implementation phase of the project.

Provide information on:

- how the hazards were identified for the implementation phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (e.g. Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);

- why was this process selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls;
- timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

8.4 Implementation Hazards, Controls and Safety Requirements

What are the outcomes of the implementation hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

8.5 Implementation Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are "not met" or "yet to be met":

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

Note: The Implementation and Design sections:

- Safety Management Activities;
- Hazards, Controls and Safety Requirements; and
- Risk Management may be combined where appropriate.

8.6 Pre-Implementation Risk Assessment

Describe any activities for review of the risks just prior to commissioning, and their outcomes.

9. Procedures and Engineering Support

What procedures and support arrangements have I had to develop or change? Confirm that the relevant ATS/Engineering/Airside Operations procedures and instructions, Service Level Agreements, maintenance agreements, contacts etc developed as a result of the change are in place.

10. Safety Performance Monitoring

How am I going to confirm the ongoing operational safety performance of the system? Specify any aspects of the system, facility or service performance that should be monitored in service to provide assurance that the safety requirements continue to be met in operation.

11. Training and Education

How have the training/education aspects been addressed? Detail the outcomes of:

- training needs analysis (TNA);
- requirements determination;
- development;
- delivery;
- Performance and Assessment Check; and
- capture and management of training records.

12. Business Continuity

What do we do if we encounter problems that could affect the safety during transitioning or in operation? Describe the development of:

- reversion strategies in case of problems during transitioning; and
- contingency plans in case of problems during operation.

13. Conclusion

A Safety Case should contain both the evidence and ARGUMENT that a change can be safely implemented and operated. Use the evidence gathered during the safety assessment process to make the ARGUMENT that this change can be safely implemented and operated.

14. Post Implementation Review

What are the levels of risk after the system, facility or service has been operating for a period? Are there any other safety issues to be managed? Are there any safety lessons to be learnt from this change? Describe the arrangements and timing for a review of the change following commissioning. Describe how the review will take place, what measure(s) will be used to determine success or otherwise, who will be involved, how the issues will be managed so that lessons can be learnt. Describe the process to be used for the review and ongoing management of the HAZLOG contents.

15. Document Review

Has the process been followed? Is the content valid? Where appropriate in the safety document provide a summary statement that there was a local/peer review and the review comments have been considered and acted on. Review feedback should be available on file, the reference should be provided.

16. Appendices

Include any appendices referred to in the text.

17. Related documents

List any related documents (e.g. Safety Plan, etc.) and provide internal links where appropriate.

Airports Authority of India

AVIATION SAFETY DIRECTORATE

Review - Safety Plan Template

Project Title	
Safety Plan Type	<Design/Implementation/All Phases>
Reviewer	

Review Criteria

The reference material included in this template (in blue) refers to that provided in the Safety Plan development template. A reviewer may choose to remove this from the final review document.

Assessment Rating Scheme

The following rating scheme is included to record whether the intent of each part of the review template has been met, delete those not appropriate.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**

Review Outcome:

Recommendations:

Document control information

Document Owner	
File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

1. Background

Why has the change come about? Describe the reasons for undertaking this project, include reference to the relevant SCARS where applicable.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

2. Purpose

What does this document do? Describe the purpose of this document and what it is expected to achieve. Is this a Design, Implementation or All Phases Safety Plan?

Rating:	Yes	Partial	No	Not Applicable
Comment:				

3. Scope of the change

What is the change? Describe the present system and the change(s) proposed for that system.

Consider the affect on:

- Service(s) provision under ICAO;
- Directorates, Aerodromes, ATS Centres and Units;
- Service Delivery Lines;
- Systems*/Facilities/Processes, including design, operations and maintenance; and
- People and associated procedures.

* Note: System includes the data and networks aspects of the system

Rating:	Yes	Partial	No	Not Applicable
Comment:				

4. Assumptions, Constraints and Dependencies

What do I need to state up front that could influence the safety outcome of the change?

4.1 Assumptions

Describe any assumptions being made which could affect the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which could restrict the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which could impact the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

6. Consultation and Communication

Who do I need to consult and communicate with? Describe the consultation and communication arrangements to be undertaken by the project team throughout the project phases. This includes both internal and external stakeholders, and may include, but is not limited to:

- Planning Branch
- ATM
- CNS
- Airports
- Defence – local and/or National
- Airlines and other Aviation Bodies
- External and/or international ATS providers
- ICAO representatives
- DGCA

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7. Safety Management Activities

What am I going to do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for each area of change indicated in the Scope, and for each phase of the project. For example: changes to the design, operation or maintenance of services, facilities, or equipment, and the associated procedures and people. These may include, but are not limited to:

- Hazard Identification Workshops – use relevant competence and experience for facilitation and participation in workshops. Participants must include a broad representative range of stakeholders, including external parties where necessary. If there is a potential need to hold additional workshops, these should be flagged.
- Testing, verification and validation
- Simulation and training exercises
- Trial implementation – under surveillance and with sufficient backup or reversion strategy, until sufficient data and experience has been acquired
- Preliminary studies; evaluation of overseas or other experience
- Reviewing past and current hazard information
- Quantitative modelling - based on sufficient data, using a validated model and analysed assumptions

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

8. Timelines and Milestones

What are the timelines and milestones for the safety activities and ongoing safety process? Detail the target dates and locations for the planned safety management activities. Milestones should include subsequent safety document development.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

9. Resources

What people and facilities will be required to conduct the safety assessment work for this change? Identify the resources that will be required to carry out the safety management activities from the operational, support and technical areas.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

10. Training and Education

What are the training/education requirements, and how will they be addressed? Describe the proposed arrangements for the:

- Training needs analysis (TNA),
- Requirements determination
- Development and delivery
- Performance and Assessment Check

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

11. Review

Does the plan adequately describe the safety management activities required for this change?

Is this Safety Plan compliant with the SMS? Has the process been followed? Is the content valid? Describe the arrangements for the review of the Safety Plan. Detail how recommendations resulting from the review process may be included.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

12. Approvals

Who accepts responsibility for the safe outcome of the project? Detail the Approval authorities and requirements for the resultant Safety Case.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

13. Related documents

List any related documents.

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Airports Authority of India

AVIATION SAFETY DIRECTORATE

Review - Concept/Design
Safety Case Template

Project Title	
Reviewer	

Review Criteria

The reference material included in this template (in blue) refers to that provided in the Concept/Design/Safety Case development template. A reviewer may choose to remove this from the final review document.

Only the specialist staff and manager responsible for the change have the detailed knowledge and background in the specific area to assure the safety of the change and determine whether the identified strategies for risk control are appropriate and in place.

Assessment Rating Scheme

The following rating scheme is included to record whether the intent of each part of the review template has been met, delete those not appropriate.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**

Review Outcome:

Recommendations:

Document control information

Document Owner	
AAI File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

1. Background

Why has the change come about? Describe the reasons for undertaking this project; include reference to the relevant SCARS where applicable.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

2. Purpose

What does this document do? Describe the purpose of this document and what it is expected to achieve. Is this a Concept/Design Safety Case?

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

3. Scope of the change

What is the change? Describe the present system and the change(s) proposed for that system.

Consider the affect on:

- Service(s) provision under ICAO.
- Directorates, Aerodromes, ATS Centres and Units
- Service Delivery Lines;
- Systems*/Facilities/Processes, including design, operations and maintenance; and
- People and associated procedures.

* Note: System includes the data and networks aspects of the system

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

4. Assumptions, Constraints and Dependencies

What did I state up front that influenced the safety outcome of the change? Detail any additional assumptions, constraints and dependencies not included in the Safety Plan. Validate all the assumptions, constraints and dependencies affecting the safe outcome of the change.

4.1 Assumptions

Describe any assumptions made which affected the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which restricted the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which impacted the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

6. Consultation and Communication

Who did I consult and communicate with? Describe the consultation and communication arrangements that were undertaken by the project team throughout the project phases. This includes both internal and external stakeholders.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7. Design Process

7.1 Design Integrity

How did I develop a good design? Describe the process used to develop the design solution. This section should provide information on the standards and design methods employed for error avoidance, detection and elimination during the development of the design and present arguments as to why these are appropriate.

Assurance of the design may come from, for example:

- Design maturity - proven reliability and integrity.
- Experience of similar Systems/Facilities/Processes
- Proven system architectures
- Design calculations - reliability and integrity

In some cases, design development may not be completed until the system has been operated and evaluated in its intended environment. Outstanding work affecting safety assurance of the design should be highlighted.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.2 Functional and Performance Requirements

What are the "underived" or "given" functional and performance requirements? Specify any functional and performance characteristics for the design. Include targets for accuracy/resolution, audibility, definition, response times, ergonomics, availability, procedures, alerts, procedures and training requirements where these affect the safety of the System. Describe how these will be confirmed before implementing the change.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.3 Design Confirmation

How have I confirmed that I have developed a good design? Provide evidence (such as test results) that the design meets the intended requirement and fulfills the safety objectives, and that the functional and performance requirements have been achieved.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.4 Design Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.5 Design Limitations and Shortcomings

Does the system not do anything that it was intended to do? Does its use need to be limited in some way? State any limitations on the use, or maintenance, of the system or shortcomings identified in the design. Reliance on other systems and procedures should be explained.

Any unresolved system shortcomings which could result in a hazard should be declared. Temporary design fixes and short term procedures or workarounds should be declared.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.6 Design Authorities

Who is responsible for the design integrity? Identify the design authorities for the airspace, procedures and systems as appropriate. All Design Authorities associated with the safety case should be identified.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.7 Design Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the design phase of the project.

Provide information on:

- how the hazards were identified for the design phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (e.g. Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);
- why was this process selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls;
- timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.8 Design Hazards, Controls and Safety Requirements

What are the outcomes of the design hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.9 Design Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are "not met" or "yet to be met":

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

8. Conclusion

A Safety Case (SC) should contain both the evidence and ARGUMENT that a concept/design change is adequately safe "in principle". Use the evidence gathered during the safety assessment process to make the ARGUMENT that this concept/design is adequately safe "in principle".

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

9. Document Review

Has the process been followed? Is the content valid? Provide a summary statement that there was a local/peer review and the review comments have been considered and acted on where appropriate in the safety document. Review feedback should be available on file, the reference should be provided.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

10. Appendices

Include any appendices referred to in the text.

11. Related documents

List any related documents (e.g. Safety Plan etc…) and provide internal links where appropriate.

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Airports Authority of India

AVIATION SAFETY DIRECTORATE

Review - Implementation Safety Case Template

Project Title	
Reviewer	

Review Criteria

The reference material included in this template (in blue) refers to that provided in the Implementation Safety Case development template. A reviewer may choose to remove this from the final review document.

Only the specialist staff and manager responsible for the change have the detailed knowledge and background in the specific area to assure the safety of the change and determine whether the identified strategies for risk control are appropriate and in place.

Assessment Rating Scheme

The following rating scheme is included to record whether the intent of each part of the review template has been met, delete those not appropriate.

Rating:	Yes	Partial	No	Not Applicable

Review Outcome:

Recommendations:

Document control information

Document Owner	
AAI File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

1. Background

Why has the change come about? Describe the reasons for undertaking this project; include reference to the relevant SCARS where applicable.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

2. Purpose

What does this document do? Describe the purpose of this document and what it is expected to achieve.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

3. Scope of the change

What is the change? Describe the present system and the change(s) proposed for that system.

Consider the affect on:

- Service(s) provision under ICAO
- Directorates, Aerodromes, ATS Centres and Units;
- Service Delivery Lines;
- Systems*/Facilities/Processes including design, operations and maintenance; and
- People and associated procedures.

* Note: Systems includes the data and networks aspects of the system

Rating:	Yes	Partial	No	Not Applicable
Comment:				

4. Assumptions, Constraints and Dependencies

What did I state up front that influenced the safety outcome of the change? Detail any additional assumptions, constraints and dependencies not included in the Safety Plan. Validate all the assumptions, constraints and dependencies affecting the safe outcome of the change.

4.1 Assumptions

Describe any assumptions made which affected the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which restricted the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which impacted the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

6. Consultation and Communication

Who did I consult and communicate with? Describe the consultation and communication arrangements that were undertaken by the project team throughout the project phases. This includes both internal and external stakeholders.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7. Design Process

7.1 Design Confirmation

How have I confirmed that I have developed a good design? Describe the process used to confirm that the design solution has not been compromised during the implementation process. Provide evidence (such as test results) that the design meets the intended requirement and fulfills the safety objectives, and that the functional and performance requirements have been achieved.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.2 Design Limitations and Shortcomings

Does the system not do anything that it was intended to do? Does its use need to be limited in some way? State any limitations on the use, or maintenance, of the system or shortcomings identified in the design. Reliance on other system/facilities/processes should be explained.

Any unresolved system shortcomings which could result in a hazard should be declared. Temporary design fixes and short term procedures or workarounds should be declared.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.3 Design Risk Management

Describe the process for managing the hazards previously identified in the concept/design phase of the project. Describe the process for reviewing the design HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- Validate residual risk estimations.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8. Implementation Process

8.1 Transition to Operations

- What process will be followed for installation, integration and transitioning to operations? Detail the process by which operational and engineering readiness is achieved and signed off.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.2 Implementation Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.3 Implementation Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the implementation phase of the project.

Provide information on:

- how the hazards were identified for the design phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (e.g. Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);
- why was this process selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls;
- Timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.4 Implementation Hazards, Controls and Safety Requirements

What are the outcomes of the design hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.5 Implementation Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- Validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.6 Pre-Implementation Risk Assessment

Describe any activities for review of the risks just prior to commissioning, and their outcomes.

9. Procedures and Engineering Support

What procedures and support arrangements have I had to develop or change? Confirm that the relevant ATS/Engineering/Airside operations procedures and instructions, Service Level Agreements, maintenance agreements, contacts etc developed as a result of the change are in place.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

10. Safety Performance Monitoring

How am I going to confirm the ongoing operational safety performance of the system? Specify any aspects of the system performance that should be monitored in service to provide assurance that the safety requirements continue to be met in operation.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

11. Training and Education

How have the training/education aspects been addressed? Detail the outcomes of:

- training needs analysis (TNA);
- requirements determination;
- development;
- delivery;
- Performance and Assessment Check;
- capture and management of training records

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

12. Business Continuity

What do we do if we encounter problems that could affect the safety during transitioning or in operation? Describe the development of:

- Reversion strategies in case of problems during transitioning; and
- Contingency plans in case of problems during operation.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

13. Conclusion

A Safety Case (SC) should contain both the evidence and ARGUMENT that a change can be safely implemented and operated. Use the evidence gathered during the safety assessment process to make the ARGUMENT that this change can be safely implemented and operated.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

14. Post Implementation Review

What are the levels of risk after the system has been operating for a period? Are there any other safety issues to be managed? Are there any safety lessons to be learnt from this change? Describe the arrangements and timing for a review of the change following commissioning. Describe how the review will take place, what measure(s) will be used to determine success or otherwise, who will be involved, how the issues will be managed so that lessons can be learnt. Describe the process to be used for the review and ongoing management of the HAZLOG contents.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

15. Document Review

Has the process been followed? Is the content valid? Provide a summary statement that there was a local/peer review and the review comments have been considered and acted on where appropriate in the safety document. Review feedback should be available on file, the reference should be provided.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

16. Appendices

Include any appendices referred to in the text.

17. Related documents

List any related documents (e.g. Safety Plan etc…) .

Airports Authority of India

Review - All Phases
Safety Case Template

Project Title	
Reviewer	

Review Criteria

The reference material included in this template (in blue) refers to that provided in the All Phases Safety Case development template. A reviewer may choose to remove this from the final review document.

Only the specialist staff and manager responsible for the change have the detailed knowledge and background in the specific area to assure the safety of the change and determine whether the identified strategies for risk control are appropriate and in place.

Assessment Rating Scheme

The following rating scheme is included to record whether the intent of each part of the review template has been met, delete those not appropriate.

Rating:	Yes	Partial	No	Not Applicable

Review Outcome:

Recommendations:

Document control information

Document Owner	
File Reference(s)	
Electronic Master Storage	
Hard Copy Master Storage	
Document Register Number	

1. Background

Why has the change come about? Describe the reasons for undertaking this project; include reference to the relevant SCARS where applicable.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

2. Purpose

What does this document do? Describe the purpose of this document and what it is expected to achieve.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

3. Scope of the change

What is the change? Describe the present system and the change(s) proposed for that system.

Consider the affect on:

- Service(s) provision under ICAO;
- Directorates, Aerodromes, ATS Centres and Units;
- Service Delivery Lines;
- Systems*/Facilities/Processes including design, operations and maintenance; and
- People and associated procedures.

* Note: System includes the data and networks aspects of the system

Rating:	Yes	Partial	No	Not Applicable
Comment:				

4. Assumptions, Constraints and Dependencies

What did I state up front that influenced the safety outcome of the change? Detail any additional assumptions, constraints and dependencies not included in the Safety Plan. Validate all the assumptions, constraints and dependencies affecting the safe outcome of the change.

4.1 Assumptions

Describe any assumptions made which affected the project scope, strategies or outcomes.

4.2 Constraints

Describe any constraints which restricted the ability of the project to achieve a safe outcome.

4.3 Dependencies

Describe any dependencies on other projects or activities which impacted the outcome of this project, or where other projects or activities are dependent on the outcome of this project.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

5. Responsibilities

Who are the key players and what are they responsible for? Describe the people who have been committed to the project and their primary responsibilities.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

6. Consultation and Communication

Who did I consult and communicate with? Describe the consultation and communication arrangements that were undertaken by the project team throughout the project phases. This includes both internal and external stakeholders.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7. Design Process

7.1 Design Integrity

How did I develop a good design? Describe the process used to develop the design solution. This section should provide information on the standards and design methods employed for error avoidance, detection and elimination during the development of the design and present arguments as to why these are appropriate.

Assurance of the design may come from, for example:

- Design maturity - proven reliability and integrity.
- Experience of similar Systems/Facilities/Processes
- Proven system architectures
- Design calculations - reliability and integrity

In some cases, design development may not be completed until the system has been operated and evaluated in its intended environment. Outstanding work affecting safety assurance of the design should be highlighted.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.2 Design Confirmation

How have I confirmed that I have developed a good design? Describe the process used to confirm that the design solution has not been compromised during the implementation process. Provide evidence (such as test results) that the design meets the intended requirement and fulfills the safety objectives, and that the functional and performance requirements have been achieved.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.3 Design Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

7.4 Design Limitations and Shortcomings

Does the system not do anything that it was intended to do? Does its use need to be limited in some way? State any limitations on the use, or maintenance, of the system or shortcomings identified in the design. Reliance on other systems and procedures should be explained.

Any unresolved system shortcomings which could result in a hazard should be declared. Temporary design fixes and short term procedures or workarounds should be declared.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.5 Design Authorities

Who is responsible for the design integrity? Identify the design authorities for the airspace, procedures and systems as appropriate. All Design Authorities associated with the safety case should be identified.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.6 Design Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the design phase of the project.

Provide information on:

- how the hazards were identified for the design phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (e.g. Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);
- why was this process selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls;
- timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.7 Design Hazards, Controls and Safety Requirements

What are the outcomes of the design hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

7.8 Design Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:

- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8. Implementation Process

8.1 Transition to Operations

- What process will be followed for installation, integration and transitioning to operations? Detail the process by which operational and engineering readiness is achieved and signed off.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.2 Implementation Procedures and Standards

What procedures/standards were applied or met? Describe any specific procedures or standards that were used in achieving a safe outcome. Where DGCA or ICAO are required to develop or amend standards, confirm the development or amendment of the standards.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.3 Implementation Safety Management Activities

How did I go about achieving a safe outcome? What did I do to manage safety, identify hazards and controls, assess the risks and gather safety related information? Describe the safety management activities for the implementation phase of the project.

Provide information on:

- how the hazards were identified for the implementation phase of the project;
- who was involved in the hazard identification and what was their relevant experience; including relevant Subject Matter Experts (SME) from the operational and technical areas and representatives of all relevant stakeholder groups (e.g. Defence, Airlines, pilot groups, external providers etc);
- what process was used to identify the hazard(s);
- why was this process was selected;
- what risk assessment criteria were used;
- who did the risk estimations;
- who determined the risk controls;
- timelines and milestones.

Describe the process used for capturing hazards that were identified outside the formal means above, i.e., those hazards that were identified on an ad-hoc basis. Who were they sent to? How were they captured and processed?

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.4 Implementation Hazards, Controls and Safety Requirements

What are the outcomes of the implementation hazard identification activities? Detail the Hazards, Controls and Safety Requirements determined from the hazard identification activities, including their status. Controls and Safety Requirements should be expressed so that their achievement can be measured. The HAZLOG Register Report includes this information and should be included here or attached as an appendix.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.5 Implementation Risk Management

Describe the process for managing the identified hazards. Include those that could not be managed locally, or which required sign-off. Describe the process for reviewing the HAZLOG, who was responsible for this activity and when this occurred.

Where Controls or Safety Requirements are “not met” or “yet to be met”:
- provide a provisional argument regarding the safety of moving to operation;
- specify the monitoring arrangements; and
- validate residual risk estimations.

State any other tools that were used for safety assurance purposes, and how they were used.

Note: The Implementation and Design sections:
- Safety Management Activities;
- Hazards, Controls and Safety Requirements; and
- Risk Management.

may be combined where appropriate.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

8.6 Pre-Implementation Risk Assessment

Describe any activities for review of the risks just prior to commissioning, and their outcomes.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

9. Procedures and Engineering Support

What procedures and support arrangements have I had to develop or change? Confirm that the relevant ATS/Engineering/Airside operations and instructions, Service Level Agreements, maintenance agreements, contacts etc developed as a result of the change are in place.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

10. Safety Performance Monitoring

How am I going to confirm the ongoing operational safety performance of the system? Specify any aspects of the system performance that should be monitored in service to provide assurance that the safety requirements continue to be met in operation.

Rating:	Yes	Partial	No	Not Applicable
Comment:				

11. Training and Education

How have the training/education aspects been addressed? Detail the outcomes of:

- training needs analysis (TNA);
- requirements determination;
- development;
- delivery;
- Performance and Assessment Check;
- capture and management of training records

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

12. Business Continuity

What do we do if we encounter problems that could affect the safety during transitioning or in operation? Describe the development of:

- Reversion strategies in case of problems during transitioning; and
- Contingency plans in case of problems during operation.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

13. Conclusion

A Safety Case (SC) should contain both the evidence and ARGUMENT that a change can be safely implemented and operated. Use the evidence gathered during the safety assessment process to make the ARGUMENT that this change can be safely implemented and operated.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

14. Post Implementation Review

What are the levels of risk after the system has been operating for a period? Are there any other safety issues to be managed? Are there any safety lessons to be learnt from this change? Describe the arrangements and timing for a review of the change following commissioning. Describe how the review will take place, what measure(s) will be used to determine success or otherwise, who will be involved, how the issues will be managed so that lessons can be learnt. Describe the process to be used for the review and ongoing management of the HAZLOG contents.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

15. Document Review

Has the process been followed? Is the content valid? Provide a summary statement that there was a local/peer review and the review comments have been considered and acted on where appropriate in the safety document. Review feedback should be available on file, the reference should be provided.

Rating:	**Yes**	**Partial**	**No**	**Not Applicable**
Comment:				

16. Appendices

Include any appendices referred to in the text.

17. Related documents

List any related documents (e.g. Safety Plan etc…) and provide internal links where appropriate.

Aviation Safety Directorate
ISSUES REPORTING FORM

Audit Number		**Directorate** (e.g. CNS, CNS-P, ATS, etc)	
Location (eg. Mumbai, Delhi)		**Unit** (eg. CNS, ATM, Airports	
Audit Date:		**Finding Manager**	
Raised by:		**Date Due:**	
Issue Type: (e.g.Major, Medium, Minor)		**Complete (Yes/No)**	
		Date Closed:	

Description of Finding

Action:
Entry Number needs to entered manually, starting at 1 for each issue.

Action No.	Action Officer	Action Details	Verification	Plan/ Response Date	Due Date	Actual Date	Closed By

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AVIATION BIRD & ANIMAL STRIKE REPORTING FORM

Submit to:
Or by facsimile to:

This report by: Airline ☐ Pilot ☐ ATC ☐ Aerodrome ☐ Aircraft Eng ☐ Other ☐

Aircraft Operator: ______________________

Aircraft Make/Model: ____________ / ____________

Engine Make/Model: ____________ / ____________

Aircraft Registration: ____________

Date: Day ________ Month ________ Year ________

Local Time:

Dawn ☐ Day ☐ Dusk ☐ Night ☐

Aerodrome Name: ______________________

Departure Aerodrome: ____________ **Arrival Aerodrome** ____________

Runway Used: ____________ **Position on Runway:** ____________

Location if En Route ______________________

Height AGL: ____________ ft

Speed (IAS): ____________ Kts

Flight Details:

Pilot Warned of Birds/Animals

Yes ☐ No ☐

Phase of Flight

Taxi	☐	Take-off Run	☐	Climb	☐	En Route	☐
Descent	☐	Approach	☐	Landing Roll	☐	Parked	☐

Effect on Flight

None	☐	Aborted Take-off	☐	Precautionary Landing	☐
Engines Shut Down	☐	Other	☐	(Specify)	

Weather details

Sky Condition

No Cloud ☐ Some Cloud ☐ Overcast ☐

Precipitation

None ☐ Fog ☐ Rain ☐ Snow ☐

Aircraft Details

Part (s) of Aircraft Hit

	Struck	Damaged		Struck	Damaged
Radome	☐	☐	Engine No. 1	☐	☐
Windshield	☐	☐	Engine No. 2	☐	☐
Nose (excluding above)	☐	☐	Engine No.3	☐	☐
Propeller	☐	☐	Engine No. 4	☐	☐
Wing/Rotor	☐	☐	Fuselage	☐	☐

Landing Gear	☐	☐	Tail	☐	☐
Lights	☐	☐			
Other	☐	☐	(specify)		

Bird/ Animal Details

Bird / Animal Species (e.g. buzzard, hyena, dog) ______________________________

Number of Birds/ Animals	**Seen**	**Struck**
1	☐	☐
2 – 10	☐	☐
11-100	☐	☐
more	☐	☐ (estimated number of birds: _____________)

Size of Bird / Animal	Small	☐	Medium	☐	Large	☐
Bird Activity	Low	☐	Normal	☐	High	☐

Environment Details

Bird Control method used

____

____

Remarks

(Describe aircraft damage, passenger injuries and other pertinent information)

____

____

____

Direct Cost Information:

Aircraft time out of service _______________________________ hrs

Estimated cost of repairs or replacement ____________

Indirect Cost Information:

Estimated other costs ________________ (e.g. loss of revenue, fuel, hotels)

Special Information on Engine Damage Strikes

Engine Position Number	1	2	3	4
Reason for failure / shutdown				
Uncontained Failure	☐	☐	☐	☐
Fire	☐	☐	☐	☐
Shutdown – Vibration	☐	☐	☐	☐
Shutdown – Temperature	☐	☐	☐	☐
Shutdown – Fire Warning	☐	☐	☐	☐
Shutdown – Other _________	☐	☐	☐	☐
Shutdown – Unknown	☐	☐	☐	☐
Estimated percentage of thrust loss*	____ %	____ %	____ %	____ %
Estimated number of birds ingested	____	____	____	____

*These may be difficult to determine but even estimates are useful

Reported By	**Position/ Company**	**Date**
____________________	____________________________	____________________

<table>
<tr><td colspan="5">Aviation Safety Directorate
AUDIT NOTIFICATION</td></tr>
<tr><td colspan="5">To:
Please note that it is the intention of …………… to conduct an audit in your area of responsibility as follows:</td></tr>
<tr><td>Audit Location/Function Business Unit</td><td colspan="4"></td></tr>
<tr><td>Audit Number:</td><td></td><td colspan="2">Audit Date(s)</td><td></td></tr>
<tr><td>Audit Team Leader</td><td colspan="4"></td></tr>
<tr><td>Audit Team Leader contact</td><td colspan="4">Phone:
e-mail:
Mobile:</td></tr>
<tr><td>Audit Objectives</td><td colspan="4"></td></tr>
<tr><td>Audit Scope</td><td colspan="4"></td></tr>
<tr><td>Audit team members:</td><td colspan="2"><u>Name</u></td><td colspan="2"><u>Position</u></td></tr>
<tr><td>Proposed schedule of meetings:</td><td colspan="4">Entry Meeting: Time:
Location:
Exit meeting: Time:
Location:</td></tr>
<tr><td>Reference documents:</td><td colspan="4">The following documents are required prior to the audit visit. Please provide them at your earliest convenience.
Documents required:
•
The documents are required by: (date)</td></tr>
<tr><td rowspan="2">Audit activities</td><td colspan="4">The expected time and duration of each major audit activity is as follows:</td></tr>
<tr><td colspan="2"><u>Activity</u>
•</td><td colspan="2"><u>Duration</u>
•</td></tr>
<tr><td>Reason for audit*
(*unscheduled audits only)</td><td colspan="4"></td></tr>
<tr><td>Audit report distribution (nominate staff to receive report)</td><td colspan="2"><u>Draft</u>
•</td><td colspan="2"><u>Final</u></td></tr>
<tr><td>Expected date of report issue:</td><td colspan="2">Draft:</td><td colspan="2">Final:</td></tr>
</table>

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Aviation Safety Directorate

AUDIT OPENING/CLOSING MEETING SUMMARY

Directorate / Location or Function / Unit:

Lead Auditor:

Opening Meeting:		**Date:**		**Open:**		**Close:**	
Agenda		**Auditor Notes**					
1.	Introduce audit team						
2.	Confirm objectives and scope of audit						
3.	Review audit program						
4.	Summarize audit methods to be used						
5.	Identify personnel to be interviewed						
6.	Arrange famil/escorts /security as required						
7.	Identify contacts or guides for each area						
8.	Explain the Requests for Corrective Action (RCA) process incl auditee responsibility						
9.	Arrange meeting room/ facilities for audit team						
10.	Arrange daily briefings if req'd						
11.	Arrange time/place for exit meeting						
Closing Meeting:		**Date:**		**Open:**		**Close:**	
Agenda		**Auditor Notes**					
1.	Discuss overview of audit findings						
2.	Provide written summary of findings						
3.	Issue or identify Requests for Corrective Action (RCA) - ensure acknowledgment						
4.	Explain post audit requirements – Requests for Corrective Action (RCA) and audit reports						
5.	Agree due date for action plan for major Requests for Corrective Action (RCA)						
6.	Copy Requests for Corrective Action (RCA) for auditor						
7.	Leave originals of Requests for Corrective Action (RCA) with auditee						
8.	Indicate draft report issue date/ response date						
9.	Provide copy of Audit Feedback Questionnaire						
10.	Thank the auditee						
11.	Close meeting						

Agenda

Agenda	Opening Meeting - Attendees			
	Name	**Designation**	**Telephone Contact**	**Signature**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
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24.				
25.				

Agenda	Closing Meeting - Attendees			
	Name	**Designation**	**Telephone Contact**	**Signature**
1.				
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Aviation Safety Directorate

Audit – Summary of Findings

Audit Location/Function		**Audit Number:**	
Audit Date(s)		**Lead Auditor**	
		Date of this Summary	

Finding No	**Finding Type** (Major, Minor Rec'n, Obs'n)	**Finding (Statement of condition)**	**SARPS REF**	**RCA No**	**Level of Risk H/M/L**	**Comments**
1.						
2.						
3.						
4.						
5.						

Finding No	Finding Type (Major, Minor Rec'n, Obs'n)	Finding (Statement of condition)	SARPS REF	RCA No	Level of Risk H/M/L	Comments
6.						
7.						
8.						
9.						
10.						

AVIATION SAFETY DIRECTORATE

AUDIT PLAN EXAMPLE

1 INTRODUCTION

2 COMMUNICATIONS

The contact numbers for the Audit Team Leader are:

Email:
External email:
Mobile Phone:
Office extn. internal:

3 AUDIT TEAM

List Audit team

4 CHECKLISTS

Audit team leader is required to produce an audit checklist from the reference documents used during the audit, such as:

- Annex 11, Annex 14, Doc 4444, and/or
- ASD CHQ National Audit focus topics (corporate focus and/or audit analysis) ,and/or
- Lead Auditor topics (from pre-audit reviews and previous audit outcomes review).

5 ENTRY BRIEFING

6 EXIT BRIEFING

7 MAJOR ISSUE MANAGEMENT

Any major issue that arises during the audit shall be immediately communicated to the responsible manager and discussed as required.

Major issues arising during the audit which directly impact safety shall be advised to Executive Director (Aviation Safety) by the Lead Auditor immediately after discussion with the responsible manager.

The auditee is encouraged to openly discuss with the audit team leader any issues related to the audit at any time.

A daily debrief will be held with the auditee Manager to discuss the progress of the audit and encourage a dialogue on any issues.

8 AUDIT DRAFT REPORT

The draft audit report shall be produced by the audit team leader and provided to the auditee within 3 weeks from the final date of the audit.

All feedback on the draft audit report must reach the audit team leader within 15 working days from the final date of the audit. (i.e. within 5 working days of the publication of the draft report)

9 DESK TOP AUDIT

Prior to the audit all relevant documentation will be desktop audited by the audit team.

The Hazlog Aviation Safety Issues Database, and previous audit reports shall be included in this process.

This Desktop audit shall be used in planning the conduct of the audit and in compiling audit checklists

10 REQUESTS FOR CORRECTIVE ACTION (RCA) MANAGEMENT

The audit team leader in consultation with the audit team will raise Requests for Corrective Action (RCAs) on non-conformances or audit issues as appropriate.

Copies of all raised Requests for Corrective Action (RCAs) will be provided to the auditee within 1 week from the final date of the audit. At the exit meeting a summary findings shall be provided. Any Requests for Corrective Action (RCA) raised will be provided.

The audit team leader is responsible for reviewing proposed remedial action and tracking all closures or progress for Requests for Corrective Action (RCAs) related to the audit.

11 AUDIT FINAL REPORT

The final audit report will be produced by the audit team leader and provided to the auditee within 6 weeks from the final date of the audit.

12 AUDIT TIMELINE AND SCHEDULE

The Audit will commence with the entry briefing on the << Insert agreed date and time >>

The Audit will cease with the exit briefing on the << Insert agreed date and time >>.

Immediately following the entry briefing the audit team leader will meet with the auditee and arrange suitable times and venues for any interviews. The audit team intends to interview

SCHEDULE

Insert section or who will be interviewed

Auditor	Monday -		Tuesday -		Wednesday -		Thursday -		Friday -	
	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon

On the ………….... the audit team will require…………………..

On the morning of the … … the audit team will be starting duty at 0630 and will be in the TAAATS ATSC to observe the early morning traffic. Their presence will be co-ordinated with the duty Operations Manager.

13 AUDIT CHECKPOINTS

The following Safety Management System Requirements checkpoints will be covered by the audit team. Some of these checkpoints will receive a higher priority than others. The audit team leader, following the period of pre-audit documentation examination and audit team co-ordination, will determine the priority for audit attention. The auditee will be notified at the entry briefing of the priority areas for the audit.

	Airports Authority of India	
RCA No.	**Request for Corrective Action**	Source: Audit / Review / Investigation
File No.	**Data Input Form**	Reference No.

Part 1 Finding

Classification: (✓) ☐ Major ☐ Minor ☐ Recommendation ☐ Observation

Reference Document ……………………………………………………………………………………………………

Description of Finding / Recommendation

………

………

………

………

………

………

………

………

………

Finding Unit:

Directorate: ………………………….... **Location:** ……………………….……….

Unit: …………………………….

Reported Date: ……./……/…..…

Reporter's Signature: ……………….………… **Reporter's Name:** ………………….…………….

Recipient's Signature ……………………..……….…. Recipient's Name ……………….…………….……..

Action Plan/Response Due Date ……/……/…... Acknowledged Date ……../….…./……..

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Airports Authority of India

Aviation Safety Directorate

Draft Audit Report

Audit Number : <<(nnn/20_ _)

Audit Title:

<< Insert Audit DIRECTORATE (as applicable)>>

<< Insert Audit LOCATION (as applicable)>>

<< Insert Audit UNIT (as applicable)>>

Audit Date _ _ / _ _ / _ _ _ _

Airports Authority of India

Aviation Safety Directorate

Audit Report			
Audit Location/Function			
Audit Number:		**Audit Date(s)**	
Audit Team Leader		**Audit Team Members**	
Audited Unit Manager		**Report Status**	**DRAFT/FINAL**
Date of this Report		**File Reference**	

REPORT CONTENTS

1. **Executive Summary**

1.1 Introduction

1.2 Overall Audit Findings

1.3 Significant Requests for Corrective Action and Management Responses

1.4 Conclusion

2. **Audit Report**

2.1 Audit Objectives and Scope

2.2 Audit Methodology

2.3 Findings/Conclusions

-
-
-
-

2.4 RCAs

Request for Corrective Action No.	DETAILS

2.5 Management Responses

2.6 Report Distribution (delete non-applicable Draft or Final)

Report Status	Copies to	No of copies	Via	Name
Draft	•	1 1 1 1		
Final	•	1 1 1 1 1		
	•	1 1 1 1		
	•	1		
	•	1		

3. Attachments

3.1 Requests for Corrective Action

3.2 Statistical Summary

1.

Aviation Safety Directorate

Audit Process Feedback Questionnaire

Audit # ________ / Lead Auditor:

1. Did you receive a reminder notification of the audit at least two weeks in advance?	YES / NO / Not Applicable
Comment:________________________________	
2. Was an Entry Meeting held with you prior to, or concurrent with, the start of the audit?	Prior To / Concurrent
Comment:________________________________	
3. Were the audit objectives, scope and times discussed with you during the Entry Meeting?	YES / NO / Not Applicable
Comment:________________________________	
4. Were your ideas and/or concerns about the audit solicited during the audit?	YES / NO / Not Applicable
Comment:________________________________	
5. Were the auditors responsive to your ideas and/or concerns regarding the audit?	YES / NO / Not Applicable
Comment:________________________________	
6. Were you kept informed of audit itinerary changes?	YES / NO / Not Applicable
Comment: ________________________________	

7. Were you periodically briefed or otherwise kept adequately and promptly informed on issues as they developed during the audit? audit?	YES / NO / Not Applicable
Comment:____ ____ ____ ____	
8. At the Exit Meeting, were all findings discussed with you in the level of detail you desired?	YES / NO / Not Applicable
Comment:____ ____ ____ ____	
9. Were all issues of fact (not interpretation) resolved during the Exit Meeting?	YES / NO / Not Applicable
Comment:____ ____ ____ ____ ____ ____	
10. Do you want to suggest any changes in the duration and frequency of Safety Audit by Aviation Safety Directorate?	YES / NO/Not Applicable
Comment:____ ____ ____ ____	
11. How much did the audit assist your workplace?	**No Value** **High Value** 0 1 2 3 4 5 6 7 8 9 10 (Please circle one)
12. Are you familiar with the AAI National Audit Schedule	YES / NO

15. What specific changes can we make to best improve our audit process? / Other comments

____

Name: (optional - Please Print)

____

Directorate / Location/ Unit:

____________/__________________/__________________

Date: __________________________

NOTE: Please use internal mail and return to:

Executive Director
Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block-C,
Safdarjung Airport,
New Delhi – 110 003.

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AAI SAF - 127

Hazlog Template

ORIGINATOR (STATION)	HAZARD NO.	SOURCE	DATE OF RECORD IN HAZLOG	FUNCTIONAL AREA(UNIT)	HAZARD DESCRIPTION	WORST CONSEQUENCE	EXISTING RISK CONTROL	INITIAL RISK			POTENTIAL RISK CONTROL	RESIDUAL RISK			ACTION OFFICER FOR IMPLIMENTATION OF POTENTIAL RISK CONTROL (NAME & DESG)	STATUS OF POTENTIAL RISK CONTROL (PDC) OR COMPLETION DATE	REVIEW PERIOD
								PROBABLITY	SEVERITY	TOLERABILITY		PROBABLITY	SEVERITY	CLASS			

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SAFETY PERFORMANCE INDICATORS (SPIs) OF AIRPORTS AUTHORITY OF INDIA

2015

Aviation Safety Directorate, CHQ

Introduction

Safety Performance Indicator (SPI) package of Airports Authority of India (AAI) for the year 2015 (1^{st} January to 31^{st} December) is drawn from three mainstream operational sectors of AAI. These safety critical sectors are Aerodrome Operations; Air Traffic Management (ATM) & Communication/Navigation/Surveillance (CNS).

Safety critical elements from these sectors are identified and established as Safety Performance Indicator (SPIs) of AAI. These SPIs are congruent with State's SSP aggregate safety indicators and are comprising of both high level as well as low level consequences SPIs.

Safety Performance Targets (SPTs) of corresponding Safety Performance Indicator (SPIs), of which historical data is available is set. Safety Performance Targets (SPTs) are based on percentage of improvement over last year safety performance (average), as agreed upon by respective directorates. Three Alert levels are also established based on the preceding period's (i.e.2014) performance, namely average and standard deviation (SD). Three Alert lines are average + 1SD / 2SD / 3SD. An alert trigger (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period (2015):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

Safety Performance Targets (SPTs) / Alert Level of corresponding Safety Performance Indicator (SPIs), of which historical data is not available, could not be fixed. Target for these Indicators shall be fixed at later stage, likely in the year 2016 or 2017, upon availability of historical data. Data pertaining to these SPIs are now being collected with immediate effect from current year (2015).

The comprehensive package of Safety Performance Indicators (SPIs) of Airports Authority of India for the year 2015, along with corresponding Safety Performance Target (SPTs) and Alert levels, is enclosed as Annexure-1.

Source of Data

Traffic data is derived from Airport Information Management System (AIMS). This includes total number of Arrivals, departures and over flights. An over flights means an aircraft entering Indian airspace, over flying Indian airspace and exiting Indian airspace.

Incidents data is derived from the AAI control room messages, reports of pilots, controllers, WSOs, Airport-in-charges, Airlines, AFTN messages and various reporting forms of DGCA / AAI.

Annual SMS performance summary

Annual SMS performance summary shall be compiled as per the format attached in Annexure-2, at the end of each monitoring period i.e. by 31^{st} January of every year. Summary will be based on respective Target & Alert level outcomes annotated. At the end of current year 2015, if the average rate for the current year is at least equal to or lower than the set Target, then the set Target of improvement is deemed to have been achieved.

For quantitative SMS performance overview, appropriate numerical value will be assigned to each Yes/No outcome for corresponding Target and Alert criteria. The numerical value will be assigned as follows (high weightage for high consequence indicators & low weightage for low consequence indicators):

High consequence Indicators:	Target achieved:	[Yes (4); No (0)]
	Alert Level not breached:	[Yes (3); No (0)]
Low consequence Indicators:	Target achieved:	[Yes (2); No (0)]
	Alert Level not breached:	[Yes (1; No (0)]

The summary score or percentage will be obtained to indicate the overall SMS safety performance at the end of given monitoring period.

References

- DGCA CAR Section 1- General Series 'C' Part-1 on "Establishment of a Safety Management System".
- ICAO Doc 9859 'Safety Management Manual' (Third edition-2013)

Annexure-1

Safety Performance Indicators for Airports Authority of India (2015)

High Consequence Indicators			Lower consequence Indicators		
Safety Performance Indicator (SPI)	**Target Level Criteria**	**Alert Level Criteria** (3 Target levels=Average+ 1/2/3 SD)	**Safety Performance Indicator (SPI)**	**Target Level Criteria**	**Alert Level Criteria**
Aerodrome Operations					
Number of Runway Excursions per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year 2015.	To be defined in 2016	Number of reported ground incidents per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Number of reported bird strikes per 10,000 arrivals & departures	**2.73** i.e. 5% improvement from mean rate of last year (2014)	Avg.+1SD=**4.87** Avg.+2SD=**6.87** Avg.+3SD=**8.87**	Number of reported incident of Foreign Object Debris (FOD) in the movement area of major aerodrome per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Number of reported wildlife strikes per 10,000 arrivals & departures	**0.34** i.e. 5% improvement from mean rate of last year (2014)	Avg.+1SD=**0.64** Avg.+2SD=**0.92** Avg.+3SD=**1.2**			
Air Traffic Services					
Number of infringement of separation minimum per 100,000 aircraft movements	**0.90** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)	Avg.+1SD=**1.15** Avg.+2SD=**1.35** Avg.+3SD=**1.55**	Number of level bust per 100,000 aircraft movements	To be defined in 2017 after collection of 2 years data 2015 & 2016	To be defined in 2017
Number of runway incursions per 10,000 arrivals and departures	**0.17** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)	Avg.+1SD=**0.21** Avg.+2SD=**0.24** Avg.+3SD=**0.27**	Number of safety occurrences due Communication errors (SOCE) per 100,000 aircraft movements	To be defined in 2017 after collection of 2 years data 2015 & 2016	To be defined in 2017
Communication Navigation Surveillance Services					
Mean time between failures (MTBF) of Landing/Navigational aids per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016	Number of VCCS (VHF) failures per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Mean time between failures (MTBF) of Surveillance aids (ADS/MSSR/TAR/RSR/ ASMGCS) per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016	Number of degradation in ATS Automation system per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016

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Annexure-2

SMS Performance Summary – 2015

High Consequence SPIs

SPI Description	SPI Target Level Criteria	Target Achieved [Yes(4)/ No(0)]	SPI Alert Level Criteria	Alert Level not breached [Yes(3)/ No(0)]
Aerodrome Operations				
Number of reported bird strikes per 10,000 arrivals/departures	**2.73** i.e. 5% improvement from mean rate of last year (2014)		Avg.+1SD=**4.87** Avg.+2SD=**6.87** Avg.+3SD=**8.87**	
Number of reported wildlife strikes per 10,000 arrivals/departures	**0.34** i.e. 5% improvement from mean rate of last year (2014)		Avg.+1SD=**0.64** Avg.+2SD=**0.92** Avg.+3SD=**1.2**	
Air Traffic services(ATS)				
Number of infringement of separation minimum per 100,000 aircraft movements	**0.90** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)		Avg.+1SD=**1.15** Avg.+2SD=**1.35** Avg.+3SD=**1.55**	
Number of runway incursions per 10,000 arrivals & departures	**0.17** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)		Avg.+1SD=**0.21** Avg.+2SD=**0.24** Avg.+3SD=**0.27**	
Communication, Navigation & Surveillance (CNS)				
Mean time between failures (MTBF) of Landing/Navigational aids per year	To be defined in 2016	-	To be defined in 2016	-
Mean time between failures (MTBF) of Surveillance aids (ADS/MSSR/TAR/RSR/ASMGCS) per year	To be defined in 2016	-	To be defined in 2016	-

Low Consequence SPIs				
SPI Description	**SPI Target Level Criteria**	**Target Achieved [Yes(2) / No(0)]**	**SPI Alert Level Criteria**	**Alert Level not breached [Yes(1) / No(0)]**
Will be assessed next year (2016) due to lack of quality data.				

9/2/2015

Aerodrome Operations

Safety Performance Indicators (SPIs)

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SAFETY PERFORMANCE INDICATORS (SPIs) FOR AERODROME OPERATIONS

A. High Consequence Indicators

1. Number of reported bird strikes per 10,000 Arrivals and Departures

1.1 Definition

As per DGCA Air safety circular 02/2011, Wildlife (bird/animal) strike are defined in following two categories:

Confirmed Strikes

a) Any reported collision between a bird or other wildlife and an aircraft for which evidence in the form of a carcass, remains or damage to the aircraft is found.

b) Any wildlife (bird/animal) found dead on an airfield where there is no other obvious cause of death (e.g. strike by vehicles in the operational area, etc.).

Unconfirmed Strike

Any reported collision between a bird or other wildlife and an aircraft for which no physical evidence is found.

1.2 Source of Data

a) Traffic data is derived from Airport Information Management System (AIMS) data Base.

b) Reports of bird strikes are extracted from source of AAI control room messages, which includes reports of pilots, controllers, WSOs, Airport-in-charges, Airlines, AFTN messages and Wildlife (Bird/Animal strike forms).

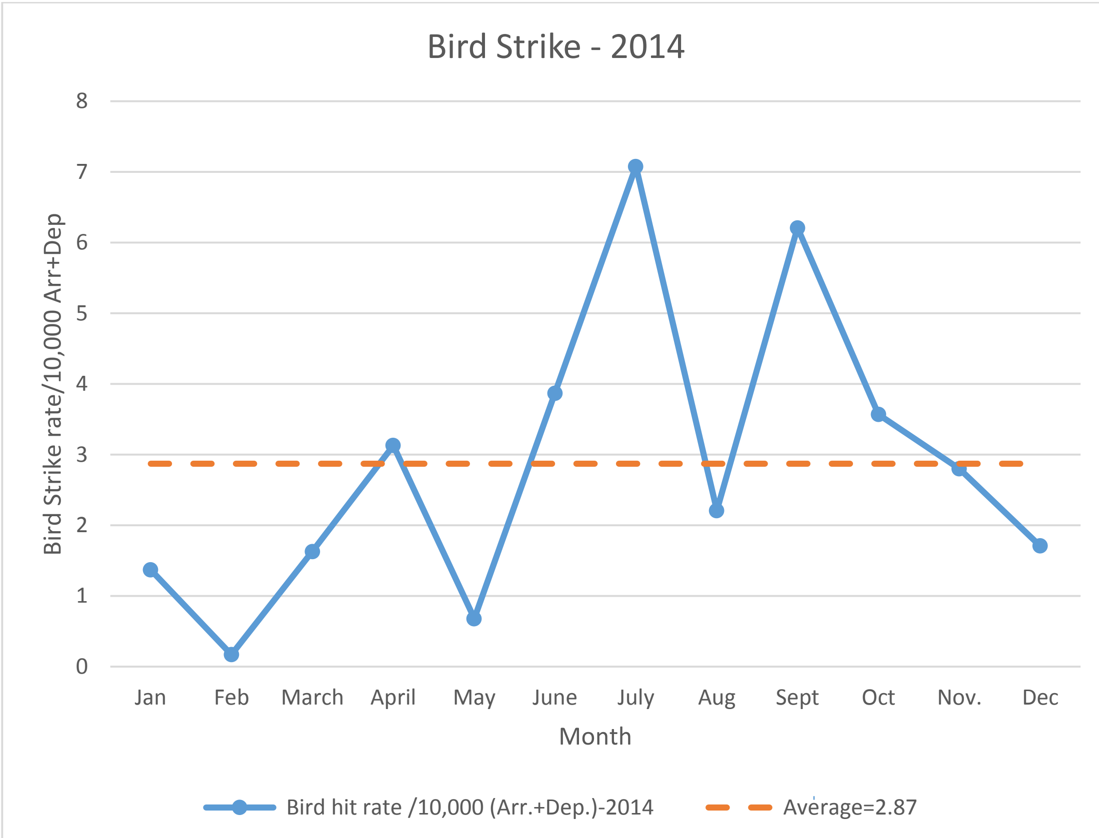
1.3 Data Analysis:

Number of reported bird strikes per 10,000 Arrivals and Departures during last year i.e. 2014 and detailed analysis is appended below:

Year 2014 (1st January - 31st December)					
No. of Bird strikes Per 10,000 Arrivals + Departures					
Month	**Total no. of Arrivals + departures**	**No. of Reported Bird Strikes**	**Incident Rate (Per 10,000)-(x)**	**Average (μ)**	**$(x-\mu)^2$**
Jan	58347	8	1.371107341	2.87	2.246679
Feb	55881	1	0.178951701	2.87	7.241741
March	61013	10	1.638994968	2.87	1.515373
April	60574	19	3.136659293	2.87	0.071107
May	58439	4	0.684474409	2.87	4.776522
June	54193	21	3.875039212	2.87	1.010104
July	53638	38	7.084529625	2.87	17.76226
August	54117	12	2.217417817	2.87	0.425864
Sept.	54666	34	6.219588044	2.87	11.21974
Oct	58703	21	3.577329949	2.87	0.500316
Nov	57096	16	2.802297884	2.87	0.004584
Dec	58198	10	1.718272106	2.87	1.326477
Average			2.87		**$\Sigma(x-\mu)^2/12$=**4.008397
SD = $\sqrt{\Sigma(x-\mu)^2/12}$			2		

Safety Performance Target (SPT) for 2015	
Current year (2015) Safety Performance Target (SPT) is 5% average rate improvement over the average rate for preceding year (2014)	**2.73**

Alert Level Setting		
Alert Level 1	Alert Level 2	Alert Level 3
Average + 1 SD	Average + 2SD	Average + 3 SD
4.87	**6.87**	**8.87**



1.4 Safety Performance Target (SPT):

a) Safety Performance Target for 2015 is 5% better than the preceding year's (i.e. 2014) average value.

b) Target level setting for 2015 = 2.87 – 5% of 2.87
= 2.73

1.5 Alert Level:

a) Alert level setting: -

Alert level for 2015 is based on the preceding period's (i.e.2014) performance, namely average and standard deviation (SD). The three alert lines are:

- Alert level 1 - average of 2014 + 1 SD = 2.87 + 2 = **4.87**
- Alert level 2 - average of 2014 + 2 SD = 2.87 + 2x2 = **6.87**
- Alert level 3 - average of 2014 +3 SD = 2.87 + 2x3 = **8.87**

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period (2015):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

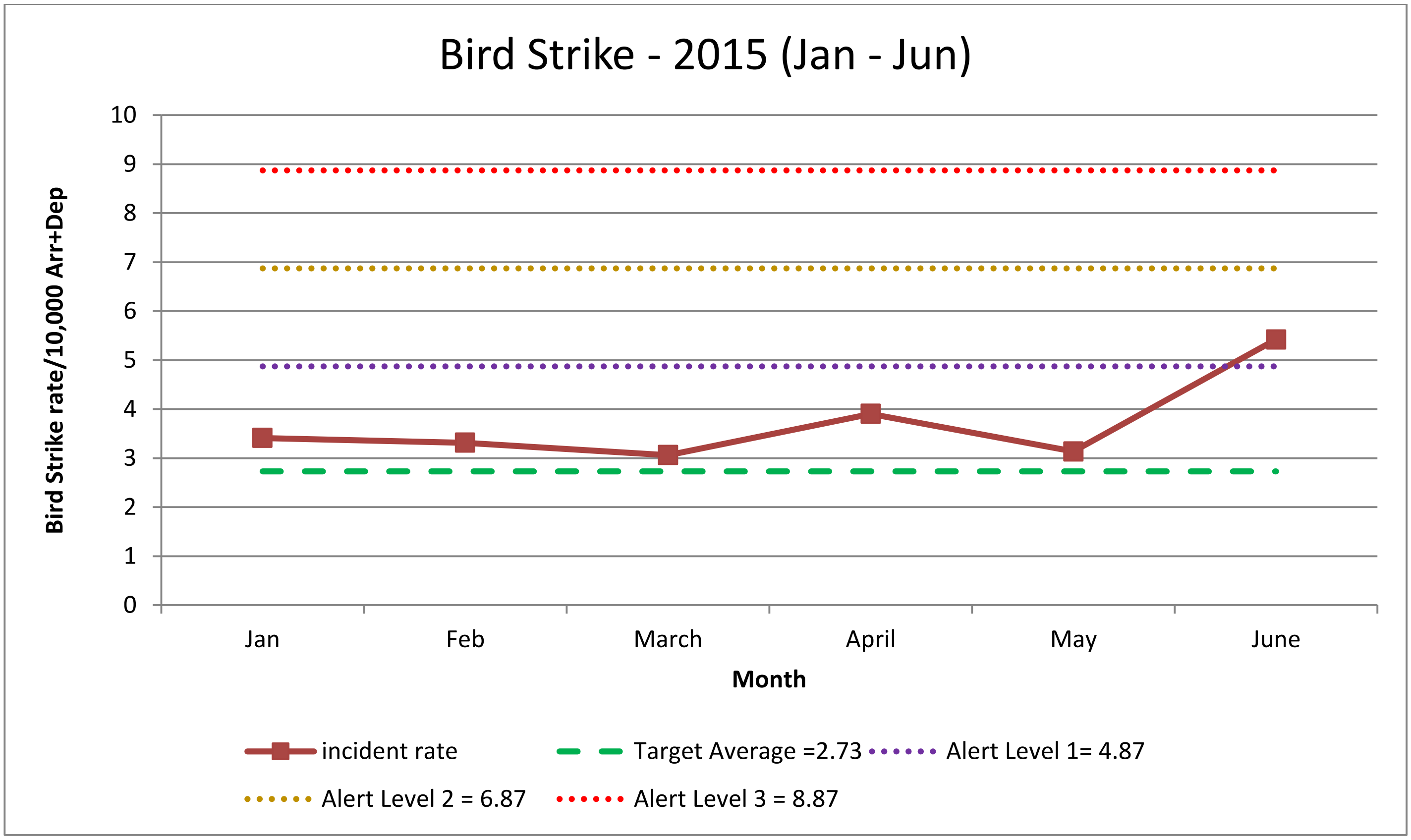
1.6 Target Achievement at the end of monitoring period (i.e. 2015)

At the end of the current year 2015, if the average rate for the current year is atleast 5% or more lower than the preceding year 2014's average rate i.e. **2.73 or lower**, then the set target of 5% improvement is deemed to have been achieved.

1.7 Trend Analysis (1st January to 30th June 2015)

Trend analysis of the SPI for the current period i.e. 1st January to 30th June 2015 is as under:

Year 2015 (1st January – 30th June)							
No. of Bird strikes Per 10,000 Arrivals + Departures							
Month	**Total no. of Arrivals + departures**	**No. of Reported Bird Strikes**	**Incident Rate (Per 10,000)(x)**	**Target Average**	**Alert level 1**	**Alert level 2**	**Alert level 3**
Jan	58,614	20	3.41215409	2.73	4.87	6.87	8.87
Feb	54317	18	3.31387963	2.73	4.87	6.87	8.87
March	58817	18	3.0603397	2.73	4.87	6.87	8.87
April	58932	23	3.90280323	2.73	4.87	6.87	8.87
May	60593	19	3.13567574	2.73	4.87	6.87	8.87
June	57187	31	5.42081242	2.73	4.87	6.87	8.87


Bird Strike - 2015 (Jan - Jun)
Bird Strike rate/10,000 Arr+Dep
10
9
8
7
6
5
4
3
2
1
0
Jan
Feb
March
April
May
June
Month
incident rate
Target Average =2.73
Alert Level 1= 4.87
Alert Level 2 = 6.87
Alert Level 3 = 8.87

2. Number of reported wildlife strikes per 10,000 Arrivals and Departures

2.1 Definition

As per DGCA Air safety circular 02/2011, Wildlife (bird/animal) strike are defined in following two categories:

Confirmed Strikes

a) Any reported collision between a bird or other wildlife and an aircraft for which evidence in the form of a carcass, remains or damage to the aircraft is found.

b) Any wildlife (bird/animal) found dead on an airfield where there is no other obvious cause of death (e.g. strike by vehicles in the operational area, etc.).

Unconfirmed Strike

Any reported collision between a bird or other wildlife and an aircraft for which no physical evidence is found.

2.2 Source of Data

a) Traffic data is derived from Airport Information Management System (AIMS) data Base.

b) Reports of bird strikes are extracted from source of AAI control room messages, which includes reports of pilots, controllers, WSOs, Airport-in-charges, Airlines, AFTN messages and Wildlife (Bird/Animal strike forms).

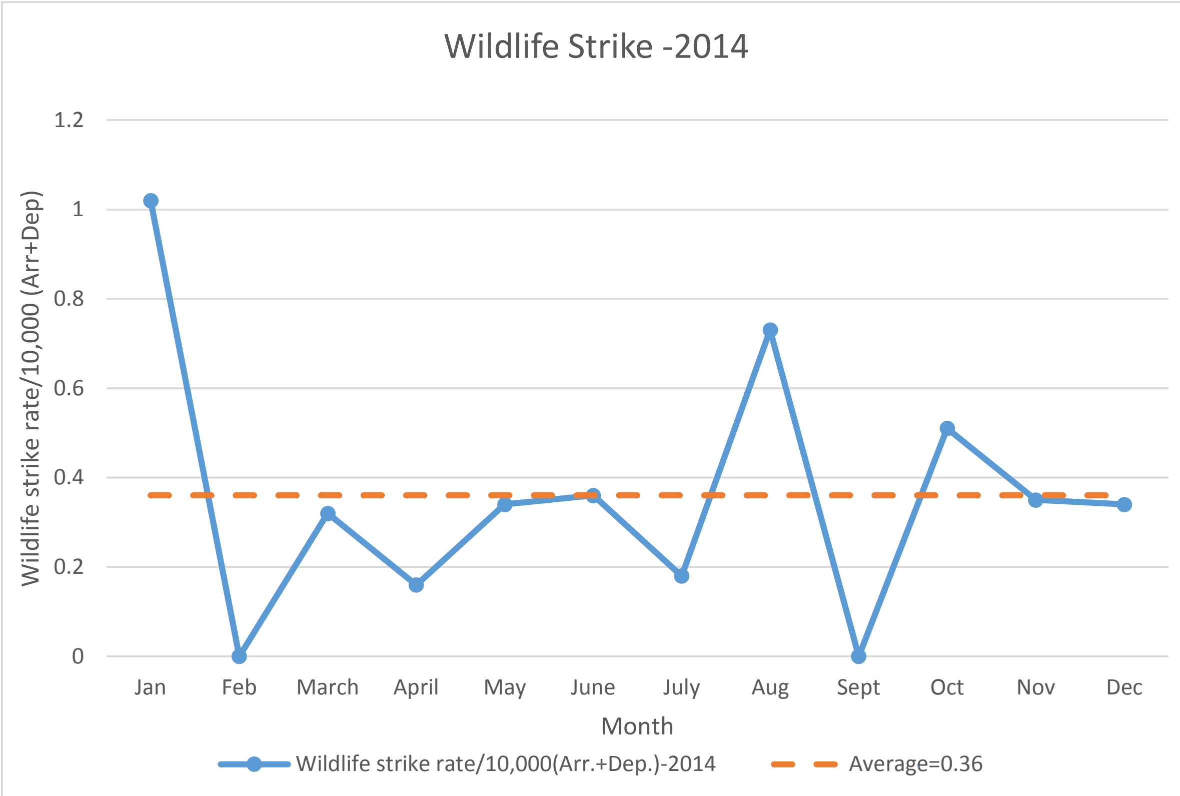
2.3 Data Analysis:

Number of reported wildlife strikes per 10,000 Arrivals and Departures during last year i.e. 2014 and detailed analysis is appended below:

Year-2014(1st January - 31st December)					
No. of Wildlife Strikes per 10,000 Arrival + Departure					
Month	**Total Arrivals + Departures**	**No. of Reported wildlife Strikes**	**Incident Rate (Per 10,000)-(x)**	**Average (µ)**	**$(x-u)^2$**
Jan	58347	6	1.028330505	0.36	0.446666
Feb	55881	0	0	0.36	0.1296
March	61013	2	0.327798994	0.36	0.001037
April	60574	1	0.165087331	0.36	0.037991
May	58439	2	0.342237205	0.36	0.000316
June	54193	2	0.369051353	0.36	8.19E-05
July	53638	1	0.18643499	0.36	0.030125
August	54117	4	0.739139272	0.36	0.143747
Sept.	54666	0	0	0.36	0.1296
Oct	58703	3	0.511047136	0.36	0.022815
Nov	57096	2	0.350287236	0.36	9.43E-05
Dec	58198	2	0.343654421	0.36	0.000267
Average			0.36		**$\Sigma (x-u)^2/12$**=0.078528
SD= $\sqrt{\Sigma(x-u)^2/12}$			0.28		

Safety Performance Target (SPT) for 2015	
Current year (2015) Safety Performance Target (SPT) is 5% average rate improvement over the average rate for preceding year (2014)	**0.34**

Alert Level Setting		
Alert Level 1	Alert Level 2	Alert Level 3
Average + 1 SD	Average + 2SD	Average + 3 SD
0.64	0.92	1.2



2.4 Safety Performance Target (SPT):

a) Safety Performance Target for 2015 is 5% better than the preceding year's (i.e. 2014) average value.

b) Target level setting for 2015 = 0.36 – 5% of 0.36
= 0.34

2.5 Alert Level:

a) Alert level setting: -

Alert level for 2015 is based on the preceding period's (i.e.2014) performance, namely average and standard deviation (SD). The three alert lines are:

- Alert level 1 - average of 2014 + 1 SD = 0.36 + 0.26 = **0.64**
- Alert level 2 - average of 2014 + 2 SD = 0.36 + 2x0.26 = **0.92**
- Alert level 3 - average of 2014 +3 SD = 2.87 + 3x0.26 = **1.2**

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period (2015):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

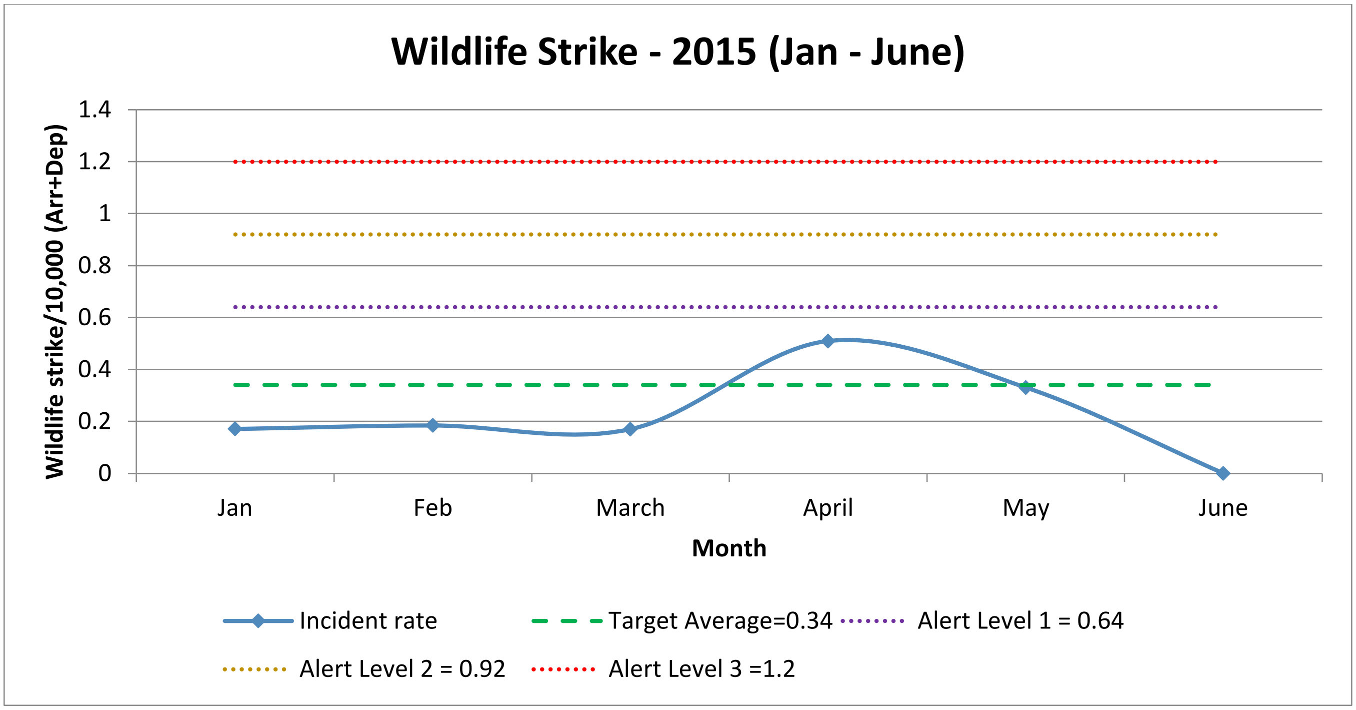
2.6 Target Achievement at the end of monitoring period (i.e. 2015)

At the end of the current year 2015, if the average rate for the current year is atleast 5% or more lower than the preceding year 2014's average rate i.e. **0.34 or lower**, then the set target of 5% improvement is deemed to have been achieved.

2.7 Trend Analysis (1st January to 30th June 2015)

Trend analysis of the SPI for the current period i.e. 1st January to 30th June 2015 is as under:

Year 2015 (1st Jan-30 June)							
No of Wildlife Strike Per 10,000 Arrivals + Departures							
Month	Total Arrivals + Departures	No. of Reported wildlife Strikes	Incident Rate (Per 10,000)(x)	Target Average	Alert level 1	Alert level 2	Alert level 3
Jan	58,614	1	0.170607705	0.34	0.64	0.92	1.2
Feb	54317	1	0.184104424	0.34	0.64	0.92	1.2
March	58817	1	0.170018872	0.34	0.64	0.92	1.2
April	58932	3	0.509061291	0.34	0.64	0.92	1.2
May	60593	2	0.33007113	0.34	0.64	0.92	1.2
June	57187	0	0	0.34	0.64	0.92	1.2



Wildlife Strike - 2015 (Jan - June)
Wildlife strike/10,000 (Arr+Dep)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jan
Feb
March
April
May
June
Month
Incident rate
Target Average=0.34
Alert Level 1 = 0.64
Alert Level 2 = 0.92
Alert Level 3 =1.2

3. <u>Number of runway excursion per 10,000 Arrivals and Departures</u>

3.1 Definition

Runway Excursion: When an aircraft on the runway surface departs the end or the side of the runway surface.

Runway excursions can occur on takeoff or on landing. They consist of two types of events:

- **Veer-Off**: Excursion in which an aircraft departs the side of a runway
- **Overrun**: A runway excursion in which an aircraft departs the end of a runway

3.2 Source of Data

a) Traffic data is derived from Airport Information Management System (AIMS) data Base.

b) Reports of runway excursion are extracted from source of AAI control room messages, which includes reports of pilots, controllers, WSOs, Airport-in-charges, Airlines, AFTN messages and ATC incident report form.

3.3 Data Analysis:

Historic data of number of runway excursion during last year i.e. 2014 is not available, data will be collected in current year 2015 and analysis will be carried out in 2016.

3.4 Safety Performance Target (SPT):

Safety Performance Target will be set in the year 2016, based on the data of 2015, which is being collected in the current year.

3.5 Alert Level:

a) Alert level setting: -

Alert level for 2016, based on the preceding period's (i.e.2015), namely average and standard deviation (SD), performance will be defined in 2016. The three alert lines are:

- Alert level 1 - average of 2015 + 1 SD
- Alert level 2 - average of 2015 + 2 SD
- Alert level 3 - average of 2015 +3 SD

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period (2015):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

3.6 Target Achievement at the end of monitoring period (i.e. 2016)

At the end of the current year 2016, if the average rate for the current year is atleast __% or more lower than the preceding year 2015's average rate, then the set target of improvement is deemed to have been achieved.

B. Lower Consequence Indicators

1. Number of ground incidents per 10,000 Arrivals and Departures

1.1 Definition

Ground Incident; Ground incident means an occurrence, other than an accident, associated with the operation of the aircraft, that could affect the safety of the operation of the aircraft or other people on the ground.

1.2 Source of Data

a) Traffic data is derived from Airport Information Management System (AIMS) data Base.

b) Reports of ground incidents are extracted from source of AAI control room messages, which includes reports of pilots, controllers, WSOs, Airport-in-charges, Airlines, AFTN messages and ATC incident report form.

1.3 Data Analysis:

Historic data of number of ground incident during last year i.e. 2014 is not available, data will be collected in current year 2015 and analysis will be carried out in 2016.

1.4 Safety Performance Target (SPT):

Safety Performance Target will be set in the year 2016, based on the data of 2015, which is being collected in the current year.

1.5 Alert Level:

a) Alert level setting: -

Alert level for 2016, based on the preceding period's (i.e.2015), namely average and standard deviation (SD), performance will be defined in 2016. The three alert lines are:

- Alert level 1 - average of 2015 + 1 SD
- Alert level 2 - average of 2015 + 2 SD
- Alert level 3 - average of 2015 +3 SD

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for the monitoring period (2016):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

1.6 Target Achievement at the end of monitoring period (i.e. 2016)

At the end of the current year 2016, if the average rate for the current year is atleast __% or more lower than the preceding year 2015's average rate, then the set target of improvement is deemed to have been achieved.

2. Number of reported incident of Foreign Object debris (FOD) per 10,000 Arrivals and Departures

2.1 Definition

Foreign Object debris (FOD): Any solid, inanimate object within the movement area which has no Operational or aeronautical function.

2.2 Source of Data

a) Traffic data is derived from Airport Information Management System (AIMS) data Base.

b) Reports of F.O.D. are extracted from source of AAI control room messages, which includes reports of pilots, controllers, WSOs, Airport-in-charges, Airlines, AFTN messages and ATC incident report form.

2.3 Data Analysis:

Historic data of number of reported incident of F.O.D. during last year i.e. 2014 is not available, data will be collected in current year 2015 and analysis will be carried out in 2016.

2.4 Safety Performance Target (SPT):

Safety Performance Target will be set in the year 2016, based on the data of 2015, which is being collected in the current year.

2.5 Alert Level:

a) Alert level setting: -

Alert level for 2016, based on the preceding period's (i.e.2015) performance, namely average and standard deviation (SD), will be defined in 2016. The three alert lines are:

- Alert level 1 - average of 2015 + 1 SD
- Alert level 2 - average of 2015 + 2 SD
- Alert level 3 - average of 2015 +3 SD

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for the monitoring period (2016):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

2.6 Target Achievement at the end of monitoring period (i.e. 2016)

At the end of the current year 2016, if the average rate for the current year is atleast __% or more lower than the preceding year 2015's average rate, then the set target of improvement is deemed to have been achieved.

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8/24/2015

Air Traffic Services

Safety Performance Indicators (SPIs)

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SAFETY PERFORMANCE INDICATORS (SPI) FOR ATM

1 Separation Minima Infringements (SMI) with Direct\Indirect ATC Contribution: Number Of occurrences per 100,000 Aircraft Movements:

1.1. Scope:

a) Separation minima infringement means infringement of applicable separation minima between two IFR flights in AAI administered airspace. Applicable separation minima is as given in Chapter 6 and Chapter 7 of Manual of Air Traffic Services-Part1.

b) Only those occurrences of separation minima infringements will be considered in which ATC has directly or indirectly contributed to the incident have occurred in AAI administered airspace. However, this does not include those occurrences of separation minima infringements which were caused by the ANSPs other than AAI, pilots, Military ATC Units or any other agency.

1.2 Source of Data

a) Traffic data will be derived from AIMS data base

b) Number of aircraft movements means total number of arrivals, departures and over-flights. Number of overflights will not be counted based on number of Indian FIRs, it has flown. An over-flight means an aircraft entering Indian airspace, over-flying Indian-airspace and existing Indian airspace.

c) Reports of Separation Minima Infringement (SMI) are received from sources such as pilots, controllers, WSOs, ATS Incharges, DGCA, other ANSPs, Airlines, ATS Incharges, Air Safety Reports, AAI Control Room messages, AFTN messages. Only those separation minima infringements will be accounted which have been validated by ATM Directorate of AAI.

1.3 Analysis of Data:

a) Data of number of occurrences of Separation Minima Infringements per 100, 000 aircraft movements during last two years is as appended below:

	1st Quarter (Jan-Mar)	2nd Quarter (Apr-Jun)	3rd Quarter (Jul-Sep)	4th Quarter (Oct-Dec)	Annual value	
Year 2013						
Number of occurrences	5	5	6	2	18	
Number of movements	451810	460339	463303	503815	1879267	
SMI/100K movements	1.11	0.22	1.30	0.40	0.96	
Year 2014						
Number of occurrences	4	4	6	5	19	
Number of movements	496141	50087	493302	511286	2000816	
SMI/100K movements	0.81	0.80	1.22	0.98	0.95	
Mean of Quarterly SMI/100 K aircraft movements for 2013 & 2014	0.95	0.94	1.25	0.69		
Two yearly aggregate (Mean) SMI /100K Movements						0.95
SD						0.20
Mean + 1 SD						1.15
Mean + 2 SD						1.35
Mean + 3 SD						1.55
Year 2015						
Number of occurrences	5*	7*				
Number of movements	504980	526829				
SMI/100K movements	0.99*	1.33*				
Yearly aggregate (Mean) SMI/100K movements for 2015						

* Provisional as some of the incidents are under investigation and validation process

1.4 Safety Performance Target:

a) 5% improvements on two year average (mean) of number of occurrences of separation minima infringements per 100,000 aircraft movements.

b) Safety Target for 2015 = Aggregate of SMI for 2013 and 2014 - 5% of (Aggregate of SMI for 2013 and 2014)

= 0.95-0.05=0.90

1.5 Alert Level Setting:

a) *Alert level for 2015* is based on the preceding period's performance (aggregate of preceding two year) and Standard Deviation (SD)

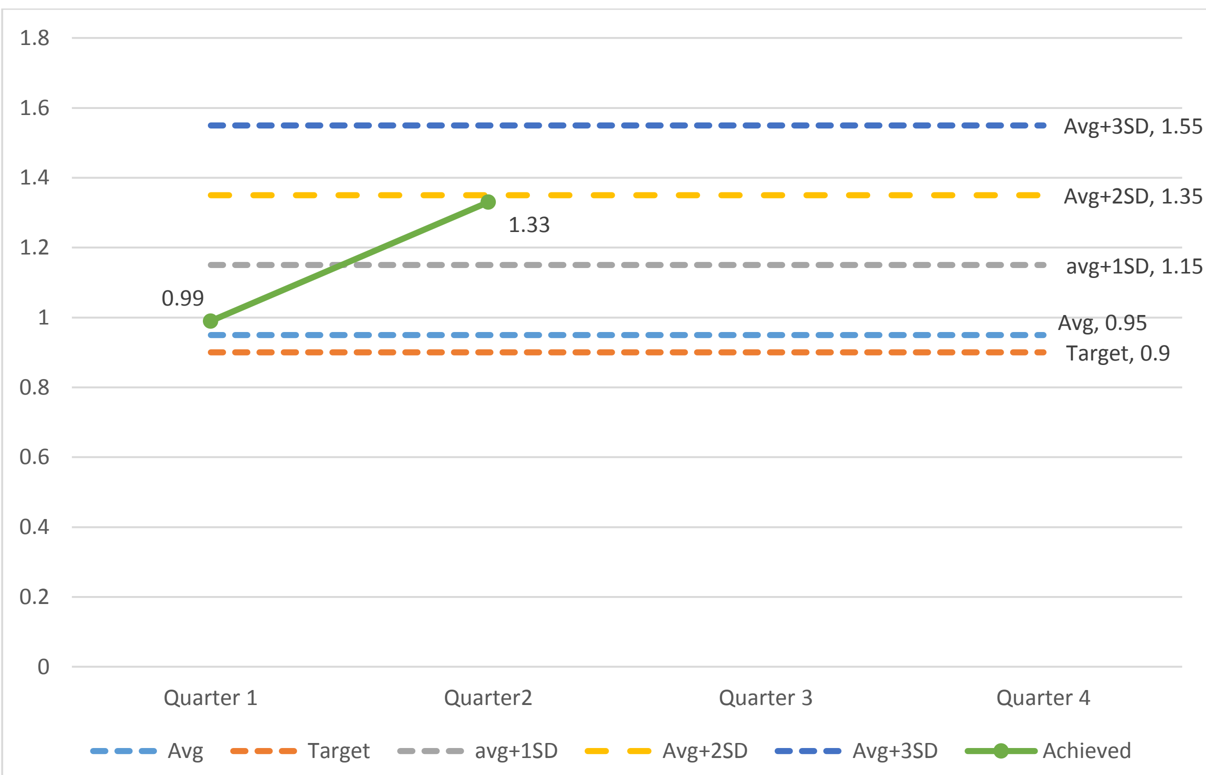
b) *Alert Level Trigger*: An Alert (abnormal/ unacceptable trend) is indicated if any of the conditions below are met for the current monitoring period (current year):

- Any single point is above 3 SD line
- 2 consecutive points are above 2 SD line
- 3 consecutive points are above 1 SD line

When an Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine source and root cause of the abnormal

c) *Target Achievement:*
At end of the current year, if the Ave rate for the current year is at least 5% or more lower than the preceding year's Ave rate, then the set Target of 5% improvement is deemed to have been achieved.

1.6 Target achievement assessed at end of each monitoring period for 2015:



2 Runway Incursions (RI): Number of Runway Incursions Per 10,000 Arrivals And Departures:

2.1. Scope:

a) Runway Incursion means any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.

2.2 Source of Data

a) Traffic data will be derived from AIMS data base.

b) For total number of arrivals and departures, only those airports would be considered where ATC is provided by AAI.

c) Reports of RIs are received from sources such as pilots, controllers, Airlines, ATS Incharges, DGCA, aerodrome operators, Air Safety Reports, AAI Control Room messages, AFTN messages. Only those RIs will be accounted which have been validated either by ATM Directorate of AAI or Runway Safety Team.

2.3 Analysis of Data:

a) Data of number of occurrences of RIs per 10, 000 arrival and departures during last two years is as appended below:

	1st Quarter (Jan-Mar)	2nd Quarter (Apr-Jun)	3rd Quarter (Jul-Sep)	4th Quarter (Oct-Dec)	Annual value
Year 2013					
Number of occurrences	4	4	8	10	26
Number of arrival & departures	357510	367464	367898	397065	1489937
RI/10K arrival & departures	0.11	0.11	0.22	0.25	0.18
Year 2014					
Number of occurrences	8	7	6	8	29
Number of arrival & departures	391592	395946	388787	402314	1578639
RI/10K arrival & departures	0.20	0.18	0.15	0.20	0.18
Mean of Quarterly RI/10K arrival & departures for 2013 & 2014	0.16	0.14	0.19	0.23	

Two yearly aggregate (Mean) RI /10K arrival and departures						0.18
SD						0.03
Mean + 1 SD						0.21
Mean + 2 SD						0.24
Mean + 3 SD						0.27
Year 2015						
Number of occurrences	8	4				
Number of arrival & departures	396632	416622				
RI/10K movements	0.20	0.10				
Yearly aggregate (Mean) RI /10K arrival and departures for 2015						

2.4 Safety Performance Target:

a) 5% improvements on two year average (mean) of number of occurrences of Runway Incursions per 10,000 arriving and departing aircraft.

b) Safety Target for 2015 = Aggregate of RIs for 2013 and 2014 - 5% of (Aggregate of RIs for 2013 and 2014)

=.18-.01=.17

2.5 Alert Level Setting:

a) Alert level for 2015 is based on the preceding period's performance (aggregate of preceding two year) and Standard Deviation (SD)

b) *Alert Level Trigger:* An Alert (abnormal/ unacceptable trend) is indicated if any of the conditions below are met for the current monitoring period (current year):

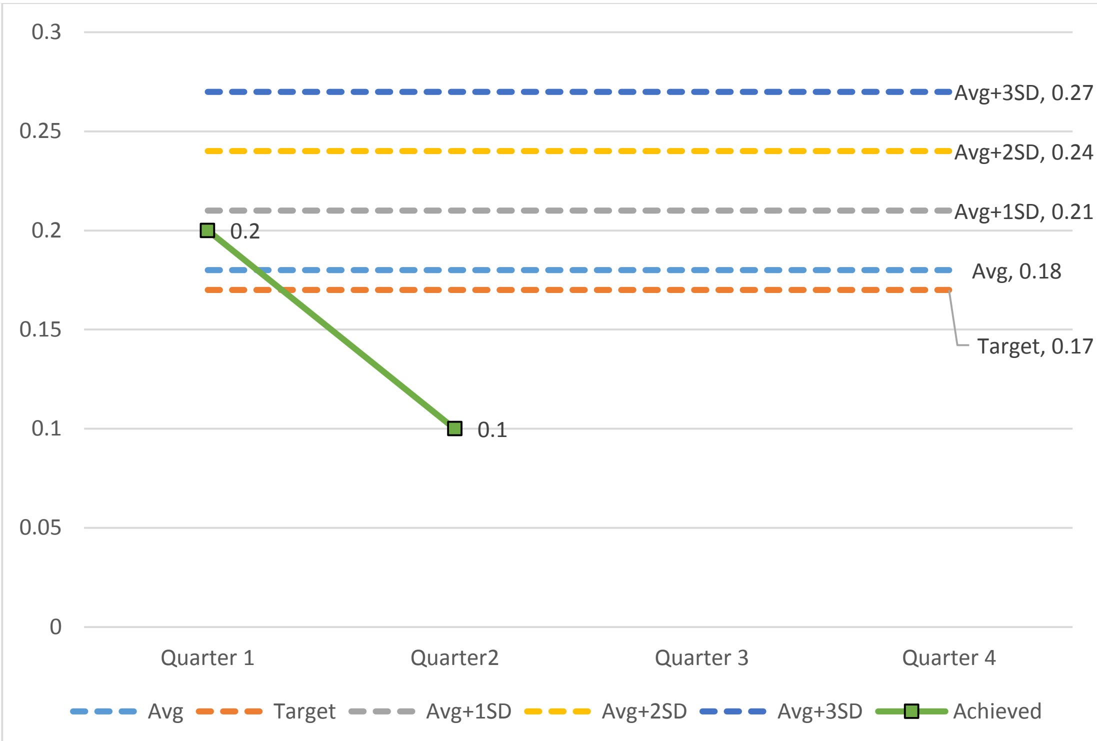
- Any single point is above 3 SD line
- 2 consecutive points are above 2 SD line
- 3 consecutive points are above 1 SD line

When an Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine source and root cause of the abnormal

c) *Target Achievement:*

At end of the current year, if the Ave rate for the current year is at least 5% or more lower than the preceding year's Ave rate, then the set Target of 5% improvement is deemed to have been achieved.

2.6 Target achievement assessed at end of each monitoring period for 2015:



3 Number of Level Bust (LB) per 100, 000 Aircraft Movements:

3.1 Scope:

a) A level bust is defined as an unauthorized deviation from the ATC assigned altitude (or flight level) equal to or greater than 300 ft in Non-RVSM airspace and 200 ft in RVSM airspace. Occurrences in which ATC gave the aircraft clearance for an incorrect altitude are not included.

b) All such Level Busts which occurred in AAI administered airspace, will be considered. However, this will not include those Level Busts which were caused by the ANSPs other than AAI. This also does not include those Level Busts which caused by Military ATC Units e.g. IAF and Indian Navy.

3.2 Source of Data:

a) Traffic data will be derived from AIMS data base. Number of aircraft movements means total number of arrivals, departures and over-flights.

b) Reports of Level Busts are received from pilots, controllers, WSOs, ATS Incharges, DGCA, Air Safety Reports, voluntarily reports, Proficiency Assessors, analysis of random tape transcripts, AAI Control Room messages, AFTN messages . Only those Level Busts will be accounted which have been validated by ATM Dte of AAI.

3.3 Analysis of Data:

a) Data of number of occurrences of level bust per 100, 000 aircraft movements during last two years is as appended below:

	1st Quarter (Jan-Mar)	2nd Quarter (Apr-Jun)	3rd Quarter (Jul-Sep)	4th Quarter (Oct-Dec)	Annual value	
Year 2015						
Number of occurrences						
Number of movements						
LB/100K movements						
Year 2016						
Number of occurrences						
Number of movements						
LB/100K movements						
Mean of Quarterly LB/100 K aircraft movements for 2015 & 2016						
Two yearly aggregate (Mean) LB/100K						
SD						
Mean + 1 SD						
Mean + 2 SD						
Mean + 3 SD						
Year 2017						
Number of occurrences						
Number of movements						
LB/100K movements						
Yearly aggregate (Mean) LB /100K movements for 2017						

3.4 Safety Performance Target:

5% improvements on two year average (mean) of number of level busts per 100,000 aircraft movements.

Safety Target for **2017** = Aggregate of Level Busts for 2015 and 2016 - 5% of (Aggregate of Level Busts for 2015 and 2016)

3.5 Alert Level Setting:

a) Alert level for 2017 will be based on the preceding period's performance (aggregate of preceding two year) and Standard Deviation (SD)

b) *Alert Level Trigger:* An Alert (abnormal/ unacceptable trend) is indicated if any of the conditions below are met for the current monitoring period (current year):

- Any single point is above 3 SD line
- 2 consecutive points are above 2 SD line
- 3 consecutive points are above 1 SD line

When an Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine source and root cause of the abnormal

c) *Target Achievement:*
At end of the 2017 year, if the Ave rate for that year is at least 5% or more lower than the preceding year's Ave rate, then the set Target of 5% improvement is deemed to have been achieved.

4 Number of Safety Occurrences due Communication Errors (SOCE) per 100, 000 Aircraft Movements:

4.1 Scope:

a) Communication errors means errors due to miscommunication in ATC on account of absent mindedness and complacency; incorrect phraseologies or inappropriate use of plain English that results in ambiguity; call sign confusion due to call sign similarity; improper enunciation and articulation of voice; hearing expectancy; not hearing a transmission at all; confused instructions due to similarity in SIDs/STARs or waypoints; High rate of speech or unnecessary pauses; readback/hearback error etc.

b) Safety Occurrences due communication errors (SOCE) include air and ground occurrences such as separation minima infringements, runway incursions, level bust, aircraft vacating runway via wrong taxiway, aircraft entering closed runway, taxiway, apron, go around, cancellation of takeoff, rejected takeoff, landing & taking off without ATC clearance etc due communication error.

4.2 Source of Data

a) Traffic data will be derived from AIMS data base

b) Number of aircraft movements means total number of arrivals, departures and over-flights. Number of overflights will not be counted based on number of Indian FIRs, it has flown. An over-flight means an aircraft entering Indian airspace, over-flying Indian-airspace and existing Indian airspace.

c) Reports of SOCE are received from sources such as pilots, controllers, WSOs, ATS Incharges, DGCA, Air Safety Reports, voluntarily reports, Proficiency Assessors, analysis of random tape transcripts, AAI Control Room messages, AFTN messages. Only those SOCE will be accounted which have been validated by ATM Dte of AAI

4.3 Analysis of Data:

a) Data of number of occurrences of SOCE per 100, 000 aircraft movements during last two years is as appended below:

	1st Quarter (Jan-Mar)	2nd Quarter (Apr-Jun)	3rd Quarter (Jul-Sep)	4th Quarter (Oct-Dec)	Annual value	
Year 2015						
Number of occurrences						
Number of movements						
SOCE/100K movements						
Year 2016						
Number of occurrences						
Number of movements						
SOCE/100K movements						
Mean of Quarterly SOCE/100 K aircraft movements for 2015 & 2016						
Two yearly aggregate (Mean) SOCE						
SD						
Mean + 1 SD						
Mean + 2 SD						
Mean + 3 SD						
Year 2017						

Number of occurrences						
Number of movements						
SOCE/100K movements						
Yearly aggregate (Mean) SOCE/100K movements for 2017						

4.4 Safety Performance Target:

a) 5% improvements on two year average (mean) of number of occurrences of SOCE per 100,000 arriving and departing aircraft.

b) Safety Target for 2017 = Aggregate of SOCEs for 2015 and 2016 - 5% of (Aggregate of SOCEs for 2015 and 2016)

4.5 Alert Level Setting:

a) Alert level for 2015 is based on the preceding period's performance (aggregate of preceding two year) and Standard Deviation (SD)

b) *Alert Level Trigger:* An Alert (abnormal/ unacceptable trend) is indicated if any of the conditions below are met for the current monitoring period (current year):

- Any single point is above 3 SD line
- 2 consecutive points are above 2 SD line
- 3 consecutive points are above 1 SD line

When an Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine source and root cause of the abnormal

c) *Target Achievement:*

At end of the current year, if the Ave rate for the current year is at least 5% or more lower than the preceding year's Ave rate, then the set Target of 5% improvement is deemed to have been achieved.

9/7/2015

Communication, Navigation & Surveillance

Safety Performance Indicators (SPIs)

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SAFETY PERFORMANCE INDICATORS (SPI) FOR CNS

A. High Consequence Indicators

1. Mean Time Between Failures (MTBF) of Landing/Navigational aids(ILS,DME, VOR, Locator & Marker) per year

1.1 Definition

ICAO Annex 10 Volume –I Attachment F- GUIDANCE MATERIAL CONCERNING RELIABILITY AND AVAILABILITY OF RADIOCOMMUNICATIONS AND NAVIGATION AIDS provides methodology and guidance in calculating MTBF of the facilities. Relevant extract from Attachment F is given as under:

Mean time between failures (MTBF): The actual operating time of a facility divided by the total number of failures of the facility during that period of time.

Note: the operating time is in general chosen so as to include atleast five, and preferably more, facility failures in order to give a reasonable measure of confidence in the figure derived.

Calculation formula defined as:

$$\text{MTBF} = \frac{\text{Actual operating time of the facility}}{\text{Number of failures}^{*}}$$

(* number of failures does not include scheduled shutdown period)

It may be seen that the reliability increases as the MTBF increases. For a higher degree of reliability we must have a large MTBF.

1.2 Source of Data

a) Source of data is daily report sent by each Airport/CNS station to CHQ. Stations will be further advised to refine the data.

b) The Data will be collected on monthly basis and will be averaged on Quarterly/Annual basis.

1.3 Data Analysis:

MTBF data analysis has been done with available “Failure” data, which is only indicative, as number of failures is collected from the NOTAM data, issued for failure of facility for more than 30minutes. The ‘CQ” action of facility i.e. failure of facility for less than 30 minutes, have not been collected. Hence the data is insufficient and calculated MTBF is not the true reflection of ‘Reliability’ factor of the facility.

However, available month-wise data of the year 2014, on ‘Total hours of operations’; ‘Total unserviceable hours’ and ‘Number of failure’ with MTBF of each Landing/Navigational aids have been appended as under:

CONSOLIDATED MTBF STATISTICS OF LANDING / NAV-AIDS FOR JAN-JUN 2014											
Facility	ALL INDIA										
	Total Scheduled Hours Of Operation							U/S Hours (Jan-Jun) 2014	TOTAL Actual Operation Time	TOTAL NO. Of Failures	MTBF
	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	TOTAL			
	NAVIGATIONAL AIDS FACILITIES										
ILS	70635.52	63993.30	69390.92	68659.55	69561.78	67011.52	409252.59	2517.33	406735.26	20	20336.76
DME-LP	35457.26	32122.25	34834.36	34431.01	35084.11	33891.12	205820.11	64.20	205755.91	1	205755.91
VOR / DVOR	50255.02	45667.66	50634.66	49657.01	50964.75	49270.64	296449.74	1429.12	295020.62	10	29502.06
DME-HP	50379.87	45751.66	50723.76	49748.01	51083.05	49357.94	297044.29	281.99	296762.30	5	59352.46
NDB/LOCATOR/ MARKER	36706.89	32602.65	36220.52	35257.98	35997.41	35039.01	211824.46	464.08	211360.38	3	70453.46

CONSOLIDATED MTBF STATISTICS OF LANDING / NAV-AIDS FOR JUL-DEC 2014											
Facility	ALL INDIA										
	Total Scheduled Hours Of Operation							U/S Hours (Jul-Dec) 2014	TOTAL Actual Operation Time	TOTAL NO. Of Failures	MTBF
	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL	TOTAL			
	NAVIGATIONAL AIDs FACILITIES										
ILS	68291.47	68689.54	67298.98	68393.88	66522.40	69051.67	408247.94	1728.60	406519.34	14	29037.10
DME-LP	34562.60	34449.87	33796.69	34708.04	33395.60	34586.46	205499.26	753.50	204745.76	3	68248.59
VOR / DVOR	50716.01	50766.61	49571.83	50827.13	49029.23	50612.57	301523.38	826.10	300697.28	20	15034.86
DME-HP	50807.01	50590.98	49385.16	50852.77	49672.93	51889.57	303198.42	651.60	302546.82	10	30254.68
NDB/LOCATOR/ MARKER	34885.01	35111.20	34900.92	35335.33	33904.59	35687.76	209824.81	141.21	209683.60	5	41936.72

CONSOLIDATED MTBF STATISTICS OF NAV-AIDS FOR 2014									
Facility	ALL INDIA								
	Total Scheduled Hours Of Operation			U/S Hours			TOTAL Actual Operation Time	TOTAL NO. Of Failures	MTBF
	JAN TO JUN	JUL TO DEC	TOTAL	JAN TO JUN 14	JUL TO DEC 14	TOTAL			
	NAVIGATIONAL AIDS FACILITIES								
ILS	409252.59	408247.94	817500.53	2517.33	1728.60	4245.93	813254.60	34	23919.25
DME-LP	205820.11	205499.26	411319.37	64.20	753.50	817.70	410501.67	4	102625.42
VOR / DVOR	296449.74	301523.38	597973.12	1429.12	826.10	2255.22	595717.90	30	19857.26
DME-HP	297044.29	303198.42	600242.71	281.99	651.60	933.59	599309.12	15	39953.94
NDB/LOCATOR/ MARKER	211824.46	209824.81	421649.27	464.08	141.21	605.29	421043.98	8	52630.50

Note: "Total number of failure" does not include all failures such as failures of less than 30 minutes and not covered by NOTAM, hence data integrity is doubtful and insufficient.

Safety Performance Target (SPT) for 2016
To be defined in the year 2016, based on quality data collected in 2015

Alert Level Setting		
Alert Level 1	Alert Level 2	Alert Level 3
Average - 1 SD	Average - 2SD	Average - 3 SD
To be defined in 2016		

1.4 Safety Performance Target (SPT):

Safety Performance Target will be set in the year 2016, based on the data of 2015, which is being collected in the current year. Present data is insufficient, as all failures including of less than 30 minutes were not captured.

1.5 Alert Level:

a) Alert level setting: -

Alert level for 2016, based on the preceding period's (i.e.2015), performance namely average and standard deviation (SD), will be defined in 2016. The three alert lines are:

- Alert level 1 - average of 2015 - 1 SD
- Alert level 2 - average of 2015 - 2 SD
- Alert level 3 - average of 2015 - 3 SD

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period (2015):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

1.6 Target Achievement at the end of monitoring period (i.e. 2016)

Target achievement will be defined in the year 2016, once Safety Performance Target (SPT) is defined on the basis of 2015 data.

2. Mean Time Between Failures (MTBF) of Surveillance aids(ADS-B, MSSR, TAR, RSR and ASMGCS) per year

2.1 Definition

ICAO Annex 10 Volume –I Attachment F- GUIDANCE MATERIAL CONCERNING RELIABILITY AND AVAILABILITY OF RADIOCOMMUNICATIONS AND NAVIGATION AIDS provides methodology and guidance in calculating MTBF of the facilities. Relevant extract from Attachment F is given below:

Mean time between failures (MTBF): The actual operating time of a facility divided by the total number of failures of the facility during that period of time.

Note: the operating time is in general chosen so as to include atleast five, and preferably more, facility failures in order to give a reasonable measure of confidence in the figure derived.

Calculation formula defined as:

$$\text{MTBF} = \frac{\text{Actual operating time of the facility}}{\text{Number of failures*}}$$

(* number of failures does not include scheduled shutdown period)

It may be seen that the reliability increases as the MTBF increases. For a higher degree of reliability we must have a large MTBF.

2.2 Source of Data

a) Source of data is daily report sent by each Airport/CNS station to CHQ. Stations will be further advised to refine the data.

b) The Data will be collected on monthly basis and will be averaged on Quarterly/Annual basis.

2.3 Data Analysis:

MTBF data analysis has been done with available “Failure” data, which is only indicative, as number of failures is collected from the NOTAM data, issued for failure of facility for more than 30minutes. The ‘CQ” action of facility i.e. failure of facility for less than 30 minutes, have not been collected. Hence the data is insufficient and calculated MTBF is not the true reflection of ‘Reliability’ factor of the facility.

However, available month-wise data of the year 2014, on ‘Total hours of operations’; ‘Total unserviceable hours’ and ‘Number of failure’ with MTBF of each Surveillance aids except for ADS-B data, have been appended as under:

CONSOLIDATED MTBF STATISTICS OF SURVEILLANCE AIDS FOR JAN-JUN 2014											
Facility	ALL INDIA										
	Total Scheduled Hours Of Operation							U/S Hours Jan-Jun-14	TOTAL Actual Operation Time	Total NO. Of Failures	MTBF
	JAN	FEB	MAR	APR	MAY	JUN	TOTAL	TOTAL			
ASR / ARSR/ MSSR	22455.16	22280.12	24671.04	22421.50	25137.40	23864.46	140829.68	1610.28	139219.40	19	7327.34
ASMGCS	5952.00	5376.00	5952.00	5760.00	5880.00	5760.00	34680.00	8.24	34671.76	2	17335.88
TOTAL	271841.72	247793.64	272427.26	265935.06	273708.50	264194.69	1595900.87	6375.24	1589525.63	60.00	26492.09

CONSOLIDATED MTBF STATISTICS OF SURVEILLANCE AIDS FOR JUL-DEC 2014											
Facility	ALL INDIA										
	Total Scheduled Hours Of Operation							U/S Hours Jul-Dec-14	TOTAL Actual Operation Time	Total No. of Failures	MTBF
	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL	TOTAL			
ASR / ARSR/ MSSR	**24322.46**	**24689.22**	**24393.21**	**24993.16**	**26986.00**	**26565.00**	**151949.05**	1020.26	150928.79	**9**	**16769.87**
ASMGCS	**5880.00**	**5952.00**	**5832.00**	**5952.00**	**5832.00**	**5952.00**	**35400.00**	16.10	35383.90	**0**	……
TOTAL	**65087.47**	**65752.42**	**65126.13**	**271062.31**	**265342.75**	**274345.03**	**1615642.86**	5137.37	1610505.49	**61.00**	**26401.73**

CONSOLIDATED MTBF STATISTICS OF SURVEILLANCE AIDS FOR 2014									
Facility	ALL INDIA								
	Total Scheduled Hours Of Operation			U/S Hours			TOTAL Actual Operation Time	TOTAL NO OF Failures	MTBF
	JAN TO JUN	JUL TO DEC	TOTAL	JAN TO JUN	JUL TO DEC	TOTAL			
ASR / ARSR/ MSSR	140829.68	151949.05	292778.73	1610.28	1020.26	2630.54	290148.19	28	**10362.44**
ASMGCS	34680.00	35400.00	70080.00	8.24	16.10	24.34	70055.66	2	**35027.83**
TOTAL	1595900.87	1615642.86	3211543.73	6375.24	5137.37	11512.61	3200031.12	121	**26446.54**

Note: "Total number of failure" does not include all failures such as failures of less than 30 minutes and ADS-B failure, hence data integrity is doubtful and insufficient.

Safety Performance Target (SPT) for 2016
To be defined in the year 2016, based on quality data collected in 2015

Alert Level Setting		
Alert Level 1	Alert Level 2	Alert Level 3
Average - 1 SD	Average - 2SD	Average - 3 SD
To be defined in 2016		

2.4 Safety Performance Target (SPT):

Safety Performance Target will be set in the year 2016, based on the data of 2015, which is being collected in the current year. Present data is insufficient, as all failures including of less than 30 minutes and ADS-B data (which was operationalized in mid of 2014) were not captured.

2.5 Alert Level:

a) Alert level setting: -

Alert level for 2016, based on the preceding period's (i.e.2015), namely average and standard deviation (SD), performance will be defined in 2016. The three alert lines are:

- Alert level 1 - average of 2015 - 1 SD
- Alert level 2 - average of 2015 - 2 SD
- Alert level 3 - average of 2015 - 3 SD

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period (2015):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

2.6 Target Achievement at the end of monitoring period (i.e. 2016)

Target achievement will be defined in the year 2016, once Safety Performance Target (SPT) is defined on the basis of 2015 data.

B. Lower Consequence Indicators

1. Number of degradation in ATS automation system per year

1.1 Definition

"ATS automation system" may reported as "degraded" when any of the following occurs:

- Failure of entire Automation System or changeover to backup system.
- Failure of any LAN in the main Automation system.
- Non availability in the Data Recording facility in the Automation system.
- Non availability of GPS clock in the Automation system.

1.2 Source of Data

a) Source of data is daily report sent by each Airport/CNS station to CHQ. Stations will be further advised to refine the data.

b) The Data will be collected on monthly basis and will be averaged on Quarterly/Annual basis.

1.3 Data Analysis:

Historic data of number of degradation during last year i.e. 2014 is not available, available data is insufficient. Data pertaining to this SPI, will be collected in current year 2015 and analysis will be carried out in 2016.

1.4 Safety Performance Target (SPT):

Safety Performance Target will be set in the year 2016, based on the data of 2015, which is being collected in the current year.

1.5 Alert Level:

a) Alert level setting: -

Alert level for 2016, based on the preceding period's (i.e.2015), namely average and standard deviation (SD), performance will be defined in 2016. The three alert lines are:

- Alert level 1 - average of 2015 + 1 SD
- Alert level 2 - average of 2015 + 2 SD
- Alert level 3 - average of 2015 +3 SD

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for the monitoring period (2016):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

1.6 Target Achievement at the end of monitoring period (i.e. 2016)

At the end of the current year 2016, if the average rate for the current year(2016) is atleast, lower than the set Safety target (SPT) (i.e. ----- % or more lower than preceding year 2015's average rate), then the set target of improvement is deemed to have been achieved.

2. <u>Number of VHF/VCCS failures per year</u>

2.1 Definition

"VHF failure" may be reported, if any of the following occurs:

- Failure of J-control system or controller work station
- Failure of remote lines
- Failure of main or standby frequency
- Failure to change over to backup system
- Change of position of antenna connected to Transmitter / Receiver.

"VCCS failure" may reported, if any of the following occurs:

- Failure of data or control lines
- Failure of main or standby system
- Failure to change over to backup system
- Failure of VCCS work station

2.2 Source of Data

a) Source of data is daily report sent by each Airport/CNS station to CHQ. Stations will be further advised to refine the data.

b) The Data will be collected on monthly basis and will be averaged on Quarterly/Annual basis.

2.3 Data Analysis:

Historic data of number of reported incident of VHF / VCCS during last year i.e. 2014 is not available, Current available data is insufficient to carry out analysis. Data will be collected in current year 2015 and analysis will be carried out in 2016.

2.4 Safety Performance Target (SPT):

Safety Performance Target will be set in the year 2016, based on the data of 2015, which is being collected in the current year.

2.5 Alert Level:

a) Alert level setting: -

Alert level for 2016, based on the preceding period's (i.e.2015) performance, namely average and standard deviation (SD), will be defined in 2016. The three alert lines are:

- Alert level 1 - average of 2015 + 1 SD
- Alert level 2 - average of 2015 + 2 SD
- Alert level 3 - average of 2015 +3 SD

b) Alert Level Trigger:-

An alert (abnormal/unacceptable trend) is indicated if any of the conditions below are met for the monitoring period (2016):

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

2.6 Target Achievement at the end of monitoring period (i.e. 2016)

At the end of the current year 2016, if the average rate for the current year(2016) is atleast, lower than the set Safety target (SPT) (i.e. ----- % or more lower than preceding year 2015's average rate), then the set target of improvement is deemed to have been achieved.

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Attachment - I

ACTION PLAN TO MEET THE SAFETY PERFORMANCE TARGETS (SPTs) FOR 2015

Aerodrome Operations

I. Runway Excursion

Safety Measures Already in Place:

Operation Directorate References	Safety Measures Already in Place
Operational circular 12 of 2011 dated 10th June 2011	Runway Surface Friction Characteristics of wet paved Runways
Operational circular 24 of 1998 dated 1st September 1998	calibration of PAPI system at AAI airports & coordination with FIU
Operational circular 7 of 1998 dated 11th June 1998	Maintenance of aerodrome & ground AIDS.
DGCA CAR Section 4, Series X, Part IV	Establishing of Runway Safety Teams at licensed airport

Safety Action Plan

Safety objective(s)	Action
Reduce the number of runway excursions	a) Continuous periodic monitoring of runway friction value. b) Continuous periodic removal of rubber deposit from runway. c) Continuous periodic calibration of PAPI. d) Continuous periodic maintenance of runway marking and lighting. e) Ensure proper slope on runway, runway shoulder and runway strip for rapid drainage of water

II. Bird strike/ Wildlife strike

Safety Measures Already in Place

Operation Directorate References	Safety Measures Already in Place
Operational circular 2 of 2014 dated 24th December 2014	Constitution of Airfield Environment Management Committees to check bird strike hazard near the airfields
Operational circular 2 of 2014 dated 3rd February 2015	Perimeter wall / Fencing check
Rule 91, Aircraft Rules 1937	Primary legislation (Aircraft Rules) preventing dumping of garbage and de-skinning of animals within a 10 km radius around airport
DGCA Order No. AV-15023/1/2009-AS (NBCC) dated 02.12.2013	National Bird Control Committee
Recommendation of NBCC (National Bird Control committee)	Education and outreach programs
Recommendation of NBCC(National Bird Control committee)	Extensive audits and inspections

Safety Action Plan

Safety objective(s)	Action
Reduce the number of wildlife strikes (ground) Reduce the number of bird strikes	a) Ensure convening AEMC meeting every month at International and major airports and every alternate month at other airports. b) Awareness campaign in localities and schools regarding wildlife hazards c) Dedicated team managed by trained staff to ensure implementation of wildlife strike control measures d) Review of existing mitigation action and identify the areas of improvement with airport management e) Appraise administration of all the State Government, through communication to the Chief Secretaries of the States on the importance of compliance of Rule 91 of the Aircraft Rules 1937

III. Ground Incident

Safety Measures Already in Place

Operation Directorate References	Safety Measures Already in Place
Operational circular 20 of 1998 dated 21st August 1998	Safety measures for control of vehicles plying in the operational area at the airport
Operational circular 3 of 2015 dated 30th March 2015	Training to Airfield Personnel in Apron Safety Regulations, Issue of Airfield Driving Permit and Vehicle Permit/Renewal Fee.
Operational circular 3 of 2015 dated March 1997	Ground Incident/Accident Reporting & Analysis procedures.
Operational circular 2 of 1998 dated 25th May 1998	Investigation/reporting of incidents/ accidents/unusual occurrences at airports
DGCA CAR Section 4, Series X, Part IV	Establishing of Runway Safety Teams at licensed airport
DGCA Air Safety Circular 04 of 2007	Guidance material issued for safety on the apron

Safety Action Plan

Safety objective(s)	Action
Reduce the number of ground collisions between aircraft and vehicles Reduce the number of ramp fatalities and serious injuries	a) Ensure training of vehicle drivers to follow speed control and know the sensitive areas b) Ensure introduce Breathe Analyzer tests for al drivers & equipment operators on airport premises. c) Ensure issuance of vehicle permit to road wort vehicle. d) Provide continuous training and monitoring activities in apron areas e) Distribute safety-related information in differen languages, or where possible usage of pictograms. f) Organize an apron safety week for enhanced awareness. g) Provide training on apron rules and regulations

IV. F.O.D on Movement Area

Safety Measures Already in Place

Operation Directorate References	Safety Measures Already in Place
Operational circular 5 of 2011 dated 10th June 2011	Procedure for inspecting runways, taxiway, apron and fencing and sweeping of operational area.

Safety Action Plan

Safety objective(s)	Action
Reduce number of FOD events	a) Provision of adequate FOD containers/bin. b) Proper care, use, and stowage of material and component or equipment items used around aircraft while in maintenance or on airport surfaces. c) Control over personal items and equipment. d) Control of debris and loose items associated with luggage, ramp equipment, and construction materials e) Establish FOD management Programme and consequences of ignoring FOD.

Air Traffic Services

Safety Action Plan

Safety objective(s)	Action
Reduce number of: (i) Separation Minima Infringements (SMI) with Direct/ Indirect ATC Contribution (ii) Runway Incursions (RI) (iii) Level busts (LB) (iv) Safety Occurrences due Communication Errors (SOCE)	a) Training to controllers on ATC simulators on conflict detection and resolution. b) Refresher training of controllers c) Competency check of controllers d) Issuance of guidance material for dealing with situation which may lead to safety occurrences. e) Organizing workshop for controllers on identified safety issues. f) Organizing workshop for ATC supervisors and sensitizing them on role of supervisors in prevention of safety occurrences. g) Presentation of case studies to the controllers so that they can learn from other's mistakes. h) Harmonization of airspace in progressive manner. i) Encouraging voluntary reporting of the incidents j) Introduction to communication errors in simulated exercises at CATC k) Training to controllers on prevention of runway incursions, prevention of level busts l) Enhancing VHF communication and surveillance capability

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File No: AAI/13-22/14-AVS

AVIATION SAFETY CIRCULAR NO: 01/2015

Safety Performance Indicators and Targets of AAI

1 Introduction

Safety Management System (SMS) framework consist four components which includes twelve elements, representing minimum requirements for SMS implementation. Safety Assurance is one of the component to be implemented in fourth phase of SMS implementation.

Safety assurance consists of processes and activities undertaken by the service provider to determine whether the SMS is operating according to expectations and requirements. The service provider continually monitors its internal process as well as its operating environment to detect changes and deviations that may introduce emerging Safety risks or degradation of existing risk controls.

DGCA CAR Section 1, Series C Part I, dated 20th July, 2010 on "Establishment of a Safety Management system (SMS)" para 11, set forth that – 'A service provider shall as a part of SMS Safety assurance activities, develop and maintain the necessary means to verify the Safety performance of the organization in reference to the Safety Performance Indicators (SPIs) and Safety Performance targets (SPTs) of the SMS and to validate the effectiveness of safety risk controls'.

2 Purpose

The purpose of this Circular is to create awareness in the AAI owned airports and ANS locations about the Safety Performance Indicators (SPIs) and Safety Performance Targets (SPTs) set by AAI, as mandated by DGCA, for measuring safety performance of AAI as a whole and individual airport / ANS locations. Further, this circular also highlights the requirement and importance of data collection, pertaining to the SPIs, by the airport / operational unit and the constant monitoring of the SPIs by analyzing the safety data.

The individual airports / ANS locations, in accordance to local conditions, may also set their own additional low consequence Safety Performance Indicators (SPIs) for enhancing the safety performance.

3 Scope

The contents of this circular are applicable to all personnel of AAI working at AAI owned airports and ANS (Air Navigation Services) locations.

4 References

- DGCA CAR Section 1, Series C Part I , dated 20th July, 2010 on *Establishment of a Safety Management System (SMS)*
- C-SMS Manual –Version 3, Issue 2
- ICAO DOC 9859 *Safety Management Manual* (3rd edition-2013)

5 Definitions

5.1 **Acceptable level of safety performance (ALoSP)** – The minimum level of safety performance of civil aviation in a State, as defined in its State safety programme, or of a service provider, as defined in its safety management system, expressed in terms of safety performance targets and safety performance indicators.

5.2 **High-Consequence Indicators** – Safety performance indicators pertaining to the monitoring and measurement of high consequence occurrences, such as accidents or serious incidents. High consequence indicators are sometimes referred to as reactive indicators.

5.3 **Lower-consequence indicators** – Safety performance indicators pertaining to the monitoring and measurement of lower consequence occurrences, events or activities, such as incidents, non-conformance findings or deviations. Lower consequence indicators are sometimes referred to as proactive/predictive indicators.

5.4 **Safety performance** – A State's or service provider's safety achievement as defined by its safety performance targets and safety performance indicators.

5.5 **Safety performance indicators (SPIs)** – A data-based safety parameters used for monitoring and assessing safety performance.

5.6 **Safety performance targets (SPTs)** – The planned or intended objective for safety performance indicator(s) over a given period.

5.7 **Safety performance** – A State's or service provider's safety achievement as defined by its safety performance targets and safety performance indicators.

5.8 **State Safety Programme (SSP)** - An integrated set of regulations and activities aimed at improving safety.

6 Regulatory Requirements

6.1 Airports Authority of India shall use the information generated through its safety reporting system to measure its safety performance.

6.2 There are two types of safety reporting systems:

- Mandatory incident reporting system
- Voluntary incident reporting system

6.3 Other sources of safety information to support safety performance monitoring and measurement may include:

- Safety studies
- Safety reviews
- Safety survey
- Safety audits
- Internal investigations

6.4 The final output of a safety performance monitoring and measurement process is the development of safety performance indicators based on analysis of data collected through the source mentioned above.

6.5 Identification of safety critical operational sectors of AAI and define safety performance indicators for these sectors.

6.6 Safety Performance Indicators shall be in harmonization with State (DGCA) SSP aggregate safety indicators.

6.7 Safety Performance Indicators (SPIs) shall provide comprehensive insight into safety performance of all aspects of operational activities of AAI and should consist of both high level and low level consequence Indicators.

6.8 Define corresponding Safety Performance Target (SPTs) for each Safety Performance Indicators (SPIs), taking into consideration recent historical data, so that desired improvement is realistic & achievable.

6.9 Define Alerts level of each Safety Performance Indicators (SPIs) by using standard deviation principle & average value of preceding historical data.

6.10 Update Performance outcome of each SPIs and track SPT & Alert level for each SPI for respective performance status.

6.11 Compile a consolidated summary of overall SPTs & Alert level performance outcome of complete SPI package and aggregate for given monitoring period i.e. yearly basis.

7 Process & Procedure

7.1 Safety Performance Indicators (SPIs) and SPTs of AAI for 2015 have been established with the consent of DGCA. The Safety Performance Indicators (SPIs) are defined to commensurate with all aspects of operational activities of AAI in ATM, CNS and Operations Directorates. See Annexure-1 for package of SPIs of AAI.

7.2 Safety Performance Target (SPTs) are to be defined of corresponding SPIs, for which historical data is available. For rest of SPIs data is to be collected for setting SPTs in future.

7.3 Three Alert levels are also to be established based on the preceding period's performance, namely average and standard deviation (SD). Three Alert lines are average + 1SD / 2SD / 3SD. An alert trigger (abnormal/unacceptable trend) is indicated if any of the conditions below are met for current monitoring period:

- Any single point is above the Alert level 3 line
- 2 consecutive points are above the Alert Level 2 line
- 3 consecutive points are above the Alert Level 1 line

7.4 When Alert is triggered (potential high risk or out of control situation), appropriate follow-up action is expected, such as further analysis to determine the source and root cause of the abnormal incident rate and any necessary action to address the unacceptable trend.

7.5 Respective directorate should issue separate instruction to all AAI airports for collection & compilation of the safety data pertaining to all Safety Performance Indicators (SPIs).

7.6 Detail guidance for setting of SPTs & Alert level for corresponding SPIs, based on preceding year performance is explained in SPI booklet, uploaded in AAI website.

7.7 Annexure-2 is a format for annual SMS performance summary. It provides a summary of all SMS safety indicators, with respective alert and target level. The performance outcome of all SPIs is to be annotated in the form. Such summary may be compiled at the end of each monitoring period (i.e. yearly) by 31st January of every year, to provide an overview of the annual SMS performance of AAI.

7.8 For more quantitative performance summary, appropriate numerical value may be assigned to each Yes / No outcome for each Target and Alert level outcome. This may allow a summary score (or percentage) to be obtained to indicate the overall SMS safety performance at the end of any given monitoring period.

7.9 The numerical value will be assigned as follows (high weightage for high consequence indicators & low weightage for low consequence indicators):

High consequence Indicators:	Target achieved:	[Yes (4); No (0)]
	Alert Level not breached:	[Yes (3); No (0)]
Low consequence Indicators:	Target achieved:	[Yes (2); No (0)]
	Alert Level not breached:	[Yes (1; No (0)]

7.10 Safety data collected from various sources shall be used only for the purpose of improvement of aviation safety and shall have restricted accessibility.

7.11 The compiled safety data after analysis should preferably be stored in Safety Library in electronic data base.

7.12 Monthly Safety data pertaining to Safety Performance Indicators (SPIs), shall be reported quarterly to Aviation Safety Directorate, by all AAI airports, in a standard format as given in Annexure-3.

7.13 Aircraft movement data, which include departures, arrivals and overflying, should be extracted from Airport Information Management Systems (AIMS).

7.14 Safety occurrence reports pertaining to Safety Performance Indicators (SPIs), should be collected from various sources, like control room messages, reports from field airports, AFTN message and information from various reporting forms submitted by operational officials e.g. pilots, controllers, ATS-in-charge, other Air Navigation Service Provider (ANSPs).

8 Clarifications

Requests for clarifications to this circular may be addressed to Executive Director (Aviation Safety) at edas@aai.aero or forwarded to following address:

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block – C
Safdarjung Airport
New Delhi - 110003

R.K.Srivastava
Chairman, AAI
15-9-2015

Distribution: As per standard list

Annexure-1

Safety Performance Indicators for Airports Authority of India (2015)

High Consequence Indicators			Lower consequence Indicators		
Safety Performance Indicator (SPI)	**Target Level Criteria**	**Alert Level Criteria** (3 Target levels=Average+ 1/2/3 SD)	**Safety Performance Indicator (SPI)**	**Target Level Criteria**	**Alert Level Criteria**
Aerodrome Operations					
Number of Runway Excursions per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year 2015.	To be defined in 2016	Number of reported ground incidents per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Number of reported bird strikes per 10,000 arrivals & departures	**2.73** i.e. 5% improvement from mean rate of last year (2014)	Avg.+1SD=**4.87** Avg.+2SD=**6.87** Avg.+3SD=**8.87**	Number of reported incident of Foreign Object Debris (FOD) in the movement area of major aerodrome per 10,000 arrivals & departures	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Number of reported wildlife strikes per 10,000 arrivals & departures	**0.34** i.e. 5% improvement from mean rate of last year (2014)	Avg.+1SD=**0.64** Avg.+2SD=**0.92** Avg.+3SD=**1.2**			
Air Traffic Services					
Number of infringement of separation minimum per 100,000 aircraft movements	**0.90** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)	Avg.+1SD=**1.15** Avg.+2SD=**1.35** Avg.+3SD=**1.55**	Number of level bust per 100,000 aircraft movements	To be defined in 2017 after collection of 2 years data 2015 & 2016	To be defined in 2017
Number of runway incursions per 10,000 arrivals and departures	**0.17** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)	Avg.+1SD=**0.21** Avg.+2SD=**0.24** Avg.+3SD=**0.27**	Number of safety occurrences due Communication errors (SOCE) per 100,000 aircraft movements	To be defined in 2017 after collection of 2 years data 2015 & 2016	To be defined in 2017
Communication Navigation Surveillance Services					
Mean time between failures (MTBF) of Landing/Navigational aids per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016	Number of VCCS (VHF) failures per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016
Mean time between failures (MTBF) of Surveillance aids (ADS/MSSR/TAR/RSR/ ASMGCS) per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016	Number of degradation in ATS Automation system per year	To be defined in 2016 after collection of data in current year (2015)	To be defined in 2016

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Annexure-2

SMS Performance Summary – 2015

High Consequence SPIs

SPI Description	SPI Target Level Criteria	Target Achieved [Yes(4)/ No(0)]	SPI Alert Level Criteria	Alert Level not breached [Yes(3)/ No(0)]
Aerodrome Operations				
Number of reported bird strikes per 10,000 arrivals/departures	**2.73** i.e. 5% improvement from mean rate of last year (2014)		Avg.+1SD=**4.87** Avg.+2SD=**6.87** Avg.+3SD=**8.87**	
Number of reported wildlife strikes per 10,000 arrivals/departures	**0.34** i.e. 5% improvement from mean rate of last year (2014)		Avg.+1SD=**0.64** Avg.+2SD=**0.92** Avg.+3SD=**1.2**	
Air Traffic services(ATS)				
Number of infringement of separation minimum per 100,000 aircraft movements	**0.90** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)		Avg.+1SD=**1.15** Avg.+2SD=**1.35** Avg.+3SD=**1.55**	
Number of runway incursions per 10,000 arrivals & departures	**0.17** i.e. 5% improvement from mean rate of last 2 years (2013 & 2014)		Avg.+1SD=**0.21** Avg.+2SD=**0.24** Avg.+3SD=**0.27**	
Communication, Navigation & Surveillance (CNS)				
Mean time between failures (MTBF) of Landing/Navigational aids per year	To be defined in 2016	-	To be defined in 2016	-
Mean time between failures (MTBF) of Surveillance aids (ADS/MSSR/TAR/RSR/ASMGCS) per year	To be defined in 2016	-	To be defined in 2016	-

Low Consequence SPIs				
SPI Description	**SPI Target Level Criteria**	**Target Achieved [Yes(2) / No(0)]**	**SPI Alert Level Criteria**	**Alert Level not breached [Yes(1) / No(0)]**
Will be assessed next year (2016) due to lack of quality data.				

Safety Performance Indicators Data Reporting Form

Annexure - 3

Year	
Name of Airport	
ICAO Location Indicator	

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1.	Total number of arrivals												
2.	Total number of departures												
3.	Total number of overflying movements												
Aerodrome Operations													
	High Consequence Indicators												
a)	Number of Runway Excursions												
b)	Number of reported bird strikes												
c)	Number of reported wildlife strikes												
	Lower consequence Indicators												
a)	Number of reported ground incidents												
b)	Number of reported incident of Foreign Object Debris (FOD) in the movement area												
Air Traffic Services													
	High Consequence Indicators												
a)	Number of infringement of separation minima												
b)	Number of runway incursions												

Safety Performance Indicators Data Reporting Form

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Lower consequence Indicators												
a)	Number of level bust												
b)	Number of safety occurrences due Communication errors (SOCE)												
Communication Navigation Surveillance Services (CNS)													
	High Consequence Indicators												
a)	**Landing/Navigational aids (ILS/DME-LP/VOR-DVOR/DME-HP/ NDB-LOCATOR-MARKER**												
	ILS												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	DME-LP												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	VOR/DVOR												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	DME-HP												
(i)	Total hours of operation												

Safety Performance Indicators Data Reporting Form

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	NDB/LOCATOR/MARKER												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
b)	**Surveillance aids (ADS/ASR/ARSR/ASMGCS)**												
	ASR (MSSR)												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	ARSR (MSSR)												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	ASMGCS												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												

Safety Performance Indicators Data Reporting Form

S. No	Data Heading	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	ADS-B												
(i)	Total hours of operation												
(ii)	Total number of failures												
(iii)	Total hours of failures												
(iv)	Total hours of planned downtime/shutdown												
	Lower consequence Indicators												
a)	Number of VCCS (VHF) failures												
b)	Number of degradation in ATS Automation system												
Engineering Services													
Electrical													
a)	Total Hours of AGL operations												
b)	Total number of failures of AGL												
c)	Total hours of failure/unserviceability of AGL												
d)	Total hours of planned shutdown												
Note													
	1. For Clarification & Definitions refer SPI booklet 2. **Failure:** Capture all types of failures including degraded performance, unserviceability of a single unit in case of redundant system e.g. (main/standby), or of a sub unit.												

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File No: AAI/13-22/14-AVS

Aviation Safety Advisory Circular No: 01/2015

Safety Policy and Safety Objectives

1 Introduction

Formulation of Safety Policy and Objectives is the first step and one of the four essential components in ICAO framework for establishment of Safety Management System in an organization. Safety Policy and Safety Objectives are a statement highlighting the organization's Safety vision. The policy establishes top management commitment towards the goal of ensuring Safety in all its core activities.

In any organization, management controls the activities of personnel and the use of resources for the delivery of a product or service. The organization's exposure to safety hazards is a consequence of these activities. Safety Policy outlines the principles, processes and methods of the Organization's Safety Management System to achieve the desired safety outcomes. They acts as a guiding principle in all the activities and processes related to Safety. They highlight the responsibilities of management and employees towards Safety.

It is also important that Safety Policy & Safety objectives should be reviewed periodically to ensure its relevance and efficacy for continually improving safety in all aspects of organization's activities.

The first AAI's Safety Policy and Objectives on ATS Safety Management System were established in 2004. They were revised in 2009, in accordance to ICAO framework and approved by the AAI board in its 130th meeting.

Later, in the 141st Board meeting held on 21st December 2010, the Safety Policy and Safety Objectives of AAI were again revised in line with the DGCA CAR Section 1, Series C Part I, on "Establishment of a Safety Management system (SMS)" published in 20th July, 2010. These set the goal of AAI ensuring Safety in all its core activities. The Chairman was delegated powers to carry out amendments in future to this Policy as may be required from time to time.

The Safety Policy and Objectives have now again been revised to align them with the changing safety environment as per the SMS Manual of ICAO (3rd Edition, 2013).

2 Scope

The contents of this circular are applicable to all AAI personnel at all locations, AAI owned airports and ANS (Air Navigation Services) units.

3 References

- DGCA CAR Section 1, Series C Part I , dated 20th July, 2010 on *Establishment of a Safety Management System (SMS)*
- ICAO DOC 9859 *Safety Management Manual* (3rd edition-2013)

4 Organizational Requirements

4.1 AAI shall revise organization's Safety Policy and Objectives to align them with the changing Safety environment as per the SMS Manual of ICAO (3rd Edition, 2013). Accordingly, "Safety Policy and Objectives" of AAI have been revised and are signed by accountable Executive of AAI i.e. Chairman. The copy of the same is placed in Annexure -1 & 2.

4.2 The Safety Policy and Objectives should be visibly endorsed by the senior management and it shall make all the employees aware of "Safety Policy and Objectives" of AAI.

4.3 AAI shall develop Safety Performance Indicators (SPIs) and establish corresponding Safety Performance Targets (SPTs) in line with the AAI Safety Policy and Objectives. Necessary Safety data shall be collected to measure Safety performance of AAI.

4.4 The Safety Performance Indicators & Targets (SPIs / SPTs) of AAI, have been established and published in Aviation Safety Circular 01/2015. Detailed information is given in a booklet of "Safety Performance Indicators of AAI- 2015".

5 Documentation

5.1 The revised Safety Policy and Objectives of AAI have been incorporated in the revised Corporate Safety Management System Manual (C-SMSM) (Version 3 / Issue 3), chapter– 2.

5.2 The revised Safety Policy and Objectives of AAI shall also be reflected in the Station level SMS Manual of all AAI airports.

5.3 Revised Safety Policy shall be visibly endorsed at all AAI airports and ANS units. It shall be communicated to all AAI employees.

5.4 Aviation Safety Circular 01/2015 and booklet of "Safety Performance Indicators of AAI- 2015" are uploaded in AAI website > AAI employees > serving AAI employees > Related links > Manuals > Aviation safety and also in Infosaarthee under Chairman > Directorate of Aviation Safety > Aviation Safety bulletin for guidance to all AAI airports.

5.5 All AAI managed airports shall ensure the collection and submission of the relevant Safety Data, to measure Safety Performance of AAI, to the Aviation safety Directorate as prescribed in Aviation Safety Circular 01/2015.

6 Clarifications

Requests for clarifications to this circular may be addressed to Executive Director (Aviation Safety) at edas@aai.aero or forwarded to following address:

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block – C
Safdarjung Airport
New Delhi – 110003

N.G. Chikkathimmaiah 09/11/15
N. G. CHIKKATHIMMAIAH
Executive Director (Aviation Safety)

Distribution: As per standard list

ANNEXURE - 1

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

SAFETY POLICY

We, in Airports Authority regard Safety as one of our core business functions. We are committed to developing, implementing, maintaining and constantly improving strategies and processes to ensure highest reasonable standard of safety within our organization.

All our employees without any exception are accountable and responsible for Safety while delivering our service.

Our commitment is to

- Comply with and wherever possible exceed international and national standards, regulations & requirements and adopt best industry practices on safety.
- Provide appropriate resources both human and financial necessary to support the implementation & management of safety.
- Define, document and communicate throughout the organization the safety accountabilities, responsibilities and authorities of all its employees including all members of management.
- Ensure that all our employees are adequately & appropriately trained for their roles & responsibilities, are competent in safety matters and continue to remain so, and are allocated only tasks commensurate with their skills.
- Foster positive safety culture in which our employees are encouraged to report their safety concern or errors without the fear of any punitive action, however, an act of gross negligence or deliberate or willful disregard of safety rules and regulations shall be subject to disciplinary action.
- Establish & Operate a comprehensive procedure for reporting, collection, analyzing and storing of data on Hazards, incidents and accidents to achieve continuous improvement in our safety performance.
- Continuously improve our safety performance through regular monitoring and measurement of realistic safety performance indicators and safety performance targets.
- Ensure that the facilities, equipments and services provided by external suppliers or contractors meet the safety performance standards and requirements of our organization.
- Share safety information generated by our internal reporting mechanism with all stake holders to improve aviation safety.
- Review periodically efficacy of our set Safety Performance Indicators & Targets, Safety Management System, and Safety Policy to enable our Organization to adapt to changing safety environment.

(R K Srivastava)
Chairman,
Airports Authority of India

ANNEXURE-2

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

SAFETY OBJECTIVES

Airports Authority of India shall:

- Ensure that air navigation service is delivered in a manner where risk of any aircraft accident / incident is reduced to and maintained at or below as low as reasonably practicable irrespective of the volume of air traffic.
- Ensure that all navigational, communications and surveillance aids function as per design specifications and meet the required level of reliability and availability as defined by appropriate authority.
- Ensure that safety is maintained at appropriate level in airside operations, including cargo operations at all aerodromes and identify & manage hazards in the operational area to keep risks to aircraft operations at minimum acceptable level.
- Strive for safe apron where an accident and incidents are kept at minimum in spite of increase in traffic.
- Ensure that all visual aids are maintained as per established standards and procedures.
- Deliver accurate aeronautical data and information to all the users as and when they require.
- Maintain the environment around the aerodrome to keep it free from any birds and wildlife that may cause damage to the aircraft.
- Conduct search and rescue coordination during emergency in an efficient and effective manner.
- Provide an efficient Aerodrome Fire and Rescue response during emergencies.
- Ensure the competency level of all employees are maintained by adequate and appropriate refresher training.

(R K Srivastava)
Chairman,
Airports Authority of India
27/X/2015

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File No: AAI/13-22/14-AVS

AVIATION SAFETY ADVISORY CIRCULAR NO: 01/2014

GUIDELINES FOR SAFETY ASSESSMENT OF NEW PROJECTS AND CHANGE

1 Introduction

Management of change is a key element under the Safety Assurance component of ICAO SMS (Safety Management System) framework. DGCA Civil Aviation Requirements (CAR) on *Establishment of a Safety Management System* also follows a similar framework and directs all concerned aviation organizations to develop and maintain a formal process for the management of change.

Airports Authority of India (AAI) has described its SMS through the Corporate Safety Management System Manual (C-SMS Manual). The latest version of C-SMS Manual (Version 3, Issue 2) which has been prepared in conformance with the DGCA CAR requires all concerned AAI offices to carry out the change management process in a systematic manner.

Although AAI is in the final stages of total SMS implementation, many personnel are not fully familiar with the safety assessment process in vogue in the organization. This circular is intended to throw light into the intricacies of change management in general and safety assessment processes in particular.

2 Scope

The contents of this circular are applicable to all operational personnel of AAI working at AAI owned airports and ANS (Air Navigation Services) locations. This circular is also applicable to contractors working for or on behalf of AAI, who undertake activities, which may directly or indirectly affect the safe operations of air navigation services or airport systems.

3 References

- DGCA CAR on *Establishment of a Safety Management System (SMS)*
- C-SMS Manual –Version 3, Issue 2
- DGCA Aerodrome Advisory Circular AD AC 1 of 2012 -*Process for communicating with the DGCA on the planning, construction and commissioning of changes to airport infrastructure, and major maintenance programs*
- DGCA SSP Division Circular No. 1 of 2012 – *Hazard Log Template*
- ICAO DOC 9859 *Safety Management Manual* (2nd edition-2009 and 3rd edition-2013)
- International Standard ISO/IEC 31010 *Risk Management–Risk Assessment Techniques*

4 Organizational Requirements for Managing Change

4.1 All changes that have an impact on the safety of the systems, facilities or services provided by AAI require a formal safety assessment to be conducted, documented and reported, prior to any change implementation.

4.2 All changes to ATM (Air Traffic Management), CNS (Communication, Navigation and Surveillance) and Airside Operations of airport service levels, procedures, equipment or organizational structures which will affect the performance, function or technical specification of a system, service or facility or organizational changes affecting safety accountabilities should be assessed to determine the safety magnitude of change.

- Section 7.4.5 of C-SMS Manual provides a detailed list of changes and activities requiring risk assessment
- Withdrawal of any facility / procedure for a prolonged period is considered as degradation of aerodrome facility for which safety assessment needs to be conducted

4.3 SCARS (Safety Case Assessment and Reporting System) is the methodology used by AAI to assess the overall safety magnitude of any change or new project. This is in conformance with DGCA Circular AD AC 1 of 2012.

- Where a proposed change will not result in any change to the items mentioned in section 4.2 (and Section 7.4.5 of C-SMS Manual), or the change is of a routine maintenance or administrative nature, the routine change process may be used in lieu of the SCARS Form

4.4 ***Clarification of Terms – Process Owner and Project Manager***

A **Process Owner** is the one who is responsible for managing and overseeing the objectives and performance of a process. He / She has the authority to make required changes related to achieving process objectives. In many cases Process owner is also the proposer / initiator of the change.

- In the airport context, the process owners will be HODs (Head of Department) of ATM, CNS, Engineering and Airside Operations (OPS). Since ARFF (Airport Rescue and Fire Fighting) is technically under OPS section, Head-ARFF is not considered as a separate Process Owner.

A **Project Manager** is the person responsible for leading a project from its inception to execution. This includes planning, execution and managing the people, resources and scope of the project.

- For an Airside Operations project, the Project Manager can be from Civil Engineering (runway extension), Electrical Engineering (Installation of Cat II approach Lights), ARFF (upgradation of RFF category from 7 to 8), Electronics (optical fibre cabling in the operational area), OPS (closure of Runway / Apron) etc.

  Same is the case with other Process Owners, viz. ATM (introduction of new ATM procedures) or CNS (upgradation of software/hardware), also, where officials from other Operational Sections can be Project Managers depending on the type of work involved.

- Project Manager can be the HOD of the Section entrusted with the project execution or a senior officer deputed by him.

In this document, wherever the terms Process Owner and Project Manager are encountered, the terms will have the meanings as given above.

5 Project Lifecycle

5.1 C-SMS Manual mentions four distinct phases in any project - **Concept, Design, Implementation and Operation phases.** The manual stipulates that safety assessments should be conducted for each phase of the project lifecycle.

5.2 DGCA Circular AD AC 1 of 2012 specifies that normally any change in infrastructure shall be in three stages – i.e. **Stage-I** as **Design + Concept phases combined**, **Stage-II** as **Execution** and **Stage-III** as **Commissioning phase**.

5.3 **"Implementation Phase"** as defined in C-SMS Manual includes both **"Execution + Commissioning"** phases as prescribed in DGCA circular. **"Operation phase"** is the additional phase defined in C-SMS Manual, which concerns post implementation stage.

5.4 Even though there are certain differences regarding the project lifecycle phases (stages) between these two documents, it is advisable to carry out safety assessments for each project stages, as prescribed in DGCA Circular AD AC 1 of 2012, for communicating the change to DGCA.

6 Safety Assessment Processes during project life cycle

6.1 ***Concept Phase***

6.1.1 This is the phase when the project is conceived. A project or change is conceived when a need is identified. *For example, a project for installing Instrument Landing System (ILS) is conceived when a need is felt to improve safety, efficiency and access to the airport.*

6.1.2 SCARS Form (AAI-SAF-103) is the first step in the safety assessment process. SCARS guides the airport managers in choosing the right steps for managing the change based on the overall safety magnitude of the change.

6.1.3 SCARS Form must be completed at the start of a change process i.e. in Concept Phase, to ensure that the safety assessment requirements of the change are identified early in the project lifecycle and the relevant documents are prepared.

6.1.4 Where the outcome of the SCARS Form indicates a MINOR change, a Safety Statement must be included in the SCARS form.

- The Safety Statement or justification included in the SCARS must provide AAI management (and the stakeholders including DGCA) with sufficient information to demonstrate that safety has been considered, and the change presents minimal or no safety issues.
- Airport Director or the Process Owner may require a Safety Case to be developed even though the outcome of the SCARS indicates a MINOR change.

- Although not mandatory, it is recommended to open a Risk Register (or a HAZLOG) even when the magnitude of change is MINOR.

6.1.5 Where the SCARS indicate a MODERATE change, a HAZLOG for this change must be developed in addition to the Safety Statement. The hazards identified during the completion of SCARS (Step-2: Preliminary Hazard Analysis) should be transferred to the HAZLOG and analyzed using the methodology described in Chapter 7 of C-SMS Manual. A HazID workshop should also be organized (either in continuation of SCARS session or separately) to identify other hazards (Low-Level / Low-Consequence hazards also) which should also be analyzed similarly.

6.1.6 Where the SCARS indicate a MAJOR change, the HAZLOG for this change must be developed as mentioned in section 6.1.5 above. Additionally a Safety Case (along with a Safety Plan) should also be prepared.

- Safety Cases can be of three types depending on the phase(s) of the project lifecycle. They are:
    - Design/Concept Phase Safety Case (AAI-SAF-104)
    - Implementation (Execution + Commissioning) Phase Safety Case (AAI-SAF-112)
    - All Phases Safety Case (AAI-SAF-113)

  Each of these phases has slightly different emphasis on the objectives for the Safety Case report and the types of issues involved. These phases are not necessarily clear cut and can overlap.
- Guidance for preparation of Safety Plan and Safety Case along with templates is given in Chapter 10 of C-SMS Manual. Additional material is also available as attachments to the Manual.

6.1.7 SCARS Form needs to be completed only once for a change / project. Once the SCARS has indicated the type of safety assessment to be conducted and the required documentation to be done, the managers will have to follow the appropriate path, depending on whether the overall safety magnitude is MINOR, MODERATE or MAJOR.

6.2 ***Design Phase***

6.2.1 This is the phase when the concept is given shape and structure in the form of examining the feasibility of the concept, arriving at various options available, develop project / change definition and finally the procurement (of products or services) process.

6.2.2 The overall safety magnitude of change (MINOR, MODERATE or MAJOR) as decided through SCARS (completed in Concept stage itself) decides on further course of action in the Design Stage.

- Where SCARS has indicated a MINOR change, no further action is needed at this stage. However as mentioned in section 6.1.4, Airport Director or the Process Owner may decide to carry out a HazID exercise to ensure that all potential hazards, however low-level/low-consequence they might be, are identified and managed. Such an action is strongly recommended.

- Where SCARS has indicated a MODERATE or MAJOR change, a HazID workshop shall be organized to identify any further hazards that may be present during the design phase of the project. The hazards so identified should be entered into the HAZLOG (Risk Register) and should be assessed and managed using the methodology described in Chapter 7 of C-SMS Manual.
- When SCARS has indicated a MAJOR change, in addition to the HazID process mentioned above, a Safety Plan and Safety Case need to be prepared. The Safety Case can either be a combined Concept/Design phase Safety Case or an All-Phases Safety Case.

6.2.3 DGCA Circular AD AC 1 of 2012 combines the Concept and Design stages as Stage-I.

6.3 ***Execution Phase***

6.3.1 This is the phase of the project which involves installation, or when actual work under the New project / change is undertaken at the airport.

6.3.2 The overall safety magnitude of change (MINOR, MODERATE or MAJOR) as decided through SCARS (completed in Concept stage itself) decides on further course of action in the Execution Stage also.

- Where SCARS has indicated a MINOR change, no further action is needed at this stage. However as mentioned in section 6.1.4, the Airport Director or the Process Owner may decide to carry out a HazID exercise to ensure that all potential hazards, however low-level/low-consequence they might be, are identified and managed. Such an action is strongly recommended.
- Where SCARS has indicated a MODERATE or MAJOR change, a HazID meeting shall be organized to identify any further hazards that may be present during the Execution phase of the project. The hazards so identified should be entered into the HAZLOG (Risk Register) and should be assessed and managed using the methodology described in Chapter 7 of C-SMS Manual.
- When SCARS has indicated a MAJOR change, in addition to the HazID process mentioned above, a Safety Plan and Safety Case need to be prepared. The safety case should be included in an Execution phase Safety Case or an All-Phases Safety Case.

6.4 ***Commissioning Phase***

6.4.1 This is the phase of the project which involves integration, transitioning and commissioning.

6.4.2 The overall safety magnitude of change (MINOR, MODERATE or MAJOR) as decided through SCARS (completed in Concept stage itself) decides on further course of action in the Commissioning Stage also.

- Where SCARS has indicated a MINOR change, no further action is needed at this stage. However as mentioned in section 6.1.4, the Airport Director or the Process Owner may decide to carry out a HazID exercise to ensure that all potential hazards, however low-level/low-consequence they might be, are identified and managed. Such an action is strongly recommended.

- Where SCARS has indicated a MODERATE or MAJOR change, a HazID meeting shall be organized to identify any further hazards that may be present during the Commissioning phase of the project. The hazards so identified should be entered into the HAZLOG (Risk Register) and should be assessed and managed using the methodology described in Chapter 7 of C-SMS Manual.
- When SCARS has indicated a MAJOR change, in addition to the HazID process mentioned above, a Safety Plan and Safety Case need to be prepared. The safety case should be included in a Commissioning phase Safety Case or an All-Phases Safety Case.

6.4.3 DGCA Circular requires separate safety assessments to be carried out for the three stages viz. Concept/Design, Execution and Commissioning. However for small projects Stage-I and Stage-II can be combined but separate HAZLOG should be provided. Safety Assessment for commissioning stage should be carried out separately.

6.4 ***Operation Phase***

6.4.1 This is the stage when the project is commissioned and a post-implementation review is conducted. After the project is commissioned, a HazID exercise should be carried out to find out any new hazards introduced into the system owing to the commissioning of the new project / change. These hazards will then be managed through the AAI methodology.

6.4.2 The hazards remaining in the Project Risk Register should be transferred to the Operational Risk Register of the airport after the project has become fully operational. These risks will then be monitored by the Safety Manager. However the responsibility of mitigation of the remaining risks will be with the Process Owner.

6.5 **Harmonizing AAI Processes with DGCA Requirements**

6.5.1 C-SMS Manual and DGCA Circular AD AC 1 of 2012 require SCARS Form to be completed at the start of the project itself, i.e. during the concept/Design phase itself.

6.5.2 There is a mismatch between the project phases of C-SMS Manual and the project stages (for safety assessment purposes) described in the DGCA Circular. In order to harmonize the two slightly varying requirements, the following procedure may be adopted:

- **The first safety assessment meeting should be a combined Concept/Design phase assessment,** in which one of the primary activities should be to complete the SCARS Form. The course of action for managing the safety risks associated with the project /change will be based on the overall safety magnitude of change (MINOR, MODERATE or MAJOR). A HazID workshop is desirable for a MINOR change but mandatory for MODERATE and MAJOR changes.
- **The second safety assessment should be conducted before commencement of work execution.** Another HazID workshop should be conducted to identify more hazards with special emphasis on Execution stage (while work in progress) i.e. new hazards may get introduced while work in progress.

  Although not mandatory when the SCARS Form has indicated a MINOR change, but a HazID process is strongly recommended for safety assurance.

- **The third safety assessment should be conducted before commissioning of the project**, after completion of project execution. Another HazID workshop should be conducted to identify additional hazards, which may likely to be get infused in the operational system on Commissioning stage.
- **The fourth and last assessment will be a post-implementation review after the project has been commissioned** and has reached full operational status. The outcome of this assessment need not be communicated to DGCA.

Note: SCARS form shall be completed only once at the start i.e. during Concept & Design Phase and need not be repeated in other subsequent phases.

7 Responsibility of Various Directorates in Change Management

7.1 Refer sections 7.4.8 and 10.3.3 of C-SMS Manual, It is the responsibility of appropriate service Delivery Directorate (Process owner) or Project Manager to initiate and resource the necessary safety assessments (as prescribed above) in coordination with Safety Manager and get approval of the change / new project.

The appropriate Process Owner / Project Manager is responsible for:

- Compliance with safety requirements
- Integrity and quality of safety documents
- Ensuring required approvals prior to any implementation
- Ensuring that Risk controls detailed in the documentation are appropriate and in place, reviewed / updated following the project / change implementation.

8 Communicating with DGCA

8.1 The following documents should also be attached with the SCARS form while communicating the change to DGCA (refer DGCA Circular AD AC 1 of 2012):

- Annexure I of the DGCA Circular duly filled
- System Description of the project, including charts and drawings, if any
- Safety risk mitigation plan (as a part of HAZLOG)
- Minutes of the meeting with the stakeholders with attendance sheet along with the details of the objection/comments by the members and the action taken on the said objections/comments
- Draft AIRAC AIP Supplement (if required) – Concept/Design stage assessment
- Work schedule (execution plan with timelines) – Execution level assessment
- Details of the training/ familiarization given to the contractors/workers/drivers etc. - Execution level assessment
- CAR Compliance checklist - Commissioning level assessment
- Certificates (e.g. for frangibility requirements) - Commissioning level assessment

All communications with DGCA in the subsequent stages of the project should be sent along with a copy of the original SCARS Form. Additional documents pertaining to a particular stage of the project (copy of HAZLOG, work schedule, CAR compliance checklist, certificates etc.) should also be attached.

8.2 AAI airports normally communicate with DGCA through CHQ, unless specifically directed by DGCA. Concerned ED of applicable service delivery directorate at CHQ to whom the work is related with (Process owner) shall be liaising with DGCA for obtaining necessary approval of the change i.e. Airport operational infrastructure related change / new project will be through ED (OPS); ATM related change will be through concerned ED (ATM); CNS related change will be through concerned ED (CNS).

Safety assessment documents are normally routed through the respective departments in CHQ for DGCA approval. All communications in respect of safety assessments of projects / changes including the SCARS Form and subsequent HAZLOGs should be sent to the following offices by the Process Owner in coordination with the Project Manager:

- Original set — Concerned ED at CHQ – ATM / CNS / OPS (for DGCA approval)
- Copies — ED (Aerodrome Licensing)
ED (Aviation Safety)
ED (Engineering)
RED of the Region (attention Jt.GM (AVS))
Concerned GM (Region)
- Internal — Safety Manager of the airport

8.3 Many airports have sought clarification whether approval from DGCA is required before commencement of the project (execution). This section intends to throw some light into this important aspect of regulatory compliance.

8.3.1 DGCA Circular AD AC 1 of 2012 states that "*as part of the licensing arrangements, a licensed airport is required by Rule 83(2) of Aircraft Rules, 1937 and as a condition of the license, to seek the prior approval of the safety regulator, i.e. the Director General of Civil Aviation (DGCA) for aerodrome projects that change/add facilities, structures, hereafter referred to collectively as infrastructure, that may affect the safety of aircraft operation".*

8.3.2 **As a general rule, for all licensed AAI managed airports, prior approval from DGCA is required for commencement of any work and also for commissioning any project, except for emergency work or minor repair work of short duration**. From the airport's point of view, airport operator should fulfill the required formalities well in advance and forward the required documents to all concerned as specified in section 7.1. Under no circumstances should the airport commence the execution of work or commission the new project without approval from DGCA (and CHQ) irrespective of whether the safety magnitude of change is MINOR, MODERATE or MAJOR.

8.3.3 **For all other unlicensed AAI managed airports, all process & procedures as detailed in this circular and also prescribed in Chapter 10 of C-SMS Manual shall be followed.** However, **there is no need to seek prior approval from DGCA before making change**. All related documents must be prepared and made available for DGCA examination, if at a later date, the airport decides to obtain Aerodrome License.

9 Scheduling of Safety Assessment Activities

9.1 It has been noticed that due to lack of proper coordination between various offices involved, safety assessment processes are often not managed systematically. The safety management processes relating to a new project / change should commence well in advance so as to ensure timely receipt of approvals from CHQ/DGCA and also to assure proper notification of the project activities through AIS. No project should be delayed for want of safety approvals or due to mandatory notification time.

9.2 Safety assessment process should start from the concept stage itself. The concept is normally given shape at CHQ planning level for medium and large-scale projects. Thus it is ideal to conduct concept / Design level safety assessments at CHQ, although CHQ may authorize airports to conduct Concept/Design level assessments at the airport on their behalf. SCARS Form will be completed during this stage. The following aspects should be considered while planning the assessment:

- Concept / Design stage safety assessment should be conducted before finalizing the scope of the project for procurement or work tender. This would allow changes to be made in the scope depending on the hazards identified and potential mitigation strategies.
- Representatives of the RHQ /airport/user should be invited to participate in the Concept / Design stage safety assessment, if it is being conducted at CHQ. In the case of a multi-location project, at least representatives from a few sample stations should be invited. If the airport is conducting the assessment, representatives from concerned departments of CHQ/RHQ should attend the meeting.
- Approval of the concept/design stage safety assessment from DGCA is required before planning the execution level assessment (except for small projects where these stages can be combined). Thus the process of concept/design stage assessment should start sufficiently in advance for avoiding project delays.

9.3 Execution of the project is normally associated with notification of information through AIS. For major and complex projects affecting aircraft operations, AIRAC AIP supplement should be issued. This would require at least 42 days advance notice (56 days advance notice recommended) after the AIP Supplement is issued. Another aspect to be considered is that information through AIS can be published only after the execution stage assessment is approved by DGCA. Thus, execution stage assessment should be completed at least 2 to 3 months ahead of the planned commencement of work.

9.4 Commissioning of the project would also entail the same processes as mentioned in section 9.3 above. Additional documents like CAR compliance checklist and reports of operational trials can only be generated only on satisfactory completion of the work. Notification of the new facility/installation/procedure through AIRAC methodology, if required, will take additional time. However DGCA Circular AD AC 1 of 2012 allows airports to take action in advance for notification of commissioning of a change / project (page 9, item (vi)). Thus the project should consider a time gap of around 2 months for actual commissioning of the project after completion of commissioning level safety assessment.

9.5 Some activities mentioned in sections 9.3 and 9.4 may run parallel thereby reducing the time requirements for the approval and notification processes.

10 Project Risk Register / ORA Register / HAZLOG

HAZLOG is the backbone of an SMS. A well-maintained HAZLOG can act as a repository of hazards pertaining to one single project or as a master database pertaining to the airport. It is a real-time indication of the safety health of an airport as well as a safety library for future reference.

10.1 The HazID format (HAZLOG Form) is given along with Safety Risk Assessment Practices Attachment (page 30 of AAI-SAF-105) to C-SMS Manual. Each identified Hazard-consequence combination should be recorded in a different HAZLOG form. The HAZLOG will thus be a collection of a number of such forms filed as a single document.

10.2 An airport will have many sub-systems, each of which will be having many processes. Thus the number of hazards identified would run into hundreds. Maintaining a HAZLOG in physical form (printed in paper) will be a tedious task and will consume a lot of stationery.

It is recommended to maintain HAZLOG in an electronic format. The various options available are:

1. Create an MS Excel worksheet following the HAZLOG format given in C-SMS Manual
2. Create an MS Access database, which would be easier to manage compared to Excel
3. Create a stand-alone customized software for the purpose
4. Create a web-based SMS software, which can be accessed from multiple locations

Options 1 and 2 are simple solutions which can be implemented at airport level itself.

DGCA SSP Division Circular 1 of 2012 presents the format of a HAZLOG. Station-level HAZLOG may also be designed based on the template suggested by DGCA.

10.3 An important issue pointed out by stations was regarding assigning numbers to hazards. HazID Form (attachment to AAI-SAF-105) has a field to enter hazard number. A single hazard can have many consequences and the risk assessments of each of these consequences would be different. So ideally, each consequence of an identified hazard should be recorded in a different HAZLOG form. If this is so, then for the same hazard different pages would exist in the HAZLOG.

HAZLOG template given in DGCA SSP Circular 1 of 2012 has devoted only one row for each hazard. The worst credible effect (consequence) of the hazard should entered against the identified hazard along with the reason (justification) which will then be assessed based on the existing controls. Thus for each hazard only one consequence is identified, which is the worst credible one, ignoring less important consequences.

However ICAO DOC 9859 promulgates the general concept that each consequence of a specific hazard should be assessed in terms of severity and likelihood.

It is suggested that HAZLOG template of DGCA SSP Division circular 01/2012 may be modified to accommodate different consequences of a specific hazard and these each consequences should be assessed and recorded in the DGCA format.

Each hazard-consequence combination should be given a separate index number, so that tracking of specific risks will be easier. The hazard numbering format suggested below is based on this philosophy, which may be followed at stations:

- Hazards should be allotted a Unique Hazard ID number in the format **HAZ/VXXX/SSS/HHHHHH-CC**. *For example, a hazard identified at Guwahati airport pertaining to a CNS process should be numbered as HAZ/VEGT/CNS/000001-01. If the same hazard is having a second consequence, whose risk is to be managed separately, the same hazard will again be recorded as HAZ/VEGT/CNS/000001-02, but the consequence will be different.*
- The abbreviations to be used for the various departments in the hazard number format (SSS) are ATM, CNS and OPS (Airside Operations).
- The hazard numbers will be allotted by the custodian of the Operational Risk Assessment Register. Normally Safety Manager manages the ORA Register.
- Project HAZLOGs are managed by Project Managers (HODs or officials deputed by them). Thus for a particular project, a series of hazard numbers will be allotted by the Safety Manager. These hazards will be transferred into the ORA Register on completion of the project.
- Hazards which are removed from the active HAZLOG, either on elimination or mitigation to ALARP region, should be retained in the safety library of the airport. These hazards, although fully managed, should be revisited at a lesser frequency (say once every year) to confirm whether the risks are still under control. Thus, index numbers of such hazards removed from the active HAZLOG, should NOT be allotted to another hazard.

11 Clarifications

Requests for clarifications to this circular may be addressed to Executive Director (Aviation Safety) at edas@aai.aero or forwarded to following address:

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block – C
Safdarjung Airport
New Delhi - 110003

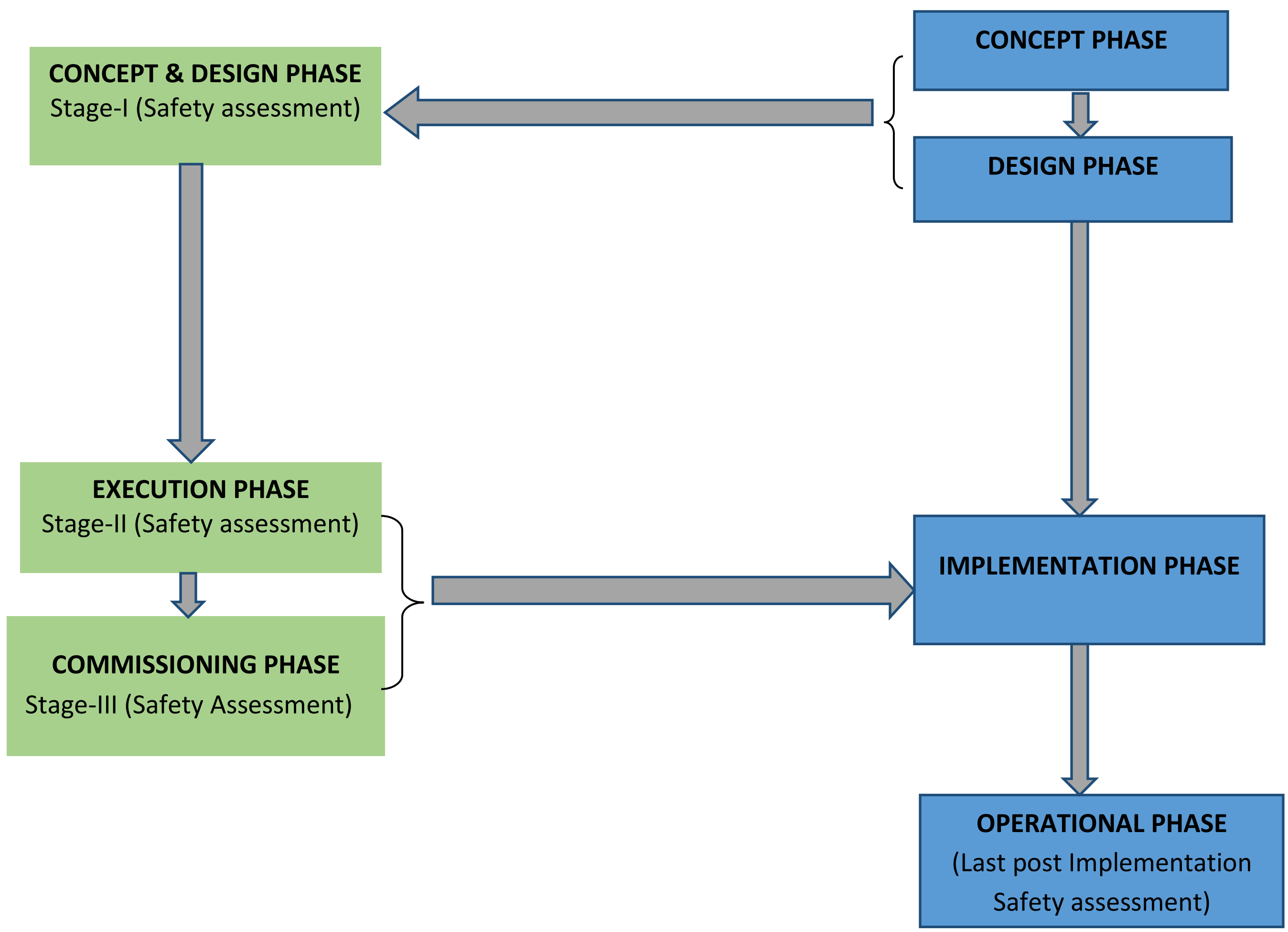
N.G. Chikkathimmaiah

N. G. CHIKKATHIMMAIAH
Executive Director (Aviation Safety)

Distribution: As per standard list

LIFE CYCLE OF PROJECT / CHANGE

AS PER DGCA AD AC 01/2012 | **AS PER C-SMS MANUAL**



File No: AAI/13-22/14-AVS

AVIATION SAFETY ADVISORY CIRCULAR NO: 02 /2014

GUIDELINES FOR COMPLETING SCARS FORM

1 Introduction

Safety **C**ase **A**ssessment **and R**eporting **S**ystem **(SCARS)** form must be used to assess permanent and temporary changes to service level, procedures or equipments, which will affect the performance, functional or technical specification of system, facility or service and for organizational changes affecting safety accountabilities.

This form must be used to determine overall safety magnitude of a project / change and type of safety documentation required to be produced and the associated requirement for sign-off acceptance. **This completed FORM is NOT a safety assessment report** but the first step in the safety analysis of change.

A clear understanding of completing the various steps of the SCARS Form is an absolute necessity for managing the change. This circular gives a detailed description and guidance to complete the SCARS Form.

2 Applicability

The contents of this circular are applicable to all operational personnel of AAI working at AAI owned airports and ANS (Air Navigation Services) locations. This circular is also applicable to contractors working for or on behalf of AAI, who undertake activities, which may directly or indirectly affect the safe operations of air navigation services or airport systems.

3 Reference

- ICAO DOC 9859 Safety Management Manual (2nd edition-2009 and 3rd edition-2013)
- DGCA CAR on Establishment of a Safety Management System (SMS)
- International Standard ISO/IEC 31010 Risk Management–Risk Assessment Techniques
- C-SMS Manual –Version 3, Issue 2

- DGCA Aerodrome Advisory Circular AD AC 1 of 2012 -*Process for communicating with the DGCA on the planning, construction and commissioning of changes to airport infrastructure, and major maintenance programs*
- DGCA SSP Division Circular No. 1 of 2012 – *Hazard Log Template*

4 SCARS Form

4.1 **Filling up of SCARS is the first step in the management of change** and is a tool to identify the safety assessment and documentation requirements for the particular project/change.

This form must be completed by person or persons with specialist knowledge about proposed project / change, along with other group members and then be reviewed and approved by appropriate process owner.

4.2 The first page of the SCARS Form gives details about the project. The various fields are as follows:

- **Project Number**: The Project Manager will allot a number to the project and the number will be entered in this field.
- **File Number**: The file number pertaining to the project will be entered in this field. This number along with the project number will be reference number for all correspondences regarding the project.
- **Project Title**: A short title of the project will be entered in this field.
- **Location**: Name of the airport / site (for off-airport sites) should be entered
- **Unit**: Section to which the process belongs (ATM / CNS / Airside Operations)
- **Brief Description of the Project / Change**: A brief description of the project or change should be entered in this field. The contents should be adequate to describe the project in a nutshell.

4.3 **STEP 1** of SCARS Form helps to assess the size of the change. There are six questions to be answered by the persons participating in the meeting for completing the SCARS Form. The following guidelines are given to help the participants in reaching the correct conclusion regarding the size of the project / change:

- The questions have a 7-point rating scale, with ratings **1** for Extremely Low; **2** for Very Low; **3** for Low; **4** for Moderate; **5** for High; **6** for Very High; and **7** for Extremely High.
- The correct method **is not** to collect participants' individual ratings for each question and then average it out. Each question should be discussed among the participants and a consensus rating reached which is adequately justified. The rating along with the justification should be entered under each question.
- Since SCARS Form will be filled up only once (at the start of the project), each of the six questions should be rated considering all four phases of the project, viz. Concept, Design, Implementation (Execution and Commissioning) and Operation phases. Any dilution in this process by not considering all the phases will certainly affect the final outcome of SCARS.

- ***Question 1*** is ***Assess the significance (scope/scale) of the project/change within AAI.*** In order to help the users in answering this question, SCARS asks them to consider the number of work areas affected (ATM, CNS, Airside Operations, ARFF etc.) and also to consider disciplines, systems, locations, business processes and organizational structures. All such work areas, locations and processes that are affected by the proposed change during all four phases of the project should be considered. **More the affected areas, higher the rating.**

  For example, installation of ILS at an airport will involve ATM, CNS, Airside Operations, Civil and Electrical personnel at the airport. Additionally when we consider the concept and design phases, personnel from CNS Planning and ATM Airspace Management are also affected.

- ***Question 2*** is ***Assess the significance of the project/change outside AAI.*** The clue given is to consider the number of services users and/or stakeholders affected, including the interfaces between these parties, e.g. government departments, customers and other ANSPs. As in the previous question, all stakeholders who are affected by the proposed change during all four phases of the project should be considered.

  Similar to Q1, **More the affected areas, higher the rating.**

- ***Question 3*** is ***Assess the level of new functionality introduced, or removed, by the proposed project/change, as opposed to the existing system, facility or service.*** Does the new system enhance/reduce existing functionality or provide different functionality? Consider new technology. The different phases of the project do not have much significance here as the question wants the participants to think about the level of new functionality introduced or removed including upgradation (or otherwise) of technology.

  Rating should be decided in accordance with the level of new functionality introduced or removed.

  An example of this question would be a project where existing ATC Radar is replaced with new state-of-the-art radar. Here the functionality introduced is more or less the same as the existing radar but considering the fact that the new radar incorporates latest technology, rating given will be somewhere in the middle of the scale.

  However if the assessment was for removal of existing radar system, then the level of functionality removed will be high as aircraft will not be provided with surveillance services.

- ***Question 4*** is ***Assess the safety significance of the systems, facilities or services affected by the project/change***? Consider for example radar systems, communication systems, data systems, AFTN, Runways, Taxiways and any organization systems such as safety reporting etc. (People / Procedures / Technology). This question directs the participants to consider the safety impact of the change. The important aspect to be considered here is that whether the project is introducing a facility, procedure or equipment or removing it, safety significance, whether enhanced or reduced, will be indicated in a positive scale.

  Rating should be as per the level of Safety significance (either enhanced or reduced)

For example the safety significance of installing an ILS on a non-instrument runway situated in a location of challenging terrain will be high. Similarly, the safety significance of withdrawing an already installed ILS (say for a temporary duration for replacement of equipment) from such a runway would also be high.

- ***Question 5*** is ***<u>Assess the training component associated with implementing the project/change?</u>*** Consider type of training required, classroom or simulation, time lines, resources, recency requirements, etc. If the change or project involves significant time, resources and other time-critical elements like recency requirements (e.g. recency of ATC surveillance ratings during a radar replacement project), the associated training component will be high and would invite a higher rating. This question should consider all phases of the project from concept to operation but the significant contribution would be from execution and commissioning stages.

  Higher the associated training requirement, higher the rating.

- ***Question 6*** & last question is ***<u>Assess the complexity of the transition from the existing system, facility or service?</u>*** Consider resources available, documentation, time lines, approvals, contingency arrangements, organizational changes, multiple locations etc. Transition from an existing system to the new system brought about by the project is a very important activity. If the transition is complex, which involves creation of SOPs (also contingency procedures should something go wrong) or multiple locations transitioning into the new system simultaneously, the rating given should be high.

  Higher the transition complexity, higher the rating.

  For example, the transition from Conventional Vertical Separation Minimum (CVSM) to Reduced Vertical Separation Minimum (RVSM) was a complex activity. The transition involved a major conceptual change for ATC (reducing vertical separation from 2000 ft to 1000 ft and also change in direction of some flight levels). Moreover, some adjoining Flight Information Regions (FIR) were still maintaining CVSM which required the creation of transition airspace for changing from RVSM back to CVSM before releasing aircraft to such FIRs.

  Another example, the integration of newly extended part of Runway in to the operational system. The transition is very complex as it involves many aspects like new visa -a visa old Runway marking, relocated PAPI & Glide path; changes in IAL procedure etc. at the time of changeover. Hence rating will be on higher side.

- The ratings given to the six questions will then be added to obtain the size of the change as **Small** (total between 6 and 18), **Medium** (total between 19 and 30) or **Large** (total between 31 and 42).

4.4 <u>STEP 2</u> of SCARS Form leads us to the Safety Outcome of the Change. It is during this process that the assessment team considers the major hazards which are likely to be encountered during the project. This is achieved through a Preliminary Hazard Analysis (PHA).

4.4.1 Preliminary Hazard Analysis (PHA) is different from a full-scale hazard identification process in many ways:

- In PHA, normally only major hazards are identified due to paucity of time. However the hazards identified should be critical ones or a combination of high-consequence and low-consequence ones. Identification of a few low-consequence hazards only and ignoring the high-consequence hazards will lead to a wrong assessment.
- PHA will not assess the risks associated with the consequence of the hazards, in terms of likelihood and severity (this process will be done later when these hazards are transferred to the HAZLOG during the HazID workshop). Instead the effect of the consequences of the identified hazards on safe operations will be rated on a 7-point scale (1-no effect to 7-extremely high effect) after considering the presence of existing controls (defenses). The intention of identifying hazards in PHA is to obtain an idea about the safety outcome of the change which in turn will lead to an assessment of the overall magnitude of the change.
- Risk assessment is not carried out during PHA. Consequently, important actions like prioritizing the risks, deciding on the potential risk control measures and acceptance of risks are not done during the PHA. These steps will be carried out later when HAZLOG is created.

4.4.2 The safety outcome of change is calculated using the equation

$$\textbf{Safety Outcome} = \frac{\textbf{Total Score X 100}}{\textbf{(7 X No: of Hazards)}}$$

The safety outcome is **MINIMAL** if the value is upto 44%, **REASONABLE** for value between 45% and 72% and **SUBSTANTIAL** for values 73% or above. Decimals should be rounded **UP** to the next higher value.

4.4.3 From the equation given in section 4.4.2, it is clear that if the identified hazards are of low-consequence, the total score will be less, for the same value of the denominator. Consequently the safety outcome will be a lower value.

This does not mean that only high-consequence hazards should be identified during PHA. The endeavor should be:

- not to omit any obvious high-consequence hazards; and
- to identify as many hazards as possible within the available time.

4.4.4 The ratings assigned to the consequences of the identified hazards should be based on their estimated effects on safe aircraft operations. The hazards can be detrimental to safe operations but if the ***existing*** controls (defenses) in the form of training, technology, procedures or regulations can reduce the ill-effects of the hazards, a lower rating can be assigned.

4.4.5 It was opined by many that during the process of carrying out the PHA, the decision whether a control is an existing defense or a potential mitigation strategy poses some difficulties.

A typical example is that of a NOTAM action to inform the pilots about the presence of men and material near the runway during a proposed runway extension work. During the *conduct of PHA (SCARS Form being completed), the NOTAM is not existing, thus make NOTAM a potential mitigation strategy rather than an existing defense.*

The effect of the consequences of the hazard & its rating should be assessed based on existing controls only and not potential ones, even though such potential controls are common and very obvious.

4.4.6 SCARS Form has limited space for recording hazards identified during the PHA. If the number of hazards is more, separate sheets may be attached as Annexure.

4.4.7 Step 2 of SCARS Form has also a limited space for the names, positions and signatures of stakeholders assisting in the PHA (Completion of SCARS Form). If the number of stakeholders present in the meeting is more, a separate attendance sheet may be provided, which should later be attached with the completed SCARS Form.

*4.4.8 There exists a **mismatch between the PHA formats given in DGCA Circular AD AC 1 of 2012 and C-SMS Manual.** The contents and information provided are more or less same in both the formats. It is felt that since DGCA has approved AAI's C-SMS Manual, the **PHA format provided in C-SMS Manual should be followed by stations**.*

4.5 **STEP 3** of the SCARS Form is to find out the overall safety magnitude of the change. The results of steps 1 and 2 should be plotted in the matrix provided in page 5 of the Form to obtain the value of overall safety magnitude of the change as MINOR, MODERATE or MAJOR.

4.6 **STEP 4** of the SCARS Form helps to determine the method of safety reporting to be adopted based on the overall safety magnitude of the change.

- MINOR Change — Safety Statement
- MODERATE Change — Safety Statement + HAZLOG
- MAJOR Change — Safety Plan + Safety Case + HAZLOG

4.7 **STEP 5** of SCARS Form is for recording the Safety Statement. Safety Statement needs to be written if the overall safety magnitude of the change is either MINOR or MODERATE.

4.7.1 The Safety Statement should provide an explicit statement that the proposed change is safe and should also provide justifications for the claim that the change is safe. It must provide the stakeholders including DGCA and AAI management with sufficient information to demonstrate that safety has been considered and with the justification that the change presents minimal or no safety issues.

A sample Safety Statement is given below:

"*I confirm that using the processes described above that I am satisfied that the proposed change is of minor (or moderate) safety magnitude. I am satisfied that the safety implications of the proposed change will be identified and adequately addressed via AAI's safety management and project management procedures*."

4.7.2 Safety Statement can be signed either by the Process Owner or the Airport Director. However, it would be appropriate if the Airport Director, being the Accountable Executive of the airport, signs the Safety Statement.

4.8 **STEP 6** of the SCARS Form is to provide details of the HAZLOG (Risk Register) created for the new project. The details to be entered in the SCARS Form are:

- HAZLOG Title — Name of the HAZLOG
- Date — Date of opening the HAZLOG
- Location — Airport / Location of the facility
- Unit — Name of the unit of the Project Manager

Illustration

- *HAZLOG Title* — *HAZLOG – Widening of Runway Turning Pad RWY 32*
- *Date* — *15 April 2014*
- *Location* — *XXX International Airport, Thiruvananthapuram*
- *Unit* — *Civil Engineering (Maintenance)*

4.8.1 The responsibility of creating the HAZLOG and maintaining it will be the responsibility of the Project Manager (*Jt.GM (Engg.-Civil), in the above illustration*). The owner of the HAZLOG will also conduct periodic review of the hazards and will forward the residual risks to the appropriate authority (ED / GM / APD) for signing-off through proper channel.

4.8.2 After the project has been commissioned or the change implemented, the risks remaining in the Project HAZLOG will be transferred to the Operational Risk Assessment Register of the airport. The Operational Risk Assessment Register will be maintained by the Safety Manager of the airport; however the responsibility of managing the remaining risks will be transferred from Project Manager to the Process Owner.

4.9 **STEP 7 TO 11** of the SCARS Form involve obtaining the details of the officials involved in the process of completing the Form.

- **STEP 7** Indicate whether Safety Case is required to be prepared (put a tick). If a Safety Case is required (overall safety magnitude is MAJOR), provide the name, designation and signature with date of the person who has been assigned the task of preparing the safety case
- **STEP 8** Enter the name, designation and signature with date of the Project Manager
- **STEP 9** Enter the name, designation and signature with date of the official who facilitated the change (Safety Expert). The Safety Expert is required to certify that *the Safety Assessment was conducted, fulfilling the requirements of the SMS*.
- **STEP 10** Enter the name, designation and signature with date of the official who approves the change and accepts the safety assessment. For projects conducted at the airport level, this should be signed by the Airport Director. For other locations, the respective official who is accountable for the change should be the signing authority.
- **STEP 11** Enter the name, designation and signature with date of the official who reviews the SCARS. This could be the appropriate

departmental heads at CHQ level and / or ED (AVS)-CHQ for MAJOR changes. This step need not be completed at the airport level.

4.10 The completed SCARS Form should contain the following attachments:

- Attendance Sheet (refer section 4.4.7)
- Copy of the Project HAZLOG (Risk Register) – mandatory for MAJOR and MODERATE changes, desirable for MINOR change
- Safety Plan for MAJOR change (either attached with SCARS or separate)
- Safety Case for MAJOR change (either attached with SCARS or separate)

In addition to these attachments, other documents as required by DGCA AD AC 01/2012 should be provided for communicating with DGCA.

4.11 As mentioned earlier in this document, SCARS is the first step in the safety assessment process. SCARS Form will be completed only once for a particular project, at the concept stage itself. Safety assessments in the form of hazard identification and risk assessment should continue for each of the following phases of project lifecycle (refer Aviation Safety Advisory circular 01/2014). The hazards so identified should be entered in the relevant HAZLOG, copies of which should be forwarded to all concerned along with a copy of the original SCARS Form.

5 Organizing Safety Assessment Meetings

5.1 Preparation of System Description

System Description is a detailed description of the system affected by the proposed project /change.

5.1.1 Section 8.3 of the DGCA CAR on *Establishment of an SMS* gives guidance for preparing a general system description for an aviation organization. The system description for safety risk management process can be prepared in a similar manner.

The system description should consider the following:

a) the system interactions with other systems in the air transportation system
b) the system functions
c) required human performance considerations of the system operation
d) hardware components of the system
e) software components of the system
f) related procedures that define guidance for the operation and use of the system
g) operational environment; and
h) contracted, subcontracted and purchased products and/or services.

5.1.2 ICAO DOC 9859 (2nd edition) Section 9.3.1 gives guidance to what a good system description should be:

Safety risk management starts with a description of the system's functions as the basis for hazard identification. In the system description, the system components and their interfaces with the system's operational environment are analyzed for the presence of *hazards, as well as to identify those safety risk controls already existing in the system or the absence thereof. Hazards are analyzed within the context of the described system, their potentially damaging consequences identified, and such consequences assessed in terms of safety risks (the probability and resulting severity of the damaging potential of the identified consequences). Where the safety risks of the consequences of hazards are assessed to be too high to be acceptable, additional safety risk controls must be built into the system. Assessment of system design and verification that it adequately controls the consequences of hazards is, therefore, a fundamental element of safety management.*

5.1.3 System description should be prepared by the Project Manager, which should be approved by the Process Owner and the Safety Manager before distribution.

5.2 <u>Attendance</u>

Meetings for completing SCARS Form and HazID workshops should be attended by representatives of stakeholders. The persons attending these meetings should be qualified, competent and experienced in their own domains. AAI Safety assessments are qualitative assessments (as opposed to quantitative assessments based on statistical data) which rely heavily on the expert opinions of the participants. The outcomes of the SCARS exercise and the depth of identification of hazards will be in direct relation to the contributions by the participants.

In order to ensure quality participation, the airport should impress upon the stakeholders about the need for deputing the right persons to attend safety assessment meetings.

5.3 <u>Intimation to Stakeholders</u>

5.3.1 Information about the proposed safety assessment meeting viz. date, time, venue and agenda, should be send to all stakeholders well in advance. The intimation should reach the stakeholders at least 15 days before the date of the meeting. It should be sent through email and/or a printed letter with a reminder email sent 5 days before the meeting date. The intimation should also contain (as attachments) specific details about the project in the form of a system description (see section 8.1) and a brief note on the SCARS methodology followed in AAI. If the safety assessment requires the presence of an expert with specialized knowledge (*e.g. Aircraft Maintenance Engineer with B777-200 license*), the mail / letter should reflect this need.

5.3.2 The responsibility of sending intimation to stakeholders lies with the Project Manager. Project Manager should coordinate with the Process Owner and the Safety Manager (Facilitator of the assessment) before finalizing the date, time, venue and agenda of the assessment.

5.4 <u>Arrangements</u>

Safety assessment meetings should be conducted in a room with basic conference facilities. Computer, overhead projector, white board with markers, writing sheets, and pencils should be provided. Copies of system description, SCARS Form, appropriate drawings and procedures should also be made available to the participants. Tea / Coffee and drinking water should be provided. If the exercise is expected to last more than 2 hours, light snacks should also be arranged.

The environment should be conducive for brainstorming activity, where decisions will be taken after discussions. The participants should be facing one another, with the facilitator controlling the proceedings.

5.5 Role of Project Manager

The Project Manager is the domain expert of the project. She/he should be able clarify any doubts raised by the participants. The meeting should start with a presentation by the Project Manager, preferably using the overhead projector, about the project being assessed, even though the participants might be having prior knowledge about the project having read the system description mailed to them in advance.

5.6 Role of Facilitator

The facilitator's task is to:

- guide the meeting through the different steps of the SCARS and/or risk assessment process. The facilitator should make a brief presentation about the methodology adopted in AAI immediately after the presentation by the Project Manager.
- assist in stimulating a thorough and systematic search for hazards
- keep the discussion focused on the subject under discussion
- assist the Project Manager in:
    - filling up the SCARS Form
    - obtain the necessary signatures in the SCARS Form
    - collect proof of attendance from all participants
    - preparation of HAZLOG
    - preparation of final set of documents to be send to CHQ etc.
    - periodic review of the proposed mitigation measures
    - transferring risks to Operational Risk Assessment Register on completion of the project

A recorder for recording the proceedings may be employed. Alternately, the facilitator himself can record the proceedings.

5.7 Role of Stakeholders

Stakeholders should nominate the right persons for attending the safety assessment meetings. The nominees should be asked to study the system description and SCARS methodology before attending the meeting. They should be able to contribute to achieving the objectives of the meeting from the stakeholder's perspective.

5.8 HazID Workshop

If the SCARS Form indicates a MODERATE or MAJOR change, preparation of HAZLOG is mandatory for which a HazID workshop needs to be conducted. However it is strongly recommended to conduct the HazID workshop even when the magnitude of change is MINOR, so that those hazards identified in the PHA can be effectively managed.

The HazID workshop may be conducted in continuation of the SCARS meeting. The hazards identified in the PHA can be assessed first, followed by identification and assessment of more hazards. The participants can also be asked to identify hazards in consultation with their colleagues and mail them to the Process Owner / Facilitator within a specified deadline.

HazID workshops primarily employ brainstorming technique to identify hazards. Other methods like Failure Mode and Effects Analysis (FMEA) may be used for specific cases (assessment of equipments, etc.).

- Section 3.3 of Safety Risk Assessment Practices Attachment (AAI-SAF-105) to C-SMS Manual provides details of HazID and FMEA techniques.
- *International Standard ISO/IEC 31010 on* Risk Management-Risk Assessment Techniques *describes various tools and techniques available for risk assessment process, many of which can be applied in the aviation context.*

5.9 HAZLOG

HAZLOG is the backbone of an SMS. A well-maintained HAZLOG can act as a repository of hazards pertaining to one single project or as a master database pertaining to the airport. It is a real-time indication of the safety health of an airport as well as a safety library for future reference.

The HazID format (HAZLOG Form) is given along with Safety Risk Assessment Practices Attachment (page 30 of AAI-SAF-105) to C-SMS Manual. Each identified Hazard- consequence combination should be recorded in a different HAZLOG form. The HAZLOG will thus be a collection of a number of such forms filed as a single document. These collection of Hazards may be transferred into a MS Excel worksheet of Hazard log template provided in **DGCA SSP Division Circular 1 of 2012.**

5.10 Feedback

It is recommended to keep stakeholders informed about the progress of the project. Important milestones like approvals from DGCA, commencement of work, date of commissioning etc. should be informed during interface meetings with stakeholders.

6 Clarifications

Requests for clarifications to this circular may be addressed to Executive Director (Aviation Safety) at edas@aai.aero or forwarded to following address:

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block – C
Safdarjung Airport
New Delhi - 110003

N. G. Chikkathimmaiah

N. G. CHIKKATHIMMAIAH
Executive Director (Aviation Safety)

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File No: AAI/13-22/14-AVS

AVIATION SAFETY ADVISORY CIRCULAR NO: 03/2014

HAZLOG Template

1 Introduction

DGCA CAR Section 1, Series C Part I, dated 20th July, 2010 on "Establishment of a Safety Management system (SMS)", requires Aerodrome operators, ATS/ANS operators to develop, establish, maintain and adhere to a safety Management System (SMS). Hazard identification & Safety Risk assessment & Mitigation are one of essential elements in ICAO SMS framework.

Appropriate documentation management of hazards is sign of mature Safety Management. Analysis of safety information generates safety knowledge that must reside in the organization and can be used by organization making safety decisions, which will be based on facts and not opinions.

HAZLOG is the backbone of an SMS. A well-maintained HAZLOG can act as a repository of hazards pertaining to one single project or as a master database pertaining to the airport. It is a real-time indication of the safety health of an airport as well as a safety library for future reference.

2 Scope

The contents of this circular are applicable to all personnel of AAI working at AAI owned airports and ANS (Air Navigation Services) locations.

3 References

- DGCA CAR Section 1, Series C Part I , dated 20th July, 2010 on *Establishment of a Safety Management System (SMS)*
- C-SMS Manual –Version 3, Issue 2
- DGCA SSP Division Circular No. 1 of 2012 – *Hazard Log Template*
- ICAO DOC 9859 *Safety Management Manual* (2nd edition-2009 and 3rd edition-2013)

4 Definitions

4.1 **HAZARD** – A hazard is defined as a condition or an object with potential to cause injuries to Personnel, damage to equipment or structures, loss of material or reduction of ability to perform a prescribed function.

4.2 **Consequence of Hazard –** The potential outcome (or outcomes) of a Hazard.

4.3 **Safety Risk –** The assessment expressed in terms of predicted probability and severity of Consequence of hazard taking a reference to worst foreseeable situation.

4.4 **Safety Risk Control –** Measures to address the hazard and bring the assessed risk under Organizational control.

4.5 **HAZLOG –** An electronic application or paper based format for the compilation & storage of Hazards, their consequences and Safety Risk assessment data.

4.6 **Risk register –** A register where hazards, their consequences, risks & controls of a project are recorded. A risk register may be opened for each phase of project and may contain any number of hazards & controls.

4.7 **Operational Risk Assessment (ORA) register -** A Risk register for the operational phase of the project where the residual risks of project (concept, design & implementation phase) are transferred and kept for onward maintenance.

5 Organizational Requirements

5.1 A service provider shall develop and maintain a formal means for effectively collecting, recording, acting on and generating feedback about hazards in operations, which combine reactive, proactive & predictive methods of safety data collection. Formal means of safety data collection include mandatory, voluntary & confidential reporting. (refer para 10.2 of DGCA CAR on SMS).

5.2 The hazard identification process shall include the following steps:

- Reporting of hazards, events or safety concerns
- Collection & storage of safety data
- Analysis of safety data
- Distribution safety information from safety data

5.3 A service provider shall also develop & maintain a formal process that ensures analysis, assessment and control of safety risks of the consequences of hazards during the provision of its services(refer para 10.3 of DGCA CAR on SMS) .

5.4 The safety risk of the consequences of each hazard shall be analyzed in terms of probability and severity of occurrence, and assessed for tolerability.

5.5 If required, initial risk should be brought down to ALARP level by introducing potential Risk control.

5.6 Residual risk, if any should be accepted by appropriate Risk Accepting authority.

5.7 All these hazards along with it's analysis should be compiled and documented in a standard format as HAZLOG register and should be maintained regularly.

6 Documentation

6.1 Hazard identification is a continuous, ongoing and daily activity. Potential source of hazards can be :

- Accident / Incident Investigation
- Random tape transcription record
- Operational data monitoring
- Internal safety audit
- Routine operational reports, hazard reports, incident reports & maintenance reports.
- Hazard workshops (during Change management)
- DGCA regulatory audits & surveillance activities
- Mandatory occurrence reports
- Voluntary reports
- Safety surveys
- Normal operation safety survey (NOSS)
- Change Risk assessments (for operational change)
- Quality audits
- Manufacturers report
- Safety Information exchange

NOTE: The above list is non-exhaustive.

6.2 Each hazard & its consequence must be documented in the template provided in C-SMS manual as attachment i.e. HazID Form (page 30 of AAI-SAF-105). It has a field to enter hazard number. A single hazard can have many consequences and the risk assessments of each of these consequences would be different. So ideally, each consequence of an identified hazard should be recorded in a different HazID form (page 30 of AAI-SAF-105) and should have a unique ID number.

6.3 Each hazard-consequence combination should be given a separate index number, so that tracking of specific risks will be easier. The hazard numbering format suggested below is based on this philosophy, which may be followed at stations:

- Hazards should be allotted a Unique Hazard ID number in the format HAZ/VXXX/SSS/HHHHHH-CC. For example, a hazard identified at Guwahati airport pertaining to a CNS process should be numbered as HAZ/VEGT/CNS/000001-01. If the same hazard is having a second consequence, whose risk is to be managed separately, the same hazard will again be recorded as HAZ/VEGT/CNS/000001-02, but the consequence will be different.

- The abbreviations to be used for the various departments in the hazard number format (SSS) are ATM, CNS and OPS (Airside Operations).

- The hazard numbers will be allotted by the custodian of the Operational Risk Assessment Register. Normally Safety Manager manages the ORA Register.

- Project HAZLOGs are managed by Project Managers (HODs or officials deputed by them). Thus for a particular project, a series of hazard numbers will be allotted by the Safety Manager. These hazards will be transferred into the ORA Register on completion of the project.

- Hazards which are removed from the active HAZLOG, either on elimination or mitigation to ALARP region, should be retained in the safety library of the airport.

6.4 Each consequence of a hazard must be assessed in terms of probability & severity (follow Table given in 7.4.11 & 7.4.12 of C-SMS Manual).

6.5 Once the initial risk with existing control is established, the next step is to consider whether there is need to treat the risk by following ALARP diagram (follow safety risk assessment Matrix in 7.4.13 of C-SMS manual)

6.6 Safety Risk Management is assessment & mitigation of safety risks of the consequence of hazard to a level of ALARP.

6.7 Develop potential control measures & mitigation strategy to bring down initial risk to ALARP level.

6.8 Residual Risk shall be accepted by appropriate Risk accepting authority (refer 7.4.16 of C-SMS Manual).

6.9 Each hazard along with its consequences, initial risk assessment (with existing risk control), Residual risk (with potential risk control) as carried out in HazID form shall be summarized & documented in an objective manner in a HAZLOG register along with action officer for implementation of potential risk control, current status & review date. The guidance for establishment of HAZLOG / Hazard register is provided in attachment AAI-SAF-108 of C-SMS manual.

6.10 DGCA has developed a Hazard log template (HAZLOG register). (Refer DGCA SSP Division Circular No. 1 of 2012).

6.11 Aviation Safety Directorate, CHQ has simplified the DGCA template and modified HAZLOG template (with a sample example) is appended to this circular. All AAI managed airports / ANS unit shall use the given template for compiling all hazards present in the system. The template shall be maintain regularly by logging all active hazards of the airport along with it's analysis.

6.12 Each aerodrome / ANS location must establish a centralized HAZLOG / Hazard register.

6.13 The safety manager is responsible for establishment and management of HAZLOG / Hazard register.

3 x

6.14 Continuous compilation and formal management of hazard related knowledge become "Safety library" of an organization.

6.15 Centralized HAZLOG / Hazard register shall be reviewed every 6 (six) month by Aerodrome / ANS location.

7 Clarifications

Requests for clarifications to this circular may be addressed to Executive Director (Aviation Safety) at edas@aai.aero or forwarded to following address:

Directorate of Aviation Safety
Airports Authority of India
Rajiv Gandhi Bhavan, Block – C
Safdarjung Airport
New Delhi - 110003

N.G. Chikkathimmaiah

N. G. CHIKKATHIMMAIAH
Executive Director (Aviation Safety)

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HAZLOG TEMPLATE (with example)

ORIGINATOR(STATION)	HAZARD NO.	SOURCE	DATE OF RECORD IN HAZLOG	FUNCTIONAL AREA(UNIT)	HAZARD DESCRIPTION	WORST CONSEQUENCE	EXISTING RISK CONTROL	INITIAL RISK			POTENTIAL RISK CONTROL	RESIDUAL RISK			ACTION OFFICER FOR IMPLIMENTATION OF POTENTIAL RISK CONTROL (NAME & DESG)	STATUS OF RISK CONTROL (PDC) OR COMPLETION	REVIEW PERIOD
								PROBABLITY	SEVERITY	TOLERABILITY		PROBABLITY	SEVERITY	CLASS			
Calicut airport	HAZ/VOCL/OPS/0001	Safety assessment of RWY strip	11/9/2012	OPS.(GFS)	Inadequate RWY strip of RWY 08 & 26. (75m either side of RWY C/L)	Runway Excursion & Aircraft damage	Available RWY strip maintained with reqd. grading and clear of obstructions. Both RWYs are Instrument RWY provided with ILS.	4 (Occasational)	C (Major)	4C (Class-II)	1. Land acquisition fm State Govt. 2. SOP for regular Rubber deposite removal progarm & RWY friction coefficient measurement.	2 (improbable)	D (Minor)	2D (Class IV) (Residual risk accepted by APD)	1. APD, Calicut (for land) 2. Mr. XXXX, DGM (Engg.-Civil) (for SOPs)	1. 31/03/2015 (land acquisition) 2. 30/10/2012 (for SOPs)	31/12/2012

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

Aviation Safety Directorate
Corporate Head Quarters, Rajiv Gandhi Bhavan,
Safdarjung Airport, New Delhi -110003
www.aai.aero