



International Civil Aviation Organization

The Combined Sixth Meeting of the FANS Implementation Team, Bay of Bengal (FIT-BOB/6) and the Third Meeting of the FANS Implementation Team, South-East Asia (FIT-SEA/3)

Bangkok, Thailand, 22 – 25 November 2005

Agenda Item 8: Any other business

Draft Document 9859 – ICAO Safety Management Manual

(Presented by the Secretariat)

SUMMARY

This paper reports the availability of the draft
ICAO Safety Management Manual (Doc 9859)

1. INTRODUCTION

1.1 Although safety management provisions were introduced into Annex 11 some years ago, ICAO experienced some delays in publishing an appropriate Manual of Safety Management for ATS. A draft ATS Manual was eventually presented to the 11th Air Navigation Conference (22 September – 3 October 2003) and was subsequently circulated electronically as a final draft document.

1.2 Subsequently, in light of the expansion of provisions for safety management systems in other areas in addition to ATS, in particular Annex 14 – *Aerodromes* and Annex 6 – *Operation of Aircraft*, ICAO pursued the philosophy of a combined safety management manual, rather than a series of separate manuals addressing separate ICAO Annexes.

2. DISCUSSION

2.1 With effect from mid October 2005 the draft *ICAO Safety Management Manual* (Doc 9859-AN/460), containing combined safety management provisions, has been placed on the internal ICAO web and is authorized for release to State civil aviation administrations on the basis of the following disclaimer:

In order to provide States with guidance material on safety management as early as possible, a draft of the Safety Management Manual (Doc 9859-AN/460) has been placed on the ICAO-NET. This draft manual is a work in progress and will be progressively update as a result of further technical input and editorial revision. The Organization accepts no responsibility or liability, in whole or in part, as to the currency, accuracy, or quality of the information in the manual, nor any consequences of its use.

2.2 A copy of the initial pages of the Safety Management Manual, including the Table of Contents, has been included as an **attachment** to this paper. Electronic copies of the complete draft SMM (comprising approximately 380 pages) are available from the Regional Office on request.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note that the draft *ICAO Safety Management Manual* (Doc 9859) has been approved for release to States on a final draft basis, and
- b) note that electronic copies of the *ICAO Safety Management Manual* are available from the Regional Office on request.

.....



ICAO Safety Management Manual

2005

International Civil Aviation Organization

TABLE OF CONTENTS

Part 1 – INTRODUCTION TO SAFETY MANAGEMENT

Chapter 1 — OVERVIEW

General

Concept of safety

Need for safety management

ICAO requirements

Stakeholders in safety

Approaches to safety management

- Traditional
- Contemporary

Using this manual

- Purpose
- Target audience
- Gender
- Relationship to other ICAO documents

Chapter 2 — RESPONSIBILITY FOR MANAGING SAFETY

Responsibilities for managing safety

- ICAO
- States
- Civil Aviation Administrations (CAAs)
- Manufacturers
- Aircraft operators
- Service providers
- Third party contractors
- Business and professional associations

Management's special responsibility for safety

Global cooperation

Chapter 3 — STATE SAFETY PROGRAMME

General

Regulatory responsibilities

Civil Aviation Administrations (CAAs)

State safety performance

Part 2 – THE MANAGEMENT OF SAFETY

Chapter 4 – UNDERSTANDING SAFETY

General

Concept of risk

Accidents vs. incidents

Accident causation

- Traditional view of causation
- Contemporary view of causation
- Incidents: Precursors of accidents
 - *1:600 Rule*

Context for accidents and incidents

- Equipment design
- Supporting infrastructure
- Human factors
 - SHEL model
- Cultural factors
 - National
 - Professional
 - Organizational
- Corporate safety culture
 - Positive safety cultures
 - Indications of a positive safety culture
 - Informed culture
 - Learning culture
 - Reporting culture
 - Just culture
- Blame and punishment

Human error

- Error Types
 - Planning errors (mistakes)
 - Execution errors (slips and lapses)
 - Errors vs. Violations
- Control of human error
 - Error reduction
 - Error capturing
 - Error tolerance

Safety cycle

Cost Considerations

- Costs of accidents
- Costs of incidents
- Costs of safety

Chapter 5 – BASICS OF SAFETY MANAGEMENT**The philosophy of safety management**

- General
- Core business function
- Systems approach
- System safety

Factors affecting system safety

- System failures
- Active failures and latent conditions
- Equipment faults

Safety Management Concepts

- Hazard identification
- Cornerstones of safety management
- Strategies for safety management
- Key safety management activities
- Safety management process
- Safety oversight
- Safety performance indicators and targets

Appendix:

1. Three Cornerstones of Safety Management

Chapter 6 – RISK MANAGEMENT**General****Hazard identification****Risk assessment**

- Problem definition
- Probability of adverse consequences
- Severity of consequences of occurrence
- Risk acceptability

Risk mitigation

- Defence analysis
- Risk control strategies
- Brainstorming
- Evaluating risk mitigation options

Risk communication**Risk management considerations for State administrations**

- Occasions warranting risk management by State
- Benefits of risk management by State administrations

Chapter 7 – HAZARD AND INCIDENT REPORTING**Introduction to Reporting Systems**

- Value of safety reporting systems
- ICAO requirements

Types of Incident Reporting Systems

- Mandatory incident reporting systems
- Voluntary incident reporting systems
- Confidential reporting systems

Principles of effective incident reporting

- Trust
- Non-punitive
- Inclusive reporting base
- Independence
- Ease of reporting
- Acknowledgment
- Promotion

International incident reporting systems

- ICAO Accident/Incident Reporting System (ADREP)
- European Coordination Centre for Aviation Incident Reporting Systems (ECCAIRS)

State voluntary incident reporting systems

- Aviation Safety Reporting System (ASRS)
- Confidential Human Factors Incident Reporting Programme (CHIRP)

Company reporting systems**Implementation of incident reporting systems**

- What to report?
- Who should report?
- Reporting method and format
- Limitations on the use of incident data

Appendix:

1. Limitations on the use of data from voluntary incident reporting systems

Chapter 8 – SAFETY INVESTIGATIONS**Introduction**

- State investigations
 - Accidents
 - Serious incidents
- In-house investigations

Scope of safety investigations

- How much information is enough?

Information sources**Interviews**

- Conducting interviews
- Caveat regarding witness interviews

Investigation methodology**Investigating human performance issues****Safety recommendations****Appendix:**

1. Interviewing Techniques

Chapter 9 -SAFETY ANALYSIS AND SAFETY STUDIES**Introduction**

- ICAO requirement
- Safety analysis – what is it
- Objectivity and bias

Analytical methods and tools

- Statistical analyses
- Trend analysis
- Normative comparisons
- Simulation and testing
- Expert panel
- Cost-benefit analysis

Safety studies

- Selecting study issues
- Information gathering
- Participation

Significant safety issues lists**Appendices:**

1. Understanding bias
2. Basics of statistical analysis

Chapter 10 – SAFETY PERFORMANCE MONITORING**Introduction****Safety health**

- Assessing safety health
 - Symptoms of poor safety health
 - Indicators of improving safety health
 - Statistical safety performance indicators
 - Minimum levels of safety

Safety Oversight

- Inspections
- Surveys
- Safety monitoring
- Quality assurance
- Safety audits

ICAO Universal Safety Oversight Audit Programme (USOAP)**Regulatory Safety Audits****Self Audit****Safety Programme Review****Appendices:**

1. Sample Indicators of Safety Health
2. Airline Management Self-Audit

Chapter 11 – EMERGENCY RESPONSE PLANNING**Introduction**

- ICAO requirements

Plan Contents

- Governing policies
- Organization
- Notifications
- Initial response
- Additional assistance
- Crisis Management Centre (CMC)
- Records
- Accident site
- News media
- Formal investigations
- Family assistance
- Post critical incident stress counselling
- Post occurrence review

Aircraft Operator's Responsibilities**Checklists****Training and Exercises****Involvement of the Safety Manager****Part 3 – SAFETY MANAGEMENT SYSTEMS****Chapter 12 – ESTABLISHING A SAFETY MANAGEMENT SYSTEM****INTRODUCTION****TEN STEPS TO SMS****1. Planning**

- a) Review
- b) Safety Assessment
- c) Performance Indicators and Safety Targets
- d) Strategy
- e) The plan

2. Senior Management's Commitment to Safety

- a) Policy
- b) Objectives

3. Organization

- a) Safety Manager
- b) Organizational structure
- c) Responsibilities and Accountabilities
- d) Safety Committee
- e) Training and Competence

- 4. Hazard Identification**
- 5. Risk Management**
- 6. Investigation Capability**
- 7. Safety Analysis Capability**
- 8. Safety Promotion and Training**
- 9. Safety Management Documentation and Information Management**
- 10. Safety Oversight and Performance Evaluation**
- Appendices**
 - 1. Sample Safety Policy Statement
 - 2. Suggested Topics To Be Included In A CEO Statement On Safety Commitment

Chapter 13 – SAFETY ASSESSMENTS

Overview

The Safety Assessment Process

- Step 1** – System Description
- Step 2** – Hazard Identification
- Step 3** – Estimation of Hazard Severity
- Step 4** – Estimation of the Likelihood of the Hazard Occurring
- Step 5** – Evaluation of the Risk
- Step 6** – Risk Mitigation
- Step 7** – Development of Safety Assessment Documentation

Appendix

- 1. Guidance Material on Conduct of Group Hazard Identification and Assessment Sessions

Chapter 14 – SAFETY AUDITING

Internal Safety Audits

The Safety Audit Team

- The role of the audit team leader
- The role of the auditors

Planning and Preparation

- Pre-audit planning
- The audit plan

Conduct of the Audit

- Opening meeting
- Audit procedures
- Audit interviews
- Audit observations
- Closing meeting
- Corrective action plan
- Audit reports

Audit Follow-Up**Chapter 15 - PRACTICAL CONSIDERATIONS FOR OPERATING A SAFETY MANAGEMENT SYSTEM****The Safety Office**

- Safety office functions

Safety Manager (SM)

- SM selection criteria
- Leadership role
- SM in expanding or large organizations
- SM's relationships

Safety Committees

- Committee Chairman
- Membership

Safety Management Training

- Training needs
 - Initial safety training for all staff
 - Safety training for management
 - Specialist safety training
 - Safety training for operational personnel
 - Training for Safety Managers
- Ongoing safety training requirements

Conducting A Safety Survey

- Principles
- Survey frequency
- Active monitoring techniques
- Where to look
- Concluding the survey

Disseminating Safety Information

- Safety critical information
- “Nice to know” information
- Reporting to management

Written Communications**Safety Promotion**

- Promotion methods

Management of Safety Information

- General
 - ICAO recommendations
 - Accident/Incident Reporting (ADREP) System
- Information System Needs
- Understanding Databases
 - What is a database
 - Database limitations
 - Database integrity
- Database Management
 - Protection of safety data
 - Safety database capabilities
- Database selection considerations

The Safety Management Manual**Appendices**

1. Sample Job Description for Company Safety Manager
2. Example Structure for a Safety Management Manual

Part 4 – APPLIED SAFETY MANAGEMENT

Chapter 16 - AIRCRAFT OPERATIONS

GENERAL

HAZARD AND INCIDENT REPORTING

- Benefits
- Encouraging the free flow of safety information
- Commercially available systems

FLIGHT DATA ANALYSIS (FDA) PROGRAMME

Introduction

- What is an FDA programme?
- Benefits of FDA programmes?

ICAO Requirement

Using an FDA Programme

- Exceedence detection
- Routine measurements
- Incident investigation
- Continuing airworthiness
- Integrated safety analysis

FDA Equipment

- Airborne equipment
- Ground replay and analysis equipment

FDA in Practice

- FDA process
- Analysis and follow-up

Conditions for Effective FDA Programmes

- Protection of FDA data
- Essential trust
- Requisite safety culture

Implementing an FDA Programme

- Aims and objectives of an FDA programme

- The FDA team
- Off-the-shelf packages

LINE OPERATIONS SAFETY AUDIT (LOSA) PROGRAMME

Introduction

ICAO's role

Terminology

- Threats
- Errors
- Threat and error management
- Systemic countermeasures

Defining Characteristics of LOSA

Safety Change Process

Implementing LOSA

CABIN SAFETY PROGRAMME

General

ICAO Requirements

Managing Cabin Safety

- Commitment
- Positive safety culture
- SOP's checklists and briefings
- Hazard and Incident reporting
- Training for Cabin Safety
- Safety oversight

Appendices

1. Sample company policy on non-punitive hazard reporting
2. Examples of items to be reported in an airline occurrence reporting system
3. Sample Memorandum Of Understanding between an airline and a pilots association for the operation of a flight data analysis (FDA) programme
4. Human Factors Affecting Cabin Safety
5. Safety Reporting for Flight Attendants

Chapter 17 – AIR TRAFFIC SERVICES OPERATIONS**ATS Safety**

- General
- ICAO requirements
- Functions of the ATS Safety Regulatory Authority
- Safety Manager

ATS Safety Management Systems

- Safety Performance Indicator And Safety Targets
- Effective Direction
- Safety Organization
- Risk Management
- Incident Reporting Systems
- Emergency Response
- Safety Investigations
- Safety Oversight
- Managing Change

Changing ATS Procedures**Threat and Error Management****Normal Operations Safety Surveys (NOSS)****Appendices:**

1. Human Factors in Air Traffic Services
2. Risk Assessment of ATS Procedures
3. Threat and Error Management in ATS

Chapter 18 - AERODROME OPERATIONS**Airport Safety - General****Regulatory Framework**

- ICAO Requirement for Safety Management
- State Responsibilities
- Approaches to Discharge of Regulatory Responsibilities

Aerodrome Safety Management

- Airport Operator Safety Management System
- Scope for Airport Safety Management
- Coherent direction
- SM and safety committee(s)

- Safety Occurrence Reporting
- Safety oversight
- Safety Audits

Airport Emergency Response Planning

- Coordinated response
- Airport emergency response exercises

Airport Ramp Safety

- Ramp work environment
- Causes of ramp accidents
- Safety management on the ramp
- Vehicle operations

Role of Airline Safety Manager in Ground Safety**Chapter 19 – Aircraft Maintenance****Maintenance Safety — General****Managing Safety in Maintenance**

- Corporate approach to safety
 - Organizing for safety
 - Documentation and records management
 - Resource allocations
 - Safety culture
- Principal tools for safety management in maintenance
- Safety oversight and programme evaluation

Managing Procedural Deviations in Maintenance

- Maintenance Error Decision Aid (MEDA)

Safety Manager's Concerns**Appendix**

1. Maintenance Working Conditions
2. Précis on the Maintenance Error Decision Aid (MEDA)