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The following circular is promulgated for information, guidance and necessary action

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Director General

IMPLEMENTATION OF AN INTEGRATED SAFETY MANAGEMENT SYSTEM (SMS) IN TANZANIA

Safety has always been the overriding consideration in the conduct of all aviation activities. Safety is the state in which the risk of harm to persons or property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

Traditional approaches to accident prevention have focused primarily on outcomes (probable cause) and unsafe acts by operational personnel. Safety improvement measures introduced usually address the identified safety concern exclusively. The 'what', 'who', 'when' and 'how' were often identified but not the 'why'. As such, the organizational and environmental contexts in which errors were made were often neglected, and measures adopted therefore often addressed only symptoms.

Due to the nature of the aviation industry, the total elimination of accidents or serious incidents is unachievable. No human endeavor or human-made system can be free from risk and error, and failures will be expected to occur in spite of the most accomplished prevention efforts. The system must, however, seek to understand and control such risks and errors.

This Aeronautical Information Circular is therefore promulgated to inform all operators that with effect from 1st August 2007, the Tanzania Civil Aviation Authority will start implementing a Safety Management System (SMS) in Tanzania as per ICAO Safety Management Manual (Doc 9859).

To assist the operator on this, the authority has issued a manual for the implementation of a safety management system with guidelines and principles to the system attached hereby.

This document applies to all Tanzania Air Operator Certificate (AOC) Holders and Approved Maintenance Organizations (AMO), Approved Training Organizations (ATO), Airport and Aerodromes Operators, Air Traffic and Air Navigation Services Operators and all other service providers in the civil aviation industry.

The document may appear to have weighed heavy on aircraft operations and aircraft maintenance organizations (these were used as examples only) since the basic principles and guidelines are as apt to any industry, business and service including those mentioned in this circular.

Attachment to AIC 08/2007



TANZANIA CIVIL AVIATION AUTHORITY

**MANUAL OF GUIDANCE TO SAFETY
MANAGEMENT SYSTEMS (SMS)**

DOCUMENT TCAA (34) 160

FOREWORD

This manual is intended to provide guidance to Air Operator Certificate (AOC) holders and Approved Maintenance Organization (AMO), Approved Training Organization (ATO), Airport and Aerodrome Operators, Air Navigation Services Operators and any other service provider in the aviation industry.

This guidance provides information which is in line with the ICAO Safety Management Manual (Doc 9859)

Safety management is a systematic application of specific technical and managerial skills to identify and control hazards and related risks. By identifying, assessing and eliminating or controlling safety related hazards and risks, acceptable levels of Safety can be achieved.

Whilst this manual is directed mostly towards aircraft operations and maintenance organizations it can be used to guide operators to implement safety management systems comfortably since the basic principles are the same for any industry.

Margaret Munyagi
DIRECTOR GENERAL

GUIDELINES ON IMPLEMENTATION OF SAFETY MANAGEMENT SYSTEMS IN TANZANIA.

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1. **PURPOSE.** This document is issued to provide general guidance and principles to implement an integrated Safety Management System (SMS).

2. **APPLICABILITY.** This document applies to all Tanzania Air Operator Certificate (AOC) Holders and Approved Maintenance Organizations (AMO), Approved Training Organizations, Airport and Aerodromes Operators, Air Traffic and Air Navigation Services Operators and all other service providers in the civil aviation industry. You will probably note emphasis in the document is primarily based to AOCs and AMOs but the same concepts are applicable to any industry, business or service as the underlying principles for an effective SMS are exactly the same.

3. **REFERENCES.** ICAO Safety Management Manual (Doc 9859)

4. INTRODUCTION.

Safety has always been the overriding consideration in the conduct of all aviation activities. Safety is the state in which the risk of harm to persons or property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

Due to the nature of the aviation industry, the total elimination of accidents or serious incidents is unachievable. No human endeavor or human-made system can be free from risk and error, and failures will be expected to occur in spite of the most accomplished prevention efforts. The system must, however, seek to understand and control such risks and errors.

Traditional approaches to accident prevention have focused primarily on outcomes (probable cause) and unsafe acts by operational personnel. Safety improvement measures introduced usually address the identified safety concern exclusively. The 'what', 'who', 'when' and 'how' were often identified but not the 'why'. As such, the organizational and environmental contexts in which errors were made were often neglected, and measures adopted therefore often addressed only symptoms.

In the 1950s, accident prevention concentrated primarily on technical factors. Recognition that human factors and human performance issues played a part gained momentum in the 1970s. In the 1990s, safety thinking has evolved to the point of widespread acknowledgement that organizational factors play a significant role in the performance of human beings and therefore is an important issue in risk and error management. The study of accident causation today focuses on organizational processes, latent conditions, workplace conditions, adequacy of defenses as well as active failures. Today, Safety Management Systems seek to enhance the organizational approach to managing a safe and successful aviation operation.

Safety management systems are based on the fact that there will always be hazards and risks, so proactive management is needed to identify and control these threats to safety, before they lead to mishaps.

Aviation in Tanzania is growing and the public must remain confident that the aviation industry in Tanzania is safe. We are, however, facing serious challenges. For example, projected growth in aviation means that maintaining the current low accident rate will result in an unacceptable number of accidents. The challenge for TCAA and the industry is to find ways to lower the accident rate even further as the industry grows.

5. INTEGRATED SAFETY MANAGEMENT SYSTEM (SMS)

Safety cannot be achieved by simply introducing rules or directives concerning the procedures to be followed by operational employees; it encompasses most of the activities of the organization. Implementing safety management systems is the cornerstone of the evolving directions. All the other directions will evolve within a safety management system environment.

For this reason, safety management must start from senior management, and the effects on safety must be examined at all levels of the organization.

An integrated Safety Management System (SMS) is a systematic, explicit and proactive process for managing safety that integrates operations and technical systems with financial and human resource management to achieve safe operations with as low as reasonably practicable risk.

SMS is systematic in that safety management activities are carried out in accordance with a pre-determined plan, and applied in a consistent manner throughout the organization. It is proactive by taking an approach that emphasizes prevention, through hazards identification and risk control and mitigation measures, before events that affect safety occur. It is also explicit, in that all safety management activities are documented, visible and performed as an essential component of management activities.

It is an integrated system which includes the people, procedures, practices and technology needed to monitor and improve the safety and well being of the organization.

Safety management may also be described as the systematic application of specific technical and managerial skills to identify and control hazards and related risks. By identifying, assessing and eliminating or controlling safety-related hazards and risks, acceptable levels of safety will be achieved.

6. BENEFITS OF AN INTEGRATED SMS

The primary reason for the introduction of SMS is to improve existing levels of aviation safety through a systematic process of hazard and risk management. An effective safety management system may also enable organizations to reap the following benefits:

- Reduction in accidents and incidents
- Minimize direct and indirect costs resulting from accidents and incidents
- Gain safety recognition from customers and traveling public
- Create a positive, reliable and generative organizational culture
- Reduction in insurance rate
- Exceed regulatory requirements with simultaneous bottom line and productivity gains
- Proof of due diligence in event of legal or regulatory safety enquiries
- Improved working environment resulting in better productivity and morale
- Synergy in the safety related processes and functions within the organization

7. SMS IMPLEMENTATION SCHEDULE

Annex 6 to the Convention on International Civil Aviation requires States to mandate the implementation of safety management systems by air operators and maintenance organizations by 1 January 2009.

To allow sufficient time for AOC Holders and AMOs to develop and implement their own SMS, TCAA has adopted a two-phased SMS implementation plan. All AOC Holders and AMOs are encouraged to initiate the implementation of their Safety Management System from 1 August 2007 until 31 December 2008. During this period, TCAA will continue to provide guidance where appropriate as well as assess each organization's level of SMS implementation. However, deficiencies will not be recorded as findings. SMS will be mandated on 1 January 2009, and by then all AOC Holders and AMOs must have in place a functioning SMS in order to meet the requirements relevant to their TCAA approval.

There is no global harmonized standard for SMS regulations; however, all basic SMS regulations have several common key features. The SMS regulations which have been adopted by TCAA from 1 January 2009 will encapsulate these features.

The regulations require the establishment of the basic components of a safety management system, starting with a safety policy and senior management commitment. To be effective, these components must be integrated into a coherent management system and should not exist as independent safety programs.

8. SMS REQUIREMENTS

From 1 January 2009, all AOC Holders and AMOs shall establish and maintain an integrated safety management system acceptable to TCAA that, as a minimum shall include:

- (a) a safety policy on which the system is based;
- (b) a process for setting safety objectives, goals and performance indicators;
- (c) clearly defined lines of safety accountability throughout the organization, including a direct accountability for safety on the part of the Accountable Manager
- (d) a process for identifying hazards to aviation safety and for evaluating and managing the associated risks;
- (e) a process for ensuring that personnel are trained and competent to perform their duties;
- (f) a procedure to document all SMS components, procedures and activities including their relevant integration;
- (g) a process for conducting periodic reviews or audits of the safety management system.
- (h) an emergency response plan.

AOC Holders and AMOs, and other identified sectors identified in this document, are free to scope their SMS to the complexity of their operations. Organizations have a wide range of procedural options for compliance, and are encouraged to identify the best method of compliance to meet their individual circumstances. The key to a successful SMS is to develop and grow the SMS based on the organization's needs and customized to its' operations.

9. SENIOR MANAGEMENT'S ACCOUNTABILITY FOR SAFETY

The senior management of the organization led by the Chief Executive Officer is ultimately responsible for the entire organization's attitude towards safety. Its organization safety culture will depend on the senior management's level of commitment toward safe operations.

Regardless of the size, complexity, or type of operation, the success of the SMS depends on the extent to which senior management devotes the necessary time, resources and attention to safety as a core management issue. A safety management system will not be effective if it receives attention only at the operational level. TCAA therefore considers it the responsibility of the Chief Executive Officer¹, as the Accountable Manager, to effectively implement the organization's integrated safety management system¹.

¹ In very large companies, it may be the case that the Chief Executive Officer may not be directly involved in the aviation business unit of the company. In such cases, the most senior person responsible for the aviation business unit, who has corporate authority for ensuring that all work can be financed and carried out to the required safety standards, may be accepted as the Accountable Manager. This is in line with the requirements for an Accountable Manager under the AMO and AOC.

The Accountable Manager, having full authority over human resources and financial issues, must ensure that the necessary resources are allocated to the management of safety. He or she has direct responsibility for the conduct of the organization's affairs and final responsibility for all safety issues.

Senior management's commitment to safety is first demonstrated to the organization's staff through its stated safety policies, objectives and goals. The Accountable Manager, supported by the organization's senior management team, must therefore be responsible for:

- Developing the organization's safety policy
- Establishing safety objectives, goals and performance indicators
- Communicating, with visible endorsement, the safety policy, objectives and goals to all staff
- Providing the necessary human and financial resources

10. IMPLEMENTING A SAFETY MANAGEMENT SYSTEM

To establish an SMS, the organization would need to build up its key SMS components as follows:

(a) Safety Policy

The written safety policy is a concrete expression of the management's philosophy and commitment to safety. It should clearly encapsulate the senior management's commitment to improving safety in the organization as their top priority. It should be a straight forward statement that includes the following points:

- Senior management commitment and intentions with regard to safety
- The organization's safety management principles
- Establishment of safety as a core value
- Responsibility for the safety programme
- Non-Punitive Reporting policy

This safety policy should bear visible endorsement by the Accountable Manager and all members of the organization's senior management team, and communicated to all levels within the organization.

A safety policy statement could look or read as follows:

“To prevent accidents and reduce their potential for damage or injury, our organization will maintain an active integrated safety management system. I support the open sharing of information on all safety issues and encourage all employees to report significant safety hazards or concerns. I pledge that no disciplinary action will be taken against any employee for reporting a safety hazard or concern to this company’s management. I pledge also that no staff member will be asked to compromise our safety standards just to “get the job done”.

Safety is a corporate value of this company, and we believe in providing our employees and customers with a safe environment. All employees must comply with this policy.

Our overall safety objective is the proactive management of identifiable hazards and their associated risks with the intent to eliminate their potential for injury to people and damage to equipment or the environment. To that end, we will continuously examine our operation for hazards and find ways to minimize them. We will encourage hazards and incident reporting, train staff on safety management, document our findings and mitigation actions and strive for continuous improvement.

Ultimate responsibility for safety in the company rests with me as the Chief Executive Officer/Accountable Manager. Responsibility for making our operations safer for everyone lies with each one of us – from managers to front-line employees. Each manager is responsible for implementing the safety management system in his or her area of responsibility, and will be held accountable to ensure that all reasonable steps are taken to prevent incidents and accidents.”

In preparing a safety policy, senior management should consult widely with key staff members in charge of safety-critical areas. Consultation ensures that the document is relevant to staff and encourages buy-in (ownership) to the safety policy.

(b) Safety Roles and Responsibilities

The successful management of safety is a cooperative responsibility that requires the participation of all management and operational personnel of the organization.

The safety roles and accountabilities between the organization’s key safety personnel (or department) and all other functional departments should be established and clearly defined.

They should be documented and communicated to all levels of the organization.

(i) Safety (SMS) Manager

Although the Accountable Manager is ultimately responsible for the safety management system, it is necessary to appoint a focal point to act as the driving force for the implementation as well as maintenance of SMS activities across the entire organization.

This is accomplished by appointing a safety manager or department whose primary responsibility is to facilitate and administer the organization's SMS.

The safety manager should be directly accountable to the Accountable Manager.

Other responsibilities of the safety manager or department would include:

- Managing the SMS implementation plan
- Facilitating hazard identification and risk analysis activities
- Monitoring the effectiveness of mitigation actions
- Providing periodic reports on safety performance
- Maintaining the SMS documentation
- Planning and organizing staff safety training
- Providing independent advice on safety matters to the senior management

It must be emphasized that the safety manager is not the sole person responsible for safety. Specific safety activities and the functional or operational safety performance and outcomes are the responsibility of the relevant operational or functional managers, and senior management must not hold the safety manager accountable for line managers' responsibilities. The safety manager should monitor all cross functional or departmental SMS activities to ensure their relevant integration. While the safety manager may be held accountable for the satisfactory administration and facilitation of the safety management system itself, he or she should not be held accountable for the safety performance of the organization.

In order to avoid possible conflict of interest, the safety manager should not have direct responsibility for any of the operational areas. In principle, integration of safety, quality, environmental control and security is possible. The safety manager (office) should be at a sufficiently high level in the management hierarchy to ensure that he or she can have direct communication with other members of the senior management team.

(ii) Safety Review Board (Safety Committee)

A high level Safety Review Board (SRB) or safety committee would normally be necessary for functional or senior management involvement on safety policy, overall system implementation and safety performance review purposes.

Level of participation in the safety committee would depend on the size and structure of the organization.

The Accountable Manager should chair this committee with all relevant functional areas of the organization being represented.

A safety committee would typically consist of the Accountable Manager, the safety manager and other members of the senior management team. The objective of the safety committee is to provide a forum to discuss safety issues and the overall health and direction of the SMS. The role of the safety committee would include:

- Making recommendations or decisions concerning safety policy and objectives
- Defining safety performance indicators and setting safety performance goals for the organization
- Reviewing safety performance and outcomes
- Providing strategic directions to departmental Safety Action Groups (SAG) where applicable
- Directing and monitoring the initial SMS implementation process.

Terms of reference for the safety committee should be documented in the Safety policy manual.

(iii) Safety Action Group(s)

Safety Action Groups (SAGs) are accountable to and takes strategic directions from the Safety Committee. Managers and supervisors from a given functional area would be members of the SAG for that area. The functional head of that area should chair the SAG. The role of the SAG(s) would include:

- Overseeing operational safety within the functional area.
- Managing the area's hazard identification and risk analysis activities.
- Implementing mitigation or corrective actions relevant to the area.
- Assessing the impact of safety on operational changes and activating hazard and risk analysis process as appropriate.
- Maintenance and review of relevant performance indicators
- Managing safety training and promotion activities within the area.

Departmental SAGs may wish to appoint "SMS Coordinators" to facilitate the department's SMS activities

(c) Safety Targets (Objectives and Goals) and Performance Indicators

(j) Safety Objectives

In conjunction with an overall safety principles statement incorporated in the Safety Policy, there should be a set of underlying tangible safety objectives. These would cover relevant aspects of the organization's safety vision, senior management commitments, realistic safety milestones and desired outcomes. They should be unambiguous and reviewed on a regular basis. Examples of such safety objectives are listed below:

- To identify and eliminate hazardous conditions
- To perform hazard and risk analysis for all proposed new equipment acquisitions, facilities, operations and procedures
- To provide relevant SMS education and training to all personnel.
- To provide a safe, healthy work environment for all personnel
- To minimize accidents/incidents that is attributable to organizational factors
- To prevent damage and injury to property and people resulting from our operations
- To improve the effectiveness of the safety management system through a yearly safety audit that reviews all aspects of the SMS

(ii) Safety Goals

Safety goals must be created in relation to each safety objective so that the organization remains aware of whether the relevant objectives are being met. These safety goals would be measured and monitored with the use of safety performance indicators.

Examples of possible safety goals are as follows:

- To increase the number of hazard reports received by X % over the previous year²
- To reduce days lost to injury or illness by X % over the previous year
- To reduce direct/indirect cost due to incidents/accidents by X % over the previous year
- To formalize safety assessment compliance for all existing safety related equipment, facilities, operations and procedures by ____ (date)

² *In a developing SMS with a new reporting system, you would expect to see an increase in the number of reports over the short term. This shows that the company culture encourages this feedback. In the long term, as the SMS matures, you would expect to see a decrease in number of hazard reports.*

- To reduce annual insurance claims due to incidents/accidents by X % over the previous year
- To reduce number of operational technical incidents by X % over the next Y months.
- To reduce the number of customer warranty claims by X % over the next Y months.
- To reduce the number of findings per external audit by X % over the previous year

(iii) Safety Performance Indicators

Safety performance indicators are generally data based expressions of the frequency of occurrence of some events, incidents or reports. There is no single safety performance indicator that is appropriate to all organizations. The indicator(s) chosen should correspond to the relevant safety goals.

Examples of possible safety indicators would be as follows:

- Number of in flight incidents per 1000 flight hours/cycles
- Number of warranty claims per 1000 man-hours
- Number of findings per audit
- Number of hazard reports received

Safety performance monitoring is the process by which safety indicators and/or goals of the organization are reviewed in relation to safety policies and objectives. Such monitoring would normally be done at the safety committee and/or safety action group level. Any significant abnormal trend or breach of safety benchmark level would warrant appropriate investigation into potential hazards or risks associated with such deviation.

(d) Hazard and Risk Management *(see flow chart in appendix 1)*

Risks cannot be totally eliminated and the implementation of risk management processes is critical to an effective safety management programme. Hazard identification is part of the risk management process.

Hazard identification is a process where organizational hazards are identified and managed so that safety is not compromised. Organizations may utilize a range of safety activities to identify hazards that may jeopardize part of its operations or may weaken its safety defenses.

There is a natural (and erroneous) tendency to describe hazards as an outcome. For example, “runway incursion” is an outcome, not a hazard. On other hand, “unclear aerodrome signage” is a hazard, not an outcome.

Mistaking hazards as outcomes disguise their nature and interfere with proper identification of actual outcomes or risks associated with those hazards. A correctly named hazard will enable the tracking of its source or origin on the one hand and the identification of its potential outcome(s) or risk(s) on the other.

Following are some examples of hazards –

- Flight Operations: *Unfamiliar phraseology, inclement weather, birds in take-off path, heavy traffic, unfamiliar airports, high terrain around airport, etc.*
- Aircraft Maintenance: *Fuel vapour from open wing tanks, discrepant test equipment, ambiguous work instructions, improper shift handover procedure, etc.*

The scope for hazards in aviation is wide, and may be related to:

- Design factors, such as equipment and task design
- Procedures and operating practices, such as documentation and checklists
- Communications, such as means and terminology
- Organizational factors, such as company policies for recruitment, training, remuneration and allocation of resources
- Work environment factors, such as ambient noise and vibration, temperature, lighting and protective equipment and clothing
- Defenses, such as detection and warning systems, and the extent to which the equipment is resilient against errors and failures
- Human performance, such as medical conditions, circadian rhythms and physical limitations
- Regulatory factors, such as the applicability of regulations and the certification of equipment, personnel and procedures.

Hazards may be identified from the organization's reactive, proactive and predictive processes. This should include the company's voluntary reporting system, audits and surveys, accident/incident reports as well as industry incident/accident reports.

The hazard identification and reporting process should be open to any employee. It may be done through formal as well as informal processes. It may be performed at any time as well as under specific conditions. Specific conditions would include:

- When there is an unexplained increase in safety-related events or infractions
- When there are abnormal audit or safety indicator trends
- When major operational changes are planned
- Before a new project, equipment, facility is set up
- During a period of significant organizational change

In essence, the three steps of hazard management are:

- State the generic hazard (hazard statement), e.g. airport construction
- Identify specific components of the hazard, e.g. construction equipment
- Project specific risk(s) associated with each hazard, e.g. aircraft colliding with construction equipment

Risk management (see flowchart in appendix 2)

Risk Management is the identification, analysis and mitigation of risks associated with the operations of an organization. It aims at a balanced allocation of resources to address all risks and ensure that viable risk control and mitigation actions are in place.

Risk management is a key component of safety management systems. It is a data-driven approach to safety management resources allocation i.e. priority is accorded to activities based on their risk index.

Risk Probability is the likelihood that a situation of danger might occur. Certain questions may be used to guide the assessment of probability, such as:

- Is there a history of occurrences like the one being assessed, or is the occurrence an isolated event?
- What other equipment, or similar types of components might have similar defects?
- What number of operating or maintenance personnel must follow the procedure(s) in question?
- How frequently is the equipment or procedure under assessment used?
- Are there organizational, management or regulatory implications that might generate larger threats to public safety?

Table 1 shows a sample risk probability table. It is sometimes useful to attach logical meanings to the qualitative definition, as illustrated in Table 1.

Table 1: Typical Risk Probability Table

Probability of occurrence		
Qualitative definition	Meaning (example)	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur some times (has occurred infrequently)	4
Remote	Unlikely, but possible to occur (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

Risk severity measures the possible consequences of a situation of danger, taking as reference the worst foreseeable situation. Severity may be defined in terms of property, health, finance, liability, people, environment, image, or public confidence. Certain questions may be used to guide the assessment of severity, such as:

- How many lives are at risk (e.g. employees, passengers, bystanders, general public)?
- What is the environmental impact (e.g. spillage of fuel or other hazardous products, physical disruption of natural habitats)?
- What is the severity of property, financial damage (e.g. direct asset loss; damage to aviation infrastructure, third party damage, financial impact and economic impact for the State)?
- What is the damage to the organization's reputation?

Table 2 shows a sample risk severity table.

Severity of occurrences		
Aviation definition	Meaning	Value
Catastrophic	<ul style="list-style-type: none"> • Equipment destroyed • Multiple deaths 	A
Hazardous	<ul style="list-style-type: none"> • A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely. • Serious injury or death to a number of people. • Major equipment damage 	B
Major	<ul style="list-style-type: none"> • A significant reduction in safety margins, a reduction in the ability of the operators 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	<ul style="list-style-type: none"> • Nuisance. • Operating limitations. • Use of emergency procedures. • Minor incident. 	D
Negligible	<ul style="list-style-type: none"> • Little consequences 	E

Once the risk Probability and risk Severity values are determined, they will (together) constitute the “Risk Index” for that occurrence. The complete “Risk Index” matrix is shown in Table 3. The acceptability (action required) for each risk index is reflected in the Risk Acceptability table (Table 4).

Table 3 : Risk Index 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

Table 4: Risk Acceptability Table

Risk Index	Acceptability/Action Required
5A, 5B, 5C, 4A, 4B, 3A	STOP: Unacceptable under the existing circumstances. Do not permit any operation until sufficient control measures have been implemented to reduce risk to an acceptable level.
5D,5E, 4C, 3B, 3C, 2A, 2B	Management attention and approval of risk control/mitigation actions required.
4D, 4E, 3D, 2C, 1A, 1B	Acceptable after review of the operation
3E, 2D, 2E, 1C, 1D, 1E	Acceptable

Risk mitigation (see flowchart in appendix 3)

Risk mitigation is the process of implementing actions or defenses to eliminate or reduce the probability or severity of risks associated with hazards. The basic defenses employed in the aviation industry are technology, training and procedures (or regulations).

When analyzing defenses during a mitigation process, following questions may be useful:

- Do defenses to protect against such risk (s) exist?
- Do defenses function as intended?
- Are the defenses practical for use under actual working conditions?
- Are the staff involved aware of the risks and the defenses in place?
- Are additional risk mitigation measures required?

Three basic strategies in risk mitigation are as follows:

- *Avoidance* – The operation or activity is cancelled because risks exceed the benefits of continuing the operation or activity. *Example: Operations into an aerodrome surrounded by complex geography and without the necessary aids are cancelled.*
- *Reduction* – The frequency of the operation or activity is reduced, or action is taken to reduce the magnitude of the consequences of the accepted risks. *Example: Operations into an aerodrome surrounded by complex geography and without the necessary aids are continued based upon the availability of specific aids and application of specific procedures.*
- *Segregation of exposure* – Action is taken to isolate the effects of risks OR ensure there is build-in redundancy to protect against it i.e. reducing the severity of risk. *Example: Operations into an aerodrome surrounded by complex geography are limited to day-time, visual conditions.*

Striking a Balance

During the process of evaluating mitigation actions or additional defenses, it is necessary to strike a balance between production and safety goals. Efficient and safe operations or provision of service require a constant balance between production goals and safety goals.

Aviation workplaces (as with other industries) contain hazardous conditions or risks which may not be cost-effective to eliminate totally. Hence, operations may have to continue so long as safety risks associated with such hazards have been mitigated to a level that is as low as reasonably practicable. (The acronym ALARP is used to describe a safety risk which has been reduced to a level that is “as low as reasonably practicable”). In determining what is reasonably practicable, consideration is given to both the technical feasibility and the cost of further reducing the safety risk. This may involve a cost/benefit study where necessary.

While the cost of risk mitigation is an important factor in safety management, it must be weighed out against the cost of undesirable outcomes due to lack of mitigation. Direct costs of incidents/accidents (which can be determined) can be reduced by insurance coverage. However, purchasing insurance only transfers the monetary aspect of a risk. It is the indirect uninsured costs which may be underestimated in such considerations. An understanding of these uninsured costs (or indirect costs) is fundamental to understanding the economics of safety. Usually they amount to more than the direct costs. These indirect costs include loss of business, damage to reputation, loss of use of equipment, loss of staff productivity, legal actions and claims, fines and citations, insurance deductibles, etc.

Management of Change

Aviation organizations experience constant change due to expansion and introduction of new equipment or procedures. Changes can introduce new hazards or risks which can impact the appropriateness or effectiveness of previous risk mitigation. External changes would include change of regulatory requirements, security status/level or re-arrangement of air traffic control/provisions, etc.

Internal changes can involve management/organizational changes, new equipment introduction or new procedures, etc.

A formal management of change process should identify changes within or from outside the organization which may affect established processes and services from a safety viewpoint. Prior to implementing such changes, the new arrangements should be assessed using the SMS hazard and risk analysis protocol to assure operational safety.

(e) Safety Training and Promotion

Safety communication is an essential foundation for the development and maintenance of a safety culture.

The safety manager should, in conjunction with the personnel department or functional heads, review the job descriptions of all staff, and identify those positions that have safety responsibilities. These should include operational personnel, managers/supervisors, senior managers and the accountable manager. This is to ensure that relevant personnel are trained and competent to perform their SMS duties. The level/mode of training shall be appropriate to the individual's involvement in the SMS.

The scope of training should cover:

Operational personnel - SMS fundamentals, organization's safety policy, Organization's SMS overview, management commitment and responsibilities.

Line managers & supervisors - SMS process, management commitment and responsibilities, hazard identification and risk management, the management of change.

Senior managers - Organizational safety standards and national regulations, management commitment and responsibilities, safety assurance, the management of change

Accountable manager - Awareness of SMS roles and responsibilities, safety policy, SMS standards, safety assurance.

There is a need to communicate and promote the organization's SMS processes and activities to all levels of personnel. The purpose of such communication includes:

- Ensuring that all staff members are fully aware of the SMS
- Conveying safety critical information
- Explaining why particular actions are taken
- Explaining why safety procedures are introduced or changed
- Conveying SMS activities updates, etc.

The medium for such communication/promotion may include notices or statements on safety policy/objectives, news letters, bulletins, safety seminars/workshops, etc.

(f) SMS Documentation and Records

A Safety Policy Manual (*see guidance in appendix 4*) is the key instrument for communicating the organization's SMS approach and methodology to the whole organization.

It will document all aspects of the SMS, including the safety policy, objectives, accountabilities and procedures. A typical Safety Policy Manual should include the following contents:

- Scope of the safety management system
- Regulatory SMS Requirements
- The safety policy and objectives
- Safety accountabilities
- Key safety personnel
- Documentation and records
- Hazard identification and risk management processes
- Management of change
- Safety performance monitoring
- Safety assurance/auditing
- Safety training/promotion
- Emergency response planning

Operating an SMS generates significant amounts of data, documents and reports. Proper management and record keeping of such data is crucial for sustaining an effective SMS. Effective safety analysis is totally dependent upon the availability and competent use of the safety information management system. To facilitate easy retrieval and consolidation of safety data/information, it is necessary to ensure that there is relevant integration between the various sources of such data or reports. This is important where different departments within an organization have traditionally limited the scope of safety data distribution to within the department itself. Cross functional safety data integration is one of the cornerstones of SMS achievement.

It is necessary that the organization maintain a systematic record of all measures taken to fulfill the objectives and activities of the SMS. Such records would be required as evidence of on going SMS processes including hazard identification, risks mitigation and safety performance monitoring. These records should be appropriately centralized and maintained in sufficient detail to ensure traceability of all safety related decisions.

Examples of such records include:

- Incident/Accident reports
- Incident/Accident investigation reports
- Safety/SMS audit reports
- Periodic analyses of safety trends/indicators
- Minutes of safety committee or safety action group meetings
- Hazard and Risk Analysis Reports, etc.

(g) Safety Assurance

Safety (SMS) audits are used to ensure that the structure of an SMS is sound. The protocol for conducting a SMS audit (from planning to final corrective action closure) should be no different from any other system audit. The overall scope of an SMS audit should include:

- Levels and accountability of staff
- Compliance with SMS hazard/risk evaluation procedure
- Adequacy of staff training for their technical/SMS roles
- Availability of performance indicators and targets
- Effective SMS component integration; etc.

The SMS audit may be undertaken by a single individual or a team, depending on the scope of the audit. Experienced and trained individuals within the organization may perform SMS audits or they may assist external auditors engaged for this purpose. The staff selected to conduct an audit should have practical experience in disciplines relevant to the area to be audited and a good knowledge of the relevant regulatory requirements and the organization's SMS.

They should also have been trained in auditing procedures and techniques. As much as possible, the audit team members should be independent of the area being audited. Wherever practical, these functions should be undertaken by persons who are not responsible for, and have not been involved in, the design or performance of the tasks and functions being audited. In this way, the evaluation is neutral and independent from the operational aspects of the organization.

Audits should involve the use of appropriate checklists, which should address areas such as:

- national safety regulatory requirements
- organizational safety policies and standards
- structure of safety accountabilities
- documentation, including safety management manual and SMS records

- hazard identification and risk management processes
- provisions for assuring safety performance of contractors
- management of change, etc.

Over and above SMS audits, safety surveys may be employed as a complementary procedure for examining particular elements, processes or a specific operation for any potential hazard/risk. Such targeted safety surveys may be initiated in view of informal feedback or voluntary/confidential reports involving issues as:

- Problem areas or bottlenecks in daily operations
- Perceptions and opinions about personnel's actions with possible safety implications
- Poor Teamwork and cooperation between employee groups or departments (especially involving safety/operational/technical functions)
- Areas of dissent or perceived confusion (especially involving safety/operational/technical functions)
- Unsafe working procedures or conditions

(h) Emergency Response Planning

An emergency response plan (ERP) outlines in writing what should be done upon a major incident or accident. The purpose of an ERP is to ensure:

- Planned actions to minimize indirect or consequential damage upon the occurrence of a major incident or accident
- Recovery actions as well as procedures for orderly transition from normal to emergency operations
- Designation of emergency authority
- Assignment of emergency responsibilities
- Authorization by key personnel for actions contained in the plan
- Coordination of efforts to cope with the emergency
- Safe continuation of operations, or return to normal operations as soon as possible

An ERP could cover the different aspects of emergency response such as governing policies, organization, notifications, initial response, additional assistance, crisis management centre (CMC), records, management of the accident site, news media, formal investigations, family assistance, post critical incident stress counseling, and post occurrence review.

11. INTEGRATING SMS WITH EXISTING SYSTEMS

Safety Management Systems differs from quality management systems in that it focuses on the safety, human and organizational aspects of an operation i.e. “safety satisfaction”. Quality management focuses on the product (service) of an operation i.e. “customer or specification satisfaction”. Safety management results in the design and implementation of organizational processes and procedures to identify hazards and control/mitigate risks in aviation operations.

Quality management techniques provide a structured process for ensuring that organizational processes and procedures achieve their intended product (service) specifications or customer expectations.

SMS is partly built upon the same procedural principles and objectives as quality management systems. An organization’s safety policy and objectives should be integrated with its quality policies. Conversely, the coverage of quality policies should be fundamentally based upon quality in support of safety. Safety objectives should receive primacy where conflicts are identified.

In civil aviation today, there are probably various control systems existing within an organization, such as:

- . ISO 9000 system.
- . Quality management system (QMS).
- . Environment management system (EMS).
- . Occupational health and safety management system (OHSMS).
- . Security management system

There are different ways to integrate a safety management system in the operation of an organization. Aviation organizations may consider integrating their management system for quality, safety, security, occupational health and environmental protection where appropriate.

The benefits of such integration would include:

- . Reducing resource duplication and therefore costs.
- . Easy integration and processing of cross functional safety related data.
- . Reducing potentially conflicting objectives and relationships.
- . Recognition of Safety as the over arching and ultimate objective of all controlling systems.

12. GAP ANALYSIS AND PROJECT PLAN

It is apparent that organizations would need to conduct a gap analysis of their system(s) to determine which components and elements of a safety management system are currently in place and which components or elements must be added or modified to meet SMS as well as regulatory requirements. The review involves comparing the SMS requirements found in item 8 of this document against the existing systems in your organization.

A checklist may be used to account for each component of item 8 (a) to (h) and their respective sub- elements. The checklist can provide for a “YES” and “NO” response in terms of the compliance of the existing system to the SMS requirements. Remarks for partial compliance or deviations should be made as well as actions required in order to meet the criteria. There should be a column for annotating existing company documentation where the requirement is addressed.

Once the gap analysis is complete and fully documented, the items you have identified as missing or deficient will form the basis of your SMS project plan. Organizations may format their project plan to suit their individual needs.

13. DEFINITIONS

ALARP: As low as reasonably practicable

Hazard: Is a condition, object or activity with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

Mitigation: Measures to eliminate the potential hazard or to reduce the risk probability or severity.

Probability: The likelihood that a situation of danger might occur.

Risk: Is the chance of a loss or injury, measured in terms of severity and probability. The chance that an event can happen and the consequences when it does.

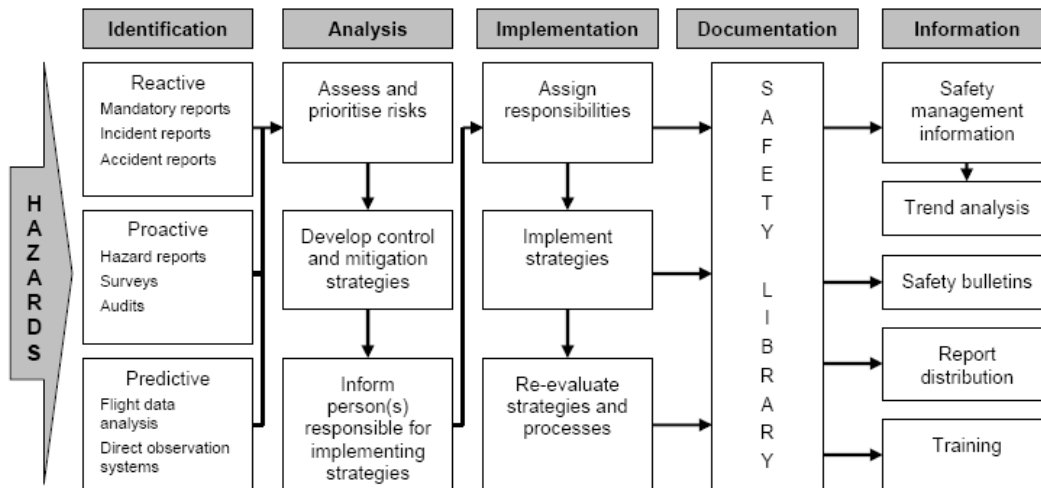
Risk Index: Combined value of risk probability and severity.

Safety: Is the state in which the risk of harm to persons or property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

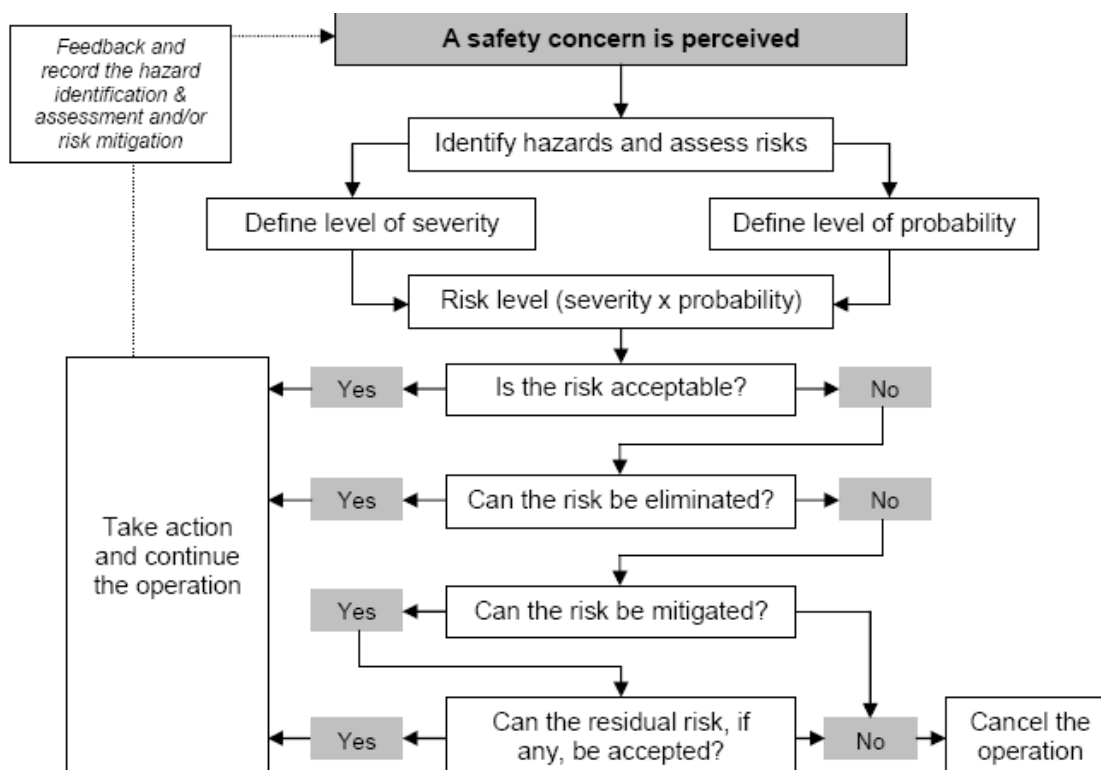
Severity: The possible consequences of a situation of danger, taking as reference the worst foreseeable situation.

SMS: A systematic, explicit and proactive process for managing safety that integrates operations and technical systems with financial and human resource management to achieve safe operations with as low as reasonably practicable risk.

APPENDIX 1 : SAMPLE HAZARD MANAGEMENT FLOWCHART

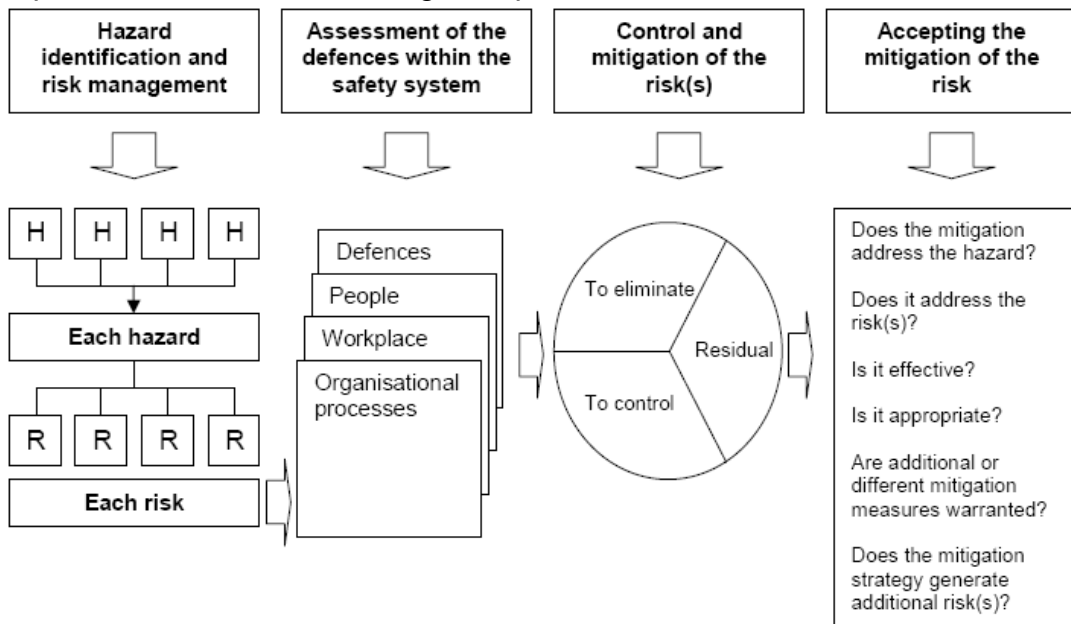


APPENDIX 2 : SAMPLE RISK MANAGEMENT PROCESS FLOWCHART



APPENDIX 3: EXAMPLE OF A RISK MITIGATION PROCESS

Sample flowchart of the risk mitigation process



Sample risk mitigation worksheet

Item	Type of operation or activity	Identified hazard	Projected Risk(s)	Current Risk Index	Risk(s) mitigation actions	Resultant Risk Index
1	A) Introduction of new equipment "XYZ"	Hazard No 1 -	Risk No 1-1	3A	Control/Action No 1-1-1	1B
					Control/Action No 1-1-2	
			Risk No 1-2	2B	Control/Action No 1-2-1	2D
		Hazard No 2	Risk No 2-1	4C	Control/Action No 2-1-1	4D
		Hazard No 3	Risk No 3-1	3B	Control/Action No 3-1-1	2C

APPENDIX 4: GUIDANCE FOR THE DEVELOPMENT OF A SAFETY MANAGEMENT SYSTEM

POLICY MANUAL

This appendix is designed to help organizations document the processes and procedures required for a Safety Management System. It is intended to provide guidance for the development of a Safety Management System policy manual, which can be a separate stand-alone document or it could be incorporated into an existing manual, as required. This suggested format is one way in which an organization can meet the documentation requirements of SMS.

Use the SMS manual template to describe the processes for your company SMS. Remember that small operations will have very basic and simple processes compared to a larger company. For example, the reporting system for a company with three employees may well be verbal in many cases. The important thing to remember when developing processes that rely on verbal communication is to keep a record of any hazards discussed and decisions made.

The guide is formatted in the following manner:

- Section headings with numbering
- Objective
- Criteria
- Cross Reference Documents

Below each numbered section heading is a description of the “Objective” for that section, followed by its “Criteria” and “Cross Reference Documents”.

The “Objective” is what the manual writer is expected to achieve.

The “Criteria” defines the scope of what must be considered when writing the section.

The “Cross Reference Document” is for you to annotate references of other manuals or SOPs of the organization which contain relevant details of the element or process as applicable.

Manual Contents

1. Document Control	9. Hazard Identification and Risk Assessment
2. SMS Regulatory Requirements	10. Performance Indicators
3. Scope of the Safety Management System	11. Safety Investigations
4. Safety Policy	12. Staff Training
5. Safety Objectives and Goals	13. SMS Audit
6. Roles and Responsibilities	14. SMS Data and Records Management
7. Non-Punitive Reporting Policy	15. Management of Change
8. Safety Reporting	16. Emergency Response Plan

Cross Reference Documents:

1. Document Control

Objective

Describe how you intend to keep the manual up to date and ensure that all personnel have the most current version.

Criteria

Hard copy or controlled electronic media are used for manual distribution.

The initial correlation of this manual with other approved documentation, such as Company Exposition Manual, Quality Manual, Maintenance Control Manual, Flight Operations Manual, as applicable.

There is a process for periodic review of other safety management system related documentation and manuals to ensure their continuing suitability, adequacy and effectiveness.

The manual is readily accessible by personnel.

2. SMS Regulatory Requirements

Objective

Elaborate on current TCAA Safety Management System regulations for necessary reference and awareness by all personnel.

Criteria

Spell out current TCAA SMS regulations/standards. Include compliance timeframe and advisory material references as applicable.

Where appropriate to elaborate or explain the significance and implications of those regulations to the organization.

Where relevant, correlation to other safety related requirements or standards may be highlighted.

3. Scope of the Safety Management System

Objective

Describe scope and extent of the organization's aviation related operations and facilities within which the SMS will apply.

Criteria

Spell out nature of the organization's aviation business and its position or role within the industry as a whole.

Identify equipment, facilities, work scope, capabilities and other relevant aspects of the organization within which the SMS will apply.

Where the SMS is expected to be operated or administered across a group of interlinked organizations, such integration and associated accountabilities is to be clearly defined and documented.

4. Safety Policy

Objective

Describe the organization's intentions, management principles, and commitment to improving safety in the company. A safety policy should be a short description similar to a mission statement.

Criteria

The safety policy should be appropriate to the size and complexity of the organization.

The safety policy states the organization's intentions, management principles and commitment to continuous improvement in the safety level.

The safety policy is approved by the Accountable Manager.

The safety policy is promoted by the Accountable Manager.

The safety policy is reviewed periodically.

Personnel at all levels are involved in the establishment and maintenance of the safety management system.

The safety policy is communicated to all employees with the intent that they are made aware of their individual safety obligations.

The safety policy should be signed by the Accountable Manager.

5. Safety Objectives and Goals

Objective

Describe the safety objectives and the safety performance goals of the organization. The safety objectives would be a short statement that describes in broad terms what you hope to achieve. In some cases this statement may be incorporated into the Safety Policy Statement in section 4 above. Performance goals are specific and measurable goals that allow you to measure the degree of success of your SMS.

Criteria

Safety objectives have been established

Safety objectives are expressed as a top-level statement describing the organization's commitment to achieving safety.

There is a formal process to develop a coherent set of safety goals or benchmark/alert levels necessary to monitor safety performance.

Safety objectives and goals are publicized and distributed.

Resources have been allocated for achieving the objectives and goals.

6. Roles and Responsibilities

Objective

Describe the safety authorities, responsibilities and accountabilities for personnel involved in the organization.

Criteria

The Accountable Manager is responsible for ensuring that the safety management system is properly implemented and performing to requirements in all areas of the organization.

Appropriate Safety Manager (office), Safety Committee or Safety Action Groups have been appointed as appropriate.

Safety authorities, responsibilities and accountabilities of personnel at all levels of the organization are defined and documented.

Safety authorities, responsibilities and accountabilities are promulgated to all personnel in key documentation and communication media.

All personnel understand their authorities, responsibilities and accountabilities in regards to all safety management processes, decision and actions.

A SMS organizational accountabilities diagram is available.

7. Non-Punitive Reporting Policy

Objective

Describe the system or procedure under which an employee can report safety deficiencies, hazards, accidents, and incidents with no fear of reprisal.

Criteria

There is a policy in place that provides immunity from company disciplinary action for employees that report safety deficiencies, hazards or occurrences.

Conditions under which punitive disciplinary action would be considered (e.g. illegal activity, negligence or willful misconduct) are clearly defined and documented.

The policy is widely understood within the organization.

8. Safety Reporting

Objective A reporting system can be designed to handle both accident/incident reports (reactive) and Hazard reports (Proactive). Describe how your reporting system is designed and how it works. Factors to consider include: report format, confidentiality, data collection and analysis and subsequent dissemination of information on corrective actions, preventive measures and recovery controls.

Criteria

The organization has a process or system that provides for the capture of internal information including incidents, accidents, hazards and other data relevant to SMS

The reporting process is simple, accessible and commensurate with the size of the organization

Reports are reviewed at the appropriate level of management

There is a feedback process to notify contributors that their reports have been received and to share the results of the analysis

The report form(s) is (are) simple, standardized and accessible across the organization

There is a process to ensure that information is received from all areas of the organization within the scope of the SMS

There is a process in place to monitor and analyze trends

The organization has a process for the systematic investigation and analysis of operational conditions or activities that have been identified as potential hazards

Data collection processes throughout the safety critical areas of the company permit company wide analysis of safety issues

9. Hazard Identification and Risk Assessment

Objective

Describe how reported hazards or related issues are collated. Describe your process for any categorization of hazards/risks and their subsequent prioritization for a documented safety assessment. Describe how your safety assessment process is conducted and how preventive action plans are implemented.

Criteria

There is a structured process for the assessment of risk associated with identified hazards, expressed in terms of consequence (severity) and likelihood (probability of occurrence) or any equivalent matrix

There is a criterion for evaluating risk and the tolerable level of risk the organization is willing to accept together with any mitigating factors.

The organization has risk control strategies that include corrective, preventive and recovery action plans

The organization has a process for evaluating and updating the effectiveness of the corrective, preventive and recovery measures that have been developed.

Corrective, preventive and recovery actions, including timelines, are documented

10. Performance Indicators

Objective

Describe how you plan to review the effectiveness of your SMS. This includes the safety performance of the company by reviewing the safety performance indicators.

Criteria

There is a formal process to develop and maintain a set of safety performance indicators for trend and target monitoring.

Periodic planned reviews of company safety performance indicators including an examination of the company's Safety Management System to ensure its continuing suitability, adequacy and effectiveness.

11. Safety Investigations

Objective

Describe how accidents/incidents are investigated. Explain how the contributing factors to an accident/incident are determined and how corrective action is recommended to prevent reoccurrence.

Describe how such corrective/preventive actions are reviewed for updating any existing safety assessment or the need to initiate a safety assessment for newly uncovered hazards/risks. Describe any provision for proactive safety investigation of suspected hazards or abnormal trends.

Criteria

Measures exist that ensure reported occurrences and incidents are investigated where applicable.

There is a process to ensure that such investigations include identification of active failures as well as contributing organizational factors.

Investigation procedure and format includes the integration of safety related findings with the SMS. This ensures that appropriate SMS follow up actions on related as well as unrelated hazard or risks uncovered during the course of investigations are addressed.

12. Staff Training

Objective

Describe the type of job and safety training that staff receives and the process for assuring the effectiveness of the training. Describe how such training procedures are documented.

Criteria
Training requirements are documented.
There is a validation process that measures the effectiveness of training.
The training includes initial, recurrent and update training, as applicable.
The organization's SMS training is part of the organization's overall training program.
SMS awareness is incorporated into employment or indoctrination program
SMS training expectations from contractors or sub-contractors where applicable

13. SMS Audit

Objective

Describe the process for reviewing the effectiveness of your SMS.

Criteria
There are planned regular audit/reviews of company safety performance including an examination of the company's Safety Management System to ensure its continuing suitability, adequacy and effectiveness.
Details of personnel involved in audits. Qualification. Frequency. Audit program. Audit reports. Corrective action procedures etc.

14. SMS Data and Records Management

Objective:

Describe your method of recording and storing all SMS related documents.

Criteria
The organization has a records system that ensures the generation and retention of all records necessary to document and support the SMS.
Records kept include hazards register, risk assessments reports, SAG/SRB meeting notes, safety performance monitoring charts, SMS audit reports, SMS training records, etc

15. Management of Change

Objective: Describe how you manage organizational internal/external/process changes that may have an impact on safety. How such processes are integrated with your SMS.

Criteria

The organization has a standard procedure or policy to perform safety assessment for all substantial internal or external changes which may have safety implications.

There is procedure for performing safety assessment prior to introduction of new equipment or processes which may have safety implications before they are commissioned.

All concerned stake holders within or without the organization are involved in such reviews. All such reviews are documented and approved by management as applicable.

16 Emergency Response Plan

Objective

Describe the organization's intentions and commitment to dealing with emergency situations and their corresponding recovery controls. Outline the roles and responsibilities of key personnel. The Emergency Response Plan can be developed as a separate document or it can be placed in this manual.

Criteria

The organization has an emergency plan that outlines roles and responsibilities in the event of an accident

There is a notification process that includes an emergency call list and an internal mobilization process

The organization has arrangements with other agencies for aid and the provision of emergency services as applicable.

The organization has procedures for emergency mode operations where applicable.

There is a procedure for overseeing the welfare of all affected individuals and for notifying next of kin.

The organization has established procedures for handling media and insurance related issues.

There are defined accident investigation responsibilities within the organization.

The requirement for preservation of evidence, securing affected area and mandatory/governmental reporting is clearly stated.

There is emergency preparedness and response training for affected personnel

A disabled aircraft or equipment evacuation plan is developed by the organization in consultation with

Aircraft owners, aerodrome operators or other agencies as applicable.

A procedure exists for recording activities during an emergency response.

APPENDIX 5: FREQUENTLY ASKED QUESTIONS

Section A: SMS and Quality Systems

Q1. How does a safety management system differ from traditional control methods?

Q2. Is SMS a prescriptive regulation?

Q3. If most of the elements of a SMS already exist in most companies, why is TCAA requiring that companies implement this new system?

Q4. To what level must an organization document its safety management system processes?

Q5. Why safety management systems?

Section B: Implementation

Q1. What is TCAA' plan for Implementation of SMS?

Q2. What are the main challenges in implementing a safety management system, and how long will it take to implement?

Section C: Safety Assessments and Audits

Q1. How will the effectiveness of an individual organization's SMS be assessed?

Q2. How will SMS affect the size and nature of TCAA audits?

Q3. With the introduction of SMS, who is responsible for performing safety assessments?

Q4. How will TCAA deal with safety assessments, which could be subjective and may vary from organization to organization?

Section D: Benefits

Q1. Will SMS be affordable to industry organizations who may be struggling economically, particularly for the small operators?

Q2. With the introduction of SMS, is TCAA expecting the industry to assume greater responsibility in monitoring and correcting problems?

Section E: Safety Culture

Q1. What is meant by a reporting culture?

Q2. Why should an organization willingly allow an auditor to view its hazards or safety issues register as part of its internal SMS data?

Q3. How does a company include service providers (eg ground handling agents) in their SMS? Is it mandatory for a company to include non TCAA approved contractors and service providers in their SMS?

Q4. What is a safety culture?

Section F: General

Q1. What are TCAA' expectations with regard to integration of SMS documentation (SMS manual) with existing approved Operational or Exposition Manuals?

Q2. What support will TCAA provide to assist organizations in implementing a safety management system?

Q3. What does a safety management system do for an organization?

Section A: SMS and Quality Systems

Q1. How does a safety management system differ from traditional control methods?

SMS is a natural progression from traditional techniques, based on modern understanding of the nature of organizational accidents and how they occur. SMS has much in common with modern quality assurance practices, but places even more emphasis on proactive hazard identification and risk analysis. It includes areas of the organization that may not be directly involved with day to day flight or maintenance operations, but nevertheless have the potential to affect aviation safety.

One notable difference is that while traditional safety and quality systems were managed at the certificate (divisional) level - for example, having separate quality systems for AOC Holder and Approved Maintenance Organizations (AMOs), SMS looks at the enterprise as a whole. While the majority of SMS activity will continue to be directed toward particular specialist functions, the system is also concerned with how all relevant functions are integrated.

To a large extent, the effectiveness of SMS relies on the corporate culture. The aim of SMS is to achieve a culture wherein each individual contributes to and is responsible for safety, and where the reporting of safety concerns is actively encouraged.

Q2. Is SMS a prescriptive regulation?

No SMS is inherently performance based. The only prescriptive elements are essentially the basic requirements themselves. Organizations have a wide range of options for compliance, and are encouraged to identify the best means of compliance to meet their individual circumstances. In fact, the system should not be static, but should be continually evolving in response to changing needs.

Q3. If most of the elements of a SMS already exist in most companies, why is TCAA requiring that companies implement this new system?

While the basic elements may be in place, a Safety Management System (SMS) is a systematic, explicit and comprehensive process for the management of safety risks, which integrates operations and technical systems with financial and human resource management, for all activities related to an enterprise. The process aims to improve the safety of an enterprise as a whole, by identifying and correcting any potential problems/hazards that could contribute to a reduction of safety margins.

Currently, certain (or most) elements may exist in an approved organization. However, these may not be systematically or adequately integrated. Existing Quality assurance processes, functional procedures and accountability structures will need to be integrated with the SMS hazards reporting/identification culture together with its crucial risk assessment process. Today's systems are predominantly reactive in nature. What is needed is to move to more proactive processes.

Q4. To what level must an organization document its safety management system processes?

An organization must document its safety management system processes to the same level as other procedures described in the relevant company manuals (e.g., the Operations Manual and Maintenance Control Manual). To this end, much of the detailed processes relating to each basic SMS element may remain in separate/existing supporting documents or manuals. However, as in the case of other procedures, enough detail must be provided in the relevant sections of the main SMS document (or policy manual) to exercise effective control and integration.

Q5. Why safety management systems?

In recent years a great deal of effort has been devoted to understanding how accidents happen in aviation and other industries. It is now generally accepted that most accidents result from human error. It would be easy to conclude that these human errors indicate carelessness or incompetence on the job but that would not be accurate. Investigators are finding that the human is only the last link in a chain that leads to an accident. We will not prevent accidents by changing people; we will only prevent accidents when we address the underlying causal factors.

In the 1990's the term 'organizational accident' was coined because most of the links in an accident chain are under the control of the organization. Since the greatest threats to aviation safety originate in organizational issues, making the system even safer will require action by the organization. TCAA acknowledges the extensive research and consultation done by the world leaders in safety, and concludes that the most efficient way to make the Tanzanian aviation system even safer will be to adopt a systems approach to safety management.

Section B: Implementation

Q1. What is TCAA' plan for Implementation of SMS?

TCAA will adopt a two phased approach for AOC/AMO SMS implementation. The first phase is from 1 August 2007 to 31 Dec 2008, whereby all AOC Holders and Approved Maintenance Organizations are encouraged to initiate or implement SMS in accordance with the guidelines of this document.

The second phase is from 1 January 2009 onwards, where SMS implementation will become a requirement. This requirement will be incorporated in AOC and AMO nearer the 1 January 2009 date line.

Q2. What are the main challenges in implementing a safety management system, and how can we assure its effectiveness?

While the procedural and organizational changes involved in introducing a SMS are relatively straightforward, the scope of full compliance will vary depending on the size of the organization.

Implementing the system and procedures merely lays the foundation. While this may satisfy the basic intent of SMS regulation, the main challenge lies in bringing about the necessary changes in company culture in support of this on going discipline of making safety assessments an integral and fundamental part of our business. Thus it may take up to several years for an organization's SMS to be fully matured.

The difficulties encountered in accomplishing the necessary cultural change will vary greatly from one organization to another. Some organizations already have a healthy culture well established, while others will have some way to go. As a general rule, once the basic SMS organization and procedures are in place, there should be indications of positive safety improvement within the next full external audit cycle. Additionally, as an enterprise-wide system, provisions must be made for the SMS processes to be subjected to internal, but independent, audits. Externally, SMS consultants are available in the industry. Apart from ICAO Doc 9859, there is also good SMS guidance material from various NAA websites. TCAA will also be available for consultation or guidance especially during the recommendation phase.

Section C: Safety Assessments and Audits

Q1. How can the effectiveness of an individual organization's SMS be assessed?

The effectiveness of an organization's SMS will be determined through a typical SMS audit checklist.

The checklist comprises a set of expectations and assessment criteria for determining whether an organization has met the requirements of the various SMS and related elements and whether the programs they have put in place are effective. Effectiveness is determined through interviews and reviews of the organization's SMS components. For example, the inspector will review the number, type and scope of internal safety assessments performed and the validity of preventive/recovery controls put in place. The inspector will evaluate whether a company, meets, exceeds or does not meet the minimum standards required for an SMS. There are "Confirmation Checklists" in ICAO Doc 9859, Chapter 12 which can be a useful reference for promulgation of audit checklists purpose.

Q2. How will SMS affect the size and nature of TCAA audits?

TCAA will be evaluating how to best integrate SMS elements into its audit plan and will inform the industry in due course.

Q3. With the introduction of SMS, who is responsible for performing safety assessments?

Other than preliminary identification of hazards and threats relating to specific or specialist work environments, safety assessments and risk analysis may be performed by knowledgeable staff from any part of the organization. Large and multi-disciplinary organizations may have a specialist analysis unit devoted to this activity. Normally, the analysis can be done by personnel from the functional department directly affected. Formalization of mitigation actions (preventive and recovery controls) however, should be under the authority of the applicable functional head. For example in the case of an AMO workshop, that will be the person responsible for Workshop operations, and in the case of Flight Operations, it may be the Director of Flight Operations. The functional head should be responsible for the assessment performed. All safety assessments would normally be signed by a project officer (or team leader) and approved by the departmental head or higher level management as appropriate.

Q4. How will TCAA deal with safety assessments, which could be subjective and may vary from each organization?

Safety assessments should be the result of sound information collection, logical analysis and thoughtful decision-making. A safety assessment that is seriously flawed or unsubstantiated may have to be rejected.

Safety assessments are inherently subjective, and that is not necessarily a bad thing. The variations may turn out to be reasonable and acceptable. In any case, the outside limits are established by regulatory compliance. A decision to permit obvious non-compliance with an existing regulation would be unacceptable, unless specific approval of such a particular assessment has been obtained from the relevant regulatory authority. Short of actual non-compliance, even a decision to do nothing in a case where it might have been more prudent to have a preventive measure in place, is better than not to have evaluated the situation at all.

At least, if the issue has been analyzed and documented, the company has established due diligence and awareness on the issue or situation. Consistent failure to take reasonable action in response to identified real safety problems will be legitimate ground for a finding that the SMS is ineffective.

Section D: Benefits

Q1. Will SMS be affordable to industry organizations who may be struggling economically, particularly for the small operators?

Apart from some initial training costs, SMS should not be particularly expensive to implement. The regulations will recognize that SMS must be tailored to the individual operation, so the changes required by a small organization should be relatively moderate and well within their financial capabilities.

The financial benefits of a safer organization are self-evident. Less incidents/accidents, time lost due to work related injuries, etc. More immediately, SMS has the potential to identify inefficient and uneconomical processes (besides hazardous ones), resulting in improvements in productivity, reduction in waste, etc. Rather than being an additional expense, a properly implemented SMS should result in a net improvement to a company's bottom line and organizational culture.

Q2. With the introduction of SMS, is TCAA expecting the industry to assume greater responsibility in monitoring and correcting problems?

The industry has always rightly assumed responsibility in frontline problem solving, whether in routine operational issues or systemic problems. Intervention by TCAA is generally limited to issues with potential for broader fleet, industry or regulatory impact. With the industry at its current size and complexity, the most effective use of resources is to establish standards/objectives and ensure they are effectively maintained or achieved. SMS facilitates this approach by allowing TCAA to focus more at the systems level. When an organization's safety and quality systems is duly enhanced through such emphasis, it will provide the organization the best opportunity to consolidate resources for proactive problem management rather than reacting to random or piecemeal problems or audit findings.

Section E: Safety Culture

Q1. What is meant by a reporting culture?

Effective safety management requires a free exchange of safety information within an organization and between the organization and its safety partners. This applies both to actual incidents and accidents occurring within the organization, and to any hazards, accident precursors and systemic vulnerabilities that may be identified. Therefore, the organization must not only have a reporting system in place, but must also foster a culture that actively encourages its use by staff at all levels and in all departments.

Such a culture will not only avoid disincentives, such as “blaming the messenger” or penalizing individuals who make honest errors, but will also provide staff with positive confirmation that all reports are taken seriously and subjected to an appropriate safety assessment. This is not to imply that there should be a “blame free” environment. Rather, the idea is to achieve a “fair” or “just” environment that distinguishes between errors and willful acts, acceptable and unacceptable risks.

Q2. Why should an organization willingly allow an auditor to view its hazards or safety issues register as part of its internal SMS data?

One of the concepts of SMS is a free and uninhibited reporting culture that encourages information to be collected and not used against the reporter or organization in cases of unpremeditated and inadvertent violations.

An auditor’s inspection of an organization’s internal/routine hazard reports or safety assessment records will not be for the purpose of exposing hidden or unreported non compliances and taking enforcement actions thereof. Rather, such inspection or review is to confirm that the organization’s safety assessments are valid and effective in the identification of vulnerabilities and their corresponding risk analysis and preventive actions. A large number of hazard reports is not necessarily an indicator of a problem, but may well be an indicator of a healthy safety culture.

Q3. How does a company include service providers (eg ground handling agents) in their SMS? Is it mandatory for a company to include non-TCAA approved contractors and service providers in their SMS?

While it cannot be mandatory for a company to include all contractors and service providers in their SMS, their SMS has to factor in the risks associated with having persons other than employees accessing either aircraft or associated facilities. Even outsiders who have no contact with the airside at all can affect the overall safety picture. If a service provider does have a SMS, it should be possible to formally link their respective reporting systems. Such integration should be appropriately documented. For those service providers who are not required to have a SMS, it would be beneficial if contractors and their employees could be offered entry level training that could enable/facilitate their input to the approved company’s hazard reporting system. This training could stimulate activity on the contractor’s part to upgrade their own management system.

Q4. What is a safety culture?

A safety culture an informed culture where

- people understand the hazards and risks involved in their own operation
- staff work continuously to identify and overcome threats to safety

A just culture where

- errors must be understood but willful violations cannot be tolerated
- the workforce knows and agrees on what is acceptable and unacceptable

A reporting culture where

- people are encouraged to voice safety concerns
- when safety concerns are reported they are analyzed and appropriate action is taken

A learning culture where

- people are encouraged to develop and apply their own skills and knowledge to enhance organizational safety
- staff are updated on safety issues by management
- safety reports are fed back to staff so that everyone learns the lessons

Section F: General

Q1. What are TCAA' expectations with regard to integration of SMS documentation (SMS manual) with existing approved Operational or Exposition Manuals?

There should be a reference to the overarching SMS manual in the appropriate Operations, Maintenance Control or Exposition Manual. The reference may indicate that the organization's documentation of SMS elements is located in the SMS manual. On the other hand, detailed documentation or procedures associated with an SMS element and which are currently located in another manual may be appropriately cross referenced in the SMS manual.

TCAA expects adequate document control to avoid any potential divergences on policy or procedures, omissions or conflicts that could result from having multiple manuals.

Q2. What support will TCAA provide to assist organizations in implementing a safety management system?

A fundamental principle of SMS success is that the organizations build the SMS themselves. With SMS, TCAA will seek to guide organizations in finding their own effective SMS levels.

Q3. What does a safety management system do for an organization?

There are two ways of thinking about safety. Traditionally, safety has been about avoiding costs. Many organizations have been bankrupted by the cost of a major accident. This makes a strong case for safety, but cost of occurrences is only part of the story. Research shows that safety and efficiency are positively linked. Safety pays off in reduced losses and enhanced productivity. Safety is good for business.

A safety management system will provide an organization with the capacity to anticipate and address safety issues before they lead to an incident or accident.

A safety management system also provides management with the ability to deal effectively with accidents and near misses so that valuable lessons are applied to improve safety and efficiency. The safety management system approach reduces losses and improves productivity.

The basic safety process is accomplished in five steps:

1. A safety issue or concern is raised, a hazard is identified, or an incident or accident happens;
2. The concern or event is reported or brought to the attention of management;
3. The event, hazard, or issue is analyzed to determine its cause or source;
4. Corrective action, control or mitigation is developed and implemented; and
5. The corrective action is evaluated to make sure it is effective. If the safety issue is resolved, the action can be documented and the safety enhancement maintained. If the problem or issue is not resolved, it should be re-analyzed until it is resolved.