**U.S. Department
of Transportation**

**Federal Aviation
Administration**

Advisory
Circular

Subject: INTRODUCTION TO SAFETY MANAGEMENT SYSTEMS (SMS) FOR AIRPORT OPERATORS	**Date:** February 28, 2007 **Initiated by:** AAS-300	**AC No:** AC 150/5200-37 **Change:**

1. PURPOSE. This Advisory Circular (AC) introduces the concept of a safety management system (SMS) for airport operators.

BACKGROUND. The application of a systematic, proactive, and well-defined safety program (as is inherent in a SMS) allows an organization producing a product or service to strike a realistic and efficient balance between safety and production. The forecast growth in air transportation will require new measures and a greater effort from all aviation producers— including airport operators—in order to achieve a continuing improvement in the level of aviation safety. The use of SMS at airports can contribute to this effort by increasing the likelihood that airport operators will detect and correct safety problems before those problems result in an aircraft accident or incident. In November 2005, the International Civil Aviation Organization (ICAO) amended Annex 14, Volume I (Airport Design and Operations) to require member States to have certificated international airports establish an SMS. The FAA supports harmonization of international standards, and has worked to make U.S. aviation safety regulations consistent with ICAO standards and recommended practices. The agency intends to implement the use of SMS at U.S. airports to meet the intent of the ICAO standard in a way that complements existing airport safety regulations in 14 CFR Part 139.

The following actions are being taken in conjunction with the implementation of SMS at commercial airports in the United States:

Rulemaking. The FAA has opened a rulemaking project to consider a formal requirement for SMS at certificated airports. In the United States, about 570 airports are certificated under 14 CFR Part 139, *Certification of Airports*. The agency anticipates issuing a notice of proposed rulemaking (NPRM) for public comment in 2008. A decision on a final rule will not be made until the agency has considered all of the public and industry comments received on the NPRM. We will also take into account the experience of airports that have already implemented an SMS. In any decision to issue a final rule to have airport operators implement SMS, the FAA would:

- Consider the benefits and costs of the rule and tailor the rule to impose the minimum burden and costs necessary for effective implementation

- Consider whether the requirement should apply to all certificated airports or only to airports above a certain activity level

- Consider, for airports subject to an SMS requirement, how SMS program elements would apply to airports of different sizes and resource

- Acknowledge the existing requirements of 14 CFR Part 139 and avoid duplication of safety programs

- Consider the appropriate degree of FAA oversight of individual SMS plans by FAA airport certification safety inspectors

- Review SMS training needs for FAA employees and airport operators

Airport Improvement Program (AIP) grant eligibility. The FAA has determined that contract costs incurred for development of an initial SMS at an airport are eligible for AIP planning grant funds.

Additional guidance on SMS at airports. If a regulation on SMS is adopted the FAA will update the SMS Advisory Circular and issue additional guidance as necessary for its implementation, including a detailed checklist and possibly a model SMS plan document.

In addition, two projects have been approved for funding under the Airport Cooperative Research Program (ACRP) administered by the Transportation Research Board that will provide further guidance on SMS implementation by airport operators. First, the Mitre Corporation has received an ACRP grant to produce a white paper on SMS with a description of its general benefits, the ICAO requirement, and how SMS could be used at airports in the U.S. The white paper should be published in May 2007. Second, ACRP has approved a grant project for development of an SMS user guidebook for airport operators with detailed practical guidance on the implementation of an airport SMS. Completion of the project is expected by September 2008.
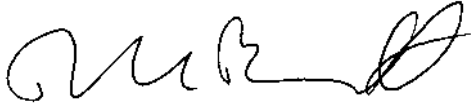
SMS will also be added to the agenda in the FAA's Airport Safety and Operations Schools (ASOS), which is offered several times each year.

2.   APPLICATION. The material contained in this AC is applicable for use at all civil airports, when adapted to the size, activity level, staff level, and resources of each airport. A safety management system can be integrated into all aspects of airport operations, business and management practices. This includes consideration of work performed by all direct contractors.

3.   COMMENTS OR SUGGESTIONS for improvements to this AC should be sent to:

Manager, Airport Safety and Operations Division
Federal Aviation Administration
ATTN: AAS-300
800 Independence Avenue, S.W.
Washington, DC 20591

4.   COPIES OF THIS AC. The Office of Airport Safety and Standards makes ACs available to the public through the Internet. These ACs may be found through the FAA home page (www.faa.gov). A printed copy of this AC and other ACs can be ordered from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785.

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Director of Airport Safety and Standards

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CHAPTER 1:   GENERAL INFORMATION

1.1.   PURPOSE.

This chapter provides general guidelines for Safety Management Systems (SMSs). The benefits of an SMS would apply to all activities at an airport. However, any action by the FAA to amend 14 CFR Part 139 to implement a requirement for an SMS would be limited to those areas subject to 14 CFR Part 139 regulation. Accordingly, the following general guidelines should not be taken as an indication of the content or scope of a possible future FAA rule relating to SMS.

1.2.   DEFINITIONS.

Gap Analysis – Identification of existing safety components, compared to SMS program requirements. Gap analysis provides an airport operator an initial SMS development plan and roadmap for compliance.

Hazard – Any existing or potential condition that can lead to injury, illness, or death to people; damage to or loss of a system, equipment, or property; or damage to the environment. A hazard is a condition that is a prerequisite to an accident or incident.

Risk Assessment – Assessment of the system or component to compare the achieved risk level with the tolerable risk level.

Safety Assessment – A systematic, comprehensive evaluation of an implemented system.

Safety assurance – SMS process management functions that systematically provide confidence that organizational products/services meet or exceed safety requirements.

Safety Management System (SMS) – The formal, top-down business-like approach to managing safety risk. It includes systematic procedures, practices, and policies for the management of safety (including safety risk management, safety policy, safety assurance, and safety promotion).

Safety Policy – Defines the fundamental approach to managing safety that is to be adopted within an organization. Safety policy further defines the organization's commitment to safety and overall safety vision.

Safety promotion – A combination of safety culture, training, and data sharing activities that supports the implementation and operation of an SMS in an organization.

Safety risk – The composite of the likelihood (i.e., risk) of the potential effect of a hazard, and predicted severity of that effect. As an example, the possibility of an overshoot by an aircraft landing on an icy runway would be considered a safety risk of the hazard. The hazard is "icy runway" and the risk is "possibility of an overshoot."

Safety risk control – Anything that mitigates the safety risk of a hazard. Safety risk controls necessary to mitigate an unacceptable risk should be mandatory, measurable, and monitored for effectiveness.

Safety Risk Management (SRM) – A formal process within the SMS composed of describing the system, identifying the hazards, assessing the risk, analyzing the risk, and controlling the risk. The SRM process is embedded in the operational system; is not a separate/distinct process.

Severity – The consequence or impact of a hazard in terms of degree of loss or harm.

System(s) – An integrated set of elements that are combined in an operational or support environment to accomplish a defined objective. These elements include people, hardware, software, firmware, information, procedures, facilities, services and environment.

Top Management – The person or group of people who direct and control an organization. Sometimes it is also referred to as Senior Management.

1.3. SAFETY CULTURE.

Effective safety management requires more than establishing an appropriate organizational structure and establishing rules and procedures to be followed. It requires a commitment to safety on the part of senior management. The attitudes, decisions and methods of operation at the policy-making level demonstrate the priority given to safety.

A key indicator of management's commitment to safety is the adequacy of resources. Establishing a management structure, assigning responsibility and accountability, and allocating appropriate resources must be consistent with the organization's stated safety objectives.

In effective safety cultures, there are clear reporting lines, clearly defined duties and well understood procedures. Personnel fully understand their responsibilities and know what to report, to whom and when. Senior management reviews not only the financial performance of the organization but also its safety performance.

Safety culture, then, is both attitudinal and structural, relating to individuals and organizations. It concerns the requirement to not only perceive safety issues but also match them with appropriate action. Safety culture relates to such intangibles as personal attitudes and the style of the organization. It is therefore difficult to measure, especially when the principal criterion for measuring safety is the absence of accidents and incidents. Yet, personal attitudes and corporate style enable or facilitate the unsafe acts and conditions that are the precursors to accidents and incidents. Therefore, safety culture may affect systems safety either negatively or positively.

CHAPTER 2:   ELEMENTS OF A SAFETY MANAGEMENT SYSTEM

2.1.   GENERAL.

Effective safety management requires a systems approach to the development of safety policies, procedures and practices to allow the organization to achieve its safety objectives. Similar to other management functions, safety management requires planning, organizing, communicating and providing direction.

A SMS provides a proactive, systematic, and integrated method of managing safety for airport operators. Essential to a SMS are formal safety risk management procedures that provide risk analysis and assessment.

Generally accepted industry standards and International Civil Aviation Organization (ICAO) guidance describe Safety Management Systems in terms of four distinct elements. They include:

- Safety Policy and Objectives

- Safety Risk Management

- Safety Assurance

- Safety Promotion.

2.2.   SAFETY POLICY AND OBJECTIVES.

2.2.1   Safety Policy.

Management's commitment to safety should be formally expressed in a statement of the organization's safety policy. This policy should reflect the organization's safety philosophy and become the establishment of the SMS. The safety policy outlines the methods and processes that the organization will use to achieve desired safety outcomes. A safety policy will be signed by Top Management and will typically contain the following attributes:

- The commitment of senior management to implement SMS

- A commitment to continual safety improvement

- The encouragement of employees to report safety issues without fear of reprisal

- A commitment to provide the necessary safety resources

- A commitment to make safety the highest priority

2.2.2   Safety Objectives.

SMS requires the support of senior management. SMS also requires that Top Management in the organization, one with the authority to adequately control resources, be assigned SMS

responsibilities. In addition to having a basic understanding of the SMS, effective decision-makers understand how to use SMS outputs as inputs to the SMS lifecycle as described in Figure 2-1. Executives and managers also understand when safety risk management is necessary, and when to elevate decisions and the supporting information to a higher level. Some key elements of accountability within an organization are:

- The organization's policy concerning responsibility and accountability, including written guidance regarding the safety authorities and responsibilities of all key personnel assigned to the airport

- Identification within the system of someone responsible for administration of the overall SMS. Often, that one responsible person will be the Safety Manager. This person reports to the highest level of management to assure appropriate consideration of all reports, recommendations, and issues

- At larger airports, operations may support the Safety Manager being a full-time permanent employee and in some cases having a support staff. Some airports may have an existing risk management office that could substantially meet SMS safety management requirements

- The responsibilities of the Safety Manager are clearly defined along with identified lines of communication within the organization

- Depending on the size and complexity of the airport's operation, it may be useful to establish a safety committee. The safety committee acts as a source of expertise for the Safety Manager and is chaired by the Safety Manager

How an organization arranges its method of conducting business and managing safety will influence its resilience to hazardous situations and its ability to reduce risks. To ensure responsible safety management, successful organizations follow a disciplined approach to documentation and information management.

The process of formal documentation clarifies the relationship of the SMS to other organizational functions and the integration of SMS activities. Further, the documentation process defines how SMS activities relate to the organization's operating policies. The contents of this documentation may be in the form of safety reporting records, surveys, hazard reporting forms, and risk analysis/mitigation processes. It is important that the organization maintain a record of the measures taken to fulfill the objectives of the SMS. These records may be required in the event of a formal investigation of an accident or serious incident and should be maintained in sufficient detail to ensure traceability of all significant safety-related decisions.

NOTE: *The Airport SMS should be distributed as necessary to educate and inform the airport staff. If the FAA adopts a rule to make a SMS mandatory at some or all certificated airports, SMS documentation related to 14 CFR Part 139 responsibilities would be incorporated into the Airport Certification Manual (ACM) or added as an appendix. As an appendix to the ACM, the Airport SMS, to the extent it relates to 14 CFR Part 139, would be subject to the same document control measures as any other part of the ACM.*
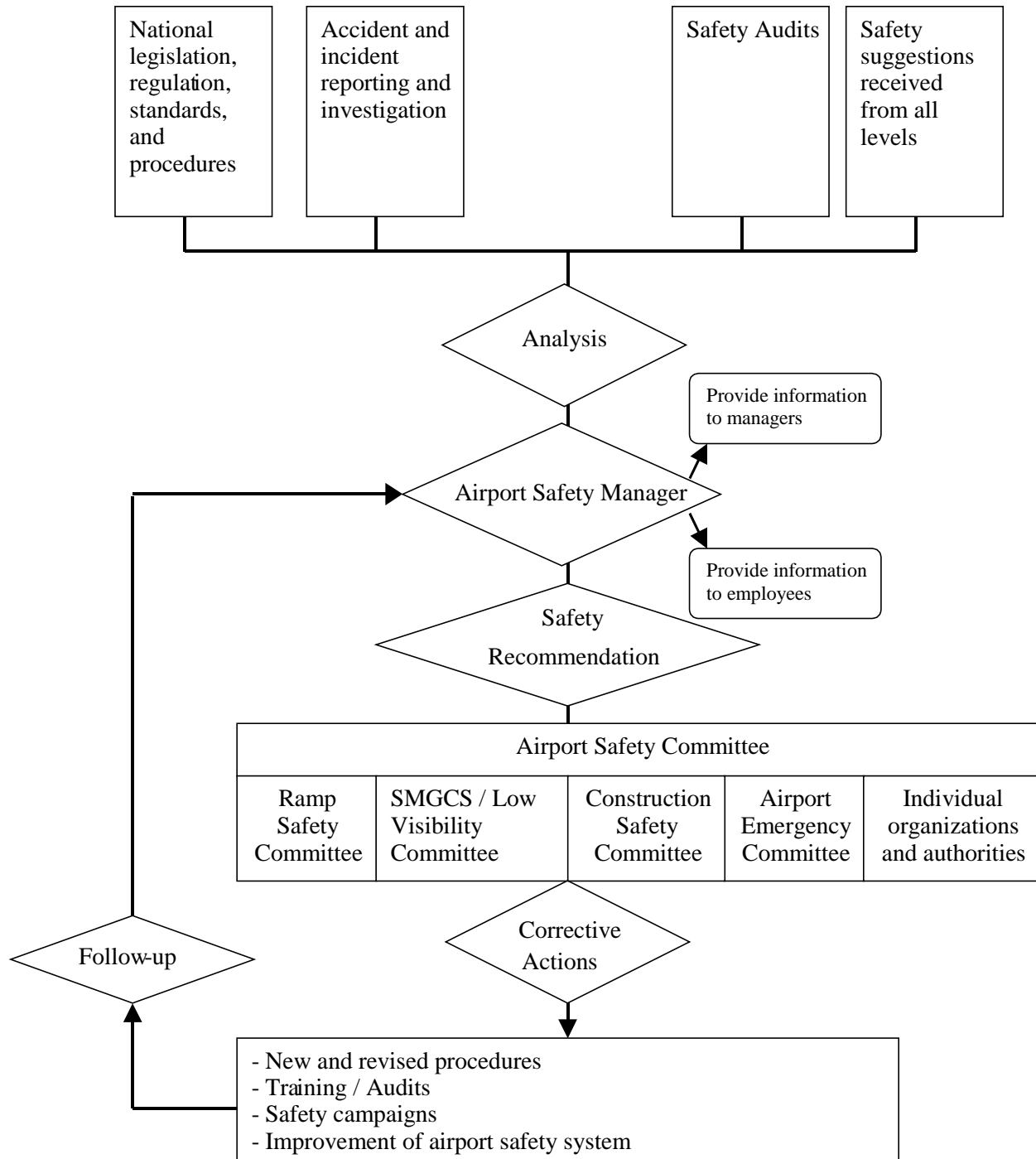
National legislation, regulation, standards, and procedures	Accident and incident reporting and investigation		Safety Audits	Safety suggestions received from all levels

Analysis

Provide information to managers

Airport Safety Manager

Provide information to employees

Safety Recommendation

Airport Safety Committee				
Ramp Safety Committee	SMGCS / Low Visibility Committee	Construction Safety Committee	Airport Emergency Committee	Individual organizations and authorities

Corrective Actions

Follow-up

- New and revised procedures
- Training / Audits
- Safety campaigns
- Improvement of airport safety system

Figure 2 - 1. SMS Lifecycle Overview

2.3. SAFETY RISK MANAGEMENT

Safety Risk Management (SRM) is at the heart of any Safety Management System. It is through the SRM process that an organization identifies hazards, determines potential risks, and designs appropriate risk mitigation strategies. Safety Risk Management is discussed in Chapter 3.

2.4.   SAFETY ASSURANCE

Safety Assurance includes self-auditing, external auditing, and safety oversight. Safety oversight can be achieved through auditing and surveillance practices, given the diverse activities at commercial airports.   In addition to the airport operator's existing responsibilities for self-inspection and correction of discrepancies under 14 CFR Part 139, an effective airport SMS audit program should:

- Develop identified safety performance indicators and targets

- Monitor adherence to safety policy through self-auditing

- Allocate adequate resources for safety oversight

- Solicit input through a non-punitive safety reporting system

- Systematically review all available feedback from daily self-inspections, assessments, reports, safety risk analysis, and safety audits

- Communicate findings to staff and implement agreed-upon mitigation strategies (14 CFR Part 139 already requires this for actions covered by that regulation)

- Promote integration of a systems approach to safety into the overall operation of the airport

A systems approach to safety management addresses significant hazards and the possible risks these hazards may present to employees and the public. Individuals responsible for developing the SMS program should work with the persons that have direct responsibility for analyzing hazards, identifying control measures derived from that analysis, and ensuring those measures are effective. Similarly, individuals responsible for operations should have direct responsibility for the safety of those operations and should be given the resources to implement the necessary controls.

Feedback is necessary to assess how well the SMS is working. This is achieved through safety oversight, performance monitoring, and continuous improvement processes.

The SMS should include a visible non-punitive safety reporting system supported by management. The safety reporting system should permit feedback from personnel regarding hazards and safety-related concerns. The SMS should use this information to identify and address safety deficiencies. The safety reporting system may also identify and correct non-conformance to safety policy.

Safety auditing is a core safety management activity. Similar to financial audits, safety audits provide a means for systematically assessing how well the organization is meeting its safety objectives. Top Management may choose to have an external agency audit the system (e.g., by a consultant or another airport operator). The safety audit, together with other safety oversight activities, provides feedback to managers concerning the overall safety performance of the organization.

Safety performance monitoring validates the SMS, confirming the organization's safety objectives. Through regular review and evaluation, management can pursue continuous improvements in safety management and may revise safety objectives to ensure that the SMS remains effective and relevant to the organization's operation.

2.5.   SAFETY PROMOTION

Safety Promotion includes:

- Training and education

- Safety communication

- Safety competency and continuous improvement

The Safety Manager provides current information and training relating to safety issues relevant to the specific operation of the airport. The provision of appropriate training to all staff, regardless of their level in the organization, is an indication of management's commitment to an effective SMS. Safety training and education should consist of the following:

- A documented process to identify training requirements

- A validation process that measures the effectiveness of training

- Initial (general safety) job-specific training

- Recurrent safety training

- Indoctrination/initial training incorporating SMS

- Training that includes human factors and organizational factors

Training requirements and activities should be documented for each area of activity within the organization. A training file should be developed for each employee, including management, to assist in identifying and tracking employee training requirements and verifying that the personnel have received the planned training. Any training program should be adapted to fit the needs and complexity of the airport in question. At certificated airports this is already being done for training required by 14 CFR Part 139.

The airport operator/safety manager should communicate safety goals and procedures to all employees. The safety management system should be visible in all aspects of the airport operation. Systems safety is a good business practice and should be promoted accordingly. The safety manager should communicate the health of the airport SMS program through bulletins, briefings and training. The safety manager should ensure that lessons learned from hazardous occurrence investigations and case history or experiences, both internally and from other organizations, are distributed widely. The communication should flow between the safety manager to the organization. Systems safety improvement will occur most efficiently if staff and

employees are actively encouraged to identify potential hazards and propose solutions. Some examples of organizational communication are:

- Safety seminars

- Safety letters, notices and bulletins

- Safety lessons-learned

- Bulletin boards, safety reporting drop boxes, and electronic reporting through web sites or email

- A method to exchange safety-related information with other airport operators through regional offices or professional organizations

- In the future, voluntary posting of safety-related information on an existing FAA web-based safety reporting system currently being used by air operators

As part of a continuous improvement process, the common element of many quality programs, the evolution of systems safety is dependent upon the SMS lifecycle. As hazards are identified, risks determined and mitigated through corrective actions, system improvements through training and revised policies and procedures, then follow-up begins the safety process over again. The diagram in Figure 2-1 gives a brief overview of how the SMS lifecycle might look at a large airport using tenant/operator safety committees.

CHAPTER 3:   SAFETY RISK MANAGEMENT (SRM)

3.1.   General.

SRM is a fundamental component of SMS. To be truly effective a SMS must have a formal risk assessment program that identifies and documents hazards on the airport. An SMS:

- determines associated risk(s)

- identifies the severity and probability of the occurring risk(s)

- develops mitigation strategies as appropriate

- applies, tracks, and monitors the mitigation strategy

- assesses and modifies strategies as necessary

A hazard is a condition, object or activity with the potential for causing damage, loss, or injury. A risk is the chance of loss or injury measured in terms of severity and probability.

3.2.   SRM Background Information.

SRM is a systematic, explicit, and comprehensive approach for managing safety risk at all levels throughout the airport. A comprehensive SMS using SRM will develop layers of safety built upon the measures taken to mitigate risk. These layers are examples of implemented protective measures such as vehicle driver's training programs, marking and lighting standards and reflective vests. An unsafe event can occur when gaps occur in the system's protective layers. These gaps are not static and may appear unexpectedly. In order for an incident or accident to take place there is normally a succession of gaps in a system that will line up and enable an event to occur.

3.3.   The Five Phases of SRM.

There are five phases to the SRM Process:

Phase 1.   Describe the system

Phase 2.   Identify the hazards

Phase 3.   Determine the risk

Phase 4.   Assess and analyze the risk

Phase 5.   Treat the risk (i.e., mitigate, monitor and track)

Phase 1:   **Describe the system**.   When considering the environment of the airport system, consider all of the safety-related functions already outlined in the ACM. The existing safety

functions should steer the focus of the risk management analysis and will assist in determining potential mitigation strategies.

Phase 2: Identify Hazards. In this phase, hazards to the system (i.e., operation, equipment, people, and procedures) are identified in a systematic, disciplined way. There are many ways to do this, but all require at least four elements:

- Operational expertise

- Training in SMS, and if possible, hazard analysis techniques

- A simple, but well-defined, hazard analysis tool

- Adequate documentation of the process

The hazard identification effort should mirror the management structure and complexity of the airport in question. The airport manager at a small airport could conduct it alone, while it may be conducted by a committee or group at a larger airport. Regardless, the person or the group will require sufficient operations expertise, safety experience, and training to adequately conduct the assessment.

The hazard identification stage considers all the possible sources of system failure. Depending on the nature and size of the system under consideration, these should include:

- The equipment (example: construction equipment on a movement surface)

- Operating environment (example: cold, night, low visibility)

- Human element (example: shift work)

- Operational procedures (example: staffing levels)

- Maintenance procedures (example: nightly movement area inspections by airport electricians)

- External services (example: ramp traffic by Fixed-Base Operator (FBO) or law enforcement vehicles)

Phase 3. **Determine the risk.** In this phase, each hazard in its system context is identified to determine what risks exist, if any, that may be related to the hazard. In this phase, there is no determination of the severity or potential of the risk occurring. First, all potential hazards are identified and documented. Next, the hazards are subjected to an assessment of the possible severity and potential risk as described in Phase 4.

In a very simple example, an airport may have identified the hazard of Foreign Object Damage (FOD) on the ramp, with the associated risk of the FOD being ingested into the engines of taxiing aircraft. That hazard and the identified risk would be documented before moving to

Phase 4, a determination of the probability of that risk occurring, and the severity if such an event were to occur.

Phase 4: **Assess and Analyze the Risk.** In this Phase, the airport operator estimates the level of risk such as by using the predictive risk matrix in Figure 3-1.

Risk is the composite of the predicted severity and likelihood of the outcome or effect (harm) of the hazard in the worst credible system state. In order to assess the risk of an accident or incident occurring, severity and likelihood are first determined.

Severity is determined by the worst credible potential outcome. Less severe effects may be considered in addition to this, but at a minimum, the most severe effects are considered. Determination of severity is independent of likelihood, and likelihood should not be considered when determining severity. Over time, quantitative data may support or alter the determinations of severity and probability, but the initial risk determinations will most likely be qualitative in nature, based on experience and judgment more than data.

The risk levels used in the matrix can be defined as:

- **High risk** – Unacceptable level of risk: The proposal cannot be implemented or the activity continued unless hazards are further mitigated so that risk is reduced to medium or low level. Tracking and management involvement are required, and management must approve any proposed mitigating controls. Catastrophic hazards that are caused by:

  (1) single-point events or failures

  (2) common-cause events or failures

  (3) undetectable latent events in combination with single point or common cause events are considered high risk, even if extremely remote

- **Medium risk** – Acceptable level of risk: Minimum acceptable safety objective; the proposal may be implemented or the activity can continue, but tracking and management are required.

- **Low risk** – Target level of risk: Acceptable without restriction or limitation; the identified hazards are not required to be actively managed, but are documented.

Hazards are ranked according to the severity and the likelihood of their risk, which is illustrated by where they fall on the risk matrix. Hazards with high risk receive higher priority for treatment and mitigation.

NOTE: *At U.S. airports, many of the airport operators' actions are governed by standards issued by the FAA. The FAA would not expect an airport operator to conduct an independent risk analysis of an action or condition directed by a mandatory FAA standard or specification. Any discretionary action or decision by the airport operator in the application of the standards should still be analyzed.*
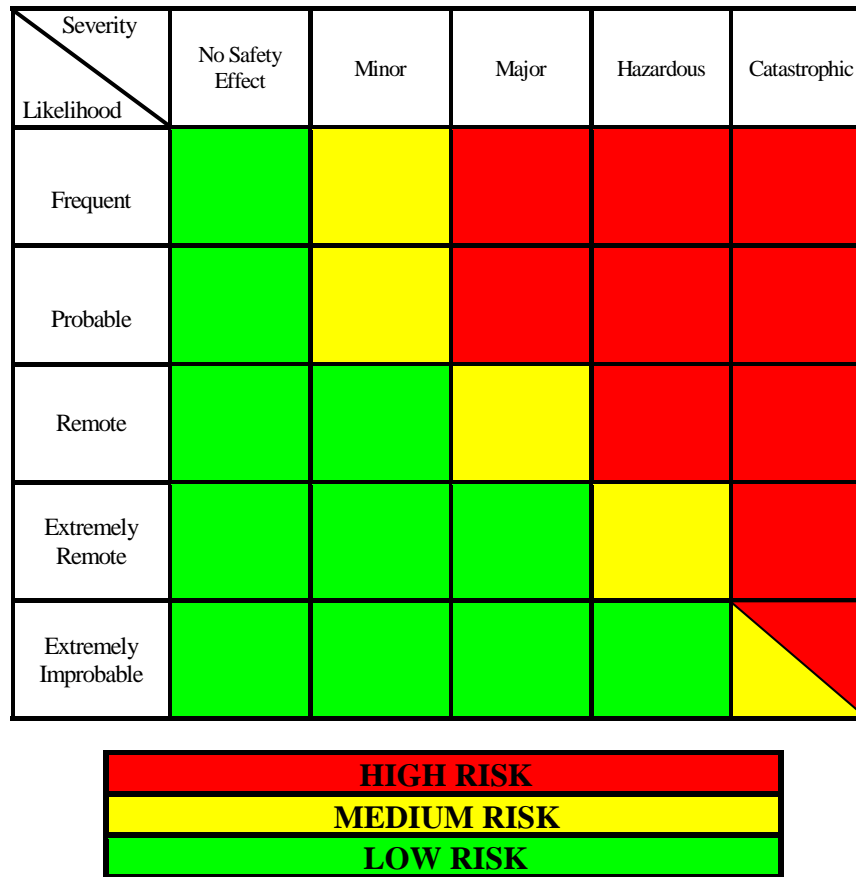
Severity / Likelihood	No Safety Effect	Minor	Major	Hazardous	Catastrophic
Frequent	green	yellow	red	red	red
Probable	green	yellow	red	red	red
Remote	green	green	yellow	red	red
Extremely Remote	green	green	green	yellow	red
Extremely Improbable	green	green	green	green	yellow/red

| **HIGH RISK** |
| **MEDIUM RISK** |
| **LOW RISK** |

Figure 3 - 1. Predictive Risk Matrix

Phase 5: **Treat the risk.** In this phase, the airport operator develops options to mitigate the risk and alternative strategies for managing a hazard's risk(s). These strategies can be used to reduce the hazard's effects on the system. It should be noted that the majority of risk management strategies address medium and high-risk hazards. Low-risk hazards may be accepted after considering risk.

The risk management activity should identify feasible options to control or mitigate risk. Some options could include:

- Avoidance: selecting a different approach or not participating in, or allowing, the operation or procedure

- Assumption: accepting the likelihood, probability, and consequences associated with the risk

- Control: development of options and alternatives that minimize or eliminate the risk

- Transfer: shifting the risk to another area

Prior to operational use, a mitigation strategy is validated and verified (as operational experience or data may support). Once validated, verified, and accepted, it then becomes an existing element of the system or operation.

Next, the effect of the proposed mitigation measure on the overall risk is assessed. If necessary, the process is repeated until a measure or combination of measures is found that reduces the risk to an acceptable level.

When risk is determined to be unacceptable, it is necessary to identify and evaluate risk mitigation measures by which the probability of occurrence and/or the severity of the hazard could be reduced. When risk mitigation strategies cross organizations, risk acceptance and approval from stakeholder organizations is necessary.

Risk mitigation may require a management decision to approve, fund, schedule, and implement one or more risk mitigation strategies. The objective of this phase is to implement appropriate and cost-effective risk mitigation plans to mitigate hazards. Appropriate risk mitigation strategies are developed, documented, selected, and implemented. Hazard tracking is the core of this risk management phase. Each medium and high-risk hazard is tracked until its risk is mitigated to an acceptable level and the effectiveness of the controls mitigating the risk is verified. The hazard record is kept for the lifecycle of the system change.

When assessing risk using a group or committee, remember that interactions between safety-group participants with varying experience and knowledge tend to lead to broader, more comprehensive, and more balanced consideration of safety issues than if an individual conducts the assessment. Thus, if possible, group analysis by appropriate subject matter experts, is recommended.

Utilization of safety risk management increases the level of safety in airport operations, maintenance, and new systems. Through SRM, hazards are assessed, mitigated, documented, tracked, and operational data are continuously monitored to provide feedback on hazards. Understanding the consequences of risk increases the ability to anticipate and control the impacts of internal and/or external events on a program.

Accountability is the foundation of an effective SMS. By accepting the safety risk mitigation strategy, the appropriate management official is certifying acceptance and accountability.

Applying the Concept of SRM: Appendix 1 provides an example of how Safety Risk Management could be applied to enhance safety during airfield construction.

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APPENDIX 1:   EXAMPLE: APPLICATION OF SRM TO A SAFETY DURING CONSTRUCTION PLAN

NOTE: *Because of the many variables within the development of a construction plan this case will focus on only one hazard and risk example.*

XYZ Airport has two runways and is planning to install drainage near the approach end of the secondary runway. Construction vehicles must cross the primary runway to gain access to the construction site. Because there are numerous operations during the day, a decision is made to do work at night during lighter traffic. The Airport Safety Manager understands a need to develop a plan for night construction to avoid interruption of day operations. It is clear that there are many challenges in developing such a plan.

To begin formulating the plan, the Airport Safety Manager consults with a designated Construction Safety Committee and follows the guidance outlined in the FAA Advisory Circular 150/5370-2, *Operational Safety on Airports During Construction*. One area of concern found during this process was the movement of construction vehicles to and from the work site in a way that would avoid runway incursions. In evaluating this process, the committee decides to follow the concept of systems safety and apply SRM to evaluate their decisions.

Phase 1. Describe the System:

- Runway environment during construction at night, including a high volume of construction vehicle traffic between the ramp and the construction site

- Existing driver training program and the use of escorts for construction vehicles

- Air Traffic Control Tower, but no radio communications with construction vehicles, which are not radio-equipped

- Signs, markings and lighting for the taxiways, runways, and construction area

Phase 2. Identify the Hazards:

- Construction vehicles crossing primary runway

Phase 3. Determine the Risk:

- Aircraft hitting a construction vehicle on the primary runway

Phase 4. Assess and Analyze the Risk:

- Using the Predictive Risk Matrix, it is the opinion of the committee there is a *remote* chance a construction vehicle will deviate from prescribed guidelines and cross the primary runway without an escort. There are night air carrier operations at the airport, so there is a remote chance that an aircraft would conflict with a crossing vehicle. The likelihood that a construction vehicle crossed the runway and caused an aircraft accident

is therefore *remote* or *extremely improbable*, but the committee understands that the severity of such an incident could be *catastrophic*

- The committee agrees that the proposed means of getting construction vehicles to the construction site is unacceptable and must be mitigated

Phase 5. Treat the Risk:

- The committee decides to *control* the risk by using an existing airport perimeter road to gain access to the construction site. All construction vehicles will then be escorted on the perimeter road. Use of the perimeter road may delay construction vehicles due to driving distance but it's in the best interest of safety

- The committee documents this decision process for future follow-up with the Airport Safety Manager