Advisory Circular

[AC/AD – 06]

Guidance Materials for Procedure for Monitoring, Reporting and Analyzing the safety occurrences

Second Edition

March 2022

CIVIL AVIATION AUTHORITY OF NEPAL

RECORD OF AMENDMENTS

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REVISION HISTORY

Edition	Date	Chapter/Section	Details
01	1st Sept. 2012	All	Advisory Circular : Guidance Materials for Development of Procedure Manual for Monitoring, Reporting and Analyzing of hazard, accident and incident
02	March 2022	All	Advisory Circular : Guidance Materials for Development of Procedure Manual for Monitoring, Reporting and Analyzing of hazard, accident and incident

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FOREWORD

Nepal as a Contracting State to the Convention on International Civil Aviation has an obligation to the international community to ensure that civil aviation activities under its jurisdiction are carried out in strict compliance with the Standards and Recommended Practices contained in the nineteen Annexes to the Convention on International Civil Aviation in order to maintain the required aviation standards.

As per the Airport Certificate Regulation, 2004 (First amendment 2016), the Aerodrome Manual requires to have a monitoring and reporting procedures in place for any certified airport. This Advisory Circular provides guidance to aerodrome operator(s) on the requirements to be fulfilled under aerodrome Safety Management System (SMS). It is also expected that the Aerodrome Operator will be benefited by this Advisory Circular as it provides an overall view of the procedures of monitoring, reporting and analyzing safety occurrences (hazard, accident and incident).

Users of this Advisory Circular are requested that the provisions of the ***Civil Aviation Authority Act - 1996 (2053 B.S.), CAAN Airport Certificate Regulations - 2004 (First Amendment - 2016) and Civil Aviation Regulation 2002, (Third Amendment 2017)*** rather than this Advisory Circular, determine the requirements of, and the obligations imposed by or under, the civil aviation legislation. Users should refer to the applicable provisions when any doubt arises.

This Authority may, without any prior notice, change the content of this Advisory Circular as appropriate.

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Director General
Civil Aviation Authority of Nepal
Babar Mahal, Kathmandu, Nepal

January, 2022

Chapter 1 Introduction

1.1 Purpose

The aim of this Advisory Circular (AC) is to provide guidance on procedure for monitoring, reporting and analyzing the safety occurrences (hazards, accidents and incidents) and observe trends, take appropriate action and to enable to identify safety deficiencies at the aerodrome.

1.1 Legislation, Standards and Technical References

Rule 20 of ACR 2004 requires aerodrome operators to have a monitoring and reporting procedures in place for any certified aerodrome as part of Aerodrome Manual including the following:

- Airside Safety
- A Security
- Airside Driving
- Airside Works
- Airport Emergency Plan
- Environment Protection etc.

Chapter 2 Role and Responsibilities of Key Personnel

2.1 Airport Accountable Executive

The Accountable Executive is responsible to take any action deemed necessary to define and implement the wildlife management program and make sure monitoring and reporting of any hazard, accident and incident at the aerodrome. The Accountable Executive shall provide executive leadership to enforce the importance of the program.

2.2 Aerodrome Safety Manager

Roles and Responsibilities:

- Act as Wildlife Coordinator for the Aerodrome;
- Act as focal point for reporting of any hazard, accident and incident
- Conduct a wildlife hazard assessment at least every four years or sooner when required by triggering event or special circumstances;
- Ensure methods in place to monitor wildlife hazard, accident and incident on a daily basis;
- Ensure that staff are trained, qualified and competent to discharge their duties under the wildlife hazard, accident and incident monitoring, reporting and analyzing procedure;
- Liaise with all pertinent government agencies to facilitate wildlife hazard, accident and incident monitoring, reporting off site that could have potential effect on aerodrome operations;
- Organize participation and facilitate meetings of the wildlife hazard, accident and incident monitoring, reporting working group as needed and maintain the associated records and action items;

2.3 Chief, Airport Operations Department/Division/Section

Roles and Responsibilities:

- Make sure that all improvements and or modifications at aerodrome facilities are made in a timely fashion so buildings, structures, and storage areas do not provide shelter for wildlife;
- Ensure all culverts and water run-off areas remain clear and provide drainage of accumulated water;
- Ensure plants around any natural bodies of water are kept low and uninviting to visiting waterfowl;
- Ensure vegetation on aerodrome is of such species that it will not be an attractant to hazardous wildlife;

- Ensure grass is cut utilizing guidelines and policies set forth by wildlife coordinator;
- Ensure any trees or foliage within 10 feet of perimeter fence is cut down to the ground or removed where feasible;
- Ensure all newly assigned personnel receive training on runway inspection procedures and how to make wildlife observations;
- Collect daily inspection forms and turn in to wildlife coordinator weekly. Report any abnormal wildlife observances immediately to wildlife coordinator.

2.4 Chief, Airside Management Division/Section/Unit

Roles and Responsibilities:

- Act as Deputy Wildlife Coordinator and in the absence of the Wildlife Coordinator execute all applicable duties;
- Ensure constant monitoring of wildlife levels in aircraft maneuvering area and its associated facilities and report any wildlife hazards to aircraft operations and wildlife coordinator immediately;
- Ensure methods in place for immediate and continuous update of wildlife hazard information to all pilots, making sure there is sufficient time from notification to ensure safe operation of aircraft;
- Attend meetings of the project implementation group and coordinate CAAN input on all construction projects which could have an impact on wildlife hazard, accident and incidents on aerodrome.
- Ensure all newly assigned personnel receive training on runway inspection procedures and how to make wildlife observations;
- Collect daily inspection forms from Air Traffic Controllers and turn in to wildlife Hazard, accident and incident monitoring wildlife coordinator.

2.5 Chief, Aviation Security Management Division/Section/Unit

Roles and Responsibilities:

- Ensure breaches to the perimeter fence are identified immediately to wildlife coordinator and make every attempt to expedite repair or increase security patrols in the area until repair can be effected;
- Ensure any animal traps set out are monitored during security patrols and notify wildlife coordinator of any animals captured; Ensure airport remains in compliance with all regulations and requirements to secure appropriate permissions to perform lethal control of wildlife;

- Establish and maintain notification process to inform local law enforcement authorities of any instances of weapons discharge or use of explosive devices on aerodrome;
- Ensure all newly assigned personnel receive training on runway inspection procedures and how to make wildlife observations;
- Report any and all observances of hazardous wildlife during routine security patrols of the perimeter fence to airport operations or wildlife coordinator;
- React to and remove immediately any wildlife reported to be on any runway or taxiway on the aerodromes during airport operating hours.

2.6 Chief, Civil Engineering Division/Section/Unit

Roles and Responsibilities

- Make sure that all new construction, improvements and or modifications at aerodrome facilities are made in a timely fashion so buildings, structures, and storage areas do not provide shelter for wildlife;
- Ensure all culverts and water run-off areas remain clear and provide proper drainage of accumulated water;
- Ensure all newly assigned personnel receive training on runway inspection procedures and how to make wildlife observations;
- Collect daily inspection forms and turn in to wildlife coordinator weekly. Report any abnormal wildlife observances immediately to airport operations or wildlife coordinator.

Chapter 3 Management of safety at aerodromes

The operation of aircraft is the 'core' business of any aerodrome. The duty of the aerodrome operator is to provide and maintain an aerodrome which is safe for aircraft and people to use. Organisations operating on aerodromes need to manage aircraft safety and occupational health and safety with a great degree of expertise and to rigorous standards. However, without adequate safety management, legal and moral obligations cannot be met, and business losses may be incurred, including significant financial losses.

In relation to aerodrome safety, an Aerodrome Operator is issued by CAAN Certification when they are satisfied that the prospective aerodrome operator is competent in operating the aerodrome in such a way as to ensure the safety of aircraft. This includes not only the physical layout of the aerodrome, but a variety of other elements that can affect aircraft safety. The aerodrome operator must provide an aerodrome which is safe for people to use, as far as reasonably practicable. Though not exhaustive this includes:

- An aerodrome layout which is safe, for example such that pedestrians and vehicles can move about safely,

- Equipment provided by the aerodrome operator which is safe, for example, where provided, Passenger boarding bridges and fixed electrical ground power etc.

- Systems of work which ensure safety, such as hotwork permits etc.

The precautions which protect aircraft from damage on the ramp often also protect people working on the ramp from harm, and vice versa. Consequently, the management of the health and safety of people (occupational health and safety) and the management of safety of aircraft share common themes. There are key elements which should form part of any system for managing safety:

- A system that sets the targets and standards to be achieved, and makes clear how people understand their responsibilities and accountabilities
- A way of identifying hazards, assessing risks and introducing control measures
- A method of monitoring that controls are in place and are effective. This should include proactive monitoring, such as inspection, reactive monitoring, such as accident investigation and data trend analysis, and audit and review of standards
- Documenting the procedures outlined above and relevant key information, including policies, risk assessments and reports from monitoring activities.

Chapter 4 Safety Reporting

One of the prime contributory factors in the establishment and maintenance of effective SMS is an open and honest accident/incident and occurrence reporting system. Such a system will create an environment of trust at all levels and will facilitate learning from common experiences and contribute to the prevention of accidents. A sound reporting system will make due allowance for the honest genuine mistake. However, there is no place in the air transport industry for ill-discipline and act of violation or lack of professionalism.

It is imperative that the industry reduces the statistically high percentage of aircraft Damage and occurrences that is not reported, but 'found'. It follows that probably the most important task is to establish a non-threatening or 'no-blame' culture for the genuine mistake which is honestly reported. It is in the general interests of the industry to reduce damage (and thus costs) to aircraft and equipment and it is everyone's responsibility to do their utmost to prevent injury to personnel. However, of paramount importance is the need to avoid aircraft departing with unreported and unknown damage. Such incidents can potentially lead to catastrophic accidents. Experience has shown that the major disincentive to reporting accidental ground damage is the fear of dismissal or other punishment.

Not only is unreported damage potentially lethal but it also precludes timely investigation and subsequent remedial action aimed at preventing a reoccurrence; a significant disadvantage when statistics show that accidents have often been presaged by earlier similar incidents. Everyone must be made aware that in any incident in which an aircraft is damaged, the most serious offence is failure to report. It follows that keeping quiet about an accident, incident or occurrence will negate the 'no-blame' policy. Any subsequent disciplinary action will reflect the seriousness of the failure to report.

To foster the comprehensive reporting of accidents, incidents or occurrences Airport managements should encourage the adoption of effective safety reporting systems. These systems should be brought to the attention of every employee and adopted by all the other organisations that have an airside role and also to the general public so far as practical.

Safety-awareness and knowledge of reporting procedures should be fostered by everyone as part of normal working activity. Both are a function of line management and should not be regarded by either management or employees as separate issues that are the sole responsibility of specialist safety staff. The Aerodrome Operator should take particular care to see that his own Safety Management arrangements and staff attitudes are exemplary and that they are seen to be so by other organizations and persons working airside.

Besides seting out some recommended practices on enforcement of regulations etc, fostering and maintenance of safety discipline should also operate on the reward principle. Good standards and operating practices should be recognized when observed and promoted to others. Safety Management should not be confined to seeking out low standards, bad operating practices and breaches of regulations, but the overall safety performance system should include procedures for recognizing, highlighting and possibly rewarding good performance.

One cause of airside accidents is where personnel trained for low skill tasks are required to carry out these tasks in a 'high-tech' environment. Managers and Supervisors must ensure that selection and training recognize the full operational safety requirement: that is, selection and training satisfy the needs of the task and the environment within which the task is to be undertaken.

Chapter 5 Active Performance Monitoring and Management

Airside safety performance and management should be pro-active, rather than reactive, at all levels of the management structure. Monitoring should be part of the daily routine, not a set piece procedure kept 'on ice', for use only following an incident or accident. Performance monitoring and management should be an accepted part of the overall responsibilities of all management and supervisory personnel. Although large organizations might have staff dedicated to full-time safety performance monitoring, safety performance monitoring and management is a line management responsibility – it cannot be delegated!

Very few, if any, airside operations procedures or working practices occur in total isolation. Many airside operations involve co-operation, both formal and informal between two or more departments of an organisation and often between two or more separate organizations. This is a complex matrix that requires good understanding and agreement. It is clearly advantageous, and in many cases necessary, for line managers to work closely with their counterparts from other departments or from other organisations. The benefits of co-ordination are obvious; increased rapport, a mutual exchange of safety-related information and the same standards of safety discipline applied across the whole aerodrome operation. The Aerodrome Operator should act as the focal point in co-ordinating best practice for all organizations on the aerodrome; for example, by acting as the Chairman of the Airside Safety Committee. The managers and supervisors of all airside operators should spend a significant proportion of their time and effort physically present on airside working areas. Their role should include observation of, and participation in, all aspects of airside work carried out by their staff and indeed the staff of other organizations where it can be seen that airside safety could be improved.

Wherever practical, Aerodrome Operators should collate safety performance data from all airside operators and co-ordinate an overall safety performance programme. Such a system will identify those organisations that operate best practice and will enable lessons from incidents to be shared by all airside operators. In order to do this, it is essential that all operators collect comparable data and the Aerodrome Operator should define the data to be collected.

Research has suggested that about 50% of serious aircraft accidents have resulted from non-compliance with procedures at some point. Clearly it is important that all safety-related activities are described by documented procedures. Such procedures should include defined performance measures and monitoring systems where appropriate.

It is also necessary that companies operating on the apron establish an audit programme to ensure that measures to assure and monitor safety performance are being implemented correctly and are achieving their intended objective. The Aerodrome Operator should also conduct a similar programme of internal audits to assess the effectiveness of aerodrome wide procedures. Any deficiencies that are identified in an audit should be considered and appropriate remedial action or measures taken. The audit should be followed up to ensure that these remedial actions and measures are effective. In this way deficiencies in procedures that could lead to an unsafe situation should be remedied before an incident or accident occurs.

Chapter 6 Investigation of Accidents and Incidents

Though desirable, hundred percent safety is an unachievable goal. Hence despite the best efforts, if accident or incident occurs, it should be the primary aim of responsible organization that any investigation following an accident or incident establishes the facts and cause of the matter in order to prevent further occurrence. The allocation of blame for disciplinary purposes should be secondary to the objective of accident prevention. Managers are reminded that beyond the requirement of internal procedures, some occurrences and accidents fall within statutory reporting requirements. These requirements are set out in descriptive material covering the Mandatory Occurrence Reporting (MOR) scheme. Accident or incident investigation will usually be best conducted by a line manager or supervisor. Such persons will almost certainly be most familiar with the type of operation or working practice during which the accident or incident occurred. In some cases, it may be preferable for the investigation to be carried out by a manager from a different department from that involved in the accident or incident. It is important that managers do not assume that investigations into accidents and incidents conducted under statutory provisions will necessarily meet the requirements of their own internal investigation procedures.

Investigations in this context should not be limited to ‘Accidents’ and ‘Incidents’ rather should encompass occurrences where physical damage or injury is sustained to equipment, structures, or persons. Occurrences exhibiting a possible risk of damage or injury will also merit formal investigation, where managers consider there has been exposure to unacceptable but avoidable risk. Managers should also be aware that where an accident occurs airside it might be necessary to co-ordinate the airside safety investigation with parallel investigations by others.

Chapter 7 Enforcement of Regulations

It is essential that a 'no-blame' accident and incident reporting policy is not confused with the necessity for sanctions that preserve airside safety against indiscipline. Establishing a 'no-blame' culture needs to be reconciled with the need to have formal disciplinary procedures that, at their extreme, might have the force of criminal law under airport bye-laws or legislative provisions. It is this area of safety performance management that requires the greatest management expertise, clear thinking and well documented procedures.

Some accidents and incidents will not come under the jurisdiction of the CAA, and in such cases the Aerodrome Operator nor can the employer (if different) interfere with the due process of law. However, there is no reason why a 'no blame' reporting system for dealing with all events cannot sit comfortably with the defined obligations under existing legislation for reporting accidents and incidents. The final stage is for the aerodrome management and the management of other agencies that operate airside to agree on what matters are contrary to published regulations and the options and level of sanctions that could be available. Most of these 'offences' will be 'prima facie', requiring an immediate response – in the interest of safety and discipline – and most, if not all, will be capable of being dealt with summarily.

Each aerodrome structure is different and each management or group will have to decide what those offences are that can be dealt with summarily. Some of the offences are listed below:

a) Failure to report damage to an aircraft;

b) Smoking airside;

c) Driving on the Maneuvering Area without permission;

d) Failure to report a potentially hazardous incident;

e) Driving in front of, or behind an aircraft with aircraft engines still running and/or anti-collision warning lights on;

f) Parking in areas marked as parking unsafe or prohibited;

g) Leaving vehicle unattended with engine running on movement area.

All employers at each aerodrome will need to consider their disciplinary structure in order to ensure that it is appropriate and fair. Procedures should provide proper opportunities for individuals to clarify the case where appropriate. The Aerodrome Operator should publish any penalties it has established for noncompliance with the rules and instructions whilst working airside including the use of vehicles. These may include temporary or permanent exclusion from the airside area of individuals, particular vehicles, or group of vehicle controlled by a specified vehicle operator.

In the interests of natural justice, it will be important for any penalty system to include an appeal procedure. However, this should not prejudice the immediate exclusion of a particular individual or vehicle where, in the opinion of the Aerodrome Operator, this is necessary in the interests of safety.

Although local circumstances and agreements will dictate the sanction or penalty awarded for offences, the following examples are for consideration. Some of the penalty are listed below:

- Verbal caution – not recorded
- Formal verbal caution, recorded on personal employment file for specified period, then expunged
- Formal written caution, recorded on personal employment file for a specified period
- Temporary airside driving restriction for driving offences
- Temporary airside driving restriction with requirement for retraining and testing
- Permanent airside driving restriction, for serious or persistent driving offences
- Temporary withdrawal of airside pass
- Permanent withdrawal of airside pass
- Disciplinary action leading to downgrading, suspension or dismissal

Apparently, the Aerodrome Operator is responsible to the CAAN for ensuring that the aerodrome is safe for use by aircraft. The continuance of the aerodrome operating licence depends on the Aerodrome Operator's ability to secure the continued maintenance of safety for aircraft. The Operator should make this responsibility for safe operation quite clear to his tenants, business partners and contractors and seek compliance with appropriate safety management and safety performance standards.

Whilst the Aerodrome Operator is responsible to the CAAN for the safe operation of the aerodrome with respect to aircraft, all organisations and operators at an aerodrome are collectively and individually responsible for safety in its widest sense. Some of these matters could be dealt with more elaboration separately, however, it should be noted that nothing said here or within this document as a whole can absolve any person from his/her responsibility and accountability under the law.

Clearly disciplinary offences against safety regulations may be reported by anyone, but should be channeled in the first instance to the alleged offender's supervisor or manager. Subsequent action will depend on what arrangements are in force for disciplinary offences at each particular aerodrome. However, it is the Aerodrome Operator who carries the responsibility and she/he may require to know how disciplinary offences against aerodrome safety regulations have been dealt with, in pursuit of his responsibilities. It is a matter for service providers and Aerodrome Operators to reach agreement about how accidents, incidents or even occurrences are to be reported, recorded and investigated. Participation in the Airside Safety Committee is a good vehicle for this action. Managers are reminded that certain events will fall within mandatory reporting requirements. In some cases, the Aerodrome Operator may take action against a company or organisation, as opposed to an individual.

Chapter 8 Trend Analysis

8.1 Importance of Trend Analysis

The causal factors of accidents and incidents, and the effectiveness of corrective actions at an airport can be fully understood and evaluated only if their frequency and distribution are examined in terms of type of event, location, and conditions. Trend analysis is one leg of this analytic triangle. It is used for hazard surveillance and monitoring, forecasting, program evaluation, policy analysis, and the investigation of potential causal relationships between risk factors and outcomes.
Trend analysis is used for the following objectives:

- To identify the overall pattern of change in a safety performance indicator over time (increase or decrease, rate of change)
- To compare one-time period with another (effectiveness of operations before versus after a risk control action or the implementation of new regulations)
- To compare different airport areas or seasonal differences (level of safety for Apron A and Apron B; accident rates in summer versus winter)
- To compare two or more groups (trained versus untrained, different service providers)
- To make future projections (monitor progress toward a safety objective; provide an estimate of the rate of future occurrence)

8.2 Analyzing Trend

Trend analysis looks for changes in safety levels over a given time period (e.g., the last 12 months). The safety level is usually measured using key performance indicators selected by the airport. The objective of trend analysis is to

- Determine the “safety health” state of the airport,
- Identify trends in safety levels, and
- Identify needs and determine actions required to maintain and/or improve safety.

For example, management could have set a goal to reduce ramp incidents by 20%. This statement is appropriate at the organizational level, but before ramp operations can act on it in a meaningful way, it needs to identify at least two things: (1) the baseline (i.e., how many incidents are occurring now) and (2) which activities are having an effect on apron incidents (passenger bridge, service equipment-aircraft, vehicle-vehicle, etc.). This knowledge comes from trend analysis. If the necessary data is not in place, it is necessary to set up a method (as part of reporting system) that will allow basis to collect data relevant to those activities. Once started collecting the data, we will know how many incidents are occurring. We can then set a baseline against which one can compare future performance.

8.3 Measuring Trends

There are two methods to determine trends: visual and statistical. Graphing or mapping data for people to see is the easiest way to communicate trends, especially to a non-technical crowd; however, this method does not allow one to "measure" that there is a trend or how big it is. Even when a statistical analysis is performed, it should start with the visual assessment of trends. For example, the root causes of runway incursions by type of vehicle over a period of 1 year are counted. It can be noted that the operation of vehicles including emergency/fire vehicles was the main activity associated with runway incursions, and the airport should take actions to provide additional training to those drivers. In addition, based on the high frequency of incidents associated with communication procedures, the airport may decide to provide additional training on radio communication, replace existing equipment, and establish procedures for escorting contractors.

The statistical method, on the other hand, can identify hard-to-see trends and can give a number that is defensible and repeatable; however, such methods can be difficult and challenging to apply. For most cases, a visual analysis with some very simple statistical measuring will be sufficient for evaluating most safety performance indicators used in airport SMS. A statistical analysis is best performed by a qualified person.

8.4 Plotting and Smoothing

Spreadsheet software like Microsoft Excel can be used to plot information on safety performance gathered by the airport. Usually, the information is plotted over the period that the data were collected, sometimes called time series. When evaluating plots, care must be exercised regarding the following issues:

- People tend to focus on the extreme values and not on more subtle changes
- Gradual trends are hard to detect by visual analysis
- Seasonal variation and exogenous variables can mask trends in a parameter
- Viewers can "see what they want to see" sometimes
- Finding no trend may only mean the data were insufficient or the type of plot was inappropriate

Obviously, it is very difficult to state any conclusions from this plot. However, by using the average number of bird strikes for the last 12 months instead of using the raw number of bird strikes in any given month, a trend may become more evident. Moving averages can be used to smooth out short-term fluctuations, thus highlighting longer term trends or cycles. The threshold between short term and long term depends on the factor being analyzed, and the parameters of the moving average should be set accordingly.

8.5 **Trend Analysis Reports**

As a minimum, the following information should be reported for each trend analysis:

- Display plots of the observed data over time
- Comments in narrative form on the stability of the rates and approaches used to improve it
- Report average percent change for periods when the rate is fairly constant
- Interpret in narrative form the trend and how it relates to achieving the safety objectives of the Airport.

For more details, refer CAAN Procedure Manual for Safety Management Functions, 2021.

In addition, it is necessary to attempt to identify any factors causing the trend. The analysis is more convincing if it demonstrates that apparent trends can be explained by plausible relationships with other factors. For example, if the airport wants to measure the level of safety at the ramp, a simple safety performance indicator in this case may be the number of accidents that have occurred on the ramp in any given month. Checking if the number of accidents is increasing or decreasing over the months is trend analysis. Then it is necessary to analyze trends to determine if things are getting better, getting worse, or staying the same.

One should be careful when using the raw number of accidents or incidents to verify trends. The number of undesirable events is related to the number of operations and a drop in the number of incidents may be a consequence of a decrease in activity level. We may prefer to use accident rates instead of the number of accidents. An accident rate is the number of accidents divided by a fixed number of operations over a period (e.g., 10,000 operations in 1 year). A decrease in the rate of accidents is a clear and reliable picture of safety improvements at any airport. Analysis of the data collected should allow us to identify which activities have the most impact in the incident count. This information should help us focus on the major problems and develop action plans to reduce them. At the same time, it will allow us to track whether these plans are effective.

Assuming that the data collected show that, after 6 months, apron-aircraft incidents add up to eight events. After analysis and investigation, the entity decides that implementation of a stricter training program and spot checks should improve airline employees' skills and compliance with the rules, thus reducing the number of apron-aircraft incidents. Six months later, when next review is done, we should be able to see if the number of incidents has gone up or down. If the number of incidents has not decreased, additional actions will be required (e.g., intensifying supervision and enforcement of SOPs) to mitigate the likelihood of more incidents.

Measurements must focus on factors that are related to overall safety objectives. Most important, measurements must be related to the most significant risk contributors. Although performance measurements include incident statistics, they are primarily intended to be proactive (i.e., identify problems before an accident occurs).

8.6 **Gathering Data**

After the airport safety objectives and goals are set, it is necessary to define the safety performance indicators that will be used to measure performance and check if the objectives are being met. Trend analysis is based on quantitative information collected for these performance indicators (e.g., number of incidents at the ramp, number of bird strikes). The airport operator who records each of these accidents will have a number for each month over a period of a few years. Other sources of data available for trend analysis are conclusions from accident/incident reports. The root causes identified in the investigations can provide valuable information on specific safety issues that should be addressed by the airport.

Data collection is a critical activity for trend analysis. It is recommended that a written procedure be established to define who will collect the data, the means for collection, specific procedures, and who will receive the information.
Very small operators may not generate enough data to allow for the monitoring of any trends. In these cases, a possible alternative is to look at the industry as a whole to help identify possible trends. Reviews of accident reports, articles in trade magazines, discussions with industry groups, participation in industry associations, and other operators can provide useful data.

For SMS, most trend analysis data are related to the key safety performance indicators selected for monitoring. The airport needs to make sure the data quality objectives are met. Trend analysis requires strict monitoring protocols. If the airport wants to determine the trends for apron accidents, it should make sure reliable data are gathered every month over a significant period(e.g., 3 to 5 years). It is essential to identify the audience and the type of analysis or presentation appropriate for that audience. For example, if it is necessary to report the trends to raise safety awareness at the ramp, the audience will be every person working on the ramp. In this case, the message should be very simple.

Determining the cause of a trend is more difficult than determining the trend, but it is the critical element for defining effective corrective actions. To identify causal factors for certain trends, it is necessary to consider all the exogenous parameters that can influence those trends (volume of traffic, environmental conditions, time of day, etc.).
The following are some important issues to consider when developing a trend analysis:

- Consistent data Quality-Trend analysis assumes that the same or equivalent methods and protocols are used for all the monitoring.
- Time frame and number of samples- 5 years of monthly data for accident and incident trend analysis; for step trends, at least 2 years of monthly data before and after a major change (e.g., new SOP, change in personnel, application of a corrective action, change in organization).
- Seasonality—Parameters that vary naturally in different seasons of the year may require special statistics (e.g., certain types of birds can be more frequent in specific months of the year; apron accidents are more prone to occur under low visibility conditions).

For reference, some representative performance indicators can be as follows:

- Number of airside vehicle operation infractions per month
- Number of FOD reports
- Number of bird strikes
- Number of runway incursions
- Percentage of employees with basic SMS training

Collecting information on the number of violations should be done carefully to avoid bias. If no enforcement officers on the ramp available, the numbers may actually go down, even when more incidents occur. For larger airports, performance indicators may be related to specific areas of the airport, for example:

- Number of airside vehicle operations infractions per month on Apron
- Number of runway incursions at a specific “hot spot”
- Statistical significance of a trend—It is common to observe upward or downward trends that simply occur by chance. This is particularly frequent for performance measurements over small periods or associated with low incidence events (e.g., number of runway incursions). The best way to check if the trend is real or is simply random variation is to set longer periods for evaluation to collect more data and use statistical techniques to check if the differences are statistically significant.

Chapter 9 Implementation of Remedial Action

The objective of any accident or incident investigation should be to produce findings which facilitate further action aimed at prevention of recurrences. Such findings should focus on how procedures, practices, or regulations failed to prevent the accident or incident. The report should list recommendations and nominate those responsible for taking corrective action. The whole proceedings should be reviewed at senior management level with the intention of establishing what subsequent actions are required. The loop should then be closed by ensuring that all line managers and safety specialists are aware of the changes so that they can monitor their effectiveness. It is equally important to determine whether the changes identified require any changes to training syllabuses or to any other factor and action accordingly.

Any system to manage safety and to measure and monitor safety performance will have a number of common elements. There are many texts which describe both theoretical aspects and practical application of safety performance management and this document seeks to illustrate some of these principles. It must be remembered, however, that only the Aerodrome Operator and managements of airside operators can determine the most appropriate systems for their organisations and environment.

Whatever systems are implemented, airside safety performance management essentially consists of two fundamental and key elements. Firstly, developing a ‘no-blame’ culture, based on company policy to ensure that not only accidents or incidents but also the occurrences affecting aircraft and airside safety are reported, in order to protect the public and the workforce from preventable injury. Secondly, a code of discipline should be established to secure a safe airside working environment for everyone. The outcome of effective safety performance management should be seen by everyone to be:

- Educational and developmental
- Encouraging and rewarding
- Active rather than reactive
- Constant rather than intermittent
- Continuing rather than currently fashionable
- Part of normal work rather than an isolated activity
- A means of reducing or containing costs rather than costing money itself
- Punitive only as a last resort