DEPARTMENT OF TRANSPORT

NO. 502   **18 MAY 2018**

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RAILWAY SAFETY REGULATOR

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DETERMINATION IN TERMS OF SECTION 28 OF THE NATIONAL RAILWAY SAFETY REGULATOR ACT 16 OF 2002 AS AMENDED

The Railway Safety Regulator, hereby in terms of section 28(a) and (b) of the National Railway Safety Regulator Act, 2002 (Act No. 16 of 2002) publishes the determination of the format, form and content of a safety management system that is required for the different categories and types of safety permits as well as the form, content and manner of submission of a safety management system report.

The determination for SMS and SMSR are published for compliance and general information with effect from date of publication.

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Chairperson: RSR Board
Dr. N.Z. Qunta
Railway Safety Regulator
Date: 10 May 2018

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LIST OF DEFINITIONS AND ABBREVIATIONS

Act	National Railway Safety Regulator Act No 16 of 2002 (as amended)
Operator	Network, Train ,Station Operator and any other category of persons designated as requiring a safety permit by the Minister by notice in the Gazette
Regulator	Railway Safety Regulator
RSR	Railway Safety Regulator
Safety critical employees	Functions and activities directly related to the authorization and control of rolling stock movements, and to the execution of the movement of rolling stock, including the direct supervision of persons undertaking these functions and activities.
Safety targets	Safety targets set for identified Key Performance Indicators (both leading and lagging indicators) which will inform the operator of the level of safety performance.
Safety-related work	Functions and activities that have an impact on safe railway operations, either directly (safety-critical work) or indirectly, including the certification of systems, subsystems or components for introduction as new or modified technologies for a network, train or station operation (or a combination thereof), or the maintenance of systems, subsystems or components which constitute a network, train or station operation (or a combination thereof), including the direct supervision of persons undertaking these functions and activities.
SANS	South African National Standard
SIP	Safety Improvement Plan
SMS	Safety Management System: "a formal framework for integrating safety into day-to-day railway operations and includes safety goals and performance targets, risk assessment, responsibilities and authorities, rules and procedures, monitoring and evaluation processes and any matter as prescribed"
SMSR	Safety Management System Report: "written submission made by the applicant, in support of a safety permit application that describes the applicant's safety management system and may include any other matter prescribed".
SPCAM	Safety Permit Conformity Assessment Methodology
SV	Safety Validation

PART I – INTRODUCTORY PROVISIONS

1. INTRODUCTION

1.1 Section 23 (3) (a) of the Act stipulates that an application for a safety permit must be made in the format determined by the Regulator. Section 28 stipulates that the Regulator must determine (a) the form and content of a safety management system that is required for the different categories and types of a safety permit; (b) the form, content and manner of submission of a safety management system report; and (c) the circumstances under which the Regulator may require the holder of a safety permit to revise or amend a safety management system or safety management systems report.

1.2 The Act defines a safety management system report (SMSR) as a "written submission made by the applicant, in support of a safety permit application that describes the applicant's safety management system (SMS) and may include any other matters prescribed".

1.3 This determination serves as an instruction to railway operators to document, implement and maintain their SMS and SMS report in compliance with the SANS 3000 series of standards and this determination.

1.4 Railway operators should therefore document their procedures and arrangements in a manner that allows:
  ➤ Assessment thereof prior to the award of the safety permit, and
  ➤ Supervision post award of the safety permit.

1.5 This determination on SMS's and SMS Reports are applicable to all railway operators as specified in the latest edition of the RSR Permit Application guide as published on the RSR National Information Management System.

2. SMS PURPOSE

The overall purpose of the SMS is to ensure that the organisation achieves its business objectives in a safe manner. It is recognised that there are wide benefits of managing business in a structured way. It adds value helping to improve overall performances, introduce

operational efficiencies, enhance relations with customers and regulatory authorities and build a positive safety culture.

In addition, for safety, adopting a structured approach enables the identification of hazards and the continuous management of risks related to an organisations own activities, with the aim of preventing accidents. When appropriate, it should take into account the interfaces with other operators in the railway system. Implementing all relevant elements of an SMS in an adequate way can provide an organisation with the necessary assurance that it controls and will continue to control all the identified risks associated with its activities, under all conditions.

The adequate implementation of an SMS by all operators is a key element for success of the entire Railway Safety Regulatory framework as foreseen by the Act, since it forms the basis on which the Railway Safety Regulator issue safety permits.

Mature organisations thereby recognise that an efficient control of its risks can only be achieved through a process that brings together three critical dimensions: a technical component with the tools and equipment used, a human component of front line people with their skills, training and motivation and an organisational component consisting of procedures and methods defining the relationship of tasks. Consequently, a good SMS succeeds in monitoring and improving the risk control measures in the three dimensions.

The implementation of an SMS is a legally binding obligation under the Act. Nonetheless, there are also other good reasons for implementing and delivering an effective SMS: many features of the railway SMS are very similar to management practice advocated by proponents of quality, safety and health at work, environmental protection and business excellence. Therefore principles of good management can be easily integrated and should not need a complete re-design of organisations that already have those systems in place.

3.   SMS SCOPE AND CONTENT

3.1 Designing and implementing an adequate SMS is a challenging task and therefore this directive, adopted by the Railway Safety Regulator, is intended to support, through practical advice, the design, implementation and delivery of a structured and organisation-wide railway SMS. The overall aim is to provide a tool for the ease of use by railway operators and, at the same time, for facilitating compliance with the legal requirements. This determination is intended to be read in conjunction with the SANS 3000 series of standards.

3.2 This document reflects the effort to present an emerging view on this dynamic and important subject through this determination in a simple and user friendly manner. It also

refers to mandatory and guidance connected documents on the implementation of safety management systems.

3.3 The following types of railway operators shall develop and implement Safety Management Systems:

- Network Operators,
- Train Operators,
- Station Operators, and
- Any other category of persons designated as requiring a safety permit as prescribed by the Minister by notice in the Gazette.

PART II – RSR DETERMINATION

4. LEGAL BASIS

4.1 The legal basis for the implementation of the SMS is the National Railway Regulator Act (Act 16 of 2002 as amended). The Act defines a Safety management System as *"a formal framework for integrating safety into day-to-day railway operations and includes safety goals and performance targets, risk assessments, responsibilities and authorities, rules and procedures, monitoring and evaluation processes and any other matter prescribed*".

4.2 The Act defines a Safety Management System report as "*a written submission, made by the applicant, in support of a safety permit application that describes the applicant's safety management system and may include any other matters prescribed*".

4.3 Section 24 (2) (b) of the Act stipulates that the "*chief executive officer may, impose any condition in a safety permit, including a condition relating to the form, manner, timing and submission of any review of a safety management system report*".

4.4 Section 28 of the Act (Act 16 of 2002 as amended) stipulates that the Regulator must determine (a) the form and content of a safety management system that is required for the different categories and types of a safety permit; (b) the form, content and manner of submission of a safety management system report; and (c) the circumstances under which the Regulator may require the holder of a safety permit to revise or amend a safety management system or safety management systems report.

4.5 Once adopted, sections 5, 6, 7, 8, 9 and 10 of this determination constitutes the RSR's determination on the (a) the form and content of a safety management system (b) the form, content and manner of submission of a safety management system report; and (c) the circumstances under which the Regulator may require the holder of a safety permit to revise or amend a safety management system or safety management systems report.

5. REQUIREMENTS ON THE STRUCTURE OF THE SMS AND SMS REPORT

5.1 The safety management system must be documented in all relevant parts and shall in particular describe the *distribution of responsibilities* within the organisation of the railway operator. It shall show how *control by the management* on different levels is secured, how

staff and their representatives on all levels are involved and *how continuous improvement of the safety management system is ensured.*

5.2 The SMS and SMS Report must be in a form that is consistent with Parts II and III and of this document. It must:
- ➢ be evidenced in writing;
- ➢ provide a comprehensive and integrated management system for all aspects of control measures adopted in accordance with the legislation;
- ➢ be set out and expressed in a way that its contents are readily accessible and comprehensible to persons who use it;
- ➢ be prepared in accordance with this determination;
- ➢ contain the matters and information required by the Standards, Regulations and this determination;
- ➢ be kept and maintained in accordance with the Standards and this instruction determination ; and
- ➢ state the persons responsible for the development of all, or all parts of, the SMS

5.3 The importance of the operator's description of the railway system is key to the adjudication of the adequacy of the SMS. The description should explain the framework for implementation of the SMS and keeping the SMS up to date. The systems description can be used to:
- ➢ provide contextual information on the organisation to which the SMS applies, including organisational charts;
- ➢ specify the scope and nature of the railway operations to which the SMS applies; and
- ➢ state the persons responsible for the implementation of the SMS and the relationship between these persons.

6. A SYSTEM APPROACH

6.1 Content of the SMS as a basis for the system approach

Railway operators must design their SMS in a manner that complies with requirements set out in Parts II and III of this document. Non-compliance to the prescripts of Parts II and III may result in the RSR requesting the Operator to revise or amend its SMS or SMS Report. An Operator's SMS, in common with the concept of management systems, should contain the description of safety related processes and procedures, all of which shall be capable of

assessment (on the basis of the SPCAM on assessing conformity with requirements for obtaining railway safety permits) and independent audits.

6.2 The adoption of a system approach

The main purpose of an SMS is "to ensure the safe management of operations of an operator in order to deliver continuous safety improvement, a system based approach and the allocation of responsibilities". The system-based approach, also known as process-based approach in the domain of management systems engineering, consists of:

➢ processes as interrelated activities which transform inputs into outputs,
➢ map of processes, including interactions, and
➢ a detailed description of processes and sub-processes.

Thus, the railway SMS can be identified as the sum of processes that contribute to the design, planning, delivery and control of operation, as part of a company business.

This section describes the representation of processes according to their function:

➢ design and improvement,
➢ implementation, and
➢ operational activities.

Each process can be seen, in itself, as an operational process, because it develops an output. Operators must use them as a reference to build their process maps and a SMS with interactions and defined responsibilities.

The SMS implemented by the Railway Operators must contain the characteristics and elements listed in the **SMS Manual** (Part III) of this directive.

The system approach is represented here as a "big picture" encompassing all elements of the SMS in an interrelation of processes, grouped according to their function:

➢ processes for design and improvement (see section 8)
➢ processes for implementation (see section 9)
➢ operational activities (see section 10)

This approach is developed throughout the SMS Manual, as follows:

➢ The three groups will be described and will contain references to orientate readers to the contained elements;
➢ Under the main features of the processes (design/improvement, implementation, operation) the elements of the SMS will be listed and described.

6.3 Human Factor Management

The SMS must include procedures to ensure that human factor matters are taken into account during the development, operation and maintenance of the SMS, and for the integration of human factors principles and knowledge into all relevant aspects of the operational and business systems. (Refer to SANS 3000-4:2011 for the complete RSR requirements on Human Factor Management).

6.3.1   Integrating Human Factors into the Safety Management System

The integration of human factors within the SMS should be driven by the integration of human factors within risk management systems and processes.

Risk assessments and reviews of risk assessments should identify those areas where human involvement in the system presents a safety risk, identify the level of human factors analysis required based on the safety criticality of the human action or activity, and based on an appropriate level of human factors analysis, identify appropriate risk controls.

This provides a process that ensures the systematic identification and analysis of relevant human factors issues and the application of appropriate tools, methods and measures to address such issues. The management of human factors issues should not be seen as a stand-alone activity.

Integration of human factors is regarded as essential in many aspects of operational and business systems that make up the SMS, including (but not limited) to:

➢ risk management;

➢ management of change;

➢ design and procurement of systems, equipment and machinery;

➢   job and task design;

➢   training of safety critical employees;

➢ safety reporting and data analysis;

➢   incident investigation.

Risk assessments may identify additional aspects or operational and business systems where integration of human factors needs to take place.

Human factors integration is about ensuring that processes are in place to:

➢ identify and analyse any human factors requirements associated with relevant safety critical projects or activities; and

➢ implement and monitor these requirements.

Human factors integration processes need to be planned and implemented in the early stages of a project to ensure adequate time for human factors activities to be conducted and findings incorporated.

Human factors integration processes have particular application in design projects (e.g. control centres, train cabs, driver safety systems), management of change projects and risk management activities. Generally, the extent of the impact on safety will determine the extent of the human factors activities.

6.3.2   Integrating Human Factors in Risk Management

An operator must have a SMS that:

➢ Identify any risks to safety in relation to railway operations in respect of which the operator is required to be accredited;

➢ Specify the controls (including audits, expertise, resources and staff) that are to be used by the operator to manage the identified risks to safety and to monitor safety in relation to those railway operations.

Risks arising from the involvement of human activity should be assessed as part of the risk management process.

Of particular relevance are:

Processes to ensure that the potential for human error is systematically addressed and integrated into all relevant risk assessments. These processes may be qualitative or quantitative or both as determined by the rail operator.

Key steps in identifying and assessing human factors risks are:

➢ Identification of the people who interact with the system (whether the system is a piece of equipment, procedure, software, or instrumentation, etc.). The focus should be on those people who are most likely to affect safety.

➢ Identification of the activity being assessed.

➢   Identification and recording of the different tasks people perform. Where a potential risk is identified, the task needs to be described before the potential for failure can be assessed. The level of task detail required depends on the risk involved.

➢   Assessment of the task for the potential for error and violations and identifying the types of error / violations that could occur and how they may affect safety.

Where the potential for error is high and the task is critical for safety, a detailed task analysis should be performed and the factors that influence performance identified, specialist support may be required.

➢   Processes to establish specific controls that address the potential for human error. In order to be most effective, these controls should be directed at:

- reducing the likelihood of error

- supporting the detection and correction of errors when they occur

- ensuring the containment of and reduction in the severity of the consequence of errors that persist uncorrected.

➢   Typical control measures for error include: equipment design, task and job design, workplace design, procedures, training, communication, team work, supervision and monitoring etc. Identified risks should be recorded and controls integrated into the relevant operational and business systems that make up the safety management system.

7. BASIC MANDATORY ELEMENTS OF THE SAFETY MANAGEMENT SYSTEM

7.1 Processes for Design and Improvement

7.1.1 Leadership:

- ➢ Management Commitment
- ➢ Safety Policy
- ➢ Safety Culture
- ➢ Safety Targets
- ➢ Decision Taking
- ➢ Management Control

7.1.2 Risk Management:

➤ Control of risks associated with the activity of the Operator

➤ Risks arising from the activities of other parties

➤ Procedures and methods for carrying out risk evaluation and implementing risk control measures

➤ Compliance with legislation, rules and standards

7.1.3 Monitoring:

➤ Safety data collection and analysis

➤ Accident and incident reporting / investigation / analysis / preventive and corrective measures

➤ Internal auditing of the SMS

➤ Review of the SMS

7.1.4 Organisational Learning:

➤ Corrective action development

➤ Continuous improvement

➤ Management of Change

7.2 Processes for Implementation:

7.2.1 Structure and Responsibilities:

➤ Distribution of Authorities and Responsibilities

➤ Management Accountability

➤ Organisational Structure

➤ Workload Planning

7.2.2 Fitness for Duty

➤ Fitness for Duty

7.2.3 Information:

➤ Configuration Control of Safety Information

➤ Consultation and involvement of staff and their representatives

➤ Internal / external communication

7.2.4 Documentation:

➢ SMS documentation

➢ SMS Report

➢ Document Management

➢ Safety Improvement Plan

➢ Changes to the SMS and Railway Operations

7.3   Processes for Operational Activities:

7.3.1 Safety Standards for Engineering and Operational systems:

➢ Process Control

➢ Procedures to meet applicable rules to assure compliance throughout life-cycle of equipment/operation (delivery phase)

7.3.2 Operational, Maintenance and Emergency Activities:

➢ Use of Contractors and control of Suppliers

➢ Asset Management

➢ Occurrence Management

➢ Security Management

➢ Interoperability and Management of Interfaces and Intrafaces

➢ Transportation of Dangerous Goods

7.3.3 The Co-ordination Tasks for the Network Operator within SMS:

➢ Compliance with Network-specific requirements for Management of Rolling Stock

➢ Safe Design of the Railway Infrastructure

➢ Safe Operation of the Infrastructure

➢ Provision of Maintenance & Material

➢ Maintenance and Operation of the Traffic Control and Signalling System

Note:

Refer to Annexure 1 (SMS Wheel) to see the integration of the main processes, elements and sub-elements of the Safety Management System

PART III: SMS MANUAL FOR THE DEVELOPMENT AND IMPLEMENTATION OF A COMPLIANT SAFETY MANAGEMENT SYSTEM

The development of the SMS shall be guided by the following criteria:

- ➢ what – the safety objectives of an operator;
- ➢ who – the responsible and accountable persons for the implementation of an SMS;
- ➢ how – the procedures for the implementation of the elements and sub-elements of an SMS; and
- ➢ monitoring – the monitoring and evaluation of an SMS to effect safety performance

8. PROCESSES FOR DESIGN AND IMPROVEMENT

Railway operators need to ensure the control of the part of railway system that they are responsible for, mainly by setting arrangements in their organisations to:

- ➢ comply with safety requirements applicable to the railway system as a whole,
- ➢ identify specific risks related to their activity,
- ➢ identify and manage future risks.

The governance of such organisations should be made of consistent arrangements, adoption of ad hoc policies, structured implementation and operational processes and allocation of responsibilities for areas of activity. Furthermore: organisations are dynamic and continuously evolving. There is a constant need to adjust and improve all SMS related processes. To be able to do so organisations need to ensure the design and control of the implementation of operational processes, through effective leadership [reference § 8.1] and the involvement of staff.

Risk assessment [reference § 8.2] can help to anticipate future developments and threats such as potential disruptions, pressures and their consequences. Unforeseen events, not identified when designing the risk control measures, may take place. Risk control measures can, because of a changing environment (external like new technologies, rules, standards, etc., and/or internal like new or changing techniques, operational procedures, organisational structure, etc.), no longer fulfil the intended purpose.   Additionally, changes in the general management arrangements and structure may impact on the safety management system.

Monitoring [Reference § 8.3] of both the performance of operational processes and of the environment is necessary to identify latent system failures, which are those system elements that are or could become a threat in the near term. Monitoring supports the return of

experience, which is an important complement for the continual reflection upon risks. Furthermore, lessons should be learnt [refer to §8.4] from operational incidents. This and the findings of audits, inspections and all other relevant sources of information can be used to improve the system. All these processes together finally are needed to provide the management of a company with the necessary input to take informed decisions about structural or functional changes of the system so that it is better prepared for what may happen in the future.

For good performance of these processes for design and improvement it is necessary that the responsible staff/management know what to do, how to do it and with timely knowledge of all relevant information to do so.

Processes for design and improvement:

> are intended to assure that desired objectives are met, to prevent problems from occurring or re-occurring and to adapt and improve in line with changing external and internal requirements,
> define how to accomplish tasks and how to evaluate and adapt them to the changing environment, allocating adequate resources.

8.1 Leadership

Strong and effective leadership ensures that safety objectives are set and prioritised (Plan), practices are implemented to meet safety targets (Do), the system effectiveness is constantly checked (Check) and corrective and/or proactive measures are taken (Act).

8.1.1 Management Commitment

The responsibility for leadership and for creating the environment of continuous improvement belongs to all levels of management, but particularly to the highest.

Senior management should be aware of how the success of the organisation, with respect to the safe operation of the railway system in a continuously changing internal and external environment, depends largely on the ability to monitor and continuously improve the effectiveness of risk control measures.

If senior management does not express informed, sustained commitment to safety as one of the primary business objectives, the commitment for safety in the field can easily shift towards other, sometimes conflicting business objectives, particularly in less mature organisations.

Management commitment implies the direct participation by the highest level management in all specific and important safety aspect or programs of an organisation. The list below shows examples on how management commitment is delivered in practice, through a sequel of safety aspects and, in case, the relevant connection to other elements of SMS that are dealt within the permit application guide:

➢ showing passion and interest for safety,

➢ formulating and establishing safety policy and objectives [ref. to § 8.1.2 – safety policy],

➢ setting targets to improve or maintain safety and benchmarking performance against others in railway sector or other industries [ref. to § 8.1.4 –safety targets],

➢ providing resources and training [ref. to § 8.2.1 – risk control and to § 9.2. – fitness for duty and competence management system]

➢ ensuring that all staff – including the Board – are sufficiently trained and competent in their safety responsibilities [ref. to § 9.2. – fitness for duty],

➢ ensuring control at all levels of the organization [ref. to § 8.1.6 – management control],

➢ regularly receiving information about safety, e.g. performance data (accidents, incidents, dangerous occurrences), and evaluating and reviewing the SMS in light of results achieved [ref. to § 8.3 – monitoring],

➢ being aware of what is happening on the ground, and what audits or assessments are undertaken, receiving results related to the activities carried out internally or by contractors [ref. to § 8.3.3 – internal auditing],

➢ ensuring appropriate Board level review of SMS [ref. to § 8.3.4 – SMS review],

➢ ensuring that all levels of the organisation, including the Board, receives relevant safety information [ref. to § 9.3.3 – internal external communication],

➢ being confident that the workforce is properly consulted on safety matters, that their concerns are reaching the appropriate level including, as necessary, the board ensuring that your organisation's risks are assessed, and that appropriate control measures are established and maintained [ref. to § 9.3.2 – involvement of staff],

➢ creating the environment of continuous improvement [ref. to § 8.4.1 – continuous improvement],

➢ bringing to the attention of the Board the changes in working arrangements that may have significant implications for safety [ref. to § 8.4.3 – change management],

➢ promoting safety culture [ref. to § 8.1.3]

Strong and active leadership is reinforced by visible, active commitment from the top:

➢ establishing effective 'downward' and 'upward' communication systems,
➢ establishing effective management structures,
➢ integrating of safety management with business decisions.

To meet their responsibilities, leaders need to understand the risks associated with the operator's railway operations, the operator's obligations under the Act, and the level of compliance being achieved with those obligations.

Appropriate governance and internal control arrangements will ensure that information required to manage rail operations safely and monitor compliance with the Act is available to the right level and people within an organisation so that decision-making is effective.

The safety management system must include systems and procedures to ensure that the CEO and Board, or the people managing the railway operations:

➢ have sufficient knowledge of the risk profile of the railway operations being carried out, to enable proactive management of the risks of those railway operations;
➢ have sufficient knowledge of the level of compliance being achieved with the rail operator's duties and obligations under the legislation; and
➢ have sufficient knowledge to determine whether: (a) the safety management system is working effectively; (b) the risks to safety are being identified, assessed and eliminated or controlled; and (c) controls used to monitor safety to manage risks to safety are being regularly reviewed and revised.

8.1.2 Safety Policy

SANS 3000-1 (Railway Safety Management) states the requirements for an operator in setting the Safety Policy. The safety policy expresses and reflects an organisation's commitment, obligation (mission) and strategic view (vision) on railway safety and security.

The safety policy statement must be communicated and made available to all staff using an appropriate medium (formal communication, newsletter, intranet, etc.) It must include, among others, a declaration of intent and also provide indications on the overall direction for the organisation to follow, the general objectives of the safety management system as well as the necessary resources and activities required to deliver these objectives. The safety policy must also reflect the following characteristics, thus giving evidence of the organisation's

management commitment and providing staff with clear guidance for action to consolidate safety culture and safety awareness within the organisation:

➢ is developed by management as well as staff and is signed by the highest level of the organisation,

➢ is appropriate to the nature and scale of the organisation's risks and contribute to all aspects of business performance as part of a demonstrable commitment to continuous improvement,

➢ outlines the principles and core values according to which the organisation and staff operate,

➢ pursues the development and improvement of working ethics,

➢ enjoys the commitment and involvement of all staff,

➢ is aligned with other operational policies,

➢ states the responsibilities and accountabilities of directors, managers and employees.

In addition, the safety policy must reflect in the actions and decisions of all staff, and be reviewed periodically. The policy must include a commitment to the development and maintenance of a positive safety culture and the continuous improvement of all aspects of the safety management system

8.1.3 Safety Culture

Safety culture is something that emerges from and is a product of all aspects of the way things are in an organisation. In everyday language, culture is, "*the way we do things around here".* A positive safety culture is characterised by awareness, assessment and action on safety matters as a part of everyday business, at every level of an organisation and supported by an open communications style throughout the whole organisation.

A positive safety culture is fundamental to an effective safety management system and the safety management system must specify the methods that will be used so far as is reasonably practicable to promote and maintain a positive safety culture.

An organisation with a positive safety culture is characterised by:

➢ communication founded on mutual trust;

➢ shared perceptions of the importance of safety; and

➢ confidence in the efficacy of preventive measures.

Key elements of a positive safety culture which organisations must consider when determining the methods to meet the requirements of the RSR and to promote and maintain such a culture are:

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➢ committed leadership (ref § 8.1.1): the organisation's leaders, from its senior executives to line managers, actively encourage and participate in safety initiatives and activities. This may be through events and communications, staff mentoring, provision of resources, or providing safety incentives and awards.

➢ keeping people informed (ref § 9.3.2 and § 9.3.3): the organisation's members, both managers and workers, know what is going on in their organisation. This includes collecting, analysing and disseminating relevant information derived from the workforce, safety occurrences, near misses, and regular proactive checks of the organisation's safety activities.

➢ maintaining vigilance (ref § 8.3.1 and § 8.3.2): the organisation's members are constantly on the lookout for the unexpected. They focus on problems and issues as they emerge well before they can escalate to more serious occurrences. Members are prepared to look upon these potential risks as a sign the system might not be as healthy as it should or could be.

➢ promoting a *"just culture"* environment (ref § 8.3): the organisation promotes a 'just culture' which acknowledges human error and the need to manage it by supporting systems and practices that promote learning from past errors or mistakes. It encourages uncensored reporting of near miss occurrences and worker participation in safety issues. A 'just culture' is transparent and establishes clear accountability for actions. It is neither 'blame free' (awarding total immunity for actions) nor 'punitive' (enacting a disciplinary response regardless of whether acts were intentional or deliberate).

➢ promoting organisational flexibility: the organisation is capable of adapting effectively to meet changing demands. This relies on being prepared for and practiced in handling changing circumstances with people competent to lead and carry out tasks. Flexibility allows local teams to operate effectively and autonomously when required, without the need to adhere to un-necessarily inflexible rules.

➢ encouraging willingness to learn (ref § 8.4): the organisation is willing and eager to learn from its workers, its own experiences and from corporate safety databases. The key here is that organisations and their members use the information to improve safety and act on the lessons derived. In developing and maintaining a positive safety culture, account must be taken of:

• the importance of leadership and commitment of senior management;
• the executive safety role of line management;
• the need to involve safety critical employees at all levels;
• the need for openness of communication;
• the need for human factors to be positively addressed;

- awareness and recognition of opportunities for safety improvement; and

- willingness to apply appropriate resources to safety.

8.1.4 Safety Targets

Each railway operator, within the framework of its own SMS, is expected to include the demonstration of its capability to achieve their safety targets, which may require maintaining or enhancing its level of safety, in line with the other business objectives. The safety targets are to be considered as part of a continuous loop:

➢ they are set on the basis of past performance assessment (that may be the achievement of the previous organisation's safety targets). They should be credible and achievable. Measurement of safety performance (collecting relevant safety data through routine checks arrangements, internal auditing and safety reporting) is part of monitoring [see Chapter 8.3 on Monitoring];

➢ specific actions are planned and implemented, broken down to be managed at all relevant levels of the organisation (See section § 9.4.4 on Safety Planning);

➢ the actions are monitored and their effectiveness is measured, (again, through routine checks, internal auditing and safety reporting) , focussing not only on the safety outcome but also on the effective performance of safety management activities;

➢ safety targets are revised according the result of monitoring.

The SMS must include systems and procedures to ensure that the safety management system is effective by using key performance indicators. (Refer to § 8.3.1 Safety data collection and analysis).

Key performance indicators measure safety performance of both the system and, where appropriate individuals, and allow the effectiveness of the safety management system to be determined.

In determining performance measures, operators must consider and select a range of positive performance indicators along with outcome indicators (or leading and lagging indicators). Positive performance indicators measure activities undertaken to improve safety performance, for example, the number of safety audits conducted, or competence checks undertaken, or the number of substance abuse tests conducted. The performance measures will be tailored to the specific circumstances of the rail and should be linked to the risk management process.

Outcome indicators measure the safety outcomes, for example the number of non-compliances revealed by a safety audit, or the number of positive results of drug tests, or

injuries sustained, or signals passed at danger. An example of a lagging indicator is Lost Time Injury Frequency Rate (LTFIR), which is a measure of the consequence of a risk happening.

Performance indicators selected should include indicators to measure the performance of key risk controls and safety management system elements.

Key performance indicators should be assessed against established performance objectives. Remedial action may be required where the system does not achieve an appropriate performance level.

The safety management system must also include systems and procedures to ensure the collection, analysis, assessment and dissemination of safety information held by the rail operator. (Refer to § 8.3.1)

8.1.5 Decision Taking

Commercial decisions are taken to meet commercial objectives. Investment to meet these objectives may also provide an opportunity to improve safety: new technology and ways of working often bring benefits in terms of performance, efficiency and safety.

Most decisions affect safety, even where this is not the main intention. Therefore, safety should be considered when taking decisions and legal obligations must be met. Management decisions must take into account the direct and indirect impact thereof on safety. Most major changes are made to meet commercial objectives or requirements that are not primarily about safety. For example:

- New technology might become available that can improve a company's performance
- Equipment might become life-expired, prompting decisions about how it should be renewed
- Operating conditions might change, presenting a company with commercial opportunities
- New legislation might be introduced
- Local complaints might draw a company's attention to a specific issue

The need to change can also arise from concerns about safety that are identified during monitoring. In this case, the options might relate directly to the implementation of new safety measures.

Processes must be transparent in order to understand how the final decision affecting safety was made. They are more effective when they include an understanding of:

➤ Identification of safety issues within the business context (examples as 'budget reduction'),

➤ Setting of priorities,

➤ Responsibilities at different levels,

➤ Methods available to address problems (analysis tools),

➤ The value of involving specialists, knowledge, skills and experience required,

➤ Extent of consultation,

➤ Output related actions (plans, timescale, and responsibilities for completion).

Therefore, failure to identify the impact of other management activities on safety and to include safety as a key business risk in all Board decisions could have catastrophic results. [Also refer to section § 8.4.3 below: "Management of Change].

8.1.6 Management Control

In general, management control is a means by which an organization's resources are directed, monitored, and measured.

It aims at helping the organization to accomplish, in the specific area of safety, its specific targets or objectives. Control on all levels of the organisation, proportionately put over the appropriate delegated functions/staff allows for the identification of flaws/faults in the SMS processes and therefore the possibility to implement preventive or corrective actions. Therefore, safety has to be effectively taken into account at every level of the organisation of the company, and any instances of malfunctioning must be detected and dealt with in good time.

For the top management it is therefore crucial, not only to ensure safety but also to fulfil its commitment and legal obligations to improve railway safety, to be aware of the results of performance monitoring and audits, and to take overall responsibility for implementation of changes to the risk control measures and relevant SMS processes. The following activities may represent examples of how the management control is put into practice:

➤ Design, implementation and monitoring of the delivery of the SMS activities, including the necessary risk assessment and management of changes,

➤ Design of the organisational structure, in order to comply with regulatory framework and all applicable rules, and allocation of resources,

➤ Delegation of responsibilities, functions and tasks to the appropriate level of the organisation,

➢ Delegation of control tasks to the appropriate level of the organisation and development of a feedback loop,

➢ Development and monitoring of a safety policy,

➢ Development and monitoring of safety measures and projects that allows continuous improvement (taking into account costs),

➢ Promotion of continuous education and training for all level of the organisation, to foster employee attitudes, management beliefs and value system,

➢ Usage of management tools to address safety issues (i.e.: problem solving tools and techniques),

➢ Benchmarking of performance results and processes,

➢ Balance between safety requirements and accessible resources,

➢ Improvement of managerial and technical processes,

➢ Integrating the customers' and suppliers' expectations,

➢ Carrying out internal audits and reviews on a continuous basis.

The above listed activities illustrate how processes for *design and improvement* are strictly connected: management commitment, monitoring and control ensure a continuous loop for input and delivery of safe operation.

8.2 Risk Management

The requirements for risk management and risk assessment are documented in SANS 3000-1 (Railway Safety Management).

Key to railway safety management is the risk management approach. Such an approach aims to ensure that railway operators identify their technical as well as operational hazards and manage the resultant risks to people, property and the environment to a level that is as low as is reasonably practicable (ALARP). The risk management process recognizes that the selection and content of the elements which constitute an SMS is influenced by the complexity and nature of the railway operation. This approach recognizes that, while there is an ideal level of safety, the costs of achieving this ideal might outweigh the benefits and limit the viability of railway operations. It is, however, implicit that railway operators shall protect their commercial and social responsibilities by running safe railways.

Risk could impact basically in the following three areas which are: financial, time or quality. Safety risks could appear in shapes of hazardous events in all three areas, which could be connected to technical systems, human or organisational factors. The responsibility for the safe operation of the railway system and the control of risks associated with it, belongs to the

railway operators, obliging them to implement necessary control measures and to apply national safety rules and standards. To achieve this, risk assessment (which is the overall process of risk analysis and risk evaluation) is a key element in any effective SMS.

Risk management is a critical activity of any organisation and the SMS must support the management of risk, as far as is reasonably practical to ensure that risks are identified, assessed and eliminated or controlled.

An operator's SMS must therefore include systems and procedures for the following:

➢ identification of any risks to safety in relation to railway operations in respect of which the operator is required to be accredited;
➢ the comprehensive and systematic assessment of any identified risks;
➢ specification of the controls (including audits, expertise, resources and staff) that are to be used by the operator to manage the identified risks to safety and to monitor safety in relation to those railway operations; and
➢ monitoring, reviewing and revising the adequacy of controls.

8.2.1 Control of risks associated with the activity of the Operator

a) <u>Risks related to activities carried out solely by the Operator</u>

To be able to control, under all conditions, the risks associated with their railway operations, Operators must set up a framework to systematically analyse all risks directly arising from work activities, job design or workload and implement appropriate controls to protect the safety of those undertaking and or affected by the tasks. This requires the identification of risks in a methodical way to ensure that all significant activities within the organisation have been identified and all the risks flowing from these activities are defined. By estimating the consequence and probability of each of the identified risks, it should be possible to prioritise the key risks that need to be analysed in more detail. When analysing such risks, the following elements must be considered:

➢ have a clear understanding of what work is involved;
➢ identify, analyse and evaluate the risks that are related to the work to be undertaken;
➢ identify ways of eliminating, mitigating or controlling those risks;
➢ set or approve specifications which detail the conditions to be fulfilled, including competencies of staff, exchange of safety related information(configuration, accessibility for review at all times, retention), data recording, etc.;
➢ implementation of a monitoring system to ensure that desired performance is achieved

b) <u>Shared risks (related to activities at interface)</u>

An Operator must also recognise the need and have the commitment to co-operate, where appropriate, with other entities (operators, manufacturer, maintenance supplier, entity in charge of maintenance, service providers, procurement entity, sidings, etc.) on issues where they have shared interfaces that are likely to affect the putting in place of adequate risk control measures. When analysing such interfaces, the following elements must be considered:

a) have a clear view of the processes and interfaces between parties;
b) have a clear understanding of what work the each party will undertake;
c) identify, analyse and evaluate the risks that are related to that work to be undertaken;
d) identify ways of eliminating, mitigating or controlling those risks (merely passing them onto others should not be a solution);
e) set or approve specifications which detail the conditions that each party must ensure, including competencies of staff, exchange of safety related information(configuration, accessibility for review at all times retention), data recording, etc.;
f) implementation of a monitoring system to ensure agreed performance is achieved.

Such monitoring can be part of or be integrated in an already existing quality or SMS and must ensure that appropriate monitoring of performance is conducted, corrective or preventive measures are identified and acted upon. During the risk analysis process, it is necessary to compare the estimated risks against risk criteria which the organisation has established. Risk evaluation therefore, is used to make decisions about the significance of risks to the organisation and whether each single risk should be accepted or treated, by selecting and implementing measures (be it technical, human, organisational or any possible combination of these) to control the risk.

8.2.2   Risks arising from the activities of other Parties

It is possible that other parties, external to the railway system, import risks onto a railway operator (i.e. level crossing, pedestrian and bicycle crossings, road network, pipelines, non-railway constructions, etc.). Other parties (external to the railway system) can be one or more of the following parties adjacent, under or above the railway operator, but not limited thereto: farms, petrol filling stations; pipelines; overhead electricity cables; informal settlements; road construction; etc. Although it is an accepted principle that the train operator does have a right of way it is also accepted that the operator does have certain obligations to all parties affected by train operations.

It is expected that the railway operator will have in place regular updated route risk assessments covering the entire network under their control which is indicative of the identified risks arising from the activities from other parties as well as the agreed mitigation measures to address the identified risks.

In general, it can said that for operating trains at level crossings, there are rules to be complied with at national and local level, and that is sufficient for Operators to operate in normal and degraded situations. However, there may be unexpected events that need to be analysed for ensuring that safety is maintained or improved.

It is more a task for Operator's to consider the safety impact of activities carried out at the interface with other transport modes (roads, waterways and other network operators) when designing or upgrading infrastructure.

In addition, working sites (either temporary or permanent) under, over or adjacent to controlled infrastructure may have impact on operation, and require the implementation of specific measures to ensure that safety is not lowered. In these cases, when analysing the interfaces with such external parties the following elements must be considered:

a. have a clear understanding of what activity is undertaken by such party and how it may impact on the railway operation;

b. identify, analyse and evaluate the risks that are related to that activities;

c. identify ways of cooperating with the relevant stakeholders, including Local and Provincial Government, in order to eliminate, mitigate or control those risks (for instance, setting specific separations or establishing safe working procedures for workers and protection of customers)

d. set or approve specifications which detail the conditions that the other party must ensure, including competencies of staff, exchange of safety related information (configuration, accessibility for review at all times retention), data recording, etc.;

e. implementation of a monitoring system to ensure agreed performance is achieved. Such monitoring can be part of or be integrated into an already existing management system and should ensure that appropriate monitoring of performance is performed. As and when necessary, corrective or preventive measures are identified and acted upon.

8.2.3 Procedures and methods for carrying out risk evaluation and implementing risk control measures

8.2.3.1 General:

Compliance with requirements does not ensure safe operation forever. Railway organisations must have systems in place to control changes to new projects and to manage the related operational risks.

Changes can apply to:

➢ techniques/technologies;
➢ operational procedures/rules/standards (either internal and involving interfaces);
➢ organisational structure.

The SMS must ensure that risk assessments are applied where appropriate. The procedures and methods are the tools to carry out risk evaluation, therefore they can be configured as key in the whole risk management process. The involvement of different levels of the organisation and of the different expertise (economical, technical, and organisational) within a risk assessment is bound to provide an important source of organisational learning [see also § 8.4.3].

8.2.3.2 Purpose:

The main purposes of an Operator's risk assessment are to support professional judgements about safety and to:

a) Meet the requirements of health & safety legislation.

b) Help ensure that the operator's managers and staff identify and understand all aspects of the risk associated with their operation (the potential hazardous events, causes, control measures and consequences that can influence their operation),

c) Provide confidence that a system can be operated safely given the equipment, facilities, safety management system and operating strategy in place,

d) Identify, understand and control the interfaces with other companies and related operations that can affect the safe operation of a system,

e) Assist in the identification of new control measures that could be used to reduce risk,

f) Help direct the development of an operator's safety plans and associated safety objectives,

g) Assess the change in risk which could result from a change in the operating strategy or following alterations/renewal of a system,

h) Enable resources to be directed effectively to achieve the maximum risk reduction,

i) Help determine the requirements and areas requiring safety audit and other monitoring measures,

j) Enable an operator to demonstrate that the level of risk associated with its operation is controlled to a level that is ALARP,

k) Provide a basis for continuous safety review and improvement,

l) Provide an input into the development of wider industry controls and standards

Risk assessments shall be reviewed at least annually or after a major railway occurrence or security incident, or when the safety performance has not improved, or on receipt of a directive from the relevant (national railway) Railway Safety Regulator.

8.2.3.3 Types of Risk Assessment:

Risk assessments can be of a qualitative or quantitative nature. 'Qualitative' refers to descriptive analysis and judgements about the factors relevant to risk. 'Quantitative' refers to numerical estimates and analysis of risk. In practice most analyses are based on elements of both. The two categories of analysis have the following common characteristics –

a) The effort and rigour of analysis are proportionate to the complexity and importance of the decision

b) The skills and competence used are relevant to support each judgement in the process

c) A person or group is identified as responsible for the assessment, taking account of all relevant judgement and analysis, and structured processes are used where appropriate

d) The evidence on which the assessment was based, and the reasoning used to interpret that evidence, are recorded. The records will again reflect the complexity and scale of the decision, (ranging for example from meeting minutes to a full formal analysis and report)

e) A degree of independent review or challenge may be necessary.

8.2.3.4 Documenting the risk assessment:

To enable a better understanding of the basis of the risk assessment and to make the assessment more meaningful, it is essential that the origin and derivation of the data behind each frequency and consequence estimate and all the assumptions made for the purposes of the risk assessment are justified and recorded within the risk assessment documentation. The records should include:

a) The risk assessment methodology used;

b) The sources of data/information used (including staff / experts involved in any workshops) and any key assumptions;

c) Any judgements made during workshop sessions. For cases where modified national data have been used an explanation of why it is believed the data is applicable should be given. Where possible, factors specific to the operation being considered which might increase or decrease the data with respect to the national average should be referred to, e.g. average passenger loadings, type of rolling stock and train speeds;

d) The results of the risk assessment for the most significant hazardous events (e.g. top 10) and identify where the arrangements for implementing the existing controls are in the SMS;

e) Summarise the results of the ALARP assessment; and

f) Identify any areas where there is a high level of uncertainty

This information would assist:

a) In demonstrating compliance with legal requirements

b) A reviewer in understanding the background to the risk assessment

c) In demonstrating that the risk assessment is robust

d) Anybody needing to change or update the risk assessment to understand where the assumptions, data and results have come from.

8.2.4   Compliance with legislation, rules and standards

Compliance with legislation, rules and standards is not an option. Operators must identify and understand the applicable laws and all other relevant standards and prescriptive conditions and must implement a system of controls to achieve compliance. The regulatory framework may include different documents such as national standards and other relevant rules,

applicable at national level. Therefore, it is crucial that all safety related procedures and processes of the SMS are:

➢ designed to comply with the regulatory framework and updated to take into account any variation or addition;

➢ consistent with type and extent of services operated by the organisation;

➢ consistent with relevant organisation changes.

To ensure this, an SMS must have a process/procedure in place to promptly identify, gather and list, relevant requirements contained in standards, national safety and technical rules and internal rules/procedures for example but not limited thereto:

➢ each individual category of staff,

➢ each type of rolling stock,

➢ safety equipment (personal protection equipment – PPE - and collective protection equipment –CPE-),

➢ other equipment (on board, on the ground, devices used for rolling stock and track maintenance).

Variations/additions in this regulatory framework must be promptly detected and recognised. For maintenance processes, organisations must comply with all legal requirements and relevant specifications, standards and requirements throughout the entire life cycle of equipment and operations.

Refer to SANS 3000-1 (Railway Safety Management) for further amplification on the requirements to ensure compliance to this element of the SMS.

8.3 Monitoring

A systematic monitoring system should provide assurance to managers and stakeholders that all identified risks are effectively controlled and evidence that the SMS requirements are being met. It provides the basis for defining any action needed to improve or maintain the targeted level of safety

8.3.1   Safety Data Collection and Analysis

The requirement for safety data collection and analysis are stated with SANS 3000-1 (Railway Safety Management).

In order to ensure that risk controls are applied and work in practice, an organisation needs to measure the level of application of these controls and their results. The collection of safety

data and the subsequent analysis allow the organisation to measure its overall performance, understanding where there are deficiencies in all SMS arrangements.

The collection of safety data is based on monitoring and must consider the following elements:

➢ Structured reporting of accidents / incidents / near misses / dangerous occurrences;
➢ Inspections findings (it could be for detecting non-compliance with operational arrangements and/or concerning the state of infrastructure or equipment);
➢ Audit results (mainly at design and implementation process level).

To make this data collection possible, an operator must ensure that the information or the unit of measurement for the specified indicator is available or can be established. In addition, a periodic evaluation of the scope and viability of indicators and tolerance levels is required.

The scope of data analysis must include the detection of:

➢ any deviance from expected outcomes (using lagging indicators);
➢ process anomalies (using leading indicators).

The KPI's of operators must include a selection of both leading and lagging indicators (Ref § 8.1.4).

'Lagging' indicators measure the final outcomes that result from an activity. Lagging indicators, like the number of accidents and incidents, demonstrate if a "safe" result is delivered. In a performance measuring system they allow the comparison with historical data, demonstrating at the same time the quality of results (e.g. improvement or worsening) and the possibility to be used in a predictive sense (e.g. the increasing number of signals passed at danger may be the precursor of a collision).

However, to have a complete picture on the effectiveness of the risk control measures also a selection of *leading indicators* needs to be compared with set levels of tolerance. These leading indicators are mainly based on proactive monitoring of the critical elements of risk control measures (i.e. those actions or processes which must function correctly to deliver the desired outcome) but also elements of the environment and/or assumptions made when designing the risk control measures (mainly during the risk assessment process) could be part of these critical elements.

'Leading' indicators are used to monitor the effectiveness of control systems and give advance warning of any developing weaknesses before problems occur. Some examples of leading indicators are:

➤ % of inspections completed to plan,

➤ % of maintenance actions identified by inspections carried out to timescale,

➤ % of staff carrying out actions without required competency,

➤ % of safety critical processes reviewed to timescales.

Internal accident and incident investigation provides the organisation with a reactive review of the performance of risk control measures and related processes of the SMS (lagging indicators). Therefore not only the immediate causes but also underlying causes are to be systematically investigated. Standardised arrangements for when and how investigation is carried out include:

➤ procedures for internal and external accident and incident notification and reporting;

➤ procedures, formats and approaches (e.g., site protocol) for investigations, eventually differentiated according to the nature of the accident (e.g., environmental, employee injuries, transportation of dangerous goods);

➤ procedures for reporting and documenting findings, conclusions and recommendations;

➤ procedures for reviewing risk control measures after an accident or incident, and for ensuring implementation of recommendations and preventive or corrective actions in order to prevent recurrence.

8.3.2   Accident and incident reporting / investigation / analysis / preventive and corrective measures

8.3.2.1 Management of notifiable occurrences

The operator's SMS must include systems and procedures for:

➤ the reporting of notifiable occurrences to the RSR, within the time and manner required in the legislation, including all the information required by the RSR as per SANS 3000-1 (Railway Safety Management)

➤ the management of the scene of a notifiable occurrence and for the preservation of evidence where reasonably practicable [ref §10.6]; and

➤ the management of all notifiable occurrences, including procedures to enable the determination of which notifiable occurrences are to be investigated and how investigations are to be conducted [ref § 8.3.2.3 below].

Supporting systems and procedures to ensure staff are appropriately trained and competent to deal with a notifiable occurrence are fundamental.

The management of notifiable occurrences is also closely related to emergency management planning [ref. § 10.6 Occurrence Management], which may be triggered for an emergency which is also a notifiable occurrence. For this reason, the two processes should be aligned. For instance, the procedures for the management of personnel at the scene of an incident in an emergency situation and responsibilities for notifying the RSR may overlap.

8.3.2.2 Reporting of notifiable occurrences

The reporting of occurrences to the RSR is a legal requirement in terms of Section 37 of the Act. The relevant section of the Act states that "an operator must report to the chief executive officer the category and type of all railway occurrences in the manner and form prescribed by the Minister".

Non-reporting of occurrences to the Regulator, late reporting or underreporting of railway occurrences is an offence in terms of the Act which may lead to a fine and/or revocation of the Safety Permit.

Notifiable occurrences that happen on, or in relation to the operator's railway premises or railway operations, must be reported by the operator to the RSR in the form, format and within the specified timeframes as prescribed by SANS 3000-1 (Railway Safety Management). Notifiable occurrences which are reportable to the Regulator can be related to:

➢ Security occurrences;
➢ Transport of Dangerous goods;
➢ Operational railway safety occurrences;
➢ Fatalities and injuries to employees, contractors, passengers, members of public
➢ Damage to railway assets
➢ Damage to the environment

8.3.2.3 Investigation of notifiable occurrences

The investigation of notifiable occurrences is addressed in section 38 of the Act and is further amplified in SANS 3000-1 (Railway Safety Management) and RSR 00-3: 2016 (Edition1).

Operators must ensure that they have in place procedures for the investigation of railway occurrences) with the primary objective of establishing the root cause(s) in order to prevent a recurrence. The scope and level of investigation shall be determined by the frequency of the railway occurrence and the severity or consequences (or both), both actual and potential.

The focus of such investigations should be to determine the cause and contributing factors, rather than to apportion blame. Persons appointed to investigate occurrences shall have the

necessary competence and independence, both in relation to the nature and seriousness of the occurrence, and the scope and level of the investigation.

The SMS must identify matters for investigation more broadly than simply responding of any instruction from the RSR to conduct an investigation of that occurrence or type of occurrence.

Requirements for systems and procedures for the management of the scene of a notifiable occurrence and the preservation of evidence are provided by section § 10.6 "Occurrence Management".

8.3.3   Internal Auditing of the SMS

The essential requirements for internal auditing of the SMS is amplified with SANS 3000-1 (Railway Safety Management). Internal audit of the SMS is mission critical in order to determine the adequacy and effectiveness of the SMS as well as the level of compliance thereto.

As a general principle, internal auditing serves the purpose of periodically reviewing the management system. In particular, the internal safety audit must assess if the procedures described within the SMS ascertain that the services of the Operator comply with relevant requirements and that all SMS processes are still effective. Operators must establish an internal auditing system, including planning of internal audits to be carried out. Staff in charge of carrying out internal auditing (auditors) must be competent and experienced in the field/matter they are assessing and also skilled and adequately prepared and trained to perform audit activity. Audits must be carried out in an impartial, independent and transparent way: auditors should be independent from the organisational unit being audited and conflict of interest between the assessing and the assessed party should be avoided.

The SMS must include procedures for:

➢ communicating the results of audits to those people who are responsible for the oversight of the railway operations in the area audited so that they may review the audit findings and take corrective action where appropriate;
➢ registration and implementation of recommendations for corrective action/s identified by the audit; (see § 8.4.2 Corrective Actions)
➢ review of the effectiveness of the audit program.

The various levels of management have different roles and responsibilities for providing oversight and taking action in relation to audit finds and recommendations for corrective action. The procedures for communicating the results of audits must reflect the need to provide

appropriate information to enable those with responsibility for oversight of the railway operations to meet their responsibilities within the safety management system and under safety legislation. For example the highest levels of management, (such as the CEO or Board or management committee) must be provided with information on the internal safety audit arrangements, and reports on the conduct and outcomes of audits or the audit program, and the review of effectiveness of the audit program.

8.3.4 Review of the SMS

SANS 3000-1 (Railway Safety Management) amplifies the requirement for review of the SMS at least once annually in order to ensure the the continuing suitability and effectiveness of the SMS.

The SMS must include systems and procedures for the review of the safety management system at specified periods, but at least annually. Operators must undertake consultation (Refer to 9.3.2) before reviewing the SMS. In conducting this consultation, the rail operator must ensure that those consulted are asked for their opinion on whether, and how, the safety management system can be improved.

In conducting the safety management system review the rail operator must ensure:

➢ that the effectiveness of the safety management system is assessed (including an examination of records in relation to notifiable occurrences and breaches of the system);

➢ that the effectiveness of any revisions that were made as a result of the last review are assessed;

➢ that any recommendations or issues arising out of any audits or safety investigations that have occurred since the last review are taken into account; and that any issues arising from any prohibition or improvement notices that have been issued by the RSR since the last review are taken into account;

➢ that any deficiencies in the system are identified;

➢ that methods of remedying any deficiencies are designed and assessed;

➢ that any opinions provided by people consulted, as to whether and how the safety management system should be improved, are assessed;

➢ that any other suggestions for improving the system that arise during the course of the review are assessed; and

➢ if any deficiencies or practicable improvements are identified, that a plan is created to remedy those deficiencies, or to effect those improvements (as the case may be).

It is good practice to nominate a person(s) responsible for conducting the review and updating the risk register as appropriate.

All of the above aspects of the safety management system review must be documented, and subsequently summarised and reported in the safety performance report provided to the RSR. [Refer to 9.4.3 – Annual Safety Improvement Plan]

The safety performance report must contain:

➢ a description and assessment of the safety performance of the operator's railway operations;
➢ comment on any deficiencies, and any irregularities, in the railway operations that may be relevant to the safety of the railway;
➢ a description of any safety initiatives in relation to the railway operations undertaken during the reporting period or proposed to be undertaken in the next reporting period; and
➢ any other information or performance indications prescribed in the regulations

While the rail operator is required to review its SMS and SMS report to the RSR as listed above they also needs to be responsive to issues as they arise and review the relevant parts of the safety management system so that it may be continuously be improved.

8.4 Organisational learning

An effective safety management system should rely on a continual, structured and documented reflection upon practice through monitoring performance, analysing data and results and establishing a feedback system to continuously improve its safety performance, culture and attitude

8.4.1 Corrective Action Development

The SMS must include procedures to ensure that, so far as is reasonably practicable, corrective action is taken in response to any safety deficiencies identified following inspections, testing, audits, investigations or notifiable occurrences.

The operator shall establish, document and maintain procedures for:

➢ The development of corrective action plans that focus on ensuring that the problem or occurrence will not recur
➢ Obtaining the appropriate management approval of recommended actions

- Formal monitoring of the implementation of and compliance with the corrective actions approved by management
- The application of controls to ensure that corrective actions are taken and that they are effective, and
- The implementation and recording of changes in procedures that result from corrective action.

In particular, procedures must be included for:

- registration of any corrective actions taken;
- the review of those corrective actions;
- the implementation of corrective actions if it is determined that corrective actions are required;
- the assigning of responsibilities for corrective action; and,
- giving priority, when undertaking corrective action, to those matters representing the greatest safety risk.

Corrective action is necessary to address matters that arise from, but are not limited to

- Directives issued by the Regulator
- Occurrence investigation reports
- Safety audit reports
- The evaluation of compliance with standards
- Risk control strategies
- Skills and competency requirements, and
- Safety performance data analysis

Procedures for the implementation of corrective action must provide a link to processes for the management of change where appropriate. (See also section 8.4.3 on Management of Change).

A system of internal control should apply to the management of corrective actions. While individual corrective action may be taken at a local level for some issues, there must be an overarching process where higher levels of management monitor the implementation of corrective action.

Reports on incomplete corrective actions must be provided to progressively higher levels of management as actions remain incomplete. The length of time that may elapse before the escalation occurs should be dependent on the level of risk associated with that particular action. For example a corrective action that is assessed as safety critical may have reporting

to higher levels of management earlier, and perhaps in more detail, than one that is of lesser safety significance.

8.4.2   Continuous Improvement

Continuous improvement can emanate from e.g.:

➢ auditing results
➢ SMS review,
➢ outputs from audits and inspections,
➢ output from accident reports,
➢ research,
➢ ad hoc ideas contributed from personnel,
➢ new legislation, etc.

In order to be effective and support decision-making, a continuous improvement process must cover and extend to all relevant phases of an organisation's SMS, e.g.:

➢ planning of preventive/corrective actions,
➢ their implementation on an adequate scale,
➢ assessment/monitoring/verification of their effectiveness,
➢ enforcement, review and revision of plans and risk control arrangements.

In combination with appropriate statistical tools to analyse data, continuous improvement must ensure that all processes are periodically revised in a systematic way. The most common representation of this cyclic activity is the 'Plan – Do –Check – Act' management circle, or Deming cycle.

Improvements should be assessed to ensure they are reasonable to be carried out. The assessment must take into account wider operational and business benefits.

8.4.3   Management of Change

The purpose of the management of change process is, first and foremost, to ensure that change is introduced safely, so far as is reasonably practicable.

Management of Change is the process to control changes in existing and new projects by identifying potential hazards and defining appropriate control measures before the implementation of a change. This process must be carried out during the consecutive steps of the project:

> ➢ identification of the need for change (e.g. after analysis of safety data, optimization of resources, obsolescence of equipment, etc.);

> ➢ determining feasibility;

> ➢ design;

> ➢ planning.

The above mentioned elements of the process are expected to support the implementation of changes: the identification of the need for change, the determination of feasibility and the design of the change are mainly management driven activities, whilst planning is more a process for implementation. The final aim is to give evidence that such changes do not decrease the level of safety in the system, and enabling traceability of implemented changes.

The organisation as a whole must rely on the change management process to identify changes within the organisation which may affect established safety related processes and services:

> ➢ to describe the arrangements to ensure safety performance before implementing changes;

> ➢ to eliminate or modify safety risk controls that are no longer needed or effective due to changes in the operational environment.

When additional risk control measures are to be implemented, relevant intermediate steps need to be identified and the level of implementation needs to be measured.

8.4.3.1 Change management procedures in a safety management system

Operators should have a range of management of change processes that require an increasing level of scrutiny as the potential level of risk associated with the change increases. The safety management system must include procedures for ensuring that changes that may affect the safety of railway operations are identified and managed, including but not limited to procedures for ensuring, so far as is reasonably practicable that:

> ➢ the change is fully identified, described and documented in the context of the specific rail organisation;

> ➢ the changes are documented in a specific change register, the risk register or other appropriate means in the safety management system;

> ➢ affected parties are identified and, where practicable, consulted;

➢ the roles and responsibilities of safety critical employees and employees of the rail operator are clearly specified with respect to the change;

➢ the risks to safety that may arise from the change are identified and assessed;

➢ the controls that are to be used to manage risks to safety and monitor safety are specified;

➢ the information in the risk register is updated with any changes to risks and control measures;

➢ that the proposed change conforms to legislation;

➢ where appropriate, the change should also be consistent with accepted codes or standards;

➢ the safety critical employees and employees of the rail operator are fully informed and trained to understand and deal with the proposed change;

➢ this may involve a review of the competence requirements for the tasks to be undertaken;

➢ review and assessment of the change, once implemented is undertaken to determine whether the change has been appropriately managed;

➢ monitoring and review of the effect of the change should be undertaken, documented and necessary corrective actions implemented, to ensure that control measures perform as intended;

➢ decisions are transparent and formally accepted by those responsible for decision-making within the rail operator.

8.4.3.2 Types of change to be managed

Operators can be subject to changes from both internal and external sources. Internal sources of change may include: turnover in staff; the findings or recommendations of internal audits; directions from the Board or Management Committee; findings from internal investigations, organisational restructuring, or changes in the organisation's physical assets (such as new equipment).

Technological change in particular may occur as:

➢ changes to the functional specification of an asset, e.g. more or less performance from a particular asset is needed in the future (as business demands may be about to change)

➢ changes to the physical characteristics of an asset, e.g. another asset with the same functional performance is needed in the future (for reliability, safety and/or cost reasons)

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> changes to the derived data associated with an asset, e.g. a differing maintenance task, spares needs, and technical manual for a particular asset is needed in the near future (as the current maintenance seems ineffective and/or appears costly).

In some situations change will involve an entirely new asset and operation. Such situations of a fresh design offer the ability to make step changes in safety and performance as many existing constraints are absent.

External sources for change may include: legislative or regulatory changes; safety investigation authorities; road authorities; other rail operators; suppliers; or rail contractors. These changes may present themselves as:

> planned change, for example change brought about by business or strategic plans;

> unavoidable, unplanned or unintended change, including 'creeping' or 'incremental' change, where the impact at any time may seem minor, but which over a period can increase risk;

> a change to an interface;

> legislative change or a direction from the RSR;

> temporary change (such as the installation process for new equipment);

> emergency or abnormal change which may be required within a short timeframe and therefore may require different controls.

The operator's management of change procedures must enable the different types of change to be identified in advance and managed appropriately.

8.4.3.3 Technological change for designers and suppliers

Designers and manufacturers of things that are to be used as or in connection with rail infrastructure or rolling stock have a safety duty. Certain attention must be paid to the commissioning and ongoing maintenance of rolling stock to ensure that decisions at the design stage of development consider safety at each subsequent stage of the product life cycle to minimise future risks. The risk management process in managing technological change must encompass all aspects of design including structures, components, systems hardware, systems software, controls, layout, and configuration.

Rail operators and designers must consider the principles of engineering safety management in commissioning or designing rail equipment or infrastructure.

8.4.3.4 Consultation during change

Consultation with persons affected is an integral part of managing change and must be included, where reasonably practicable, at regular intervals throughout the management of change process. Proper consultation with key stakeholders about proposed changes will ensure that a risk is not transferred to those stakeholders without their knowledge.

The level of consultation will be guided by the scale of change; major change will likely require a wide and comprehensive consultation, whereas minor changes may only need consultation with those directly managing the task.

The guiding principle is that it is better to consult with people no matter how little they may be affected by the change, as part of an open and transparent management of change process and good risk management. There are specific requirements for who a rail operator must consult with when establishing or reviewing a safety management system (Refer to section 9.3.2 Consultation).

8.4.3.5 Steps in the management of change:

The amount of scrutiny and detail at each step should reflect the scale and risks involved with the change. For example a riskier project would require more careful planning and risk analysis than a routine change.

There are two aspects of risk in relation to a change: (a) Risks associated with the change itself, and, (b) the risk associated with the process of introducing the change (for example the risks of building a new bridge). Each will have an influence on the practicability of potential solutions to the problem at hand. It is a fundamental objective of the change management process that both aspects of risk are managed.

STEP 1: **Establish the context of the change and consult with stakeholders.**

This step involves identifying the change and developing the necessary plans for change management in consultation with stakeholders, including interfacing organisations.

A clear description of the current situation, including the problem or matter that the change seeks to address, and the change itself, is required. This should be sufficiently detailed to fully define the overall nature and scope of the change. Changes can be defined and analysed at several levels, including project level, component level and/or process level. More than one may be applicable.

Where the rail operator has a range of management of change processes in place that require varying levels of scrutiny, the appropriate process is selected.

Each management of change process should:

➢ describe safety documentation requirements (such as safety validation documentation), including whether a change management plan is required;

➢ specify whether independent safety validation assessment is required and how that is to be achieved;

➢ identify the authority responsible for granting or refusing approval for implementation of the change (may include road authorities or other authorities outside of the RSR); (Refer to Section 9.4.5 – Changes to the SMS)

➢ and provide criteria and guidance on the extent and nature of the consultation and briefing that should be carried out for the level of safety validation being applied.

Changes that involve new or modified assets, plant, equipment or information technology for which a project life cycle applies must be subject to processes that consider the life cycle of the project, including:

➢ concept and feasibility;

➢ definition of requirements;

➢ design;

➢ implementation;

➢ installation and commissioning;

➢ operations and maintenance;

➢ modification; and

➢ decommissioning and disposal.

STEP 2: Undertake a risk assessment.

This step is the actual undertaking of a risk assessment on the proposed change and deciding how the risk, including the controls, can be managed so far as is reasonably practicable. Appropriate use of risk management tools and techniques as part of the management of change process ensures that the potential impacts are understood. This requires an in depth understanding of the change proposed, its potential impacts on current activities and operational interfaces.

When an operator undertakes a risk assessment, the emphasis is usually on any new incidents or associated hazards that could arise from the proposed change. The assessment

should also take into consideration any existing risks and common cause failures should be considered where the change is not independent of existing systems or functions. The operator should compare the level of risk before and after the proposed changes.

The operator should ensure that the new cumulative impact of all the hazards does not increase the overall risk of rail operations, without appropriate management. This may require the implementation of additional controls initially rejected because the benefit was marginally less than the resources to implement them. The RSR requires that operators eliminate or reduce the risks to safety of their operation so far as is reasonably practicable. If the level of residual risk increases following a change it could be argued that the lower level of risk that existed before the change was introduced was clearly reasonably practicable and that the change which increased the level of risk is therefore not in compliance with the safety duty.

Therefore, as a general principle, operators must be endeavouring to achieve a level of residual risk following implementation of the change that is at least the same or better than the residual risk that existed prior to the implementation of the change. If an increase in residual risk is unavoidable, it would be prudent for the rail operator to keep records demonstrating why the lower level of risk is no longer reasonably practicable.

Risk assessments of proposed changes should extend to consideration of opportunities to improve previously existing risk controls.

Change may alter the balance of risk exposure to different groups. Operators must endeavour to ensure an equitable balance of risk exposure to affected groups. Where the change involves a potential increase in risks to another party, the management of change process must cover how those risks are likely to be increased and subsequently managed.

For example a change may reduce risk to a group, but introduce or increase risk to another group or an individual. In such circumstances there is a need to balance the risks affecting each group so that one group does not suffer very high levels of residual risk in order to reduce or remove the risk to the other.

Where existing risk controls are removed the decision should be documented, explaining what controls have been removed and why, and how the associated risks are to be managed.

STEP 3: Evaluate levels of change and develop an implementation plan

This step requires evaluation of the consolidated information gathered, further consultation (if practicable) with appropriate stakeholders and making decisions on the options available. The change and associated activities are identified and an implementation plan developed.

The implementation plan must address a range of matters including:

➢ plans for introducing the change including all necessary modifications to the safety management system and regulatory approvals;

➢ communication, whereby important changes regarding operations, equipment and procedures are effectively communicated throughout the organisation;

➢ requirements for instruction and training;

➢ any additional resources required to implement the change, for example supervision or verification;

➢ documents that need to be revised, for example, operating procedures, risk registers, training material, interface coordination plans, emergency plans and management of change documentation itself;

➢ and plans for monitoring and reviewing the change following implementation.

Regulatory requirements and timeframes are an important part of the implementation plan. In considering the time at which to lodge an application for variation to accreditation, for example, an accredited operator will need to be mindful of the definition of railway operations; and the circumstances in which the accredited operator may be considered to have commenced any new railway operations not addressed in the scope and nature of the initial accreditation. For instance, an accredited operator would need to apply and have approved any application for variation to accreditation before constructing any railway, railway track and associated track structure or rolling stock. (Refer to Section 9.4.5 – Changes to the SMS)

Similarly, an accredited operator must need to have a variation approved before commissioning any new rail infrastructure or rolling stock. For this reason, the accredited operator must ensure that any application for variation of accreditation is submitted in sufficient time before the carrying out of any new railway operations to ensure compliance with the RSR.

It is therefore advisable that the rail operator contacts the RSR early in the planning process to determine and initiate any regulatory requirements for the proposed change. Information from the RSR may better allow the rail operator to plan for notification or approval times and improve the RSR's understanding of the project.

STEP 4: Document changes and obtain approvals

This step involves consolidating documentation on the change including any supporting records (such as external reports, quotes, or findings). The change must be clearly documented and gain internal sign off from the appropriately authorised independent person or persons within the rail operator.

An independent safety validation where the proposed change relates to major projects must be undertaken by an appropriately experienced and/or qualified person who is independent from the change. In the railway industry this person is normally called an Independent Competent Person (ICP)

There are three important things to consider when appointing an ICP.

Competence

a). They must have the _skills and knowledge_ needed to carry out the Safety Validation. Operators may wish to gather and keep evidence of this. This evidence could include:

   • experience in the industry or the type of work and workplace;

   • direct knowledge of the specific process they are overseeing, such as making sure vehicles are acceptable or replacing signal systems;

   • experience of the regulatory process, in terms of setting standards and gathering evidence appropriately;

   • written qualifications that can be checked;

   • being aware of current best practice; and

   • being aware of the limits of their skills and experience.

Impartiality

b. They must not have been responsible for any of the things they will have to assess because that might cause them to be biased in their assessment

Independence

c. They must not be part of the line management team that is responsible for the project. For example:

   • they should not benefit personally from the project being completed successfully and quickly;

- they should not profit (other than any remuneration for acting as the independent competent person) from the project being introduced, such as if they run or own shares in a company which makes parts being used in the project;

- they should not verify the suitability of a product or component that they designed or built;

- an ICP should report direct to senior management and not be responsible for designing the project; and

- they must have the authority to ask for information, carry out examinations and make recommendations.

The main sources of ICPs in the railway sector are likely to be:

- in-house experts (see below);

- other operators;

- consultants; and

- individuals acting independently.

In-house ICPs: A competent person does not have to be employed by another organisation (a 'third party') to be independent. It is perfectly acceptable for SV to be done in-house. The most important thing is to show that the ICP is independent enough from the project to give an objective (unbiased) assessment. It is important that the ICP has appropriate levels of impartiality and independence from pressures, especially of a financial or operational nature, which could affect sound judgment.

They should not verify their own work, and their management lines should be separate from those people whose work they are checking. For instance, it is acceptable in principle for an operator's in-house team or chief engineer to check work done elsewhere in the same organisation. However, it would influence objectivity if that team or individual's management chain included the manager responsible for meeting targets that might be adversely affected by the findings of the verification process.

Where a group of individuals are fulfilling the ICP role, the transport operator, or responsible person should make arrangements to ensure that tasks such as record keeping are carried out consistently. Decisions on verification standards are for the transport operator or responsible person to take. If ICPs have differing views, the transport operator or responsible person will need to make an informed decision on how to proceed.

STEP 5: Review of Safety management system

This step involves the operator reviewing, and revising where necessary, its safety management system, risk register, emergency plans and interface agreements.

STEP 6: Implementation

Once a change has received the necessary internal and external approvals, the change may be implemented using the approved implementation plan.

It is essential that the approved implementation plan is fully carried out, including making all necessary modifications to organisational documentation, such as the safety management system, risk assessments and other operational documentation.

STEP 7: Monitoring and review

The following questions should be asked at this step in the management of change process:

➢ have any new risks eventuated or pre-existing risks increased after implementation? Have any pre-existing risks been reduced or eliminated?

➢ are additional risk controls, implemented as part of the change, appropriate?

➢ have performance targets for the change been set, and where applicable organisational key safety performance targets been reviewed?

➢ has training been provided to staff affected by the change?

➢ has a post implementation competency assessment been conducted to ensure the training provided was adequate for facilitating the change?

➢ is there a process to revise the risk assessment as new information accumulates?

Monitoring and review arrangements can be introduced immediately following the implementation of the change to ensure all risk controls, including training, have been effective, and that documentation has been updated.

9.   PROCESSES FOR IMPLEMENTATION

To make the sometimes very complex design and operational processes work effectively, there is a need for a set of processes for implementation. The processes should serve to implement activities and to assure that such activities are being carried out and that results are obtained.

In this context, people need to know what their role in the system is and what they're responsible for. Therefore, the structure [ref § 9.1] must include identification of responsibilities and assignment, where appropriate, of functions and activities to people. They also need to have the knowledge and skills [ref § 9.2] to know what to do in all circumstances and at all time they need to have all relevant information [ref §9.3] available in an adequate form.

Resource management, and in particular the suitability of professional competence and health requirements to perform safety critical or safety related tasks is a key factor for delivering safe operation.

Processes for implementation underlie and ensure documentation [§9.4] of all operational and processes for design and improvement, since they are necessary to implement them efficiently and therefore to run the business.

9.1 Structure and Responsibilities

The safety management system must be based on a clear distribution of responsibilities and on adequate human and technical resources, in order to deliver safe operations. This can be achieved through determining management accountability, an enabling organizational structure and effective work load planning.

9.1.1 Distribution of authorities and responsibilities

The requirements for authority and responsibilities structures, including the responsibilities of the Nominated Manager are described in SANS 3000-1 (Railway Safety Management).

Each Operator must clearly identify and define the areas of responsibility related to railway safety, in order to allocate them at the appropriate level, within their organisational structure, to associated staff and/or specific functions. Delegation of responsibilities and safety tasks must be formal and approved by the senior/top management and by the staff member responsible for the specific function and safety task.

An organisation needs to ensure that staff with delegated responsibilities has the authority, competence and appropriate resources to fulfil their function. Therefore responsibility and competence must be coherent and compatible with the given role/task. Clear authorities, roles, tasks and objectives for safety at all levels in the railway company have an important part in the design and implementation of a SMS by ensuring that staff at all levels takes responsibility.

It is essential in any management system that each person responsible for implementation of the system has a clear understanding of their accountabilities, responsibilities and authorities in relation to the system (including limits of authority). This must cover the scope of operations at any given time, i.e. business as usual, degraded and emergency situations.

To achieve this, the SMS must include documents that describe the responsibilities, accountabilities, authorities and interrelation of the personnel who manage or carry out rail safety work, or who verify such work. These requirements may be satisfied by organisational charts supported by position descriptions which describe the key dependencies between roles.

Similarly the SMS must support the role of safety personnel by specifying procedures for safety personnel to report safety risks, for example through safety management committees. Documents that describe the authorities given to safety personnel to enable them to meet their responsibilities must also be included in the safety management system.

When assigning responsibilities, accountabilities and authorities, particular account must be taken of the need for:

➢ the nomination of a manager who, irrespective of other responsibilities, is responsible for maintaining, reviewing and reporting on the organisation's safety management system [refer to SANS 3000-1 (Railway Safety Management)];

➢ individuals to have the necessary authority to execute their responsibilities;

➢ individuals to be held accountable for the execution of their responsibilities;

➢ clear lines of accountability for personnel certifying the safety of critical infrastructure, equipment and operations;

➢ personnel who manage or carry out work relating to the safety of the railway operations, or who verify such work, to be given the necessary organisational freedom and technical authority to;

- initiate action to prevent unsafe occurrences;

- initiate, recommend or provide solutions to railway safety issues through designated channels;

- initiate action to learn from railway safety occurrences and to prevent any recurrence;

- verify the implementation of solutions;

- control further design, construction, commissioning, operation or maintenance activities so that any observable deficiency or unsatisfactory railway safety condition is corrected; and

- identify internal verification requirements, provide adequate

9.1.2　Management accountability

The railway organisation must ensure that those given roles, tasks and objectives in safety management are accountable for delivery of the business safety objectives for which they are responsible.

Adequate supervision, in line with monitoring mechanisms, compliments the provision of information, instruction and training to ensure that the safety policy of an organisation is effectively implemented and developed. Good supervision regimes can form a powerful part of a proper SMS.

9.1.3　Organisational structure

The organisational structure of an Operator must be appropriate to deliver the safety policy and safety approach of the organisation, so that:

➢ Risk controls fit sensibly into management structure (the design of the structure should cover all internal and external interfaces);

➢ Responsibility for and delivery of (possibly conflicting) business objectives in a safe manner are transparent and effectively deal with interfaces;

➢ Resources are effectively allocated;

➢ Safety related information reaches all levels of the organisation

9.1.4　Workload planning

Good planning of activities will significantly improve the way that organisations manage safety, by providing the sufficient and appropriate resources to complete tasks. The SMS may benefit from having procedures for estimating the necessary resources that the company will need:

➢ to operate and maintain its railway operations;

➢ to implement, manage and maintain its safety management system as a whole;

➢ for the preparation of plans to ensure adequate assignment and workload.

Such processes must be expected to be part the normal business planning cycle, and subsequently reviewed to ensure that resources are being appropriately managed. This will lead to effective risk control as well as to efficient operation.

Operators are required to classify their workforce involved with safety tasks in railway operations into "safety related" grades and "safety critical" grades and submit a list of those grades to the RSR as part of their SMS Report. When work to be assigned includes execution of safety related or safety-critical tasks, the job-design shall take into account the following:

- the volume, frequency, nature, intensity and duration of tasks to be completed is not excessive at times when a safety-critical task is being carried out;
- where safety-critical tasks are combined the operator is able to demonstrate that safety is not compromised. For example:
  - there is no requirement for independence of the combined tasks,
  - the combination is permitted by national safety rules,
  - the combination contains no "functional" contradictions;
- there are no contradictions between execution of safety-critical tasks and other objectives assigned to staff (for example: systematic conflict between safety and production, lack of resources, etc.).

The operator shall put into place processes and procedures to ensure direct behaviour monitoring of safety related and safety critical tasks, which must address the following at a minimum:

- Monitoring of relevant task performance indicators (e.g. train handling, speed, radio communications)
- Monitoring of safety critical communications;
- Immediate post-occurrence investigations or tests, and
- Adherence to rules pertaining to workload limits

9.2 Fitness for duty

Fitness for duty outlines the factors that must be assessed before an individual can be declared fit to perform their duties. An organisation must ensure that all staff with a responsibility in the safety management system are fit for duty to ensure safe, effective and efficient delivery of its objectives, in all circumstances. Fitness for duty of personnel is crucial for safe railway operations since it minimizes the extent to which personnel psychological and physical conditions and the resulting performance may compromise safety. (Refer to SANS 3000-4:2011 Edition1).

The operator must establish, develop or adopt, document, implement and maintain policies, processes and procedures to manage employees who, whilst on duty, experience problems that might impact on fitness for duty, in accordance with the relevant national legislation.
The fitness on duty of personnel must entail continually ensuring a match between employee capabilities and task, environmental and organisational demands. This must be achieved through identifying, measuring and managing the following:

- Medical conditions – psychological and physical;
- Fatigue;
- Substance abuse;
- Medication;
- Pregnancy;
- Training and development;
- Employee wellness;
- Employee Stress.

9.3 Information

Organisations must define information control procedures, based on existing management systems. Safety information must be readily available for consultation and/or verification. The necessary flow(s) of internal and external information has to be identified and acted upon.

9.3.1 Configuration control of safety information

Measures to control vital safety information are important to maintain and improve safety performance within an organisation. The availability of correct information enables awareness and allows for corrective actions to be taken promptly and efficiently.

There are several types of information to be managed, with different degree of criticality for operation:

- operational urgent information concerning train movements, like late notices, temporary speed restriction, dangerous goods, hauled load, etc.;
- operational safety information/documentation, like braking sheet, train schedule, etc.;
  - operational permanent information documentation like rules books or route books, permanents safety orders, etc.;
  - more general SMS information (feedback of experience, staff involvement, minutes of meetings, etc.).

The elaboration, transmission, archiving requirement and processes may be different for the listed types of information. As a general principle, organisations must ensure that key operational information is:

- relevant and valid,
- accurate,
- complete,

➢ appropriately updated,

➢ controlled,

➢ consistent and easy to understand (incl. the language used),

➢ staff are aware of its existence before it must be applied,

➢ easily accessible to staff and where required copies are formally given to them.

A method to format and generate controlled document is to provide appropriate fields at least for:

➢ unique identification number,

➢ date,

➢ responsible person for preparation,

➢ responsible person for authorising the release (of the original document and of the following revisions),

➢ list of revisions

9.3.2 Consultation and Involvement of staff and staff representatives

The rail operator must undertake consultation before establishing or varying the safety management system. The safety management system must include auditable systems and procedures to ensure that this consultation occurs.

Consultation must be undertaken, so far as is reasonably practicable, with

➢ persons who carry out railway operations, or work at the rail operator's railway premises or with the rail operators rolling stock and who are likely to be affected by the review or variation of the safety management system;

➢ health and safety representatives within the meaning of occupational health and safety legislation representing any of these people or entities;

➢ any union representing any of these people;

➢ any other rail operator with whom the rail operator has an interface co-ordination plan relating to risks to safety of railway operations carried out by or on behalf of either of them; and

➢ the public, as appropriate.

People or entities that carry out railway operations may include contractors, or personnel sourced from labour brokers. Consultation processes must include reasonable opportunities for persons consulted to make submissions on the safety management system and to advise them in a timely manner of the outcome.

In general, consultation with the public would be considered appropriate where the public may be affected by the establishment, review or variation of the safety management system. This may be where a control requires a particular action or understanding of the public to be effective. For example, it would be appropriate to consult with the public when installing a new door operating device on a passenger carriage.

When undertaking consultation rail operators must bear in mind that effective consultation:

➢ occurs early, before the agenda is set and decisions are made;

➢ is planned, genuine and collaborative, within a process that is open and receptive to rail safety worker participation and where the rail operator is interested in and values safety critical employees' ideas;

➢ is characterised by mutual trust and respect between the rail operator and its safety critical employees;

➢ requires the application of interpersonal, facilitative and listening skills;

➢ includes a proactive role for safety critical employees, who are encouraged to suggest ideas;

➢ may require that training in communication skills and risk assessment be provided to enable effective participation by safety critical employees;

➢ requires the provision of relevant information;

➢ provides opportunities for feedback on issues raised, including opportunities for one on one communication where this is reasonably practicable; and

➢ results in outcomes that improve the safety management system. Within any organisation, involvement of staff is a key element in developing safety culture, gaining staff confidence and encouraging cooperation, support and acceptance. The involvement of staff in the implementation of a SMS is crucial for the development, maintenance and improvement of a strong safety culture within the organisation.

Employee and representative consultation in drafting the company safety policy is recommended.

A collaborative approach will help ensure that significant employee concerns are addressed in the policy and will provide an additional vehicle for communicating the railway's commitment to safety to employees. Employees and their representatives must also be consulted in setting annual safety targets and identifying the associated safety initiatives. Consulting with employees and linking the target-setting process with the risk management process will help ensure that the most significant outstanding safety issues and concerns are addressed.

Employees and their representatives can make important contributions to each step of the risk assessment process that should include mechanisms for employees to identify safety issues

and concerns on a routine and ongoing basis. These mechanisms should have a high level of visibility and participation to ensure that all risks are captured. Employees and their representatives must also be involved in the development of risk control strategies, particularly for risks that they have identified. Employees must be informed of actions that are being taken or that are planned to address the safety issues and concerns they have identified. Feedback is essential to ensure continued participation.

9.3.3   Internal / external communication

Organisations cannot operate without communication. Communication can take various forms but all forms involve the transfer of information from one party to others. Communication processes in place within the organization allow the SMS to function effectively.

The exchange of relevant safety information is crucial within and among organisations.   It is therefore important that defined reporting channels and interfaces exist, within a structured process, to ensure that knowledge and understanding of the SMS is ensured and all safety relevant information [ref. § 9.3.1 on configuration control of safety information] is conveyed to or available for the right person/role/function in a prompt and clear way.

Internal communication refers to all levels of an organisation, as for instance:

➢ staff involved in SMS design, implementation and delivery,
➢ staff involved in operational and organisational arrangements and changes,
➢ operational staff.

There are three interrelated methods for communication within an organisation:

(i)   Visible Behaviour
(ii)   Written Communication
(iii)   Face - to - face discussion

Managers may wish to acknowledge and if possible remove barriers to the official communication. Examples of obstacles or barriers include illiteracy, language differences, reprisals (supervisory and/or peer), or other forms of discrimination. Incentive programs, substance testing programs, and disciplinary mechanisms should be carefully designed and implemented to ensure that employees are not discouraged from reporting job related injuries, illnesses, hazards, and risks.

External communication refers to safety aspects that may be relevant, but not limited, to:

- other companies operating on the same infrastructure (maintenance providers, service providers, etc.),
- suppliers / contractors,
- customers,
- regulatory agencies
- other stakeholders (users, neighbours, all kind of authorities).

The exchange of information may especially pertain to known hazards that need to be controlled by others. Good two way communication is also essential because it supports the development of a positive safety culture.

9.4 Documentation

9.4.1 SMS Documentation

Processes and procedures describing activities, having direct and indirect effects on railway safety, are relevant parts of the SMS, both at an organisational and operational level and should be duly documented to ensure traceability.

Refer to the requirements for document and data control as contained in SANS 3000-1 (Railway Safety Management).

SMS documents must be promptly and accordingly updated in case of relevant technical, operational and organisational changes, even if they do not affect operational safety directly. The documentation needs to ensure the traceability of SMS processes.

Up-to-date and consolidated documentation describing the characteristics and elements of the safety management system must exist.

A formal document on SMS is to be submitted by Operators applying for a Safety Permit (Refer Part II – Section 5 and 9.4.4 below). The document underlines the main elements of the railway operator's SMS. It must detail and give supporting information and evidence of the different processes or company standards/rules implemented (or in the phase of implementation), cross referencing or linked to the items identified in Annex III. In addition to the manual, a set of procedures is requested. A procedure is the specified way to perform a task.

9.4.2 SMS Report

9.4.2.1 The operator shall submit his documented SMS report to the Regulator in order to demonstrate his ability to manage railway operations safety. This report is intended to provide:

➢ Evidence that the operator has the ability, commitment, organization and resources to properly assess and effectively control the risks to assets, environment, health and safety of its customers, staff, contractors, visitors and others who may be affected by its railway operations.

➢ A comprehensive working document against which both the operator and the regulator can check that the accepted risk control measures and SMS have been put properly into place and continue to operate in the way in which they were intended.

➢ Visibility of the processes being applied to demonstrate that the operator's arrangements for ensuring safety are effective and sufficiently robust.

9.4.2.2 The SMS Report describes:

➢ The Operator's organisational and procedural arrangements through which it will ensure safety of railway operations.

➢ The Operator's arrangements to be implemented and further activities which are still to be carried out to ensure the ongoing safety of operations.

9.4.2.3 The structure and content of a SMS report shall be as follows:

9.4.2.3.1   General:

The following information shall be documented and provided in an SMS Report:

➢ The name, physical and postal address, and company registration number, including the name, physical and postal addresses and contact details of the Nominated Manager

➢ A systems description of the operator which must provide the Regulator with a holistic business overview of the following:

• A statement of strategic intent, nature of the business (freight, passenger, heritage, etc.), vision and mission statement, business philosophy, envisaged market growth, including new works during the period of issuance of new Safety Permit

• Organogram, number of employees, geographical areas of business,

• Annual volume of passengers and tonnage transported, number of yards, sidings, number and types of rolling stock and locomotives

- Description of train operations (including signal and telecommunication systems in use), depot operations and station operations

- Maintenance strategy: broad maintenance strategy; person in charge for delivery of maintenance arrangements (maintenance organogram); shared maintenance responsibility, management of contractors, introduction of new technology, asset configuration process.

- A summary of the key aspects of the elements of the operator's SMS as required by SANS 3000 series of standards

- A list of the applicable titles and dates of relevant safety-related legislation,

- A list of all the applicable SMS Standards

- A list of all the applicable SMS procedures

- A list of all the safety critical and safety related positions

- A list of the training courses required for each employee who does safety related work

- A list of interface agreements with other operators with whom the applicant interfaces

- Safety Improvement Plan

9.4.2.3.2   Additional Information by the Network operator:

The Network operator shall supply the following information

a) A description of the network, with the following suitable diagrams attached:

1. A diagram of the infrastructure (e.g. track gauge, bridges and tunnels, servitudes and wayleaves (where applicable), train control systems and related telecommunication methods, and electric traction infrastructure; and

2. A diagram of the geographical areas of operation, including

    i.   The train service border areas

    ii. The network borders

    iii. The sections of lines with route kilometres and single track kilometres

    iv. The location and type of level crossings (vehicle crossings and pedestrian crossings), and

    v.   The total number of private sidings, and the number (s) of sidings in use

b) Operational descriptions, for example train control systems (such as colour-light signalling; radio based train control systems); and

c) Operational parameters per route,

    1. Maximum allowable speed

    2. Maximum axle loading

3. Maximum train length, in metres, including the motive power,

4. Route restrictions other than normal operational parameters (for example, the loading profiles, motive requirements, or infrastructure limitations when specialized freight such as abnormal loads or dangerous goods are to be conveyed),

5. Capacity utilization of each route,

6. Motive power (steam, electric, diesel, other),

7. List of maintenance depots and maintenance equipment in use;

8. List of power supply substations, and

9. Other (specify)

9.4.2.3.3   Additional Information by the Train operator:

The train operator shall supply the following information:

a) information about the rolling stock, i.e.

1. The motive power, whether

i. Electric (type and number of locomotives),

ii. Diesel (type and number of locomotives),

iii. Steam (type and number of locomotives),

iv. Others (specify)

2. Wagons (type and number)

3. Passenger coaches (type and number)

4. Information on the maintenance depots and maintenance facilities;

5. Other (specify)

b) The routes of the network used by the train operator and the frequency and nature of the operation;

c) The stations that will be used and the frequency of use;

d) Dangerous goods handled, i.e.

1) Projected volumes

2) Routes, and

3) Classes, and

e) Other (Specify)

9.4.2.3.4   Additional Information by the Station Operator:

The station operator shall supply the following information:

a) A list of the stations under his control, the routes, and name of the network operator responsible for each station;

b) A list of the names of train operators and the stations they use,

c) The capacity of stations in terms of trains and passengers,

d) The average utilization of stations in terms of trains and passengers; and

e) Other (Specify)

9.4.3   Document Management

Processes and procedures describing activities, having direct and indirect effects on railway safety, must be considered as relevant parts of the SMS, both at an organisational and operational level.

The safety management system must have systems and procedures to control and manage all documents and information relevant to the management of risks to safety associated with railway operations. Such systems and procedures must include systems and procedures for:

➢ the identification, creation, maintenance, management, storage and retention of records and documents;
➢ ensuring the currency of documents required for railway operations; and
➢ the communication of any changes to the document control systems and procedures, to safety critical employees and employees of the rail operator who rely on those systems and procedures to carry out their work.

Processes and procedures describing activities, having direct and indirect effects on railway safety, should be considered as relevant parts of the SMS, both at an organisational and operational level.

The following documents pertaining SMS must be considered:

➢ procedures applicable at company level;
➢ safety plans/ reports;
➢ audit and monitoring results;
➢ documents related to implementation of corrective/preventive actions;

➢ any other operational document that is necessary to ensure compliance with applicable rules (rule books, route books, safety orders, etc.), including all operational information described at section § 9.3.1)"configuration control of safety information");

➢ applicable standards;

➢ any other technical document that is related to life-cycle of equipment and operation and with risk analysis.

For SMS documentation, the following principles must be applied:

➢ Format, preparation, distribution and control of changes should be defined beforehand,

➢ The documents should be regularly monitored and updated,

➢ All relevant documentation should be collected and stored/archived.

Safety related documents and data must be reviewed and approved for adequacy prior to issue and use. A master list or equivalent document control procedure identifying current revision status of documents must be established and be readily available to preclude the use of invalid or obsolete documents.

The document control system and arrangements must ensure that:

➢ the pertinent issues of appropriate documents are available at all locations where operations essential to the effective functioning of the safety management system are performed.

➢ invalid or obsolete documents are promptly removed from all points of issue or use, or otherwise assured against unintended use.

➢ any obsolete documents retained for legal or knowledge preservation purposes are suitably identified.

9.4.4   Safety Improvement Plan

The Safety Improvement Plan which shall be submitted annually shall support the Operator's safety policy, demonstrating commitment to continual safety improvement (Refer § 8.4.1). The safety performance report and safety improvement plan must be signed by the head of the operator's organization or his/her delegated representative, and communicated to all the employees.

The Safety Improvement Plan must be based on a five (5) year rolling cycle of safety targets and objectives to be achieved and which will be measured on an annual basis.

Operators are required to document their Safety Improvement Plans in such a manner that the first part of the document addresses the safety performance of the previous cycle of their

Safety Permit and the second part of the document addresses the Safety Improvement Plan of the new cycle of the Safety Permit.

The annual safety improvement process (plan) includes:

➢ Results of the most recent (but not older than 6 months old) risk assessment undertaken and the resultant risk control strategies (section 8.2);

➢ the most recent results of internal safety auditing (section 8.3.3);

➢ Periodic analysis by the operator of occurrence data to identify safety trends and to provide feedback to the risk management process section (8.3.1);

➢ Results of trend analysis using historical data of railway occurrences reportable to the RSR and also the root causes thereof (section 8.3.2.3);

➢ Periodic review of the safety data analysis by Senior management (section 8.4);

➢ the development of safety indicators (both leading and lagging indicators) as far as it is relevant to the reporting organisation (section 8.3.1);

➢ Observations on deficiencies and malfunctions of railway operations and infrastructure management that might be relevant for the safety authority;

➢ information on how the organisation's safety targets are met and the results of safety plans;

➢ Based on the finding above a list of the most critical railway safety issues to be addressed for the next year and beyond

➢ Where appropriate, annual safety performance targets must be set for each discipline or department of the operator, which are measureable, meaningful and realistically achievable whilst taking into account the current realities. These targets shall:

- Promote continual improvement
- Be tailored to the needs of the operator
- Be linked to the operator's risk management process

➢ Deviations from the original planned asset maintenance interventions.

Refer to SANS 3000-1 (Railway Safety Management) for specific requirements regarding the Annual Safety Improvement Plan.

It is important to note that:

- "organisation's safety targets" may tend to improvement or maintaining of safety performance, resulting from the analysis of past performances;

- "safety plans" are documents containing a list of actions with expected results, relevant timeframe and allocation of responsibilities, identified in order to pursue improvement in performance or maintaining of an adequate level of safety.

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9.4.5　Changes to the SMS and Railway Operations

Changes to the specific conditions imposed by the Regulator on the granting of a Safety Permit may only be authorized by the Regulator.

The Operator is required to carry out his operations in compliance with the conditions of his Safety Permit, which includes the SMS and SMS Report. The operator shall keep his SMS Report up to date, amending it to reflect changes in operations.

Changes to an operator's SMS and/or the SMS Report are to be expected, particularly in the early stages after granting of a Safety Permit, in the light of experience, after audit recommendations, and at the implementation of requirements imposed by the Regulator.

Material changes to the SMS report, including changes to the SMS, shall be submitted to the RSR for noting, 30 days before the changes will be effected. This requirement does not prevent an operator from taking immediate action should safety be compromised, or when it has the potential to be compromised. Minor changes to conditions of the Safety permit that result from changes to the SMS, including the SMS Report shall be submitted to the Regulator for noting within 30 days of the changes being made.

Examples of minor changes to the SMS:

➢ Changes to the management team and or organizational structures which will not affect the safety organization of the operator;
➢ Insignificant changes to staff deployment and management, supervisory or inspection responsibilities (or both);
➢ Minor changes to the audit regime, including the appointment of new auditor; minor changes to the audit scope and or audit frequency;
➢ Minor changes made to operating agreements

Examples of Material changes to the SMS:

➢ New lines, extensions, discontinued and abandoned lines;
➢ Changes to the management team and or organizational structures which may affect the safety organization of the operator;
➢ Increases to line operating speeds over part of or all of the operations;
➢ Significant changes to operating procedures that require additions to or amendments of operating standards;
➢ Changes to train control systems or equipment (or both) over part of or all of the operation, including arrangements for work place protection;
➢ Motive power changes – steam to diesel, diesel to electric, etc.;

➤ Non-electrified to electrified lines;

➤ Changes to inspection procedures, for example, track inspection frequencies, bridge examinations, procedure and frequencies; structure inspection, traction overhead inspection;

➤ Changes to rolling stock and infrastructure examination and maintenance frequencies, etc.;

➤ Alterations to fixed and moving structure gauges;

➤ Alteration to track standards, including material specifications, geometric configuration, and clearance standards;

➤ Alterations to bridge and structure loadings, material specifications and clearance standards;

➤ Introduction of new types of motive power, including aspects that relate to axle loading, braking and coupling systems and aspects that require additions or changes (or both) to existing standards or operating procedures;

➤ Introduction of new or substantially changed rolling stock including aspects that relates to width length, height, loading capacity, and axle loading and aspects that require additions or change (or both) to existing mechanical and operating standards or operating procedures (or both);

➤ Introduction of new on-track equipment that require any additions or changes (or both) to standards or operating procedures;

➤ Introduction of new train services;

➤ Changes to operating agreements, including access or running rights agreements.

Failure by the operator to notify the Regulator of changes to the SMS Report will constitute an offence as contemplated in section 45 (3) of the Act.

10.   PROCESSES FOR OPERATIONAL ACTIVITIES

Operational activities form the core of a company by creating, producing and delivering the products and services that customers requires - taking into account primary business objectives like safety, from initial planning to conform to applicable requirement to maintenance and operation.

Safety is, of course, one of the primary objectives and so safety and safety measures should be embedded in operational related processes.

The risk control measures - be it technical, human, organisational or every possible combination of these - are an integral part of the operational activities. They are built into the

system to make it able to deliver normal operation and respond adequately to regular and irregular disruptions and disturbances, e.g. by adjusting its functioning to better match the new conditions, by mitigating the effects of an adverse event, by preventing a further deterioration or spreading of events, by restoring the state that existed before the event, etc.

Operational activities should ensure that service is delivered in compliance with applicable rules.

Typical operational processes (the list is not exhaustive) refer to:

➢ Traffic planning,
➢ Traffic management in normal and degraded situation (it includes control-command system and equipment),
➢ Train preparation,
➢ Train Operation in normal and degraded conditions,
➢ Infrastructure (track, telecommunication and signalling) maintenance,
➢ Rolling stock fitness for operation.

Such operational arrangements and procedures [refer to § 10.3] must take into account normal and degraded situations, as well as emergencies [refer to § 10.6].

10.1 Safety standards for Engineering and Operational Systems

The safety management system must include:

➢ a documented set of engineering standards and procedures, and operational systems, safety standards and procedures, to cover the following, and, if relevant, the interface between any two or more of them:
  • rail infrastructure;
  • rolling stock; and
  • Operational systems.
➢ details of the implementation and updating of these documents as required by the document control arrangements (also see section 9.4 Document control arrangements and information management).
➢ procedures for the control and verification of the design of structures, rolling stock, equipment, and systems, in accordance with the engineering standards and procedures, and operational systems safety standards; and systems, procedures and standards for the following in relation to rail infrastructure and rolling stock:
  • engineering design;
  • construction and installation;

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- implementation and commissioning;
- monitoring and maintenance;
- system operation;
- modification; and
- decommissioning or disposal.

Safe working procedures must contain the following, but not limited to:

➢ a description of the activity;
➢ identification of the person or position that has a supervisory responsibility for the activity or process;
➢ a clear explanation in sequential order, of the steps or stages comprising the procedure or process;
➢ identification of potential hazards in the process;
➢ identification of safety controls to minimize potential risk from any identified hazards;
➢ recovery actions should the risks associated with the hazards be realized;
➢ mechanisms for reviewing procedures;
➢ record keeping requirements; and
➢ document control information.

Design control procedures must include (but are not limited to) the following:

➢ identification of the responsibility for each design or development activity.
➢ safety risk review at both the design input and design output stages taking into account reliability and maintainability.
➢ assignment of design verification and validation functions.
➢ control of design changes.

Verification is the testing and evaluation of an item of equipment or system to assure compliance with its specification and other requirements.

Validation is confirmation that the particular requirements for a specific intended use are fulfilled.

Also refer to SANS 3000-1 (Railway Safety Management).

10.1.1 Process Control

Process control provides controlled conditions for the carrying out of railway operations. These are achieved by:

➢ establishment and appropriate application of standards and procedures;

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➢ effective monitoring to ensure standards and procedures are being adhered to; and

➢ Corrective action in response to deficiencies identified (see section 8.4.4 Corrective Action Development).

The safety management system must include:

➢ procedures for the rail operator to monitor its compliance with the standards and procedures specified in section 8.3, including procedures for the inspection and testing of safety related engineering and operational systems;

➢ procedures for the control, calibration and maintenance of all equipment used to inspect or test rail infrastructure or rolling stock; and

➢ arrangements for the establishment and maintenance of inspection and test records to provide evidence of the condition of rail infrastructure or rolling stock.

Procedures for inspection and testing of safety related engineering and operational systems must define the location, method, level of detail and frequency of inspection and testing. Frequencies of inspection and testing must consider operational criteria, rate of deterioration, consequences of failure, frequency of occurrences and performance data [Reliability, Availability, Maintainability and Safety (RAMS)]. Inspection and testing must be undertaken according to a set schedule and in response to defined events.

Records must be created and maintained that provide evidence of the condition of all elements critical to railway safety, in accordance with section 9.4 Document control arrangements and information management.

Inspection and testing processes must include links to processes for corrective action as required in section 8.4.4.

Also refer to SANS 3000-1 (Railway Safety Management)

10.1.2 Procedures to meet applicable rules to assure compliance throughout life-cycle of equipment/operation (delivery phase)

Operator's should carefully reflect upon the elements that are to be considered when delivering safe operation, as far as compliance with applicable rules, road worthiness of rolling stock, integrity of infrastructure and professional competence of staff is concerned.

The following list (that cannot be considered exhaustive) contains some operational processes in the railway sector:

➢ processes related to train movements,

➢ processes related to operation of safety installations and equipment,

- ➢ processes related to operation of power supply installations,
- ➢ track and equipment maintenance,
- ➢ command and control system and telecommunication maintenance,
- ➢ power supply installations maintenance,
- ➢ maintenance of civil infrastructure,
- ➢ management of infrastructure and equipment, including emergency equipment,
- ➢ assignment and use of rolling stock and equipment,
- ➢ rolling stock and equipment maintenance,
- ➢ exchange of information with asset owner or entity in charge of maintenance,
- ➢ Inspections (prior to departure and during journey).

The staff performing safety related tasks must receive instructions with the following characteristics:

- ➢ Exhaustiveness. All the rules and requirements relevant to safety tasks relevant to the operation of the Operator are identified and transcribed in the document,
- ➢ Preciseness. Each of the rules and requirements are correctly transcribed without error (for example: behaviour to adopt before a signal, safety related communication texts, etc.),
- ➢ Consistency. The requirements applying to a single person or a single team from different sources are compatible and consistent. They do not come into conflict."

10.2 Operational, Maintenance and Emergency Activities

Operational, Maintenance and Emergency activities should be duly documented.

10.2.1 Use of Contractors and Control of Suppliers

Where suppliers, partners and sub-contractors are relied upon to undertake activities relating to safe railway operations, the railway operator must control the delivery of safety related supplies and services provided by these suppliers, partners and subcontractors.

This means in particular that:

- ➢ criteria for selection and accreditation of service providers/contractors shall be established;
- ➢ suppliers, partners and subcontractors must satisfy the same requirements that the operator is required to meet: the corresponding contracts shall cover all the relevant requirements, including at least: responsibilities and tasks relating to railway safety issues, the obligations related to the transfer of relevant information between both partners and the traceability of safety related documents;

➢ the Operator must ensure, through appropriate monitoring, that the supplies and services offered consistently meet safety requirements; the operator or infrastructure manager must ensure that its suppliers, partners and subcontractors undertake to accept the checks, inspections and audits called for by the regulations;

➢ the Operator must ensure, that preventive or corrective measures are implemented after checks, inspections and audits.

It is equally important suppliers and/or contractors have a clear understanding of the railway risks they're under as well as of risks they import to the railway operations.

10.2.1.1 Procurement

The operator shall establish and maintain procedures for ensuring that purchased goods, services and products comply with specified railway safety requirements. These procedures shall ensure that:

➢ procurement document contain adequately specified railway safety requirements,

➢ steps are taken to verify that the supplied goods or services, including those supplied from within the organization, comply with railway safety requirements before they are accepted, and

➢ where appropriate or specified, traceability of manufacture through batch or other identification is available.

10.2.1.2 Contract Management

The operator shall establish and maintain procedures for the management of contracts in respect of safety issues.

Tender or proposal invitation documents shall be reviewed by the organisation to ensure that railway safety requirements are adequately defined and documented. Any conflict between the specified railway safety requirements and those contained in a tender or proposal shall be resolved before a contract is awarded.

The capability of a likely contractor to comply with the specified safety requirements shall be reviewed before a contract is awarded. Permission for the engagement of a subcontractor by the contractor both initially and during the course of a contract shall be subject to a review of the capability of the proposed subcontractor to comply with the specified railway safety requirements.

10.2.1.3 Assessment of Contractors and subcontractors

Procedures for the selection, control and ongoing review of contractors and subcontractors for safety-related work, including the coordination of these activities across all parts of the organization, shall be established and maintained. The type and extent of control exercised shall be dependent upon the type of service and, where appropriate, on the records of contractors' and subcontractors' previously demonstrated capabilities and safety performance.

The selection of contractors and subcontractors shall take into account their capability to comply with railway safety requirements.

10.2.2 Asset Management

Asset management is the systematic and co-ordinated activities and practices undertaken by an Operator to manage assets that are a key or critical factor in achieving effective service delivery and their associated risks in an optimum manner to achieve its strategic and regulatory objectives.

Operators must adopt a strategic approach to managing the safe operations of assets, as part of their risk management framework and as documented in their safety management system. Under this framework, a risk management approach must be applied in each stage of an asset's lifecycle from development of the concept or need, through to and including its design, construction, procurement, commissioning, operation, maintenance, modification and decommissioning phases.

The intent of this approach to asset management is to minimise the risks related to equipment failure and the impact on the surrounding operations both now and into the future. For example, the provision of detailed information on known risks will assist designers to design out potential problems and provide opportunities to improve safety during the life of the asset.

An effective configuration management system, as part of the safety management system, will assist in tracking any changes made to the asset (both functional and physical) during its lifecycle and ensure the correct operating context is considered during design, manufacture, commissioning, operation, modification, decommissioning and disposal.

The asset management policy and processes must provide detail of the principles and means by which the organisation will enact the management of its assets, the configuration management requirements for its assets to ensure continuity throughout the various life stages, and the organisation's responsibilities and accountabilities associated with the management of its assets.   It is important for an operator to document what assets are used

to deliver the railway operations (either owned or leased), what the asset is expected to do, and under what operating conditions. The asset management processes must use a risk-based approach to understand the relationship of how an asset can fail, what causes the failure, what happens when the failure occurs, what the probability of that failure is, and the consequences of each failure.

It is a requirement that the safety management system include an asset management policy and processes that address all phases of the asset lifecycle of the rail infrastructure or rolling stock operations. Successful asset management involves identification of the assets owned or managed by an Operator. In general, the following types of assets are identified:

- Physical assets; e.g. buildings, networks, infrastructures, equipment,
- Human assets; e.g. people skills, career paths, training, reporting, mentoring, competencies,
- Financial assets; e.g. cash, investments, liabilities, cash flow, receivables, etc.,
- Intangible assets; intellectual property assets and relationship assets like reputation with customers, suppliers, business units, regulators, competitors, channel partners and brands,
- Information assets; digitized data, information, and knowledge about customers, processes performance, finances, information systems, the protection of the telecom configuration management data, etc. The focus for the railway sector is mainly in the first group, and the physical asset to be considered should be track and related equipment and trains.

Asset management also refers to the policies, strategies, information, plans and resources, which integrate to deliver efficient operation, and the put in place of the above-mentioned activities and practice to ensure that assets remain in condition to allow the operation to deliver its business objectives safely, effectively and efficiently during all its life-cycle.

The outcome of competent asset management is asset integrity, i.e. assets that are fit for their purpose and whose risk of failure is managed to meet an appropriate standard of performance, however the management of assets can also plan for safety hazards brought into the organisation during asset renewal and disposal.

Asset management can therefore support the procedures to assure compliance throughout the life-cycle of equipment.

Operators must submit a comprehensive updated rail asset register and maintenance data in the form and format as prescribed by the Regulator from time-to-time. (Refer to the RSR requirements as per the NIMS Asset Management Module). Operators must also submit

regular asset performance data to the Regulator as it relates to reliability, availability, maintainability and safety (RAMS data) of such assets.

10.2.3 Occurrence Management

Each railway operator must set up an emergency/contingency plan identifying and specifying the different types and levels (critical, non-critical etc.) of emergencies that might occur on the railway network. [Refer to SANS 3000-1 (Railway Safety Management) and RSR Standard 00-3 of 2016 (Edition 1)].

The plan must be based on risk assessments to provide for the prevention and mitigation of the consequences of all potential occurrences associated with railway operations.

Each plan must be periodically reviewed (at least annually) and detail the actions, alerts and information to be given in case of an emergency.

All foreseeable emergencies need to be identified, and for each emergency situation the plan must clearly identify and define:

➢ the different parties/staff interested/involved (including periodic participation of management);
➢ the interfaces between operators and relevant public authorities;
➢ the references for emergency related activities and actions;
➢ processes and procedures to be set in place according to the type of emergency.

Periodically testing of the emergency plans, including joint exercises with other involved parties, is good practice in order to monitor the effectiveness and update of the emergency plans.

Emergency procedures must be agreed with appropriate entities and should be adequate and anticipate different operational scenarios that may occur in a disruption, involving also the intervention of public authorities, emergency and rescue services.

Scenarios should take into account specific situation, like for instance:

➢ Language issues that may arise in case of events involving foreign language speaking drivers and on board staff;
➢ Transport of dangerous goods (specific knowledge of substance labelling and flow of information to relevant entities in conformity with RID provisions and with national applicable rules);

➢ All internal and external entities to be informed in relation to emergency management and recovery;

➢ Involvement of all parties concerned in testing phases.

The emergency preparedness plan must address specifically, as a minimum, the following:

➢ Initial response procedures

➢ Call-out procedures, including reporting of the occurrence the RSR (Ref 8.3.2)

➢ On-site management of an occurrence

➢ Liaison with emergency responders

➢ Evacuation procedures

➢ Initiation of an investigation

➢ Environmental response and rehabilitation

➢ Service restoration to normal operations

10.2.4 Security Management

Operators must include in their Safety Management System procedures, processes and systems aimed at the management of security as described in SANS 3000-1 (Railway Safety Management)

The SMS must include:

➢ A security management plan that includes measures to protect people from theft, assault, sabotage, terrorism and other criminal acts of other parties and from other harm;

➢ Systems and procedures to ensure that safety critical railway assets are protected from theft, sabotage, vandalism and other criminal acts,

➢ Notifying and reporting security incidents to the RSR and other relevant authorities, and

➢ systems and procedures to ensure that the appropriate response measures of the security plan are implemented without delay if such a security incident occurs.

The security management plan must include all of the following:

➢ a list of the risks arising from theft, vandalism, assault, sabotage, terrorism, and other criminal acts or other sources of harm;

➢ a description of the preventative and response measures to be used to manage those risks, including a description of the policies, procedures and equipment and other physical resources that it is proposed to use for those measures, and of the training that it is proposed to be provided;

> if the rail operator shares a location, such as a model interchange or a port with one or more operators, a description of the arrangements made with those other operators in relation to that location to prevent or respond to security incidents;

> procedures for the recording, reporting and analysis of security incidents;

> the allocation of security roles and responsibilities to appropriate people;

> provision for liaison, the sharing of information and for joint operations with emergency services and with other operators who may be affected by the implementation of the plan; and

> provision for the evaluation, testing and if necessary, the revision, of security measures and procedures.

10.2.5 Interoperability and Management of Interfaces and Intraface

An interface agreement is a written agreement for managing risks in relation to interfaces between operators and for rail. As a minimum an interface agreement must include provisions for:

> implementing and maintaining control measures that are to be used to manage safety risks associated with the interface, and providing for the evaluation, testing and, if necessary, revision of those control measures;

> the respective roles and responsibilities of each party to the agreement in relation to each control measure;

> the procedures by which each party will monitor and determine whether the other party complies with its obligations under the agreement;

> the exchange of information between the parties in relation to their obligations under the agreement; and

> the triggers for, and the frequency of, reviews of the agreement, and if necessary, the revision of the agreement.

SANS 3000-1 (Railway Safety Management) describes the minimum requirements for interface or intraface management (or both) to be met by network, train and station operators to accomplish the required levels of safety and performance for those operations throughout their life cycle, and the removing of technical barriers to the supply of equipment. Operators must include in their Safety Management System procedures, processes and systems aimed at the management of interoperability, interface and intraface management as described in SANS 3000-1 (Railway Safety Management).

Documented procedures and processes must be established, developed or adopted, implemented and maintained to ensure the safe interoperability of railway operations and for

the management of safety at interfaces between operators and intraface between functional disciplines within an operator's organization.

The purpose of the interface coordination provisions is to ensure operators identify risks to safety arising from each other's railway operations. The safety management system must include procedures for:

➤ the identification of interface risks to the safety of railway operations;

➤ the development and implementation of interface agreements to manage the interface risks identified; and

➤ monitoring the implementation and effectiveness of and compliance with interface agreements.

Operators are required to keep a register of their interface agreements and to ensure that the interface agreements are regularly reviewed in light of new risks, changes made to standard working and operating procedures.

10.2.6 Transportation of Dangerous Goods

10.2.6.1 The management of dangerous goods as reflected in this sub-clause is amplified in SANS 10405:2014 (Edition 2).

10.2.6.2 The responsibilities of the consignor are as follows:

➤ classification and packaging;

➤ requirements for loading;

➤ waste classification confirmation;

➤ precautions with respect to food products for human consumption and animal feeds;

➤ loading of gas cylinders;

➤ documentation, including consignment note and wagon label;

➤ placarding; and

➤ management of the relevant railway occurrences

10.2.6.3 The following are the responsibilities of the train operator:

➤ confirmation of the suitability and service worthiness of the rolling stock or containers (or both);

➤ accuracy of documentation for the dangerous goods to be conveyed;

- shunting and marshalling of rolling stock, including compatibility requirements and the correctness of the train consist;
- in-transit monitoring of the rolling stock, containers and integrity of the dangerous goods load;
- an appropriate contingency plan; and
- railway occurrence management.

10.2.6.4 The following are the responsibilities of the consignee:

- offloading of dangerous goods by competent and resourced personnel
- verification that the consignment was not damaged or spilled. Where there is evidence of damage or spillage to engage the relevant competent authorities on appropriate actions;
- certifying the state of cleanliness of empty wagons or containers (or both);
- handling of bulk deliveries appropriately; and
- management of the relevant railway occurrences.

10.2.6.5 Design requirements include vehicles under pressure and non-pressurized tank wagons and general freight wagons.

10.2.6.6 Security requirements include:

- appropriate training of personnel, including, where appropriate, consignor and consignee personnel, and
- development of security plans for the transportation of dangerous goods.

10.2.6.7 Exemptions include:

- dangerous goods carried by a passenger intended for domestic use, or leisure or sporting activities;
- gases and liquids in tanks affixed to vehicles intended for use in its operation; and
- Exempt quantities as listed in SANS 10231.

10.3   The co-ordination tasks for the Network Operator within the SMS

The SMS of a Network operator is, compared to that of a Train Operator, more sensitive to number, type and extent of Train operators running services on its network. As interactions between railway partners increase, the SMS of a Network operator should reflect the appropriate and updated level of complexity of services it provides.

Some examples of infrastructure related and operation related activities that should be considered as interfaces to be managed by the Network Operator are listed below:

b) Infrastructure related

➢ infrastructure maintenance (tracks, signalling, telecommunications, overhead lines), ensuring that train movement and maintenance activities can be performed without endangering passengers, workers, third persons and assets (either carried out internally or outsourced);

➢ protection from other transport modes' interfaces (crossings, bridges, sidings);

➢ safety of tunnels;

➢ safety of persons working (track, signalling or overhead lines maintenance) on or adjacent to railway premises (for construction sites or other reasons);

➢ communication of infrastructure related information that may affect traffic: requirements, permanent / temporary restrictions, adoption of degraded mode procedures, alerts, etc.).

c) Operation related

➢ train movement control or authorisation, in normal and degraded situation for all Operators operating on the controlled infrastructure;

➢ interface with neighbouring network operators (to ensure continuity of service at national and international level);

➢ access to marshalling yards, freight terminals, private sidings;

➢ shunting (operating directly or supervising undertakings operating on the controlled infrastructure); exchange of operational information with other operators in case of rolling stock failures that may have an impact on the scheduled operation;

➢ Control of activities in the passengers stations, including the control of passengers and public access, specific provision for persons with reduced mobility and availability, lightening and conditions of platforms. These issues are limited to areas that are functional

to the core railway related activities as, for instance, access to track area, platforms for boarding and getting off trains.

d) Emergency related

➢ Protection of passengers in case of accident;

➢ Exchange of information with all interested parties in case of emergencies and service disruptions;

➢ Clearance of the affected tracks after accidents or disruptions.

10.3.1 Compliance with Network-Specific Requirements For Management of Rolling Stock

The network operator must demonstrate:

➢ In the SMS documentation, the types of rolling stock to be used on the specific network and the type of operations to be conducted are clearly indicated.

➢ The documentation outlines how the train operator complies with any operational restrictions placed on the type of rolling stock used on the network.

➢ In the documentation, any additional maintenance requirements for the network concerned are identified and appropriate arrangements for maintenance are in place.

➢ In the documentation, any additional requirements to manage rolling stock incidents for the network concerned are identified and appropriate arrangements are put in place.

10.3.2 Safe Design of the Railway Infrastructure

The Network Operator must demonstrate:

➢ There are procedures to ensure the safe design of the infrastructure throughout the life-cycle of the infrastructure, covering design and installation.
➢ There are procedures which take into account technical change of the infrastructure and the management of that change.
➢ There are procedures which show that relevant rules covering the design of the infrastructure and any national safety methods have been identified and that the applicant can comply with them.

10.3.3 Safe Operation of the Infrastructure

The Network Operator must demonstrate the following:

- There are procedures to ensure that the infrastructure is managed and operated safely, taking into account the number, type and extent of operators running services on the network including all necessary interactions depending on the complexity of the operation.
- There are procedures which show how safety is managed at the physical and/or operational borders of the infrastructure.
- There are procedures which show how effective cooperation and coordination is managed, both in normal and emergency situations.
- There are procedures which show that rules covering the safe operation and management of infrastructure/vehicle interfaces have been identified and that the applicant can comply with them.

10.3.4 Provision of Maintenance and Material

The Network Operator must demonstrate the following:

- There are procedures to ensure that maintenance of the infrastructure is undertaken safely, including clear management control and documented audit and inspection.
- There are procedures which ensure that the maintenance of the infrastructure meets the specific needs of the network.
- There are procedures which show that rules covering the supply of maintenance and material have been identified and that the applicant can comply with them.

10.3.5 Maintenance and Operation of the Traffic Control and Signalling System

The Network Operator must demonstrate the following:

- There are procedures to ensure that the traffic control and signalling system is operated and maintained so as to ensure the safe operation of the railway.
- There are procedures to comply with existing, new and altered technical and operational standards.
- There are procedures which set out how safety is managed at the physical and/or operational borders of the traffic control and signalling system, including how cooperation, if necessary, is managed.

➢ There are procedures which show that rules covering the safe operation and maintenance of the traffic control and signalling system have been identified and that the applicant can comply with them.

ANNEXURE 1: THE SMS WHEEL

The RSR Safety Management System (SMS) Wheel (™) Version 1.2