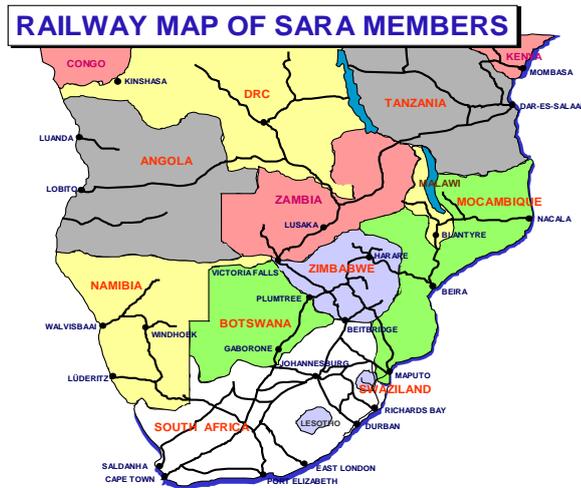




# RAILWAY SAFETY MANAGEMENT STANDARD

## FOR SOUTHERN AFRICAN RAILWAYS ASSOCIATION



*Issued with the Authority of the SARA Board, May 2008.*

**TOGETHER WE ARE BETTER  
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### Table of changes

Change No.	Date	Scope
1	November 2012	This SARA standard describes the minimum requirements of a safety management system to enable the Railway Administrations to develop a system for the management of safe railway operations under his/her control in the asset life cycle phases

### Foreword

This SARA standard was approved by the SARA Board in May 2008.

This document was published in May 2009.

SARA Regional Safety Standards consists of the following documents:

*SARA SAFETY POLICY*

SARA 001: *Railway Safety Management (this standard)*

SARA 002: *Technical requirements for engineering and operational standards – General.*

SARA 003: *Technical requirements for engineering and operational standards – Track, civil and electrical infrastructure.*

SARA 004: *Technical requirements for engineering and operational standards – Rolling stock.*

SARA 005: *Human Factors Management*

SARA 006: *Technical requirements for engineering and operational standards - Track, civil and electrical infrastructure - Level crossings*

Many references are made to “*relevant national legislation*” and in these instances; the specific national legislation would depend on the country in which the Railway Administrator (RA) operates in. Where there is no relevant national legislation, best practices shall prevail. The following references are made:

Reference is made in clause 1.3 and 3.1.2 to the *relevant national legislation* for railway safety

Reference is made in clause 3, 5.2.1 and 8.2 to the “*relevant national railway safety legislation*” for railway safety, which refers to national railway related legislation and SARA standards.

Reference is made in clause 5.2.1 to the relevant national health and safety legislations.

Reference is made in clause 5.2.2, 5.5.1, 5.5.3, 5.5.7, 5.6.1.3, 5.8.6, 5.9.1, 6.3.4, 6.4, 7.2.1, 7.6, 8.6, 9.2, 10.1.1, 10.2.1, 10.3.2, 11.1.2, 11.2, 14.1, clause 16 and annex E to the relevant national regulating authority for railway safety.

Reference is made in clause 5.6.1.3 and 5.8.7 to the relevant national legislation that deals with the Archives and Record Services of that country.

Reference is made in clause 5.7.2 to the relevant national railway safety regulations and/or SARA safety regulations.

Reference is made in clause 7.5.1 to the relevant national health and safety legislation

Reference is made in clause 10.1.1 to the relevant national authority responsible for police services including Railway police, government security and the Chief inspector for explosives.

Annexes D and E form an integral part of this document. Annexes A, B and C are for information only.

## **Introduction**

This document has been developed primarily with a view to achieving uniformity in the management of railway safety both as a general principle and with specific reference to safety management systems.

Key to railway safety management is an appropriate risk management system that aims to ensure that RAs identify their technical and operational hazards and manage the resultant risks to people, property and the environment to a level that is as low as is reasonably practicable.

This approach recognises that, while there is an ideal level of safety, the costs of achieving this ideal might far outweigh the benefits and limit the viability of railway operations. However, it is understood that RAs protect their commercial and social responsibilities by running safe railways.

Railway safety has a relationship with workplace health and safety, and with security, both of which are governed by specific legislation in different countries depending on the country in which the RAs is in. The safety management system is required to take into account the impact of occupational health and safety issues as well as security matters on railway operational safety.

This document outlines a common approach to the management of the interfaces between RAs/operators and intrafaces within an operator's activities, which are crucial for ensuring the safety of railway operations.

Different RAs may require may require different elements described in this document to be complied with. The application of the elements of this standard depends on the complexity of railway operations.

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# Southern African Railways Association (SARA) Safety Standards

## SARA 001: Railway safety management - General

### 1 Scope

**1.1** This SARA standard describes the minimum elements of a safety management system (SMS) to enable the RAs to develop an SMS for the management of safe railway operations under his/her control, taking into account each of the following in the asset life cycle phases:

- a) The demands on and capacity of the railway operations;
- b) Business goals and value propositions;
- c) Critical activities enabling the business;
- d) The asset base and its associated life cycle and maintenance plans; and
- e) The role of support services.

**1.2** It also describes the circumstances that will necessitate changes to the RA's SMS.

**1.3** This standard applies to RAs as defined in the relevant national railway legislation

**1.4** The point of departure in the development of an SMS is the risk management process as described in clause 6. This process recognizes that the content of the elements which constitute an SMS is influenced by the complexity and nature of the railway operation.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Information on currently valid national and international standards can be obtained from Standards South Africa.

SANS 10228, *The identification and classification of dangerous goods for transport.*

SANS 10229-1, *Transport of dangerous goods – Packaging and large packaging for road and rail transport – Part 1: Packaging.*

SANS 10229-1, *Transport of dangerous goods – Packaging and large packaging for road and rail transport – Part 2: Large packaging.*

SANS 10405, *Operational requirements, design and emergency information for the transportation of dangerous goods.*

SARA: *Dangerous Goods Handbook*

*Relevant national legislation applicable to each RA has to be referenced as mentioned in the foreword.*

## 3 Definitions and abbreviations

For the purposes of this document, the definitions and abbreviations given in the relevant national railway safety legislation (see foreword) and the following apply.

### 3.1 Definitions

#### 3.1.1

##### **accident**

unplanned event that results in harm to people or damage to property or the environment

#### 3.1.2

##### **adequacy and effectiveness audit**

audit to assess the integrity, as defined in the relevant national legislation (see foreword), of the elements and sub-elements of the SMS as they relate to the total system

#### 3.1.3

##### **asset life cycle**

design, construction/manufacturing, commissioning, operation, monitoring, maintenance, modification, decommissioning and disposal of an asset

#### 3.1.4

##### **compliance audit**

audit to assess whether all the elements and sub-elements of the SMS are in place and can be substantiated

#### 3.1.5

##### **Dangerous goods**

The commodities, substances and goods that are capable of posing significant risk to health and safety of persons or damage to property or the environment that are listed and/or referred to in the SARA Dangerous Goods Handbook.

#### 3.1.6

##### **Human factors**

Factors which include perceptual, physical and mental capabilities of people and interaction of individuals with their job and working environments, the influence of equipment and system design on human performance and the organisational characteristics that influence safety-related behaviour at work.

#### 3.1.7

##### **incident**

unplanned event, which, under different circumstances, could have resulted in an accident

#### 3.1.8

##### **interface**

area, point, or location, either physical or organizational, where two or more operators' activities meet and where the activities have the potential to affect one another.

#### 3.1.9

##### **intraface**

area, point or location, either physical or organizational, where the activities of two or more of the functional disciplines within an operator's organization meet and have the potential to affect one another

#### 3.1.10

##### **Network**

A system of railway infrastructure elements comprising track, civil, infrastructure, train control and train authorization and control(signalling) systems and where applicable electrical traction

infrastructure which constitutes running lines, and any part of the following on which those elements are situated, including:

**occurrence**

railway occurrence

accident or incident that is managed by an RA in accordance with his/her safety management system

**3.1.9****safety critical work**

functions and activities related to the authorization and control of the movement of rolling stock

NOTE This includes the direct supervision of those functions and activities.

**3.1.10****safety-related work**

functions and activities that have an impact on safe railway operations

NOTE This includes safety critical work.

**3.2 Abbreviations**

CCTV	closed-circuit television
DMU	diesel multiple unit
EMU	electric multiple unit
EDI	electronic data interchange
EDP	electronic data processing
OHTE	overhead traction equipment
PA	public address
PPE	personal protective equipment
SMS	safety management system
SPAD	signal passed at danger

**4 Safety management system (SMS)**

**4.1** The management of safety is a dynamic risk management-driven process that requires commitment and understanding at all levels within an organization and documentary evidence of the existence of the elements of the SMS at the relevant levels within the organization.

**4.2** The RA's SMS requires that

- a) the risks are identified and managed, and
- b) the complexity of the railway operation is understood and taken into account.

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

- a) what – the safety objectives of an administrator;
- b) who – the responsible and accountable persons for the implementation of an SMS;
- c) how – the procedures for the implementation of the elements and sub-elements of an SMS; and

NOTE A diagrammatic representation of the elements of an SMS is given in annex A.

- d) monitoring – the monitoring and evaluation of an SMS to effect safety performance improvement.

## **5 Policy, structure and procedures**

### **5.1 RAs safety policy**

**5.1.1** A safety policy and objectives for, and commitment to, railway safety shall be defined and documented by the RA.

NOTE Guidance on the preparation of a safety policy statement is given in annex B.

**5.1.2** The RA shall ensure that this policy is understood, implemented and maintained at all levels in the organization.

### **5.2 Nominated manager**

**5.2.1** The head of the RA shall appoint in writing, a senior staff member, either directly reporting to the CEO, or a member of the executive management or mandated by the executive management as nominated manager. This appointment shall be supported, where appropriate, by a dedicated section in the organization. The letter of appointment shall state that the nominated manager, irrespective of other responsibilities, shall ensure that the requirements of the said national railway safety legislation, the SARA Railway safety management series of standards, other applicable standards, and directives or guidelines (or both) are effectively implemented, maintained and auditable. The letter of appointment may provide for the further delegation in writing of these responsibilities.

A letter of appointment only in terms of the relevant national health and safety legislation (see foreword) and any other applicable legislation is not acceptable in accordance with the said railway safety legislation.

**5.2.2** The nominated manager is the principal point of contact for railway safety issues. The RA shall therefore ensure continuity of the position of the nominated manager and shall inform all to all the relevant parties immediately in writing of a change of nominated manager.

**5.2.3** The authority and responsibility of the nominated manager shall be demonstrated by the requirements that such manager be mandated by the executive management, and that such manager may

- a) report directly to the head of the RA, or
- b) be a member of the executive management.

**5.2.4** The nominated manager shall ensure that the RA produces and maintains documentation that details the elements of the SMS.

### **5.3 Authority and responsibilities of the RAs**

**5.3.1** The RA shall define the authority, safety roles, responsibilities, accountabilities and relationships of all organizational units and all levels of employees who manage, perform or verify work with regard to railway safety, and shall ensure that this information is communicated to all levels in the organization.

NOTE The authority, responsibilities and accountabilities regarding railway safety shall be illustrated by

- a) an organizational chart placed in a prominent position that indicates the chain of safety responsibilities and linkages,

- b) clear job descriptions that include safety responsibilities and authorities, and
- c) clear performance evaluation systems that include safety requirements.

**5.3.2** The RA shall define the safety roles and responsibilities of customers, contractors and other parties whose activities could affect railway safety, and shall communicate these roles and responsibilities to all the relevant parties.

**5.3.3** The RA shall provide the resources required for the fulfillment of these responsibilities, including the personnel, skills, technology and funding.

## **5.4 Involvement of employees and their representative structures**

The RA shall put in place procedures to ensure that employees or their representatives (or both) are

- a) involved in the drafting of a safety policy for the organization,
- b) consulted on the setting of annual safety targets and the identification of associated safety initiatives,
- c) afforded the opportunity and encouraged to identify safety issues and concerns on a routine and ongoing basis, and
- d) informed of actions that are being taken or that are planned to address the safety issues and concerns they have identified.

## **5.5 Annual safety improvement plan**

### **5.5.1 General**

The RA shall develop an annual safety improvement plan in accordance with guidelines provided by SARA 001. This plan shall support the RA's safety policy, demonstrating commitment to continual safety improvement. The annual safety improvement plan shall include the information described in 5.5.2 to 5.5.5.

### **5.5.2 RAs details**

The following details of the RA shall be included in the annual safety improvement plan:

- a) the legal name of the organization;
- b) the trade name;
- c) the company registration number;
- e) the physical address and postal address of the RA's head office;
- f) the network, train or station operators (or a combination thereof), or private siding operators (siding numbers) included in the organization
- g) the contact details of the nominated manager (i.e. his/her name, job title, telephone number, cellphone number, fax number and e-mail address).

### **5.5.3 The safety improvement process**

The safety improvement process comprises the following:

- a) Results of the most recent risk assessment undertaken and the resultant risk control strategies.
- b) Railway safety trends indicating critical problem areas to be addressed.
- c) Periodic analyses by the RA of occurrence data to identify safety trends and to provide feedback to the risk management process.
- d) Periodic review of the safety data analyses by senior management.
- e) Based on the findings of (a) and (b) above, a list of the most critical railway issues to be addressed for the next year and beyond (i.e. year 1, 2 and 3).
- f) A list of the annual corporate safety performance targets and associated initiatives to achieve the targets for the next year and beyond (i.e. year 1, 2 and 3).
- g) A list of all action plans to be taken in order to reach all corporate safety performance targets as indicated in (e) above. This should include the targets for the next three years, objectives, actions, the responsible person and the completion date.
- h) Where appropriate, annual safety performance targets set for each Railway administrator, which are measurable, meaningful and realistically achievable while taking into account the current realities. These targets shall
  - 1) promote continual safety improvement,
  - 2) be tailored to the needs of the RA and
  - 3) be linked to the RAs risk management process.
- i) Initiatives undertaken to achieve the set targets that are monitored, measured and reported to the head of the RA or his/her delegated representative and, where necessary, corrective actions taken.

#### **5.5.4 Changes to the SMS and railway operations**

Changes to the SMS and railway operations shall be listed. Planned or expected changes for the next year and beyond (i.e. year 1, 2 and 3) shall also be listed.

#### **5.5.5 Approval of the annual safety improvement plan**

The annual safety improvement plan shall be approved by the head of the RA or his/her delegated representative, and communicated to the relevant employees.

#### **5.5.6 Submission of the annual safety improvement plan**

The annual safety improvement plan shall be submitted to to all the relevant parties every year on an agreed date.

### **5.6 Safety audits**

#### **5.6.1 General**

**5.6.1.1** Safety auditing comprises the elements of compliance and adequacy as described in 5.6.2 and 5.6.3, respectively.

**5.6.1.2** The audit process shall include the following:

- a) audits shall be conducted by competent personnel who are impartial and objective;
- b) recognized audit methodologies shall be used that include validation through interviews, random spot checks, and feedback gathered from employees and relevant stakeholders;

NOTE An example of an audit methodology is one that is used to audit compliance with an ISO management system.

- c) audits shall be conducted at least annually and shall be prioritized,

NOTE Audits may be prioritized according to risk assessments, occurrences, or the operational entity site.

- d) findings of the audits, including recommendations for corrective action, shall be documented and brought to the attention of employees who are responsible for safety in the areas concerned;
- e) the appropriate level of management shall consider the findings for the area that has been audited, decide on the appropriate actions to be taken, and document the decisions;
- f) follow-up actions shall be documented and carried out in accordance with the documented decisions;
- g) audit findings and corrective actions shall be reported to senior management; and
- h) audit findings shall be signed off when implemented.

**5.6.1.3** Audit reports shall be retained for review by all the relevant parties for a period determined by the relevant national legislation (see foreword), but the period shall be not less than three years.

## **5.6.2 Compliance with the SMS**

Regular compliance audits shall be carried out to verify

- a) the existence of the SMS elements and sub-elements as a minimum in compliance with this part of SARA 001, and
- b) that the elements and sub-elements are implemented and complied with at the appropriate levels within the organization.

## **5.6.3 Adequacy and effectiveness of the SMS**

Adequacy and effectiveness audits shall be carried out to determine the adequacy and effectiveness of each element and sub-element of the SMS as part of an integrated process for managing and improving operational safety.

This audit component of the SMS should include periodic reviews of the system to ensure the continued suitability, adequacy and effectiveness of the SMS, taking into account changing circumstances, including the results and recommendations of risk assessments, occurrence investigations, and safety performance analyses.

## **5.7 Compliance with safety legislation**

**5.7.1** An SMS shall include procedures to ensure that the RAs:

- a) identifies all the legal obligations impacting directly or indirectly on railway safety,

- b) monitors changes in legislation,
- c) complies with the requirements contained in legislation, and
- d) evaluates compliance with the legislative requirements.

**5.7.2** The RAs existing standards, including codes of practice, rules and notices, should be identified in the RAs SMS and will continue to apply in their current form, until amended or replaced. Procedures and processes for developing new standards, and for amending, accepting or adopting existing standards are covered in relevant national railway safety regulations (see foreword).

**5.7.3** The RA shall

- a) develop systems and procedures to demonstrate and evaluate compliance with applicable railway safety regulations and standards, including codes of practice, rules, notices and directives, and
- b) identify exemptions and the procedures to demonstrate compliance with the terms or conditions specified in the notice of exemption.

## **5.8 Document and data control**

**5.8.1** All safety-related documents and data shall be in the specific area/region medium of instruction and may be made available in other official languages when required.

**5.8.2** The RA shall

- a) establish and maintain documented procedures to control all documents and data that relate to the SMS and railway operations, including, to the extent applicable, documents of external origin;
- b) in the event of electronic data processing (EDP) or electronic data interchange (EDI) being used, ensure that procedures for the capturing, storing and processing of data comply with applicable legal requirements;
- c) approve documents and data before they are issued.

**5.8.3** Employees who are authorized to approve safety-related documents for issue shall ensure that the contents are accurate and that the documents will be understood by all recipients to whom they apply.

**5.8.4** The RAs shall establish, develop or adopt, implement and maintain documented procedures to review documents and data for applicability and validity and to update and approve as appropriate.

The changes to these documents and data shall be reviewed and approved by the same functions or organizations that performed the original review and approval, unless specifically designated otherwise.

The designated functions or organizations shall have access to pertinent background information upon which to base their review and approval.

**5.8.5** The RAs shall ensure that documents and data are current, legible and identifiable. This can be achieved by the use of a master list, a file reference list or an equivalent document control procedure.

**5.8.6** The RAs shall establish, develop or adopt, implement and maintain procedures to ensure that

- a) the pertinent issues of appropriate documents are available at all relevant locations and are understood by all recipients to whom they apply,
- b) where practicable, the nature of changes is identified in the documents or the appropriate attachments,
- c) invalid or obsolete documents are promptly removed from all points of issue or use, or otherwise assured against unintended use,
- d) any obsolete documents retained for legal or knowledge preservation purposes are suitably identified, and
- e) retention periods for documents and data are established, documented and complied with.

**5.8.7** The RAs shall ensure that procedures for the collection, indexing, filing, storage and disposal of safety records and reports, including documentation on occurrences and activities relating to railway safety, are established, developed or adopted, implemented and maintained. Safety records and reports shall be retained for at least three years, and thereafter for a period that complies with the relevant national legislation (see foreword) and other relevant specifications and standards.

## **5.9 SMS review**

**5.9.1** In order to ensure the continuing suitability and effectiveness of the SMS, the RAs shall review it at regular intervals not exceeding three years, or more frequently, as required.

**5.9.2** The process of review of the SMS shall be formalized, documented and signed off by the appropriate level of management.

**5.9.3** Since the results of the audit processes, unacceptable occurrence trends, or changes in operating and technical circumstances are likely to be the prime catalysts for the need for more frequent reviewing of the SMS, the reasons for the review shall be documented.

## **6 Operational risk management processes**

### **6.1 General**

In the case of existing operations, many of the risks would already have been considered and risk controls would have been included in the administrator's current rules, standards, procedures and operating practices. In this case, the risk assessment process would document this link and then focus on the results of occurrence investigations, a safety data analysis, complaints follow-up, inspections and audits to ensure that the risk is being mitigated to an acceptable level. This analysis should point RAs to areas where they could undertake initiatives beyond their current practices in an effort to improve their overall safety performance.

### **6.2 The risk management process**

The RAs risk management process shall comprise the following elements:

- a) identification of hazards;
- b) evaluation of the hazards (i.e. risk ranking);
- c) determination of the level of control (i.e. to tolerate, transfer, treat or terminate);
- d) implementation of the controls; and

e) monitoring the effectiveness of the controls.

### **6.3 Operational risk assessment processes**

NOTE See 6.2(a) and (b).

**6.3.1** The RAs shall establish, develop or adopt, implement and maintain procedures to identify, evaluate and prioritize hazards by means of an operational risk assessment process.

**6.3.2** A complete analysis of existing operations shall be adequately documented. Input from occurrence investigations, safety performance data collection and analysis, inspections and safety audits shall be used to identify areas of existing operations where an analysis is required. RAs shall undertake a thorough analysis of both new operations and proposed changes to existing operations, as determined by the RA. In particular, operational safety concerns and issues relating to human factors and interfaces shall be assessed.

**6.3.3** In the case of new equipment, systems, operations, practices and procedures where experience and a safety history are not available, formal analytical techniques shall be applied, taking into account international benchmarking.

**6.3.4** In addition, procedures for risk analysis should be reviewed periodically after a major occurrence when the safety performance has not improved or on receipt of a directive from the relevant parties

**6.3.5** RAs shall prioritize and classify the identified hazards.

### **6.4 Operational risk controls**

NOTE See 6.2(c), (d) and (e).

**6.4.1** The RAs shall establish, develop or adopt, implement and maintain risk controls to address the risks identified and quantified in 6.2 to ensure business continuity. Risk controls are required for risks that have been classified as unacceptable or tolerable with mitigation. In generic terms, these controls can focus on

- a) terminating the situation, substance, condition or activity that generates the risk; or
- b) mitigating the probability or consequences of an occurrence.

**6.4.2** Operational risk controls should be established, developed or adopted, implemented and maintained with full appreciation of the need to balance costs, benefits and opportunities.

## **7 Occurrence management**

NOTE Occurrence management as reflected in this clause and annexes C and D are amplified in a standard which is in course of preparation.

### **7.1 Occurrence management processes**

**7.1.1** The management of occurrences shall include the measures to be taken to minimise hazards at the scene, the consequences of the occurrences and the conducting of investigations to determine the causes.

**7.1.2** The RAs shall establish, develop or adopt, communicate and maintain contingency plans, including emergency preparedness plans for railway operations. Such plans shall be integrated with similar plans of other RAs at the interfaces/intrafaces of railway operations and also with those of relevant external emergency responders, including the departments that deal with disaster management.

**7.1.3** The contingency plan, including an emergency preparedness plan, referred to in 7.1.2 shall be based on risk assessments to provide for the prevention and mitigation of the consequences of all potential occurrences associated with railway operations. The emergency preparedness plan shall address specifically, as a minimum, the following:

- a) initial response procedures;
- b) call-out procedures;
- c) on-site management of an occurrence;
- d) liaison with emergency responders;
- e) evacuation procedures;
- f) initiation of an investigation;
- g) environmental response and rehabilitation; and
- h) restoration of normal operations.

## **7.2 Railway occurrence categories**

### **7.2.1 General**

Railway occurrences shall be recorded and reported to all the relevant parties. These railway occurrences shall reflect the number of occurrences and not the consequences thereof, which are to be recorded and reported as indicated in 7.5.

### **7.2.2 Category A — Collisions during movement of rolling stock**

Category A occurrences cover the following:

- a) a collision between rolling stock on a running line;
- b) a collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock);
- c) a collision of rolling stock with a stop block on a running line;
- d) a collision of rolling stock other than on a running line;
- e) a collision of rolling stock with an obstruction other than on a running line; and
- f) a collision of rolling stock with a stop block other than on a running line.

NOTE Level crossing collisions or persons struck by rolling stock in motion are excluded from this category.

### **7.2.3 Category B — Derailments during movement of rolling stock**

Category B occurrences cover the following:

- a) derailments of rolling stock on a running line;
- b) derailments of rolling stock on a line other than a running line; and

- c) derailments of rolling stock during tippler activities.

#### **7.2.4 Category C — Unauthorized movements (rolling stock movements exceeding the limit of authority)**

Category C occurrences cover the following:

- a) signal passed at danger on a running line;
- b) signal passed at danger on any other line;
- c) passing limit of authority on a running line;
- d) passing limit of authority on any other line;
- e) physical train token limit passed on a running line;
- f) physical train token limit passed on any other line;
- g) verbal authority exceeded on a running line;
- h) verbal authority exceeded on any other line;
- i) written authority exceeded on a running line; and
- j) written authority exceeded on any other line.

#### **7.2.5 Category D — Level crossing occurrences**

Category D occurrences cover the following:

- a) collisions between rolling stock and road vehicles (including motor vehicles, bicycles and animal-drawn vehicles) at a recognized level crossing on a running line;
- b) collisions between rolling stock and road vehicles (including motor vehicles, bicycles and animal-drawn vehicles) on any line other than a running line (including yards, sidings and private sidings) at a recognized level crossing;
- c) persons struck by rolling stock at a recognized pedestrian level crossing; and
- d) persons struck by rolling stock at a recognized road level crossing.

#### **7.2.6 Category E — Persons struck during movement of rolling stock (other than at level crossings)**

Category E occurrences cover the following:

- a) occurrences where a member of the public is struck by rolling stock on a running line;
- b) occurrences where an employee is struck by rolling stock on a running line;
- c) occurrences where a contractor or a contractor's employee is struck by rolling stock on a running line;
- d) occurrences where a member of the public is struck by rolling stock on a line other than a running line;
- e) occurrences where an employee is struck by rolling stock on a line other than a running line; and
- f) occurrences where a contractor or a contractor's employee is struck by rolling stock on a line other than a running line.

NOTE In this category only the number of occurrences should be recorded and not the number of persons injured or fatally injured (or both).

### **7.2.7 Category F — People-related occurrences: trains outside station platform areas (in section)**

Category F occurrences cover the following:

- a) occurrences where a passenger fell or was pushed from inside a moving or stationary train;
- b) occurrences where an employee fell or was pushed from inside a moving or stationary train; and
- c) occurrences where a contractor or contractor's employee fell or was pushed from inside a moving or stationary train.

### **7.2.8 Category G — Passenger-related occurrences: travelling outside designated passenger area of train**

Category G occurrences cover the number of occurrences for each train on each scheduled route where passengers travel outside the designated passenger area of trains.

### **7.2.9 Category H — People-related occurrences: platform-train interchange**

Category H occurrences cover the following:

- a) occurrences where a passenger fell between the train and the platform whilst entraining/detraining a stationary or moving train;
- b) occurrences where a passenger fell on the platform whilst entraining/detraining a stationary or moving train;
- c) occurrences where an employee fell between the train and the platform whilst entraining/detraining a stationary or moving train;
- d) occurrences where an employee fell on the platform whilst entraining/detraining a stationary or moving train;
- e) occurrences where a contractor or a contractor's employee fell between the train and the platform whilst entraining/detraining a stationary or moving train; and
- f) occurrences where a contractor or a contractor's employee fell on the platform whilst entraining/detraining a stationary or moving train.

### **7.2.10 Category I — People-related occurrences: Station infrastructure**

Category I occurrences cover the following:

- a) occurrences resulting in injuries and fatalities to the public due to infrastructure defects in a public area of the station;
- b) occurrences resulting in injuries and fatalities to passengers due to infrastructure defects in the passenger area of the station;
- c) occurrences resulting in injuries and fatalities to an employee due to infrastructure defects in a public area of the station;

- d) occurrences resulting in injuries and fatalities to an employee due to infrastructure defects in the passenger area of the station;
- e) occurrences resulting in injuries and fatalities to a contractor or a contractor's employee due to infrastructure defects in a public area of the station; and
- f) occurrences resulting in injuries and fatalities to a contractor or a contractor's employee due to infrastructure defects in the passenger area of the station.

#### **7.2.11 Category J — Electric shock**

Category J occurrences cover the following:

- a) an electric shock to a member of the public on the network infrastructure;
- b) an electric shock to an employee on the network infrastructure;
- c) an electric shock to a contractor or a contractor's employee on the network infrastructure;
- d) an electric shock to a member of the public, including passengers, whilst on rolling stock or in rolling stock;
- e) an electric shock to an employee whilst positioned on rolling stock or on part of rolling stock;
- f) an electric shock to a contractor or a contractor's employee whilst positioned on rolling stock;
- g) an electric shock to a member of the public in the public area of a station;
- h) an electric shock to an employee in the public area of a station;
- i) an electric shock to a contractor or a contractor's employee in the public area of a station;
- j) an electric shock to a passenger in the passenger area of a station;
- k) an electric shock to an employee in the passenger area of a station; and
- l) an electric shock to a contractor or a contractor's employee in the passenger area of a station.

#### **7.2.12 Category K — Spillage/leakage, explosion or loss of dangerous goods**

Category K occurrences, as given in SANS 10228, SANS 10229 (parts 1 and 2) and SANS 10405, cover the following:

- a) spillage or leakage of dangerous goods en route;
- b) spillage or leakage of dangerous goods during shunting operations;
- c) spillage or leakage of dangerous goods whilst staged;
- d) missing consignments of dangerous goods;
- e) theft of dangerous goods; and
- f) explosion of dangerous goods.

#### **7.2.13 Category L — Fires**

Category L occurrences cover the following:

- a) fires in fixed operational assets (for example in station buildings, tunnels, relay rooms and substations);
- b) freight fires;
- c) rolling stock fires; and
- d) veld fires that threaten operational safety.

### **7.3 Categories of immediate causes**

#### **7.3.1 General**

In addition to the recording and reporting of occurrences as required in categories A, B and D (see 7.2.2, 7.2.3 and 7.2.5, respectively), the immediate causes of railway occurrences shall be recorded in the categories and sub-categories as required in 7.3.2 to 7.3.7 and reported in the quarterly reports as required in clause 11.

#### **7.3.2 Track and civil infrastructure**

The category of track and civil infrastructure covers the following:

- a) rail breaks;
- b) kick-outs;
- c) track geometry, including slacks, twists and cants (superelevations);
- d) gauge widening;
- e) wash-aways;
- f) defective points and crossings;
- g) structural failure (bridges, culverts, tunnels and overhead traction equipment (OHTE));
- h) cuttings or embankment failure; and
- i) other (specify).

#### **7.3.3 Signalling failures**

The category of signalling failures covers the following:

- a) wrong-side signal failure;
- b) signal equipment defects;
- c) electromagnetic interference; and
- d) other (specify).

#### **7.3.4 Rolling stock failures**

The category of rolling stock failures covers the following:

- a) broken axle;
- b) braking system failure;
- c) coupler failure;
- d) wheel profile including a sharp wheel flange;
- e) high-tension equipment fire; and
- f) other (specify).

### **7.3.5 Operational irregularities**

The category of operational irregularities covers the following:

- a) loading irregularities;
- b) movements that exceed the limits of authority, including signals passed at danger (SPADs);
- c) speeding;
- d) shunting irregularities; and
- e) any other operational irregularities (for example errors caused by drivers, train control officers (TCOs), shunters and maintenance personnel).

### **7.3.6 Security aspects**

The category of security aspects covers the following:

- a) vandalism (wilful acts not for gain) of operational assets;
- b) theft of operational assets;
- c) malicious damage (vandalism) to property, impacting on operational safety; and
- d) other (specify).

### **7.3.7 Externalities**

The category of externalities covers the following:

- a) power outages;
- b) adverse weather conditions;
- c) non-compliance with road signage; and
- d) other (specify).

## **7.4 Human factor root (basic) cause**

**7.4.1** In addition to the recording and reporting of occurrences as required in categories A to D (see 7.2.2 to 7.2.5), the human factor root (basic) cause of railway occurrences shall be recorded in the categories and sub-categories as required in 7.4.2 and reported in the quarterly reports as required in clause 11.

**7.4.2** Categories of the human factor root (basic) cause cover the following:

- a) failure of the human resources procurement and placement process (recruitment);
- b) substance abuse;
- c) shift work and fatigue;
- d) training;
- e) unfit for duty owing to a physical or psychological condition (or both);
- f) gross negligence; and
- g) other (specify).

## **7.5 Fatalities and injuries**

**7.5.1** The RAs shall record and report fatalities and injuries resulting from railway occurrences that are recorded in the categories and sub-categories A to L (see 7.2.2 to 7.2.13), in the categories as required in 7.5.2, in accordance with 7.6 and in accordance with the relevant national health and safety legislation (see foreword).

**7.5.2** The number of members of the public

- a) fatally injured,
- b) seriously injured, and
- c) that suffered minor injuries

shall be recorded and reported as specified in 7.5.1.

**7.5.3** The number of employees

- a) fatally injured,
- b) seriously injured, and
- c) that suffered minor injuries.

shall be recorded and reported as specified in 7.5.1.

**7.5.4** The number of contractor or contractor employees

- a) fatally injured,
- b) seriously injured, and
- c) that suffered minor injuries

shall be recorded and reported as specified in 7.5.1.

**7.5.5** The number of passengers

- a) fatally injured,
- b) seriously injured, and

c) that suffered minor injuries

shall be recorded and reported as specified in 7.5.1.

## **7.6 Railway occurrence recording, notification and reporting to the relevant national regulating authority/SARA (see foreword)**

### **7.6.1 General**

**7.6.1.1** RAs shall ensure that procedures for recording and reporting of occurrences are established, developed or adopted and maintained in compliance with 5.8, 7.2, 7.3, 7.4 and 7.5.

**7.6.1.2** The format of the documentation shall be in accordance with the directives or guidelines (or both) provided by the relevant national regulating authority. In the event of more than one RAs being involved in a railway occurrence, all RAs shall report the occurrence to their respective regulating authorities and relevant parties.

**7.6.1.3** In addition to the railway occurrences that are reported to the respective regulating authorities and relevant parties.

RAs are expected to track those occurrences that could assist them in assessing their own safety performances. These occurrences might be incidents that could serve as leading indicators of problems and that could be used to identify shortcomings in procedures or products, or they could be used to identify specific problem areas.

See annex D for a list of examples of occurrences that the RAs shall record and manage other than the ones required to be reported to the respective regulating authorities and relevant parties.

**7.6.1.4** RAs shall identify the safety data to be collected to assess performance with regard to their annual safety targets and to address other analytical requirements.

### **7.6.2 Immediate telephonic notification (within 15 min)**

Railway occurrences (see categories A to L as given in 7.2.2 to 7.2.13) that result in injuries or fatalities to people, or significant damage to property and the environment shall be reported telephonically by the RAs to the respective regulating authorities and relevant parties.

(see foreword) within 15 min.

These occurrences include extensive damage to rolling stock and infrastructure, threats to nearby communities or the environment resulting from a spillage of dangerous goods, or other major disruptions that affect normal train operations.

### **7.6.3 Immediate written notification (within 12 h)**

**7.6.3.1** Railway occurrences (see categories A to L as given in 7.2.2 to 7.2.13) that have been notified in terms of 7.6.2 shall be confirmed in writing via fax or e-mail to the respective regulating authorities and relevant parties.

(see foreword) within 12 h.

**7.6.3.2** The written notification shall provide at least the following information:

- a) the name of the RAs;
- b) the physical address of the RAs ;
- c) the date of reporting the occurrence;

- d) the date of the occurrence;
- e) the time of the occurrence;
- f) the place of the occurrence;
- g) the province of the occurrence;
- h) a short description of the occurrence;
- i) details of dangerous goods involved, including details of the consignor, the quantity spilled, the shipping name, the United Nations (UN) number and also damage to property, assets and the environment; and
- j) the name and contact details of the reporting person.

#### **7.6.4 Daily occurrence report**

**7.6.4.1** The respective regulating authorities and relevant parties foreword) shall receive daily reports of occurrences (categories A to L) that occurred in the prevailing period 00:00 to 23:59 by 11:00 on the following day, except for weekends or holidays in which case the reports shall be provided by 11:00 on the next working day.

These reports shall include fatalities and injuries that emanate from attempted suicides or people struck by trains whilst trespassing on the railway reserve.

**7.6.4.2** The daily reports shall include the immediate reportable occurrences as described in 7.6.3.

**7.6.4.3** The daily reports shall provide at least the following information:

- a) the name of the RAs;
- b) the name of the reporting person;
- c) the physical address of the RAs;
- d) the date of reporting the occurrence;
- e) the date of the occurrence;
- f) the time of the occurrence;
- g) the place of the occurrence;
- h) the province of the occurrence;
- i) a short description of the occurrence;
- j) the railway occurrence category and sub-category;
- k) the RAs's occurrence reference number.
- l) details of dangerous goods involved, including details of the consignor, the quantity spilled, the shipping name, the UN number and also damage to property, assets and the environment; and

m) the names of the persons contacted.

### **7.6.5 Ad hoc reports**

**7.6.5.1** In addition to the information to be provided in terms of 7.6.2, 7.6.3 and 7.6.4 respective regulating authorities and relevant parties (see foreword) may request additional information, such as:

- a) the exact location of the occurrence (i.e. the kilometre point or mast pole(s) number(s)),
- b) the train number(s) involved,
- c) the type of train (i.e. passenger, freight, tourism, or mixed trains, inspection trolleys and on-track maintenance machinery),
- d) the type of braking system (i.e. vacuum or air brake),
- e) the gradient at the point of occurrence,
- f) the type of power (i.e. 3 kV dc, or 25 kV ac, or 50 kV ac,) or non-electrified,
- g) the classification of the line (i.e. light rail, heavy rail (N1, N2, N3 or S1), or monorail),
- h) the motive power (locomotives, whether electric multiple units (EMUs) or diesel multiple units (DMUs)),
- i) the name of the network operator (if different from that of the train operator),
- j) the name of the station operator (if different from that of the train operator),
- k) the content of the load of the freight train (if applicable),
- l) the names of train personnel involved,
- m) the weather conditions (at the time of the occurrence),
- n) a description of the immediate natural and built environment,
- o) the method of train authorization,
- p) normal or abnormal train working,
- q) the possible cause of the incident, and
- r) the number of injuries and fatalities.

**7.6.5.2** The respective regulating authorities and relevant parties shall receive prompt notification of any occurrence that otherwise might not have been reported in terms of 7.6 in order to be in a position to respond to queries. Such queries might include queries from politicians, the community, local interest groups and the media.

## **8 Occurrence investigations**

**8.1** RAs are encouraged to adopt a just culture to occurrence investigations in which the sole focus will be to determine the facts and the root cause(s) of the occurrence and to make recommendations to prevent or reduce the risk of recurrence rather than to allocate blame or liability (or both).

**8.2** In compliance with the provisions of the relevant national railway safety legislation (see foreword), RAs shall establish, develop or adopt, implement and maintain procedures for investigating the root cause(s) of occurrences and implementing the corrective action(s) needed to prevent recurrences of occurrences.

**8.3** The scope and level of investigation shall be determined by the frequency, severity and consequences, both actual and potential, of the occurrence.

**8.4** Persons appointed to investigate occurrences shall have the necessary competence and seniority, both in relation to the nature and seriousness of the occurrence, and the scope and level of the investigation.

**8.5** RAs shall ensure that their respective occurrence investigation processes provide for cooperation, support in collating evidence, and the undertaking of joint occurrence investigations at the interface/intraface of railway operations.

**8.6** Occurrence investigation reports shall be retained by operators (see 5.8.7) and made available to respective regulating authorities and relevant parties (see foreword), when required.

NOTE Depending on the scope and level of the investigation, and as a minimum recommendation, the contents of the occurrence investigation report described in annex C should be addressed.

## **9 Corrective action plans**

**9.1** RAs shall establish, develop or adopt, document and maintain procedures for

- a) the development of corrective action plans that focus on reducing the risk of the problem or the occurrence recurring,
- b) obtaining the appropriate management approval of recommended actions,
- c) formal monitoring of the implementation of corrective actions and compliance with the corrective actions approved by management,
- d) the application of controls to ensure that corrective actions are taken and that they are effective, and
- e) the implementation and recording of changes that result from corrective actions.

**9.2** Corrective actions may include the following:

- a) directives or guidelines (or both) issued by respective regulating authorities and relevant parties. (see foreword);
- b) occurrence investigation reports;
- c) safety audit reports;
- d) the evaluation of compliance with standards;
- e) risk control strategies;
- f) skills and competency requirements;
- g) a safety performance data analysis; and
- h) other (specify).

## **10 Security management**

### **10.1 General**

**10.1.1** RAs shall develop procedures, processes and systems in collaboration with the respective regulating authorities and relevant parties. (see foreword) with the objective of:

- a) preventing security incidents as described in 10.2,
- b) managing security incidents, and
- c) notifying and reporting security incidents to the respective regulating authorities and relevant parties.(see foreword) and other relevant authorities in accordance with 10.3.

**10.1.2** RAs shall establish, develop or adopt, communicate and maintain contingency plans, including emergency preparedness plans for security incidents. Such plans shall be integrated with similar plans of other operators at the interfaces/intrafaces of railway operations and also with those plans of relevant external emergency responders, including the police services and the departments of provincial and local government.

**10.1.3** The contingency and emergency preparedness plans referred to in 10.1.2 shall be based on risk assessments to provide for the prevention and mitigation of the consequences of all potential security-related incidents associated with railway operations.

### **10.2 Security incidents categories**

#### **10.2.1 General**

Security incidents shall be recorded and reported to the respective regulating authorities and relevant parties.(see foreword) in the categories 1 to 9 as given in 10.2.2 to 10.2.10. These records and reports shall reflect the number of incidents and not the consequences thereof.

#### **10.2.2 Category 1 — Theft of assets**

Category 1 incidents cover the theft of the following assets, causing an impact on operational safety:

- a) rolling stock components in sections;
- b) rolling stock components in yards and sidings;
- c) civil infrastructure components in sections;
- d) civil infrastructure components in yards and sidings;
- e) overhead traction equipment in sections;
- f) overhead traction equipment in yards and sidings;
- g) train authorization and control systems and equipment in sections;
- h) train authorization and control systems and equipment in yards and sidings; and
- i) ancillary equipment, including public address (PA) systems, information boards and closed-circuit television (CCTV).

#### **10.2.3 Category 2 — Malicious damage (vandalism) to property**

Category 2 incidents cover malicious damage (vandalism) to the following, causing an impact on operational safety:

- a) rolling stock components in sections;
- b) rolling stock components in yards and sidings;
- c) civil infrastructure components in sections;
- d) civil infrastructure components in yards and sidings;
- e) overhead traction equipment in sections;
- f) overhead traction equipment in yards and sidings;
- g) train authorization and control systems and equipment in sections; and
- h) train authorization and control systems and equipment in yards and sidings; and
- i) ancillary equipment including, PA systems, information boards and CCTV.

#### **10.2.4 Category 3 — Threats**

Category 3 incidents cover the following threats to operational safety:

- a) bomb threats to networks;
- b) bomb threats to stations;
- c) bomb threats to rolling stock;
- d) threats due to electrical power outages; and
- e) threats other than bomb and power outage threats.

#### **10.2.5 Category 4 — Hijacking of trains**

Category 4 incidents cover the kidnapping of train crews and the hijacking of

- a) passenger trains,
- b) freight trains, and
- c) other rolling stock.

#### **10.2.6 Category 5 — Crowd-related incidents**

Category 5 incidents cover crowd-related incidents and include stampedes.

#### **10.2.7 Category 6 — Industrial action**

Category 6 incidents cover industrial action that causes a threat to safe railway operations or to security.

#### **10.2.8 Category 7 — Personal safety on trains**

Category 7 incidents cover the following:

- a) murder;
- b) attempted murder;
- c) rape;
- d) assault;
- e) indecent assault;
- f) aggravated robbery;
- g) common robbery;
- h) theft; and
- i) bomb explosions.

#### **10.2.9 Category 8 — Personal safety on stations**

Category 8 incidents cover the following:

- a) murder;
- b) attempted murder;
- c) rape;
- d) assault;
- e) indecent assault;
- f) aggravated robbery;
- g) common robbery;
- h) theft; and
- i) bomb explosions.

#### **10.2.10 Category 9 — Personal safety outside station platform areas**

Category 9 incidents cover the following regarding personal safety outside station platform areas (in sections between stations, including yards, sidings and depots):

- a) murder;
- b) attempted murder;
- c) rape;
- d) assault;
- e) indecent assault;
- f) aggravated robbery;
- g) common robbery;

- h) theft; and
- i) bomb explosions.

### **10.3 Security incident recording, notification and reporting**

**10.3.1** All security incidents shall be recorded and reported to the police services in terms of guidelines provided to the RAs by respective regulating authorities and relevant parties from time to time.

**10.3.2** In addition, RAs shall report security incidents in the categories described in 10.2.2 to 10.2.10 to respective regulating authorities and relevant parties (see foreword) as provided for in clause 11.

## **11 Information to be submitted (where applicable)**

### **11.1 Quarterly reports**

**11.1.1** Quarterly reports shall be submitted not later than the end of the month following the quarter under review. The quarters shall follow the cycle

- a) April to June,
- b) July to September,
- c) October to December, and
- d) January to March.

**11.1.2** In addition to the railway occurrence recording, notification and reporting required in 7.6, RAs shall submit to the respective regulating authorities and relevant parties (see foreword) quarterly railway occurrence reports and security incident reports that shall comprise a summary of the following:

- a) the railway occurrences in accordance with the sub-categories listed in categories A to L as described in 7.2;
- b) the immediate causes as described in 7.3;
- c) the human factor root (basic) cause as described in 7.4;
- d) fatalities and injuries as described in 7.5; and
- e) security incidents in accordance with the sub-categories listed in the categories 1 to 9 as described in 10.2.

**11.1.3** Quarterly reports shall also provide the following management information:

- a) explanations of significant changes in trends in each category and sub-category;
- b) recommendations that are proposed and accepted to address the trends in (a);
- c) actions taken to address any adverse trends;

- d) actions that lead to favourable results and lessons learned; and
- e) traffic information, in order to normalize occurrence trends.

## **11.2 Annual safety improvement plans**

In addition to the quarterly reports as described in 11.1, RAs shall submit annual safety improvement plans in accordance with 5.5 to respective regulating authorities and relevant parties (see foreword). These plans shall demonstrate continual safety improvement and the effectiveness of the SMS.

## **12 Human factors management**

### **12.1 General**

**12.1.1** The management of human factors as reflected in this clause is amplified in SARA 005, as adopted by the SARA Board.

**12.1.2** Human factors is a holistic discipline that includes the perceptual, physical and mental capabilities and limitations of persons and the interaction of individuals with their respective working and passenger environments, the influence of equipment and systems design on human performance, and the organizational characteristics that influence safety-related behaviour.

**12.1.3** The management of human factors applies a user-oriented philosophy that acknowledges human variability as a parameter. The result incorporates features that take advantage of unique human capabilities and also built-in safeguards to mitigate the impact of human error or misbehaviour (or both). The benefit of a human factors management programme is measured by the level of improved efficiency, safety, health and comfort for the user and optimized safety and productivity for the organization.

**12.1.4** The management of human factors encompasses the following:

- a) human factors in design (human-system interface);
- b) psychological factors:
  - 1) psychosocial factors; and
  - 2) psychophysiological factors;
- c) physical environmental factors; and
- d) organizational factors.

### **12.2 Human factors in design (human-system interface)**

**12.2.1** The human-system interface is an interaction between persons and one or more physical components to bring about a desired output or to fulfil the function for which the human system is designed in order to optimize human performance and mitigate risks in railway operations.

**12.2.2** The work environment refers to the physical area in which tasks are performed. The performance of tasks is directly linked with the human-system interface. Human capabilities and limitations are important factors to bear in mind when designing work interfaces, irrespective of their size or nature.

**12.2.3** The two aspects of the human anatomy that are of particular importance in the design of system interfaces and equipment are anthropometrics (dealing with the size and proportions of the human body) and biomechanics (dealing with how the human body applies forces to itself and objects with which it comes into contact, and how the human body is affected by external forces).

These two aspects cover the limited ability of the human body to adapt to poor workplaces and the forces on and by the human body.

## **12.3 Psychological factors**

### **12.3.1 General**

Psychological factors are a person's cognitive ability (judgement, reasoning, memory and perception), emotions, personality, aptitude, attitude and motivation. These factors determine how a person receives stimuli, processes the information and responds. A person's psychological makeup is further influenced by the interaction of physiological and social aspects (see 12.3.2 and 12.3.3).

### **12.3.2 Psychophysiological factors**

Psychophysiological factors are those factors that deal with the relationship between physiological processes and thoughts, emotions, and behaviour. These factors might impair the sensory, motor-functional and cognitive abilities of a person to perform tasks effectively and safely.

### **12.3.3 Psychosocial factors**

Psychosocial factors are the inherent characteristics of a person, which include personality, attitude, aptitude and motivation that are prone to be influenced by a person's interaction with his/her social environment. The social environment includes both his/her workplace and the impact of the external environment on a person's safe working behaviour.

## **12.4 Physical environmental factors**

Physical environmental factors are stressors that can impact on the human physiological and psychological equilibrium, and consequently on railway safety.

## **12.5 Organizational factors**

Organizational factors are characteristics that refer to the inherent features of organizations that influence the safe behaviour of people at work. These factors include the safety culture, the safety climate, leadership, the demonstration of management's commitment to safety, the physical work environment, policies and systems that address human factors, and that consequently impact on railway safety.

## **12.6 Standards and procedures**

**12.6.1** RAs shall establish, develop, adopt, document and maintain standards and procedures for the management of human-system interfaces to optimize human performance and mitigate risks in railway operations.

**12.6.2** RAs shall establish, develop, adopt, document and maintain standards and procedures for the management of psychological factors in order to mitigate the potential effects of these factors on railway safety. These factors include:

- a) return to work or normal duties: care should be taken when a person returns to work after a period of absence, depending on the reason for the absence;
- b) shift work: understanding the impact and nature of shift work and its relationship to work performance;

- c) night work: understanding the impact and nature of night work and the management of employee activities during the day;
- d) substance abuse: understanding the impact of substance abuse (i.e. the abuse of drugs, alcohol and medication);
- e) pregnancy: employers shall determine the limit of the duration of work by pregnant employees in safety-related roles;
- f) medication: employees shall understand and declare the impact of the type of medication on their ability to execute their duties safely;
- g) illness: employers and employees shall understand and manage chronic, acute and life-threatening diseases/illnesses; and
- h) stress: employers and employees shall understand and manage physical and mental stress.

**12.6.3** The RAs shall establish, develop, adopt, document and maintain standards and procedures for the management of environmental stressors, such as

- a) noise: any sound that can have a distracting effect and impact on railway safety,
- b) vibration: any vibration that can have a negative effect and impact on railway safety,
- c) lighting: includes proper illumination, luminance, contrast and glare of the working and passenger environment that impact on railway safety,
- d) temperature: temperature extremes that can have a negative effect and impact on railway safety.
- e) toxic substances: any toxic substances that can have a negative effect and impact on railway safety.

**12.6.4** RAs shall establish, develop, adopt, document and maintain standards and procedures for the management of organizational factors in relation to safety-related roles as a minimum in order to ensure safe railway operations. These include

- a) human factor risk assessments: RAs shall have processes to assess human-factor-related hazards, unsafe conditions and risks impacting on workers in safety-related roles, which can have an effect on railway safety. These risk assessments should ensure that hazards are identified and risks are mitigated,
- b) medical surveillance: RAs shall have processes to assess the mental and physical fitness of workers for potential and existing safety-related duties,
- c) recruitment, selection and placement: RAs shall have processes to ensure that employees in safety-related roles are able to perform the tasks required of them and should ensure compatibility between the capabilities and limitations of employees and task demands,
- d) training: RAs shall have processes to ensure that employees in safety-related roles have the necessary knowledge, competencies and skills to perform their work safely,
- e) return to work or normal duties: RAs shall have processes to manage workers in safety-related roles who return to work or who resume normal duties after a period of absence,
- f) shift work: RAs shall have processes to manage the impact of shift work on the organization and the consequences thereof (such as fatigue, burnout and ill health) on persons in safety-related roles,

- g) night work: RAs shall have processes to manage the impact of night work on the organization and the consequences thereof (such as fatigue, psychosocial consequences and ill health) on persons in safety-related roles,
- h) substance abuse: RAs shall have processes to manage the use, misuse and abuse of substances by workers in safety-related roles,
- i) pregnancy: RAs shall have processes to manage the impact of pregnancy on workers in safety-related roles. The organization shall monitor the task requirements of pregnant employees and ensure that they are not given any task that may impact on railway safety,
- j) medication: RAs shall have processes to manage the use, misuse and abuse of medication by workers in safety-related roles,
- k) illness: RAs shall have processes to manage the impact of chronic, acute and life-threatening diseases/illnesses on workers in safety-related roles,
- l) stress: RAs shall have processes to manage the impact of stress on workers in safety-related roles,
- m) employee wellness: RAs shall have processes to manage the wellbeing of workers in safety-related roles, and
- n) fitness for duty: RAs shall have processes to enable supervisors to ensure that employees in safety-related roles are fit for duty.

## **13 Procurement of goods and contracted services**

### **13.1 Procurement**

The RAs shall establish, develop or adopt, implement and maintain procedures for ensuring that purchased goods, services and products comply with specified railway safety requirements. These procedures shall ensure that

- a) procurement documents contain adequately specified railway safety requirements,
- b) 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
- c) where appropriate or specified, traceability of manufacture through batch or other identification is available.

### **13.2 Contract management**

#### **13.2.1 General**

**13.2.1.1** The RAs shall establish, develop or adopt, implement and maintain procedures for the management of contracts in respect of safety issues.

**13.2.1.2** Tender or proposal invitation documents shall be reviewed by the organization 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.

**13.2.1.3** 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 a contract shall be subject to a review of the capability of the proposed subcontractor to comply with the specified railway safety requirements.

### **13.2.2 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, the records of contractors' and subcontractors' previously demonstrated capabilities and safety performance.

## **14 Safety standards for engineering and operational systems**

### **14.1 General**

Safety standards for engineering and operational systems as reflected in this clause are amplified in SARA 002, SARA 003 and other standards which are in course of preparation.

RAs shall establish, develop or adopt, implement and maintain safety standards, procedures and instructions for engineering and operational systems to cover the applicable life cycle phases, namely design, construction/manufacturing, commissioning, operation, monitoring and maintenance, modification, and decommissioning and disposal. These standards, procedures and instructions also cover all safety and other relevant aspects of

- a) track, civil and electrical infrastructure,
- b) rolling stock,
- c) train authorization and control systems and equipment,
- d) train operations management, and
- e) inter-modal and utilities management.

The implications of the introduction of new or modified engineering and operational systems to RAs SMSs shall be addressed in accordance with clause 16 and any directives or guidance notices (or both) provided by respective regulating authorities and relevant parties.(see foreword).

### **14.2 Process control**

Activities that directly affect railway safety shall be carried out under controlled conditions, which shall be achieved by

- a) compliance with the safety standards referred to in 14.1,
- b) following documented procedures that specify all the processes associated with the activities of the operator, including train control and operation, maintenance, equipment and facility usage, installation and construction, that shall be used in all cases where the absence of such documentation could adversely affect railway safety, and
- c) monitoring to ensure compliance with (a) and (b).

### **14.3 Design and development**

RAs shall establish, develop or adopt, implement and maintain procedures to control and verify the design of structures, vehicles, equipment and systems in accordance with the safety requirements

for engineering and operational systems as set out in 14.1. Design control procedures shall include the following:

- a) identification of the responsibility for each design or development activity;
- b) safety review at both the design input and design output stages;
- c) assignment of design verification functions;
- d) control of design changes in accordance with (a), (b) and (c); and
- e) coordination between various engineering and operational functions where safety could be affected by the change.

## **14.4 Inspection and testing**

### **14.4.1 General requirements**

**14.4.1.1** RAs shall have in place procedures for the inspection and testing of safety-related engineering and operational systems. The procedures shall define the location, method, level of detail and frequency of inspection and testing (see 14.4.2).

**14.4.1.2** The procedures shall identify the need for inspection and testing on both a scheduled basis and an ad hoc basis after a defined event (for example, flooding of the track, a derailment, including both rolling stock and track after the derailment, lightning strike impact on the signalling system, or detection of a hot axle box).

**14.4.1.3** RAs shall control, calibrate and maintain all equipment (which, for this part of SARA 001, SARA 002, SARA 003, & SARA 004 used for inspection and testing. RAs shall ensure that this equipment is used correctly and complies with the required measurement capability and accuracy.

**14.4.1.4** Where the safety of part of an engineering or operational system cannot be verified before its commissioning or its entry or re-entry into service (for example safety issues that can become apparent only after the activity has started or the item has been placed in service), operators shall make special provision for in-service monitoring and shall document the requirements for such monitoring.

### **14.4.2 Inspection frequency**

**14.4.2.1** RAs shall establish, develop or adopt, implement and maintain formal frequency schedules for the regular inspection and testing of safety-related engineering and operational systems, and shall determine the frequency of inspection and testing of each item of each system by taking all of the following into account:

- a) capacity utilization, operational speed and load limits (infrastructure and rolling stock);
- b) the known or estimated rate of deterioration of critical elements;
- c) consequences of failure of any part of the system;
- d) adverse environmental factors; and
- e) occurrence experience.

**14.4.2.2** Inspection in response to defined events and occurrences (see 14.4.1.2) shall be additional to scheduled inspections.

### **14.4.3 Inspection and test records**

RAs shall establish, develop or adopt, implement and maintain inspection and test records that provide evidence of the condition of all elements critical to railway safety. The records shall be established and maintained in accordance with the requirements of 5.8.

### **14.4.4 Inspection and test status**

**14.4.4.1** The inspection and test status of any item of track or other infrastructure, rolling stock or equipment shall be identified by the use of suitable means that will indicate compliance or non-compliance of the item with regard to inspections and tests performed. The identification of inspection and test status shall be maintained, as necessary, throughout the life cycle of the item to ensure that only items that have passed the required inspections and tests are allowed to be in service.

**14.4.4.2** Where an item of infrastructure, rolling stock or equipment does not comply but remains in service temporarily, procedures shall be in place to ensure safe railway operations. (For example, the imposition of temporary speed restrictions over substandard track, or speed or other limitations placed on rolling stock involved in an occurrence.)

## **14.5 Method of assessment**

RAs shall establish, develop or adopt, implement and maintain standards and procedures for assessing the condition of all safety-related engineering and operational systems and their deterioration as determined by inspection and testing. RAs shall define the response interval between inspection and assessment such that both the safe operation of trains and public safety are not compromised, and the safety standards are not infringed.

## **14.6 Corrective action**

**14.6.1** RAs shall establish, develop or adopt, implement and maintain standards and procedures for taking corrective action when the assessed safety condition of any element of the system

- a) can cause the RAs safety standards to be infringed, or
- b) has reached prescribed intervention levels, or
- c) can cause acceptable levels of risk being exceeded.

**14.6.2** All corrective actions shall be subjected to re-inspection and reassessment in accordance with 14.4 and 14.5.

## **15 Interoperability, interface and intraface management**

### **15.1 General**

Documented procedures and processes shall 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 RAs and intrafaces between the functional disciplines within an administrator's organization.

The requirements for the management of interfaces/intrafaces between railway operations shall be included in business or operating agreements (or both) between parties.

### **15.2 Identification of interfaces/intrafaces**

Network operators shall identify where they meet the networks of another operator and which parts of their networks are used or are to be used by more than one RA (train or station or both).

Station operators shall identify where they interface/intraface with network operators and indicate which parts of a station are used or are to be used by more than one train operator.

### **15.3 Management of interfaces/intrafaces**

#### **15.3.1 General requirements**

All RAs involved in the management of interfaces/intrafaces shall establish, develop or adopt, implement and maintain the necessary systems, procedures and processes that provide for safe railway operations in accordance with this part of SARA 001, including

- a) interface agreements,
- b) standard working and operating procedures, and
- c) contingency plans as given in 7.1.2.

#### **15.3.2 Common essential requirements**

In addition to the general requirements given in 15.3.1, the common essential requirements to be addressed in business or operating agreements (or both) between operators, in addition to commercial aspects, technical standards, and other matters that form part of such agreements, include the following:

- a) Rolling stock shall be considered in respect of the following:
  - 1) vehicle design, overall vehicle and load dimensions in compliance with the clearances required by the fixed and moving structure gauges;
  - 2) service worthiness of vehicles and train sets;
  - 3) permissible speed limit of vehicles and train sets;
  - 4) size, shape, profile and gauge of wheels and wheel sets;
  - 5) limits and tolerances of wheel size, defects, gauge, and wheel shape (including flange thickness);
  - 6) front and rear-end visibility of trains;
  - 7) coupler types, height and tolerances;
  - 8) braking systems, taking into account train performance parameters;
  - 9) auxiliary equipment attachment (for example for telemeters, side and rear-end markers);
  - 10) fire-fighting and related equipment;
  - 11) vehicle fittings for personnel safety (for example, brake-steps and hand brakes);
  - 12) vehicle maintenance standards and procedures, including applicable visible evidence on the vehicle of maintenance done;
  - 13) vehicle type identification, including bogie types;

- 14) electrical resistance tolerances between wheel-to-rail contact faces on the same axle (train detection requirements);
  - 15) electrical compatibility between traction systems and train control systems (signalling systems);
  - 16) effective vigilance controls; and
  - 17) technical limitations on the length of a train.
- b) Track, other civil engineering infrastructure, and electrical traction infrastructure shall be considered in respect of the following:
- 1) structure clearances;
  - 2) track gauge, geometry and tolerances;
  - 3) axle mass limits of track;
  - 4) structural condition of track;
  - 5) maintenance plans, standards and procedures; and
  - 6) track-side indicators, including speed restriction boards and whistle boards.
- c) Stations shall be considered in respect of the following:
- 1) platform structure clearances;
  - 2) building and other structure clearances;
  - 3) capacity of stations;
  - 4) safety equipment, including fire equipment and communication systems;
  - 5) abnormal working hours, including effective communication thereof;
  - 6) occurrence management; and
  - 7) dangerous goods passing through stations.
- d) Electric traction infrastructure shall be considered in respect of the following:
- 1) fault protection;
  - 2) power supply parameters;
  - 3) electrical clearances and approach distances;
  - 4) safety switching and isolation procedures; and
  - 5) earthing and bonding.
- e) Train control shall be considered in respect of the following:
- 1) train control systems;
  - 2) train working rules and instructions;
  - 3) safe work procedures; and
  - 4) effective means of communication.

- f) RAs shall be considered in respect of the following:
- 1) availability and suitability of route;
  - 2) train performance parameters;
  - 3) indication of track speed limits;
  - 4) axle mass limits;
  - 5) commodity loading profiles and patterns, and stability;
  - 6) occurrence management, including contingency plans;
  - 7) personnel competence;
  - 8) effective communication;
  - 9) handling of dangerous goods;
  - 10) operation limitations and restrictions;
  - 11) compatibility;
  - 12) train compilation;
  - 13) personal protective equipment (PPE);
  - 14) abnormal loads; and
  - 15) special vehicles for dedicated freight.
- g) Other (specify).

## **16 Changes to the SMS**

**16.1** In addition to the life cycle requirements described in clause 14 and in SARA 001, and any guidelines issued by respective regulating authorities and relevant parties.(see foreword), the RAs shall ensure that the implications of changes to the SMS are considered, and that the necessary changes to the SMS are made (see annex E).

**16.2** The respective regulating authorities and relevant parties shall be notified of such changes 30 days before implementation.

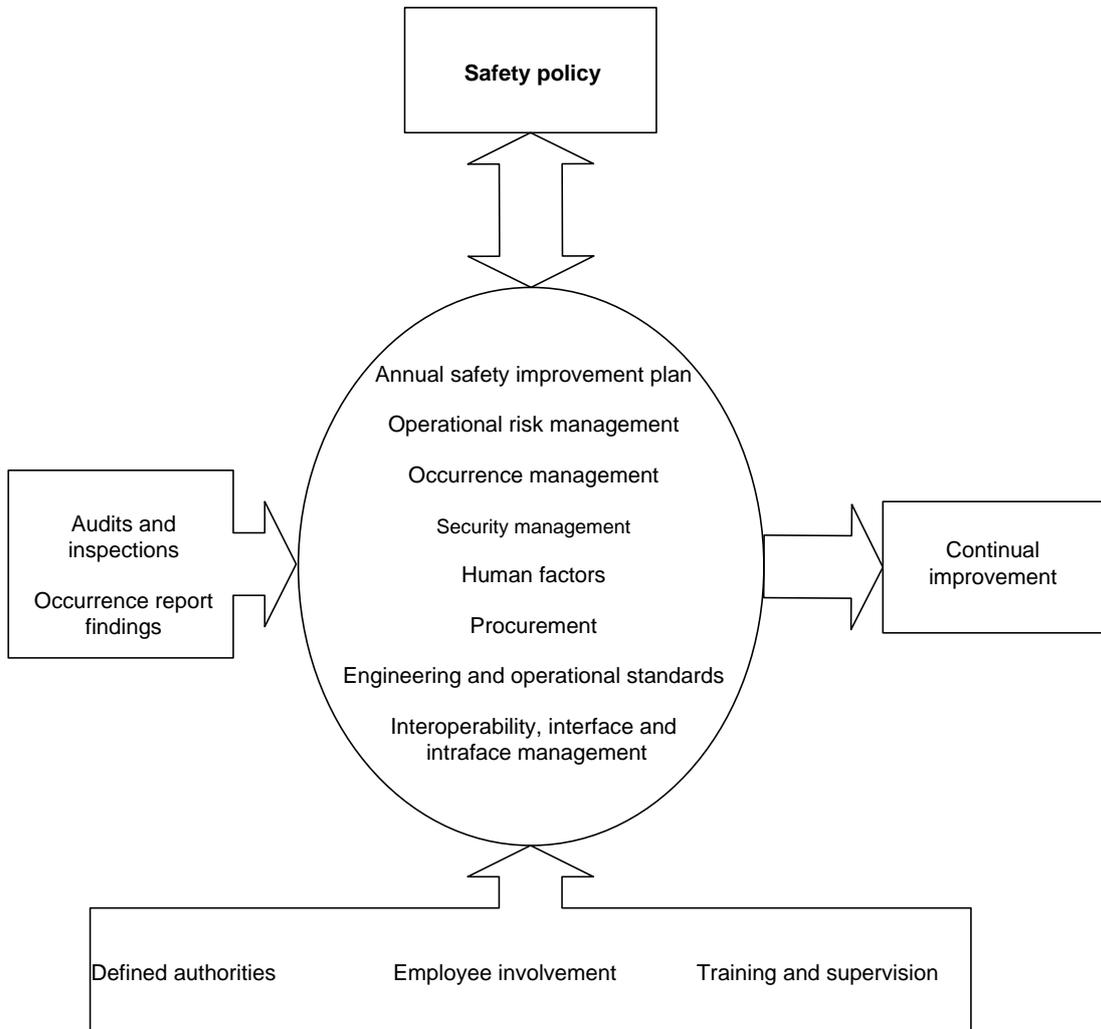
**16.3** If safety might be compromised by not implementing an identified change, the RAs shall immediately implement the change and inform respective regulating authorities and relevant parties in writing as soon as possible.

## **17 Recognized management systems**

Where an RA is certified as compliant with other management systems, it is recommended that the requirements of SARA 001 be incorporated into such systems thereby ensuring an integrated approach to the management of operational safety.

**Annex A**  
(informative)

**The elements of the SMS**



## Annex B

(informative)

### Guidance on the preparation of a safety policy statement

**B.1** A safety policy is a concise statement that sets out an organization's safety philosophy, including railway aspects, and that guides the establishment of goals and objectives, policies, procedures and programmes.

**B.2** Experience has shown that there is a strong correlation between companies with low accident rates and companies whose senior management are concerned with safety and communicate this concern to employees. To maximize the effect of the commitment in order to manage safety, the safety policy should be approved at the highest possible level of the company.

**B.3** The major challenge that faces organizations, especially large ones, is to enable and encourage diverse groups of staff to direct their best contributions towards the goals of the organizations. This implies, amongst other things, the need for involvement and ownership within and between departments, groups, divisions and employees. If all the interested parties are not involved it is impossible to engender the sense of ownership.

**B.4** The policy statement should include the following:

- a) a general statement that reflects the organization's commitment to safety principles and practices;
- b) a demonstration of senior management's commitment to safety and of where the safety responsibilities and accountabilities lie;
- c) a commitment to make resources available in order to achieve the objectives of the safety policy;
- d) a declaration of the organization's safety philosophy and guidance for the establishment of goals and objectives, policies, procedures and programmes, which will contribute to the enhancement of business performance; and
- e) a directive that all employees shall be involved in achieving the safety policy objectives.

**B.5** International best practice regarding the development of a safety policy indicates that

- a) the policy is integrated to comply with other applicable legislation,
- b) references to safety training are included,
- c) safety is monitored at all levels,
- d) the safety policy is periodically reviewed and revised, and
- e) the objectives of the safety policy are practicable and realistically achievable.

## **Annex C**

(informative)

### **Occurrence investigation report**

#### **C.1 General**

An occurrence investigation report should be based on the guidelines given in this annex. The format of the report, however, is left to the user's discretion.

#### **C.2 Cover page**

A title that includes the following information should appear on the cover page of the report:

- a) the number and reference number of the report;
- b) the number(s) of the train(s) involved;
- c) the type of train(s);
- d) the type of occurrence (for example an accident, collision and SPAD);
- e) the place; and
- f) the date and time of the occurrence.

#### **C.3 Contents of the report**

##### **C.3.1 Remit and abstract**

The remit of the report or terms of reference, if applicable, should be included in the report. The report should also include an abstract that gives the background of the occurrence and a summary of the report.

##### **C.3.2 Investigating team**

The following information regarding the investigating team should be included in the report:

- a) a list of the names of the members on the investigating team or board of inquiry or the name of the investigator, including the competence and designation of each individual; and
- b) the date(s) on which and location(s) where the inquiry or investigation took place.

##### **C.3.3 Other information**

Other relevant information may be given in an annex, where appropriate. Such information should include the following:

- a) the name of the operator(s);
- b) the type of occurrence (for example, derailments, collisions, and level-crossing accidents);
- c) the location of the occurrence;
- d) the geographic layout of the surrounding area;
- e) the date and time of the occurrence;

- f) the time when the occurrence was reported;
- g) a time comparison;
- h) a description of the weather and visibility;
- i) a list of all injuries;
- j) a list of damage to property, including other assets and the environment;
- k) the train type(s) and the number(s) of the rolling stock and the shunting operation;
- l) the number(s) and type(s) of the locomotive;
- m) the composition and load of the train;
- n) the origin and destination of the train;
- o) the names of personnel involved in the occurrence and location where they are stationed;
- p) the hours on duty of personnel involved;
- q) a list of any tests done for substance abuse;
- r) the method of working of the train and of the train control system;
- s) the condition of the rolling stock and infrastructure;
- t) a statement of relevant documentation or token (or both) withdrawn;
- u) a list of the names of witnesses;
- v) witness statements and evidence;
- w) sketches, photographs, pictures (these would normally be given in an annex);
- x) particulars of the clearing operation; and
- y) any other known factual information.

### **C.3.4 Analysis**

The following should be stated in the analysis:

- a) the nature of the cause (immediate or basic):
  - 1) technical;
  - 2) operational;
  - 3) human; or
  - 4) environmental;
- b) an assessment of the risk of the occurrence;

- c) any irregularities (that did not contribute directly to the occurrence); and
- d) other (specify).

### **C.3.5 Findings**

Findings should be stated in the following categories:

- a) human factors;
- b) technical;
- c) operational;
- d) institutional; and
- e) other (specify).

### **C.3.6 Interim actions**

Interim actions should be stated in the report.

### **C.3.7 Recommendations**

Appropriate recommendations should be included in the report.

### **C.3.8 Signatures and dating**

Provision should be made for the signing and dating of the report.

## **Annex D** (normative)

### **Occurrences that operators record and manage**

#### **D.1 General**

In addition to the railway occurrences recorded in clause 7 (categories A to L) and security incidents recorded in clause 10 (categories 1 to 9), each operator will have a list of railway occurrences and security incidents that shall be tracked, monitored and managed.

#### **D.2 Examples of occurrences**

##### **D.2.1 Operational occurrences**

Serious train working irregularities include the following:

- a) uncontrolled movement of rolling stock (runaway rolling stock);
- b) authorizing of conflicting movements;
- c) near misses (averted collisions);
- d) illegal occupation (trespassing and illegal crossing);
- e) overshooting platform;
- f) inadequate protection of work area;
- g) disregard of track-side indicators and hand signals; and
- h) points run through.

##### **D.2.2 Infrastructure**

Infrastructural deviations from standards include the following:

- a) level crossing warning system failures;
- b) lack of track-side indicators; and
- c) structure clearances.

##### **D.2.3 Rolling stock**

Rolling stock deviations from standards include the following:

- a) hot axle boxes;
- b) defective couplers;
- c) cracked wheels;
- d) loose tyres;
- e) defective handbrakes;

- f) defective steps; and
- g) defective doors.

#### **D.2.4 Stations**

Station deviations from standards include the following:

- a) unavailability or malfunctioning (or both) of PA systems;
- b) unscheduled changes to platform working;
- c) safety-related complaints; and
- d) trespassers.

**Annex E**  
(normative)

**Changes to the SMS**

**E.1** The relevant national railway safety regulator (see foreword) shall be notified of the changes to the SMS as given in E.2 and E.3.

**E.2** Changes to an operator's SMS include the following elements:

- a) policy, structure and procedure;
- b) operational risk management processes;
- c) occurrence management;
- d) security management;
- e) human factors management;
- f) safety standards for engineering and operational systems; and
- g) interoperability, interface and intraface management.

**E.3** Changes to an operator's SMS include the following network, rolling stock, station and railway operations:

- a) new lines, extensions, discontinued and abandoned lines, including changes in the operating status of sidings;
- b) increases to line operating speeds over part or all of the operation;
- c) significant changes to operating procedures that require additions to or amendment of (or both) operating standards;
- d) changes to train authorization and control systems or equipment (or both) over part or all of the operation, including arrangements for workplace protection;
- e) changes to the type of motive power, for example steam-to-diesel, and diesel-to-electric;
- f) changes to the types and routes of rolling stock, other than motive power, used;
- g) new and modified rolling stock;
- h) non-electrified to electrified lines, and vice versa;
- i) changes to inspection procedures, for example, track inspection frequencies, bridge examination procedures and frequencies, structure inspection, and traction overhead inspection;
- j) changes to rolling stock and infrastructure examination and maintenance frequencies;
- k) alterations to fixed and moving structure gauges;

- l) the 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 (or both);
- m) the introduction of new or substantially changed rolling stock, including aspects that relate 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);
- n) the introduction of new on-track equipment that require any additions or changes (or both) to standards or operating procedures;
- o) the introduction of new train services;
- p) changes to operating agreements, including access and interface agreements;
- q) changes in ownership (permits are not transferable);
- r) alterations to track standards, including material specifications, geometric configuration, and tolerances; and
- s) alterations to bridge and structure loadings, material specifications and clearances standards.

## **Bibliography**

OHSAS 81001, *Occupational health and safety management systems – Requirements.*

OHSAS 18002, *Occupational health and safety management systems – Guidelines for the implementation of OHSAS 81001:2007.*

SANS 9001/ISO 9001, *Quality management systems – Requirements.*

SANS 14001/ISO 14001, *Environmental management systems – Requirements with guidance for use.*

SANS 3000-1