STATE OF SAFETY REPORT 2019/20

RSR Railway Safety Regulator

STATE OF SAFETY AT A GLANCE

3 392

Operational occurrences, a **15%** decrease.

369

A **2%** decrease in the number of fatalities as a result of operational occurrences.

A total of **20** fatalities as a result of people travelling outside of designated passenger areas.

An increase of **11%.**

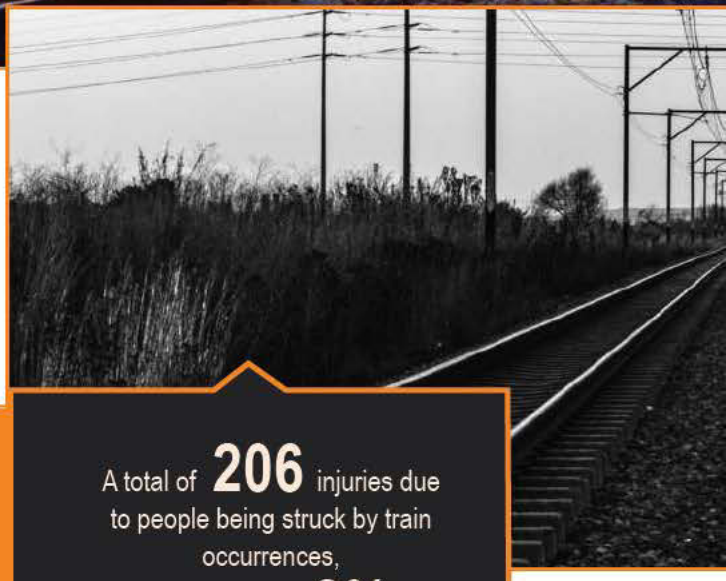
A total of **96** injuries as a result of people travelling outside of designated passenger areas. A **38%** decrease.

1 210

A **55%** decrease in the number of injuries as a result of operational occurrences.

490

A **24%** decrease in the fatality weighted injuries overall number of injuries as a result of operational occurrences.



A total of **264** fatalities as a result of people being struck by train occurrences, a **7%** decrease.

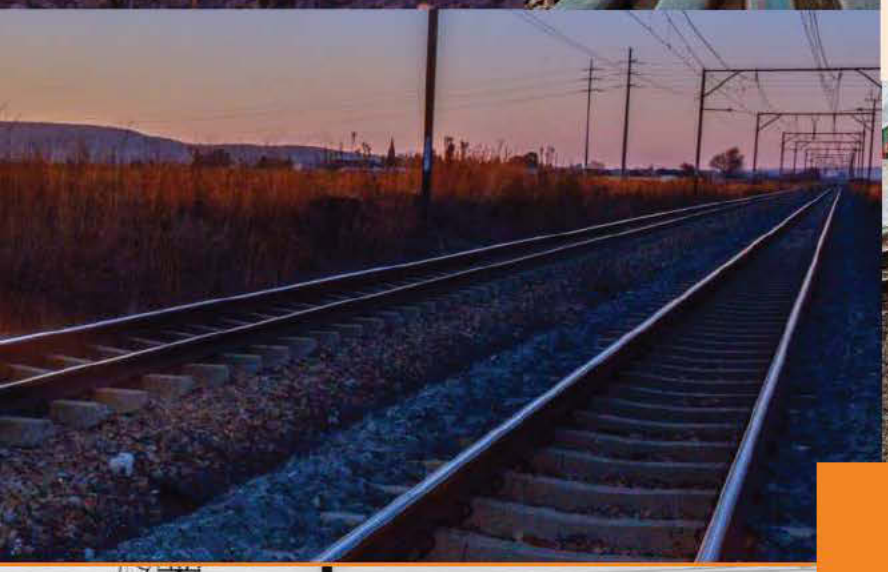
A total of **206** injuries due to people being struck by train occurrences, decreased by **8%**.

9 996

Security-related incidents, an **8%** increase.

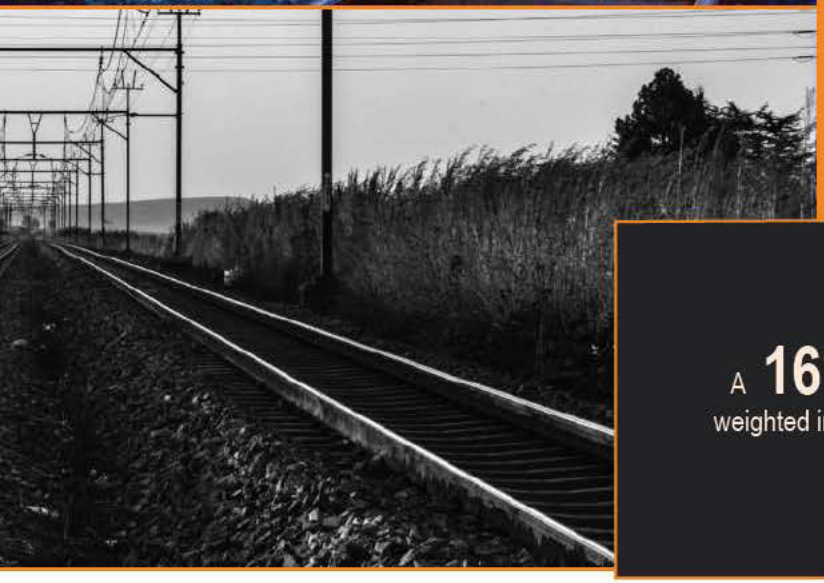
28

A **7%** decrease in the number of fatalities as a result of security-related incidents.



458

A **22%** decrease in the number of injuries as a result of security-related incidents.



74

A **16%** decrease in the fatality weighted injuries as a result of security-related incidents.

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LIST OF ACRONYMS AND ABBREVIATIONS

A

Act National Railway Safety Regulator Act No. 16 of 2002 (as amended)

ASoSR Annual State of Safety Report

B

BOC Bombela Operating Company

C

CEO Chief Executive Officer

D

DEL Department of Employment and Labour

DoT Department of Transport

F

FWI Fatalities and Weighted Injuries
(10 injuries are equivalent to 1 fatality)

N

NIMS National Information Monitoring System

P

PRASA Passenger Rail Agency of South Africa

PSBT People struck by trains

PTI Platform-train interchange (alternatively Interface)

R

RRP Rapid Rail Police

RSR Railway Safety Regulator

S

SA South Africa

SANS South African National Standard

SAPS South African Police Service

SPAD Signal Passed at Danger

T

TCO Train Control Officer

TFR Transnet Freight Rail

PREFACE

The Railway Safety Regulator (RSR) is mandated to oversee railway safety in South Africa. To promote rail as the preferred mode of transport, the RSR endeavours to ensure that all role players involved in the rail sector are informed of the prevailing safety issues to meaningfully play their respective roles in creating a safe and reliable rail industry.

In compliance with Section 20 of the National Railway Safety Regulator Act, the RSR annually produces a report on the state of safety within the South African railways. This report provides an analysis of operational occurrences and security-related incidents. To ensure a holistic picture of the rail safety state in the analysis of safety risk, this year s Annual State of Safety Report (ASoSR) once again focuses on safety performance with regards to regulatory practices for the protection of persons, property and the environment.

The ASoSR incorporates data from the RSR s National Information Monitoring System (NIMS), the South African Police Service (SAPS), occurrences, incidents and harm reports by passengers and members of the public via the RSR s Call Centre. This includes occurrence and incidents data received directly from railway operators. Its scope is predominantly delimited to operational occurrences and security-related incidents connected with the railway operations that are reported to the RSR. The harm to persons herein has been extended to include fatalities and injuries (i.e. harm) to the workforce (employees and contractors), train passengers and the general public.

When analysing collective risks, injuries of differing levels of seriousness are combined into one composite measure. For the present safety analysis, an approach has been used which is based on an established standard in risk analysis of transport modes. The composite measure is termed fatalities and weighted injuries or FWI. It is calculated using the following formula: [number of fatalities] + 0.1 x [number of injuries].

Understanding the overall profile of risk on the railway helps with its management, by enabling focus to be given to areas that are identified as priorities. When calculating the overall railways risk profile as well as that for the individual key focal occurrence categories (i.e. collisions, derailments, level crossings, people struck by trains and platform-train interchange occurrences), injuries and fatalities data for the 2010/11-2019/20 period was used because this provides for a better estimation of risk due to the size of the data. This is especially important for those categories of occurrences with low frequencies and high consequences.

This ASoSR must be read in the context of operator utility and train service of the three largest South African operators. These are Transnet Freight Rail (TFR), Passenger Rail Agency of South Africa (PRASA) and the Bombela Operating Company trading as Gautrain. This herein means the number of tonnages of freight and of fare-paying passengers for passenger rail.

A round figure synopsis of these tonnage variations can be presented as follows:

- Transnet Freight Rail (TFR) produced 32,7 million train km and 145,8 billion tonne km in the 2019/20 reporting period, this productivity level is compared to a total of 46 million train km (29% reduction) and 117.9 billion tonne km (24% increase) recorded during the 2010/11 reporting period.
- PRASA Rail produced 17,9 million train km in the 2019/20 reporting period - a 32 per cent decrease compared to the 26.6 million train km during 2010/11 and 3 million passenger km a 76 per cent decrease of the 12 232 million passenger km reported during the 2010/11 reporting period.

CEO'S FOREWORD

CEO S FOREWORD

In a world where traffic congestion and the high price of fuel is the bane of our existence, I would think that the availability of trains as a means of transport would be a welcomed relief. It is, therefore, perplexing and outright devastating to learn that the destruction of railway property is slowly becoming the norm in South Africa.

Cable theft and vandalism account for millions of Rands being lost, which has a direct impact on the economy. According to media reports, the Department of Transport has estimated that at least R1 billion has been lost by the rail sector due to vandalism and public disorder. This is unacceptable as lives are affected in the most crippling way. Just a year ago, a train crash outside Pretoria claimed the lives of three people while 600 fellow passengers were left injured. As it turned out, cable theft was a contributory cause to the accident.

It is tragic to learn that the scourge continues as the 2019/20 period has seen major operators experience unprecedented levels of theft and vandalism of infrastructure.

The Annual State of Safety Report (ASoSR) further elaborates on this by providing an overview of the safety of our railways. It is used to determine where the challenges are, what causes them and what steps need to be taken to improve the safety of railway operations.

This year's ASoSR shows an increase of eight per cent in the total number of security-related incidents when compared to the previous reporting period. This is as a result of the open network and lack of security which exposes commuters, trains and railway infrastructure to criminal activity.

The report also highlights the total number of incidents of persons illegally crossing the railway lines during the 2019/20 reporting period. This activity increases the potential risk of people being struck by trains and/or contributes to theft and vandalism of railway assets. A lot still needs to be done to ensure that our commuters and railway assets are safeguarded. Therefore, the RSR has intensified the monitoring of security plans of the various operators.

The staggering numbers in the report reflect that more needs to be done to ensure that our commuters feel safe. There is a need to increase security in the railways before they become defunct. The railways are an asset which is both a business and a service. It renders the most critically needed means of transport for ordinary people whose finances cannot continue to be drained by other means of transport. The safety of commuters cannot be undermined.

On a positive note though, not all is grim as the 2019/20 reporting period saw a 15 per cent decrease in total train collisions when compared to the 2018/19 reporting period. This is a result of the Regulator's contribution in curbing signals passed at danger in the 2019/2020 reporting period.

Furthermore, to affirm our commitment towards the protection of rail workers, the RSR is focussing its efforts on protecting our rail icons. Earlier this year, the Regulator embarked on a safety campaign entitled Siyabavikela. The campaign, which is ongoing, enjoys the participation and support of rail operators, employees and rail stakeholders at large to ensure maximum reach and awareness.

I remain hopeful that the bleak numbers in the report will push us further to address challenges in the rail industry. As Minister Fikile Mbalula articulated recently, we cannot sit back and fold our arms while the state of safety of our railways remains dire. We must redouble our efforts to turn the tide and ensure that the massive investments in rail infrastructure result in tangible improvements in safety .

It would be remiss of me not to acknowledge the efforts of the operators and various other rail stakeholders. If we continue to work together and remain committed to improving the state of our railways, nothing can stop us.

[redacted]

Ms Tshepo Kgare
ACTING CHIEF EXECUTIVE OFFICER

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Section 20(1) of the National Railway Safety Regulator Act No.16 of 2002 (as amended) stipulates that the Regulator must annually produce and submit a report on the safety of workers, the public and environment associated with railway operations to the Minister of Transport. Therefore, the ASoSR is a legislative requirement which provides a range of safety-related information for railway operators, the general public and members of the broader railway industry, to assist in the management of railway safety. In analysing the data received by the RSR, the safety overview indicates increasing trends in operational occurrences as well as security-related incidents. The 2019/20 reporting period headlines include:

- A total of 13 897 negative events reported to the RSR. The breakdown is as follows:
  - 3 392 Operational occurrences,
  - 9 996 Security-related incidents, and
  - 509 Operational occurrences or security-related incidents which the RSR and operators did not allocate a SANS category reporting code to.

- Theft of assets (SANS Category 1) contributed a total of 7 180 incidents to the total 9 996 security-related incidents recorded during the 2019/20 reporting period. The total security-related incidents increased from 9 268 during the 2018/19 reporting period. This is largely due to a 14 per cent increase recorded between the 2018/19 and 2019/20 reporting periods for theft of assets.
- Despite an overall 24 per cent reduction in network traffic since the 2010/11 reporting period, operational occurrences per million train km still increased by six per cent, but security-related incidents per million train km increased dramatically by 105 per cent.
- A total of 490 FWI comprising 369 fatalities and 1 210 injuries were recorded as a result of all the SANS coded operational occurrences during the 2019/20 reporting period. FWI is taken as a "statistical equivalent" of 10 injuries to one death. Of these, 69 per cent of the FWI recorded during the 2019/20 reporting period were suffered by the general public, largely due to Category E occurrences (people struck by trains during movement of rolling stock).
- Since the 2010/11 reporting period, on average, 633 fatality and weighted injuries resulted from operational occurrences. SANS Category E (people struck by trains during movement of rolling stock) contributed 60 per cent of this total.
- The three large metropolitan cities in the Gauteng, KwaZulu-Natal and Western Cape provinces, each with high commuter traffic volumes, recorded 88 per cent of the calculated FWI.
- Although 30 per cent of all persons harmed during the 2019/20 reporting period were passengers, in 70 per cent of all operational occurrences, they were harm free.
- The workforce was not harm free. One FWI occurred in 63 per cent of the cases and two FWI in 37 per cent of operational safety occurrences; and Operational occurrences associated with more than two workforce FWI have a probability of zero.
- The general public was harm free in only 14,29 per cent operational occurrences during the 2019/20 reporting period compared to 16,47 per cent recorded during the 2018/19 reporting period. Less than one general public FWI occurred in 38 per cent of the 2019/20 reporting period operational occurrences, and one to two general public FWI occur in 46 per cent compared to 44 per cent in the 2018/19 reporting period.
- There was an 8 per cent overall increase in security-related incidents in the 2019/20 reporting period compared to the 31 per cent increase recorded between the 2017/18 and 2018/19 reporting period.
- Since 2010/11, there was a 57 per cent increase in the overall number of security-related incidents. Since the 2013/14 reporting, there was a 113 per cent increase.
- A total of 73.8 FWI comprising 28 fatalities and 458 injuries were recorded as a result of all the security-related incidents during the 2019/20 reporting period. The biggest contributor to these figures are incidents of personal safety including murder, attempted murder, assault, aggravated robbery and common robbery on trains, stations and outside platform areas.
- The 2019/20 reporting period ASoSR then examined, in greater detail, the safety performance of each of the high consequence occurrence categories to better understand their risk profiles and where possible, causal factors.

A high-level overview of the main findings from each of the occurrence categories are provided below:

The Collisions chapter focuses on the safety risks related to "collisions during movement of rolling stock" (SANS occurrence Category A). Headlines for the 2019/20 reporting period include:

- A total of 847 collisions recorded during the 2019/20 reporting period.
- Per million train km, operators recorded a 39 per cent rise in occurrences in SANS Category A: Collisions between rolling stock on a running line.
- TFR contributed 24 per cent less train kilometres since the 2010/11 reporting period, yet it recorded an eight per cent increase in train collisions.
- PRASA contributed 322 per cent less train km since the 2010/11 reporting period, yet it recorded a 19 per cent increase in train collisions.
- A total of 91 per cent of all collisions occur in sub-category A-b: Collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock).
- Collisions between rolling stock on a running line (A-a) is 7.5 times more likely to result in an FWI than collisions of rolling stock with obstructions on a running line (A-b). In the 2019/20 reporting period this type of occurrence was 86 times more likely to occur.
- The Gauteng province is responsible for 88 per cent of all train collision harm since the 2010/11 reporting period.
- The 2019/20 reporting period resulted in only three per cent of all harm since the 2010/11 reporting period while it contributed 29 per cent during the 2018/19 reporting period.

The Derailments chapter cover safety risks pertaining to derailments during movement of rolling stock on a running line (SANS Occurrence Category B) and tippler activities in line with SANS sub-category B-c. The 2019/20 reporting period headlines include:

- A total of 382 derailment occurrences recorded during the 2019/20 reporting period.
- Overall, there was a 29 per cent decrease in derailments per million train km in the 2019/20 reporting period compared to the 32 per cent recorded during the 2018/19 reporting. The decrease in derailments per million train km commenced in the 2010/11 reporting period.
- Whereas the 2019/20 reporting period witnessed a three per cent decrease in total train derailments when compared with the 2018/19 reporting period, on a per million train km normalised basis, this represents a 15 per cent increase.
- Since the 2010/11 reporting period, the FWI value has decreased by 56 per cent. On a per million train km normalised basis this represents a 42 per cent decrease since the 2010/11 reporting period.
- FWI resulting from derailments increased by 196 per cent in the 2018/19 reporting period.
- Gauteng (54%) and KwaZulu-Natal (16%) account for the majority of FWI harm as a result of derailments.

The Level Crossings chapter presents the risks arising from train accidents at level crossings. It also examines the relationships between occurrence sub-categories and their respective consequences. Distinctions were made between train passengers, pedestrians and road vehicle users (i.e. the general public), and workforce (train drivers and assistants) for the 2019/20 reporting period to understand the risks borne by different road-rail user groups. Headlines for the 2019/20 reporting period include:

- A total of 104 level crossing occurrences recorded during the 2019/20 reporting period.
- The North West (20%), KwaZulu-Natal (17%), Western Cape (16%), Gauteng (14%), and Mpumalanga (11%) provinces account for 78 per cent of all level crossing occurrences during the 2019/20 reporting period.
- Level crossing occurrences decreased by 32 per cent overall since the 2010/11 reporting period.
- The number of level crossing occurrences during the 2019/20 reporting period increased by 20 per cent over the 2014/15 reporting period low point.
- Level crossings occurrences per million train km increased by 43 per cent between the 2014/15 and 2019/20 reporting periods. This upward trend is amplified as the largest operators, produced 16 per cent fewer train km over the same period.
- A total of 18 fatalities and 59 injuries were recorded at level crossings during the 2019/20 reporting period
- The overall level of harm at level crossings during the 2019/20 reporting period was 21,5 FWI, compared with 26,9 FWI harm for the 2018/19 reporting period.
- Most of the recorded level crossing risk during the 2019/20 reporting period arose from road user behaviour.

The People Struck by Trains chapter examines the safety risks related to people struck by trains and excludes pedestrian level crossing occurrences since these are accounted for in the level crossings chapter. Inclusive in this occurrence category are members of the general public, railway employees and railway contractors. Headlines for the 2019/20 reporting period include:

- A total of 519 PSBT occurrences recorded during the 2019/20 were eporting period.
- While the number of PSBT occurrences reduced by 25 per cent and the calculated FWI count decreased by 24 per cent between the 2010/11 and 2019/20 reporting periods, the FWI per million train km only reduced by 0,2 per cent.
- While all people struck by trains occurrences per million train km increased by 4 per cent since the 2018/19 reporting period, it decreased by 2 per cent since the 2010/11 reporting period). Note that since most people struck by trains occurrences occur on the PRASA network, the impact of a 11 per cent reduction in PRASA train km last year distorts the statistics favourably.
- In line with the long-term trend, Gauteng, Western Cape and the KwaZulu-Natal provinces recorded 88 per cent of the PSBT during movement of rolling stock occurrence category.
- While all PSBT occurrences per million train km reduced by six per cent since the 2018/19 reporting period, it decreased by 25 per cent since the 2010/11 reporting period. This equates to a long-term average of harm of 5,13 FWI per million train km.

The Platform-Train Interchange (PTI) chapter focuses on those occurrences that occurred at the station or on the platform as passengers and the workforce entrain and detrain stationary or moving trains. Headlines for the 2019/20 reporting period include:

- A total of 456 PTI occurrences were recorded during the 2019/20 reporting period.
- While the 2019/20 reporting period PTI occurrences reduced by 27 per cent compared to the 2018/19 reporting period, PTI occurrences contributed to 20 per cent of the overall recorded operational occurrences in the 2019/20 reporting period.
- PTI occurrences on average result in nine fatalities annually while 97 per cent of PTIs result in injuries.
- PTI occurrences are a weekday peak hour phenomenon, indicating overcrowding of stations as a major concern.
- The Gauteng province represents more than half of all PTI occurrences, followed by KwaZulu-Natal and the Western Cape. The three large metropolitan areas account for 99 per cent of the occurrences in the 2019/20 reporting period.
- Despite a 27 per cent reduction in the 2019/20 reporting period PTI occurrences compared to the 2018/19 reporting period, PTI occurrences decreased marginally by five per cent since the 2010/11 reporting period.

The Railway Security chapter focuses on the railway security-

related incidents reported to the RSR by railway operators as well as national security statistics provided by the South Africa Police Service, (SAPS) Rapid Rail Police (RRP) division. It examines the most prevalent security concerns and provides a geographical overview of the overall harm arising from security-related incidents. Due to the nature and format of reporting of the security-related incidents, neither risk analysis per rail user group nor risk profiles were calculated. Highlights for the 2019/20 reporting period include:

- Security-related incidents increased by 8 per cent overall between the 2018/19 and 2019/20 reporting periods, and 113 per cent since the historic low of the 2013/14 reporting period.
- Since the 2018/19 reporting period, the overall harm to persons as a result of security-related incidents was 17 per cent.
- Fatalities due to security-related incidents decreased by seven per cent since the 2010/11 reporting period and decreased by 300 per cent since the historic low in the 2012/13 reporting period.
- The RRP recorded 2 801 incidents of persons illegally crossing the railway lines during the 2019/20 reporting period. This translates to the significant number of non-railway persons in the railway environment with the potential of being struck by trains and/or contributing to the theft of railway assets.
- The RRP identified Pretoria North, Germiston, Bishop Lavis, Swartkops, Brighton Beach, Potchefstroom, Kimberley and Blinkpan among the high incidents frequency areas.
- The RRP identified unused railway buildings, train delays, angry commuters, overgrown vegetation, encroachments, unvetted operator security personnel and unmaintained service roads among the main generators of railway related criminal activities.
- A total of 15 criminal cases were registered by the RRP for train torchings during the 2019/20 reporting period.

The RSR interventions are based on its mandate which includes overseeing the safety of railway transport and ensuring compliance with the RSR Act. To fulfil its mandate, the RSR issue safety permits, conduct inspections and audits, investigate railway accidents, conduct safety education and awareness and develop regulations and safety standards.

These activities are conducted through the RSR's Head Office and the three regional offices. The regional offices comprise the Central Region which encompasses the Gauteng, North West, Mpumalanga, Limpopo, Free State and part of the KwaZulu-Natal province; the Coastal Region comprise the Western Cape,

Eastern Cape, Northern Cape and part of the Free State province, while the Eastern Region encompasses the KwaZuluNatal, Free State and the Mpumalanga provinces.

During the 2019/20 reporting period, the three regional offices conducted 186 safety audits, 178 inspections, issued directives and conducted investigations. Uncontrolled vegetation on railway lines and sidings, signal failures and non-filling of critical vacancies were identified as common challenges over the reporting period.

Various regulatory tools were developed for implementation by the operators. These include the safety management system requirements, railway management maturity model, common safety method for risk assessment, verbal safety-critical communication protocol and the interface agreement framework.

Furthermore, the Regulator ensured continued participation in the South African Bureau of Standards (SABS) for the development of railway safety management standards, conducted continuous operator training on the SMS requirements, reviewed existing tools where applicable, developed new regulatory tools and collaborated with the Department of Transport (DoT) and the industry to develop the required regulations.

The following regulatory tools are currently under development by the RSR in consultation with the industry: Common Safety Method for Risk Assessment (CSM-RA), Railway Management Maturity Model (RM3), Verbal Safety Critical Communication Protocol (VSCC), Interface Agreement Framework, SANS 3000-2-2-1 and SANS 10229, Regulations Regarding Infrastructure or Activity Affecting Safe Railway Operations (Railway Reserve Management Regulations), Security Management Regulations, Occurrence Management Regulations and Standards Development Regulations.

The RSR continues to provide support to the Southern African Development Community (SADC) on activities related to the harmonisation of Railway Safety Management requirements throughout the SADC region. In collaboration with the Land Transport Regulatory Authority (LATRA) of Tanzania the RSR has facilitated and conducted training on harmonised safety standards for all the Southern African Railways Associations(SARA) members. The Regulator is also playing a vital role in the development of the framework and guidelines for the establishment of the Regional Regulatory Association of Southern Africa (RRASA).

To further ensure that the mandate is fulfilled, the RSR provided regulatory oversight across all railway operations, including major rail projects by providing guidance to operators in the execution of their duties and obligations as it relates to new works project activities. During the 2019/20 reporting period, various operators submitted their new works and new technological development projects at different life cycle stages in line with the SMS Determination and the standards.

During the 2019/20 reporting period, the RSR regional offices conducted 237 SMS audits and 233 inspections across all its operational regions. The common findings from these activities include:

Non-adherence to maintenance and inspection schedules in operators SMS.

Non-compliance to manual authorisation processes.

Theft and vandalism due to a lack of security.

Through its endeavours, the RSR has established platforms to engage stakeholders, communicate developments and inspire participation in interventions that impact the industry and rail safety, while encouraging support for effective enforcement and relevant standards and regulations. All the Regulator s public education interventions are aimed at raising awareness through outreach engagements, partnerships with like-minded stakeholders and educational initiatives and programmes. As part of its stakeholder engagement initiatives, the RSR continues to reach out to stakeholders across various platforms such as the Annual Rail Safety Conference, State of Safety Dialogues, and industry engagements.

CHAPTER 1

INTRODUCTION

Overview of the RSR

The primary legislative mandate of the RSR is to oversee and enforce safety performance by all railway operators in South Africa, including those of neighbouring states whose rail operations enter South Africa. The National Railway Safety Regulator Act No. 16 of 2002 (as amended) states in Section 5 that the objects of the RSR are to:

a) oversee the safety of railway transport while permit holders remain primarily responsible and accountable for ensuring the safety of their railway operations;

b) promote improved safety performance in the railway transport industry;

c) develop any regulations that are required in terms of the Act;

d) monitor and ensure compliance with the Act; and

e) give effect to the objects of the Act.

The RSR regulates the railway industry by issuing safety permits to railway operators based on an established Safety Management System (SMS) that meets the requirements of the Act and the SMS Determination. The SMS Determination stipulates the format, form and content of an SMS that is required for the different categories and types of safety permits. A railway SMS is a formal framework for integrating safety into day-to-day railway operations and includes safety goals and performance targets, risk assessment responsibilities and authorities, rules and procedures, monitoring and evaluation processes etc. The overall purpose of the SMS is to ensure that railway organisations safely achieve their business objectives.

The safety compliance activities undertaken by the RSR includes audits and inspections of railway operations, investigations of railway occurrences, development of an enabling regulatory framework and issuing operators with directives, notices of non-conformances and non-compliances. The regulatory framework also empowers the RSR to impose penalties for non-compliance with the Act and the safety standards.

The RSR aspires to safe, reliable and sustainable railway operations, recognised globally. This vision is supported by the Regulator's mission to oversee and promote safe railway operations through appropriate support, monitoring and enforcement, guided by an enabling regulatory framework.

Objectives of the ASoSR

The Annual State of Safety Report (ASoSR) is a legislative requirement which provides a range of safety-related information for railway operators, the general public and members of the broader railway industry to assist in the management of railway safety. It is compiled in accordance with the RSR's mandate to oversee the safety of railway transport; to promote improved safety performance to encourage the use of rail, and to monitor and ensure compliance with the Act.

The ASoSR incorporates data from the RSR's National Information Monitoring System (NIMS) and the SAPS. The report includes occurrences, incidents and harm reports by passengers and members of the general public as well as occurrence and incidents data received directly from railway operators.

The information contained in the report is of use and interest to stakeholders such as the academics, the media, public bodies involved in the industry's funding and oversight and those who use the railway, or who are employed by the rail industry.

The ASoSR aims to support the rail industry in its mission to reduce the risks associated with railway operations to levels as low as is reasonably practicable. This impact may be extended to persons and property transported by railway and the environment. It does this by providing insight into the state of railway safety by analysing the number, frequency of operational occurrences and security-related incidents as well as their associated consequences and causes where possible.

It is important to note that the RSR is the main source of railway safety statistics in South Africa while the SAPS remain the custodian and main source of statistics relating to security-related incidents. However, details on the security-related incidents are combined as it relates to the railway environment to present the impact thereof on safe railway operations.

In this report, safety means the lack of railway occurrences, fatalities, injuries or damage within railway operations.

Scope of the report

This report is predominantly focused on operational occurrences and security-related incidents related to the railway operations that are reported to the RSR. These have been extended to include fatalities and injuries (i.e. harm) to employees and contractors, the general public and train passengers.

Structure of the report

This report is produced for consumption by various stakeholders with different interests in the level of detail and analysis presented. The report is thus compiled and arranged in various chapters to facilitate ease of understanding and reading.

Chapter 1 serves as an introduction and provides the reader with, among others, an overview of the RSR and the operators, the objectives and scope of the report, the description of the data and how harm is analysed. Chapter 2 provides the railway safety and security performance overview by setting the overall context and provides an analysis of all the negative events and their consequences (fatalities and injuries) to identify and understand the overall safety performance in the railway transport industry. Chapters 3, 4, 5, 6 and 7 provide a detailed analysis of the established high consequence occurrence categories, namely: collisions, derailments, level crossings, people struck by trains and platform-train interchange occurrences respectively. These chapters are followed by Chapter 8 that presents significant security-related incident categories. Finally, Chapter 9 outlines the safety intervention activities carried out by the RSR during the reporting period.

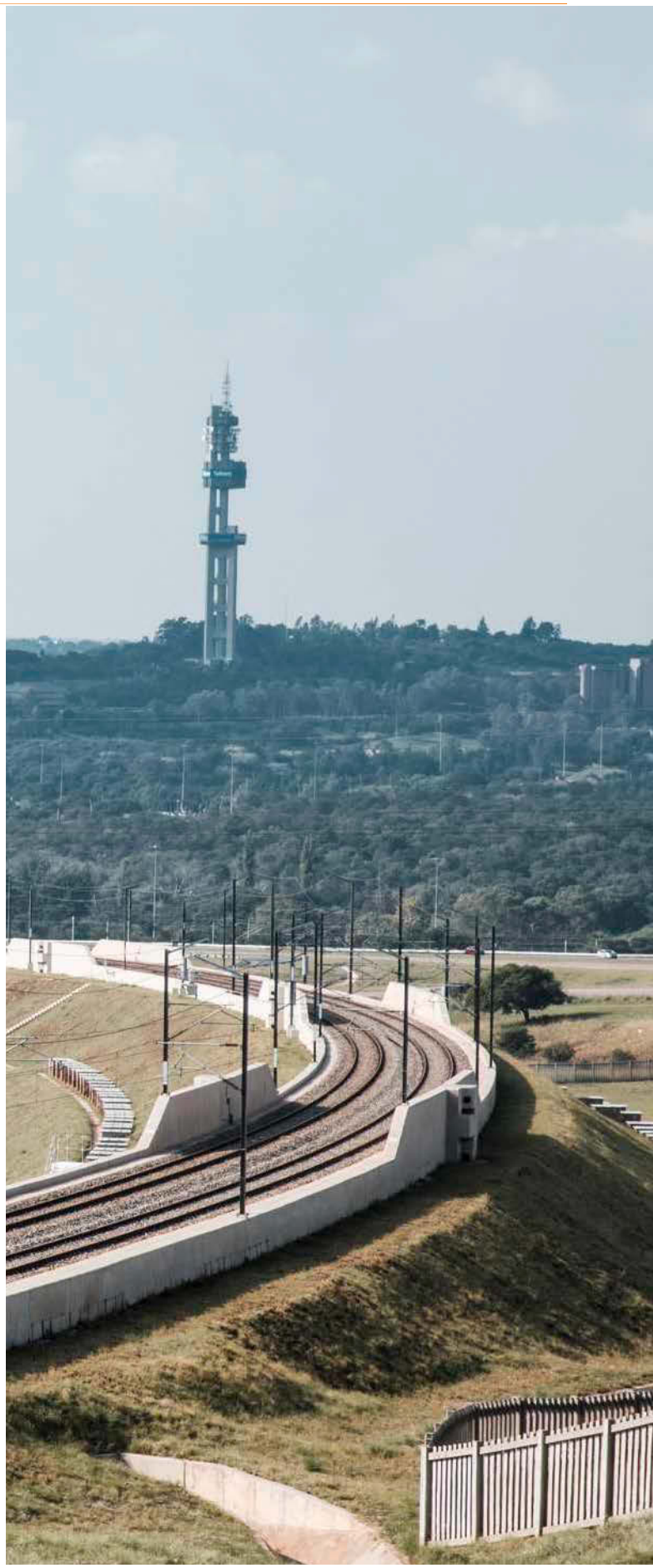
Origin of the data

A significant proportion of the analyses in the ASoS report is based on the operational occurrences and security-related incidents reported by the railway operators to the RSR. These are supplemented where appropriate with data from other sources, such as the SAPS, the general public and media reports.

The analysis in this report is based on occurrence and incidents data from the 2010/11 reporting year and includes events up to and including 31 March 2020.

How safety is analysed

The RSR collects a vast amount of information about operational and safety-related occurrences during each year. More than 3 392 operational occurrences records were analysed in the 2019/20 reporting period. Each occurrence record contains information of the type of occurrence and the respective consequences (i.e. injuries and fatalities), short descriptions of the occurrences, the network and train operators involved in these occurrences. This allows for detailed analysis to be carried out by examining trends and where possible, identifying the causes of the occurrences and their respective consequences.



Similar to the 2018/19 report, when analysing collective risks, fatalities and injuries of differing levels of seriousness are combined into one composite measure. For the present safety analysis, an approach has been used which is based on an established standard in risk analysis of transport modes. The composite measure is termed Fatalities and Weighted Injuries or FWI, abbreviated. It is calculated using the following formula: [number of fatalities] + 0.1 x [number of injuries].

The ASoSR includes a focus on harm to persons,inclusive of the general public, passengers and workforce, when analysing safety risk profiles to obtain a more holistic picture of the railway s safety performance. This harm is expressed as FWI and inferences are made about the contributions of each railway safety operational occurrence category to the overall level of harm. The overall FWI for the 2019/2020 reporting period on operational occurrences which had SANS codes was 490 comprising 369 fatalities and 1 210 injuries. Over the same reporting period, the overall FWI reported on security-related incidents which had a SANS code has been calculated at 73,8 and comprises 28 fatalities and 458 injuries. The detail thereof will be explained under the relevant sections.

Understanding the overall profile of risk on the railway helps with its management by enabling focus to be applied to areas that are identified as a priority. When calculating the overall railways' risk profile, as well as that for the individual key focal occurrence categories (i.e. collisions, derailments, level crossings, people struck by trains and platform-train interchange occurrences), injuries and fatalities data for the 2010/11 to 2011/20 period was used because this provides for a better estimation of risk due to the size of the data. This is especially important for those categories of occurrences with low frequencies and high consequences.

Recorded harm

Given the Regulator s mandate and the public s requirement for safe rail transport, it is important to understand the limitations of recorded harm. Whether railway safety is improving or not is normally a more complicated question to answer than by just looking at how recorded levels of harm have changed from one year to the next. Level crossing occurrences offer the most readily available example of this effect. A year without occurrences involving a collision between a passenger train and a bus or truck does not necessarily indicate an improvement in safety. This is similar to a year with such an occurrence as it does not necessarily imply a rise in risk. Answering the better/worse question normally involves looking at trends calculated over a longer period, considering how harm has changed in relation to other system factors such as usage (normalisation) and risk modelling.

Railway cost

TFR and PRASA railway costs are presented to indicate the financial translation of railway operational safety occurrences and security-related incidents in the South African railway industry.

Data cut-off

The data used in the 2019/20 ASoS Report is based on the latest and most accurate and verified information available at the time of production. The data cut-off date for the 2019/20 ASoS Report was 31 March 2020.

Overview of the operators

A number of 198 safety permits were issued during the 2019/20 reporting period and is inclusive of the two largest operators, namely Transnet Freight Rail (TFR) and Passenger Rail Agency of South Africa (PRASA). The Bombela Operating Company (BOC) trading as Gautrain, the first standard gauge passenger operation in South Africa, commenced its operations in June 2010 and is a significant operator in terms of commuter services in the Gauteng province. The remaining operators comprises of tourism operators, cross border operators, surface operations on mines, rail operations in ports, municipal sidings and service lines as well as private siding operators in agricultural, manufacturing and petro-chemical sectors.

The operators are classified according to the extent of their operations. A total of 84 safety permits were issued to Class-A Operators. These comprise large and high-risk railway operators which transport 500 000 tons or more of general goods, 50 000 tons or more of dangerous goods or passengers.

A total of 43 safety permits were issued to Class-B Operators. These are intermediate and medium-risk railway operators that transport between 200 000 and 500 000 tons of general goods and less than 50 000 tons of dangerous goods or tourists, while 63 railway organisations were classified as Class-C low-risk operators transporting less than 200 000 tons of general goods. A total of eight temporary safety permits were issued to active operators as an interim arrangement pending the issuance of a safety permit.

CHAPTER 2

RAILWAY SAFETY AND SECURITY OVERVIEW

This chapter sets the overall context by analysing the railway occurrence and consequence (fatalities and injuries) data to identify and understand the safety performance in the railway transport industry. It makes use of time-series analyses of railway occurrences and consequences to provide an overview of the high-level trends and risk profiles in passenger, public and workforce safety performance. The analysis may include tables and graphs with descriptions and narrative.

The 2019/20 overall headlines

TFR produced 32,7 million train km and 145,8 billion tonne km in the 2019/20 reporting period. This productivity level is compared to a total of 46 million train km (29% reduction) and 117.9 billion tonne km (24% increase) recorded during 2010/11 reporting period.

- PRASA produced 17,9 million train km in the 2019/20 reporting. This signifies a 32 per cent decrease compared to the 26.6 million train km during the 2010/11 reporting period and 3 million passenger km equating to a 76 per cent decrease of the 12 232 million passenger km recorded during the 2010/11 reporting period.

  The safety occurrences reduced by 26 per cent between the 2013/14 and 2019/20 reporting periods and the security-related incidences increased by 113 per cent over the same period.

- Despite an overall 27 per cent reduction in network traffic by TFR, PRASA and Gautrain since the 2013/14 reporting period, operational occurrences per million train km increased by two per cent. However, security-related incidents per million train km increased significantly by 192 per cent.

  Since the 2010/11 reporting period, on average, 633 FWI resulted from operational occurrences, with 60 per cent of these resulting from SANS Category E (people struck by trains during movement of rolling stock).

  The three large metropolitan cities in the Gauteng, KwaZulu-Natal and Western Cape provinces, each with high commuter traffic volumes, recorded 88 per cent of the FWI.

  Of all persons harmed (490 FWI) as a result of operational safety occurrences recorded during the 2019/20 reporting period, when compared to the 57 per cent recorded during the 2018/19 reporting period, 69 per cent can be attributed to the general public, largely due to occurrence Category E (people struck by trains during movement of rolling stock).

  Operational occurrences contributed 30 per cent of harm to passengers during the 2019/20 reporting period compared to 46 per cent during the 2018/19 reporting period.

  The workforce is less safe in the 2019/20 reporting period. Less than one workforce FWI occurred (62,5%) compared to the 90 per cent of operational safety occurrences recorded in the 2018/19 reporting period, with a 37,5 per cent probability of one to two FWI per operational safety occurrence.

  FWI for the public remains higher, largely due to occurrence Category E (people struck by trains during movement of rolling stock).

  The public was harm free in only 14,29 per cent of these operational safety occurrences compared to 16,47 per cent in the 2018/19 reporting period. Less than one public FWI occurred in 38,25 per cent of the operational occurrences campared to 37,83 per cent in 2018/19. One to two public FWI occured in 45,87 per cent of the operational safety occurrences compared to 44,21 per cent in the 2018/19 reporting period.

  There was an eight per cent overall increase in security-related incidents in 2019/20 when compared to the 2018/19 reporting period. This follows yet another increase of 20 per cent recorded during the 2018/19 reporting period, compared to the 2017/18 reporting period.

  Since 2013/14 reporting period, there was a 194 per cent increase in the overall number of security-related incidents per train km.

Table 1: TFR, PRASA Rail and BOC utility and train service for 2010/11 2019/20

FY	Transnet Freight Rail (TFR)		Passenger Rail Agency of South Africa (PRASA) (Excluding fare evasions)		Bombela Operating Company (BOC)(Gautrain)	
	Million train km	Billion tonne km	Million train km	Million passenger km	Million train km	Million passenger km
10/11	46,0	117,9	26,3	465	0,5	43
11/12	46,0	126,5	19,9	686	2,5	139
12/13	46,0	132,4	24,5	682	4,4	341
13/14	47,0	134,6	25,0	571	4,9	420
14/15	47,0	144,7	23,9	572	5,3	494
15/16	39,0	138,4	22,2	534	5,2	505
16/17	39,0	143,5	21,4	461	5,2	504
17/18	40,0	151,5	20,3	222	3,7	487
18/19	37,0	146,0	20,1	285	4,6	454
19/20	32,7	145,8	17,9	168	4,9	449

Table 1 lists the operator utility and train service for the 2010/11 - 2019/20 reporting periods as submitted to the RSR by the three major operators, namely TFR, PRASA Rail and BOC (Gautrain). When examining the annual train km per operator from the 2010/11 to the 2019/20 reporting period, interesting trends for each of the operators are revealed.

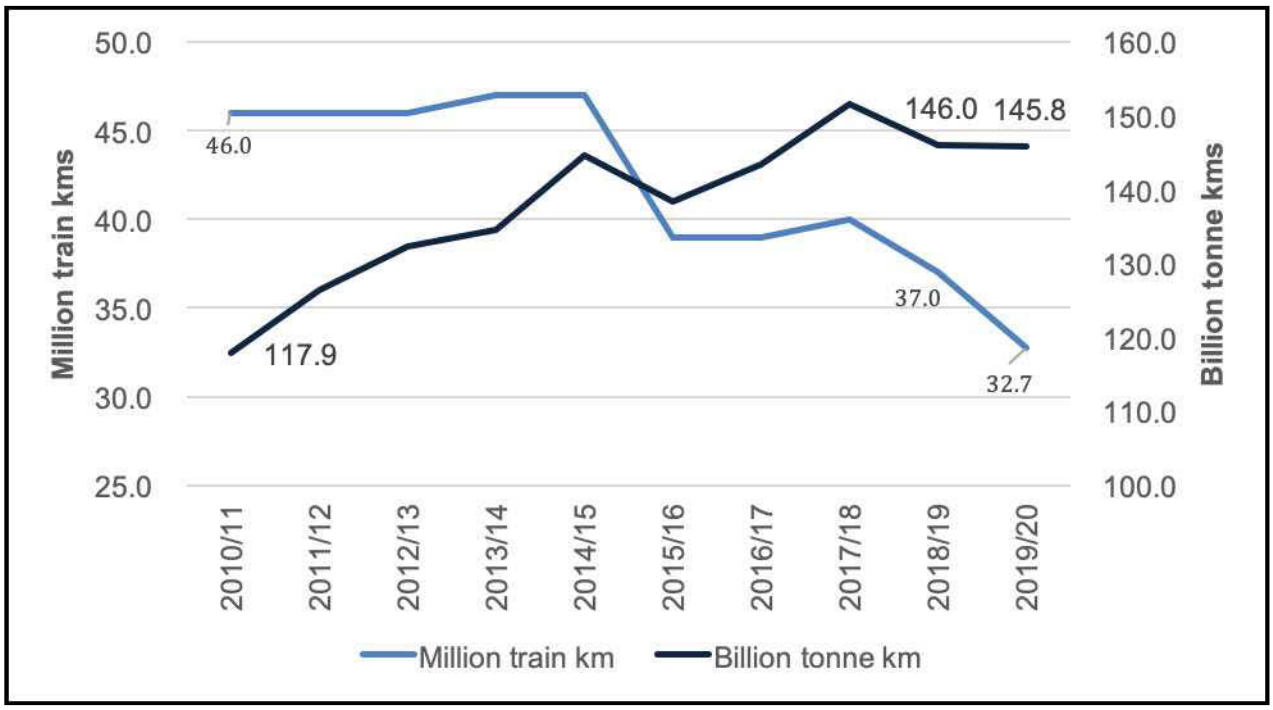


Figure 1: TFR operations data from 2010/11 to 2019/20 reporting period

Table 1 and Figure 1 indicate that TFR, South Africa's major freight operator, experienced a 28,9 per cent decrease in train km since the 2010/11 reporting period from a rounded 46 million train km to 32,7 million train km as recorded during the 2019/20 reporting period.

Since the 2010/11 reporting period, PRASA Rail experienced a 32 per cent decrease in train km and a 75 per cent decrease in passenger km as reflected in Table 1 and Figure 2.

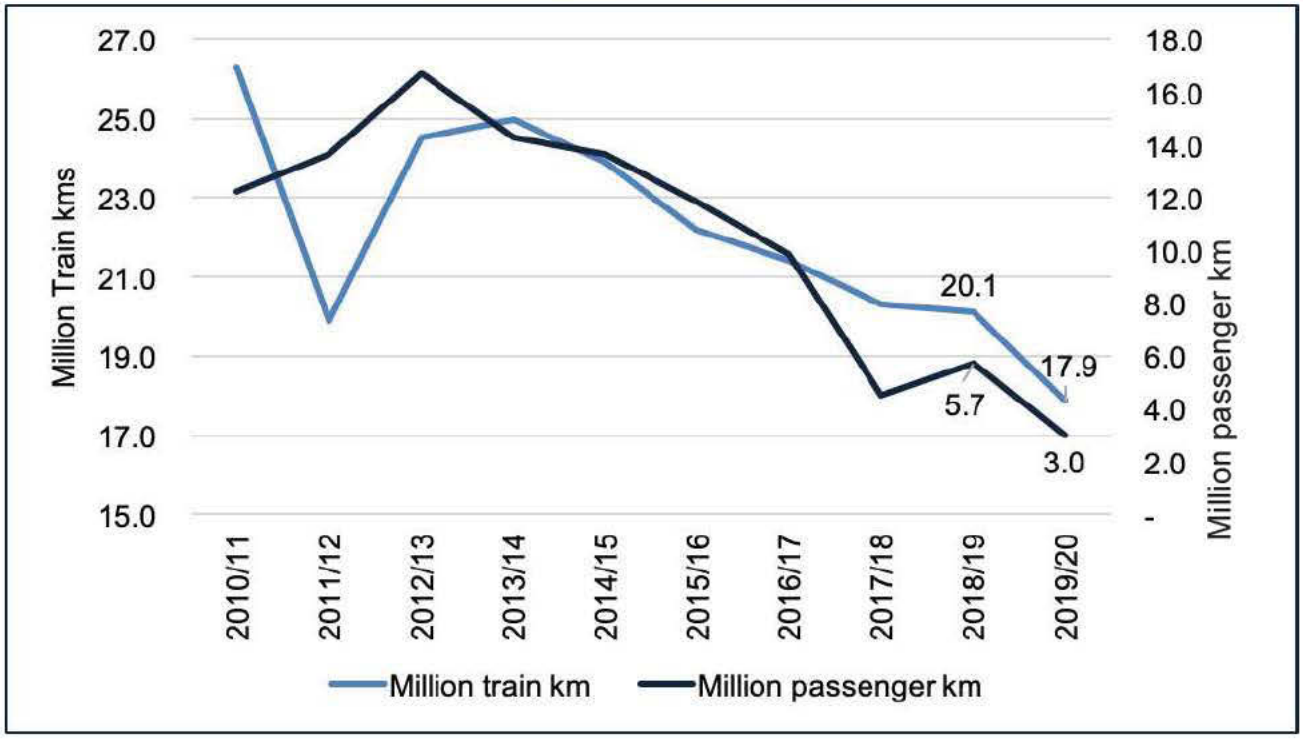


Figure 2: PRASA Rail operations data from 2010/11 to 2019/20 reporting period

Table 1 and Figure 3 shows that Gautrain achieved an increase of 643 per cent in train km and a 41 per cent in passenger km respectively from the first full year of operations in 2011/12 to the 2019/20 reporting period.

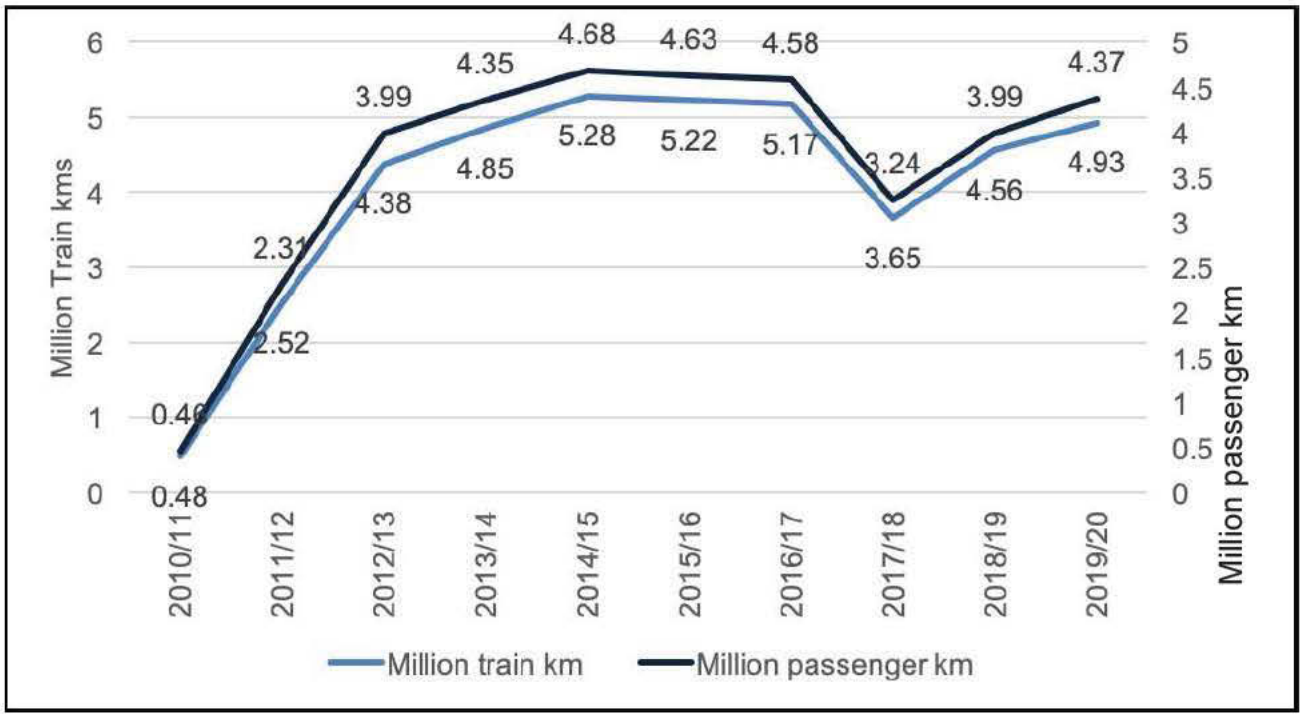


Figure 3: Gautrain operations data from 2010/11 to 2019/20 reporting period

Safety Performance Overview

Railway occurrence data is classified into two broad categories, namely operational occurrences and security-related incidents as contained in SANS 3000-1 (2009). In terms of the Act, operational occurrences fall within the ambit of the RSR's oversight activities. The Act also instructs the RSR to play a supporting and advocacy role regarding security-related incidents. In this regard, the RSR monitors and supports the efforts of other organs of state such as the SAPS and the Department of Employment and Labour (DEL) that share concurrent jurisdiction and mutual interests in addressing railway safety.

SANS 3000-1 stipulates the minimum requirements for the reporting of operational occurrences and security-related incidents. The SANS defines and organises occurrences into categories and sub-categories to be used by railway operators in their reporting to the RSR. These categories and sub-categories are used for more detailed data analysis. Operational occurrences are captured in 12 major categories [A-L] and security-related incidents into nine categories. Table 2 provides an overview description of the major operational occurrences and security-related incidents. A detailed listing hereof is presented in Appendix A; it can also be found in SANS 3000-1 (2009) version 2, clauses 7.2 and 10.2 respectively.

Table 2: **SANS 3000-1 description for operational occurrences and security-related incidents**

OPERATIONAL OCCURRENCES	
CATEGORY	**DESCRIPTION**
A	Collisions during movement of rolling stock
B	Derailments during movement of rolling stock
C	Unauthorised movements including rolling stock movements exceeding limit of authority
D	Level crossing occurrences
E	People struck by trains during movement of rolling stock
F	People-related occurrences: trains outside station platform areas or in section
G	Passenger-related occurrences: travelling outside designated area of train
H	People-related occurrences: platform-train interchange (colloquially known as PTIs or Platform-train interface)
I	People-related occurrences: station infrastructure
J	Electric shock
K	Spillage/leakage, explosion or loss of dangerous goods
L	Fires
SECURITY-RELATED INCIDENTS	
1	Theft of assets (impacting on operational safety)
2	Malicious damage (vandalism) to property
3	Threats (to operational safety)
4	Hijacking of trains
5	Crowd-related occurrences
6	Industrial action
7	Personal safety on trains
8	Personal safety at stations
9	Personal safety outside platform area (including yards, sidings and depots)

Table 3: A summary of all operators total operational occurrences and security-related incidents recorded from 2010/11 to 2019/20

Reporting Period/ Totals	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Operational occurrences	4 181	4 348	4 262	4 587	4 632	4 250	4 066	4 478	3 990	3 392
Security-related incidents	6 379	5 702	4 124	4 703	6 222	5 520	6 378	7 737	9 268	9 996

Table 3 shows the number of operational occurrences and security-related incidents between the 2010/11 and 2019/20 reporting periods and Figure 4 presents a graphical representation thereof.

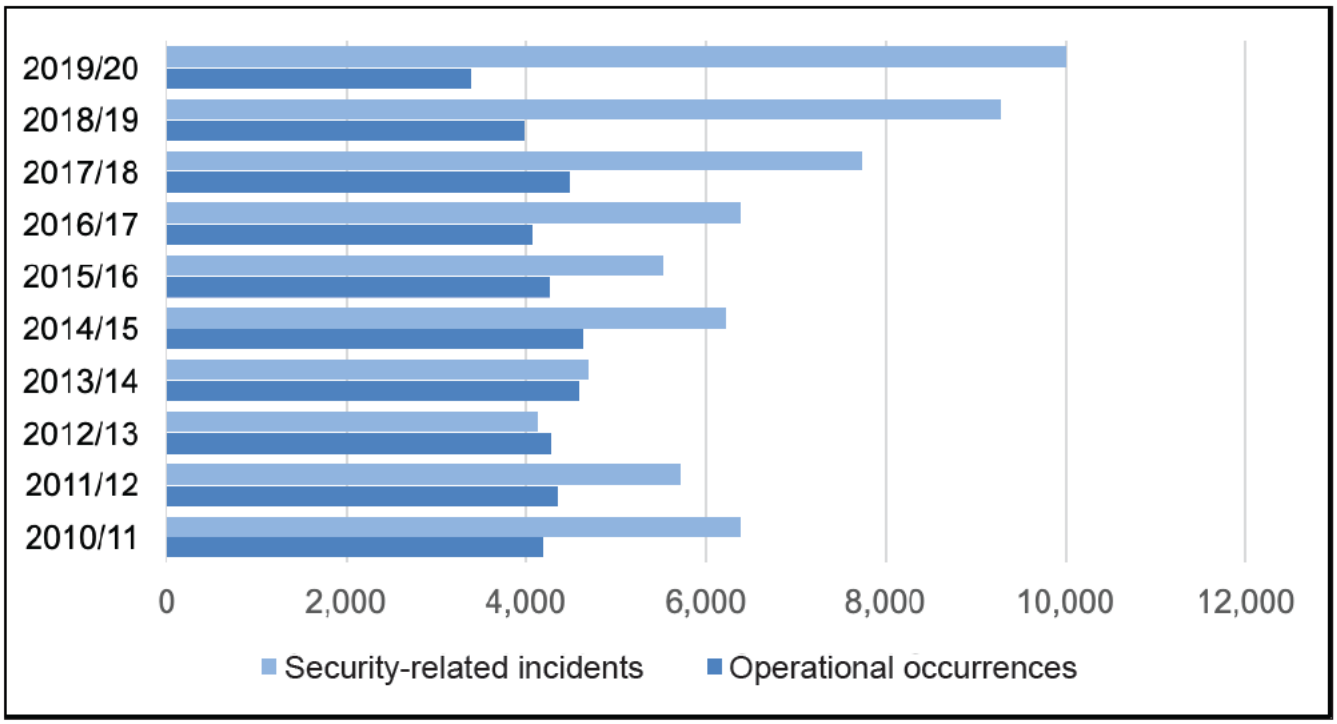
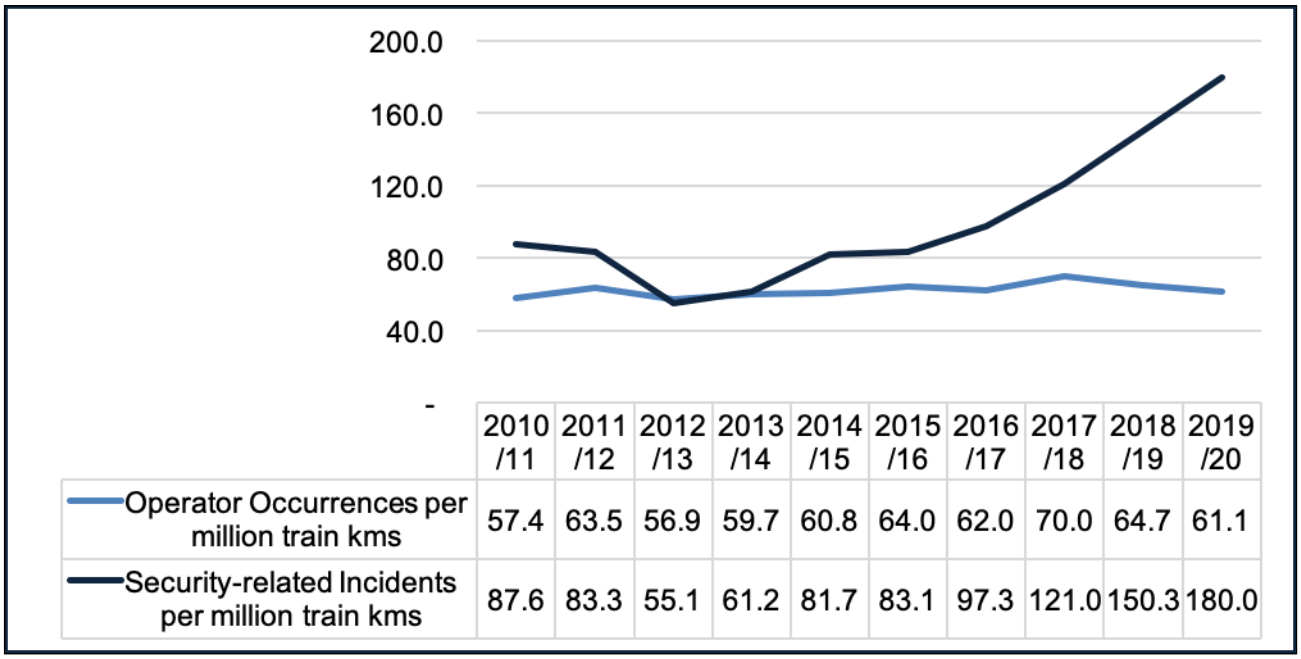


Figure 4: Total number of operational occurrences and security-related incidents from the 2010/11 to the 2019/20 reporting period

The 2012/13 reporting period recorded the lowest levels of operator occurrences and security-related incidents in absolute terms and normalised per million train km. Whereas the number of operational occurrences remained constant since 2012/13 reporting period, security-related incidents has grown exponentially.



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Operator Occurrences per million train kms	57.4	63.5	56.9	59.7	60.8	64.0	62.0	70.0	64.7	61.1
Security-related Incidents per million train kms	87.6	83.3	55.1	61.2	81.7	83.1	97.3	121.0	150.3	180.0

Figure 5: Occurrences and incidents per million train km for the 2010/11 to 2019/20 reporting period

Figure 5 shows that although there is an overall reduction of 27 per cent in network traffic from 72,8 during the 2010/11 reporting period to 55,5 million train km during the 2019/20 reporting period, the train operational occurrences decreased by only two per cent per million km and security-related incidents dramatically increased to 194 per cent per million train km from the lowest recorded incidents during the 2012/13 reporting period.

TFR and PRASA are two dominant railway operators in SA. These two operators consistently record the highest number of occurrences and incidents annually. This observation is depicted in Figure 6.

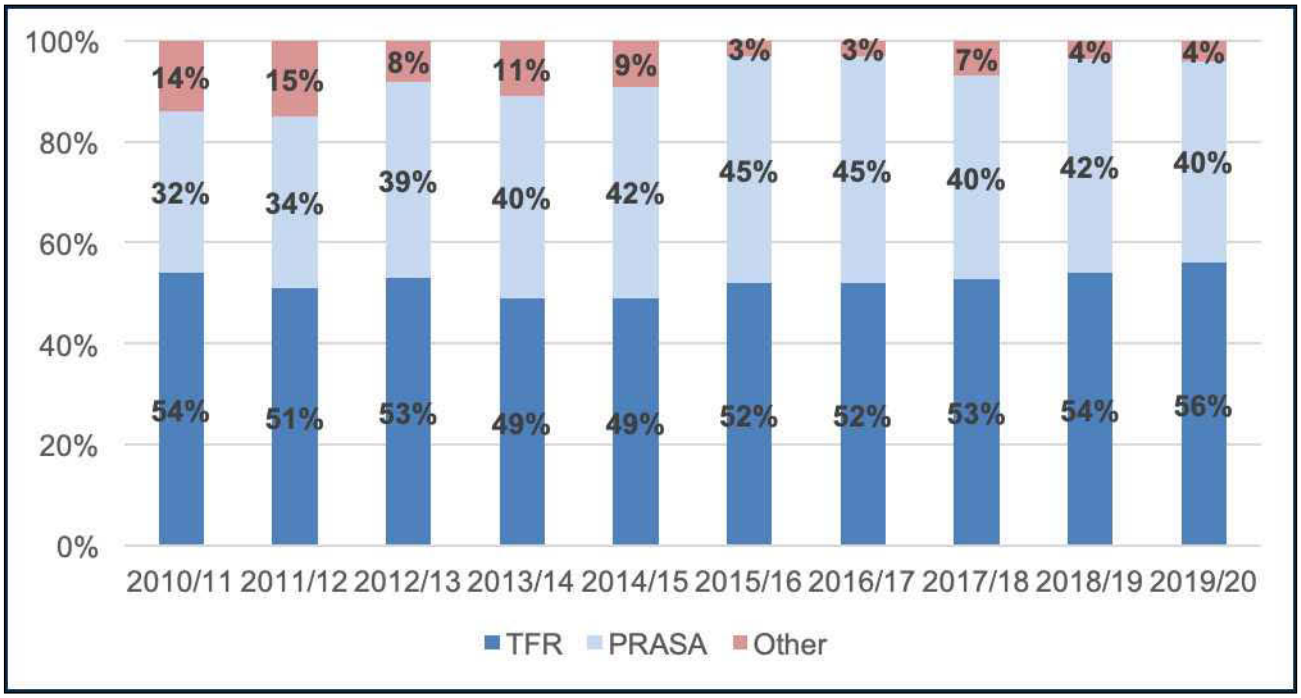


Figure 6: Distribution of safety occurrences for the reporting period 2010/11 to 2019/20

Railway operational occurrences by province are dominated by the three large Metrorail networks. These large networks are in Gauteng, KwaZulu-Natal and the Western Cape.

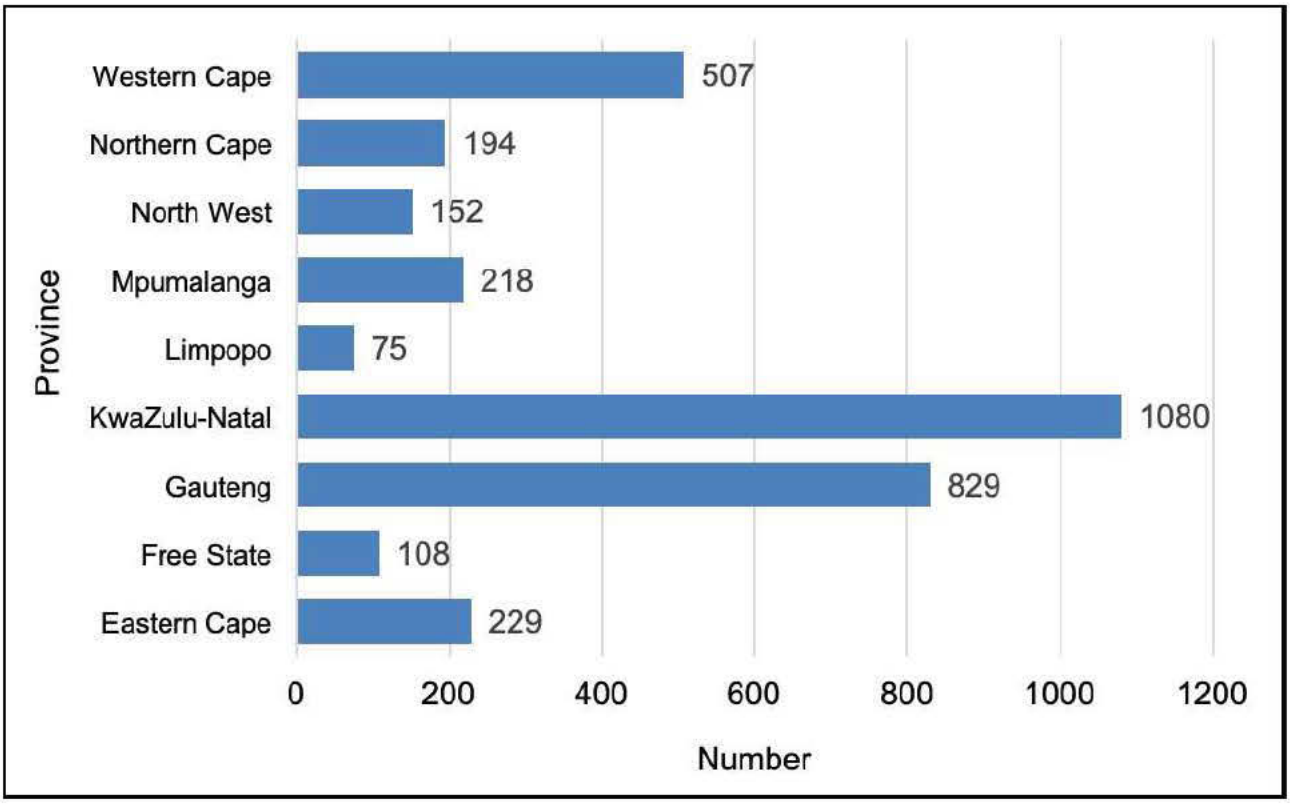


Figure 7: Safety occurrences by province are dominated by the three large Metrorail networks

Table 4, shows improvements in all SANS categories since the 2018/19 reporting period except for derailments during movement of rolling stock [Category B] and electric shock [Category J].

Table 4: 7-year overview of operational safety occurrences

Reporting Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20				
South African National Standards (SANS) Category	All	All	All	All	All	All	TFR	PRASA	Other	All	Variance
A: Collisions during movement of rolling stock	980	1 059	1 100	1 006	1 027	873	784	46	17	847	-3%
B: Derailments during movement of rolling stock	718	592	420	386	450	370	252	42	88	382	3%
C: Unauthorised movements including rolling stock movements exceeding limit of authority	121	93	94	84	95	127	41	29	14	84	-34%
D: Level crossing occurrences	119	109	87	119	126	133	84	12	8	104	-22%
E: People struck by trains during movement of rolling stock	588	643	541	651	588	519	160	327	3	490	-6%
F: People-related occurrences: trains outside station platform areas or in section	09	338	337	325	169	165	0	132	0	132	-20%
G: Passenger-related occurrences: travelling outside designated area of train	94	163	131	140	160	169	0	116	0	116	-31%
H: People related occurrences: platform-train interchange	715	612	658	573	744	625	0	456	0	456	-27%
I: People related occurrences: station infrastructure	190	166	130	111	116	110	0	65	0	65	-41%
J: Electric shock	35	34	27	30	46	45	20	46	0	66	47%
K: Spillage/leakage, explosion or loss of dangerous goods	250	265	223	209	212	154	134	0	0	134	-13%
L: Fires	568	558	502	432	745	700	428	85	3	516	-26%
TOTAL	4 587	4 632	4 250	4 066	4 478	3 990	1 903	1 356	133	3 392	-24%

Overall, there was a 24 per cent decrease in operational occurrences in the 2019/20 reporting period compared to the 2018/19 reporting period.

Figure 8 shows the Top 5 focus categories for safety occurrences recorded during the 2019/20 reporting period.

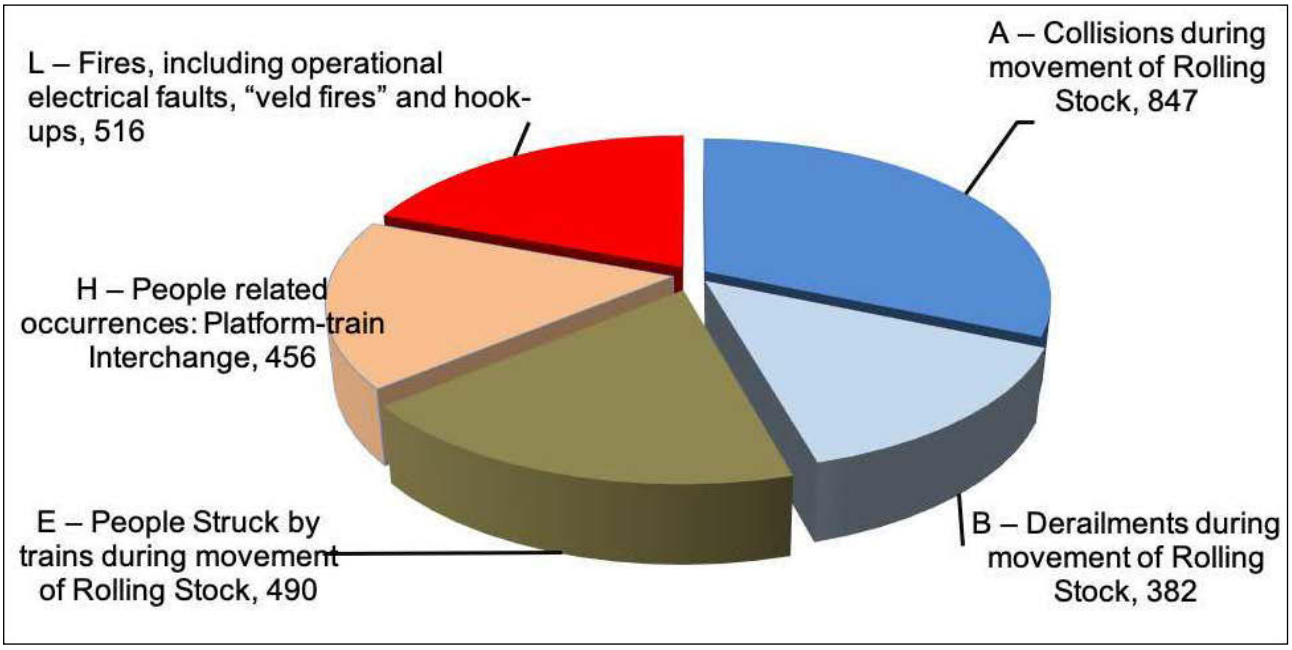


Figure 8: Occurrence categories with the most occurrences recorded for 2019/20

Table 5: RSR's 5 Strategic areas of operational occurrence focus

SANS SUBCATEGORY	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
A-a (Collision on running Line)	6	14	6	8	7	12	6
B-a (Derailment on running line)	280	212	114	118	119	112	123
D-a (Level crossings)	102	94	83	110	114	117	96
E-a (People struck by trains)	564	627	531	642	577	514	482
H-a & H-b (Platform train interface)	707	611	657	572	743	623	455

Table 5 present the trend data of these Top 5 focus categories since the 2013/14 reporting period. Figure 9 graphically presents these figures.

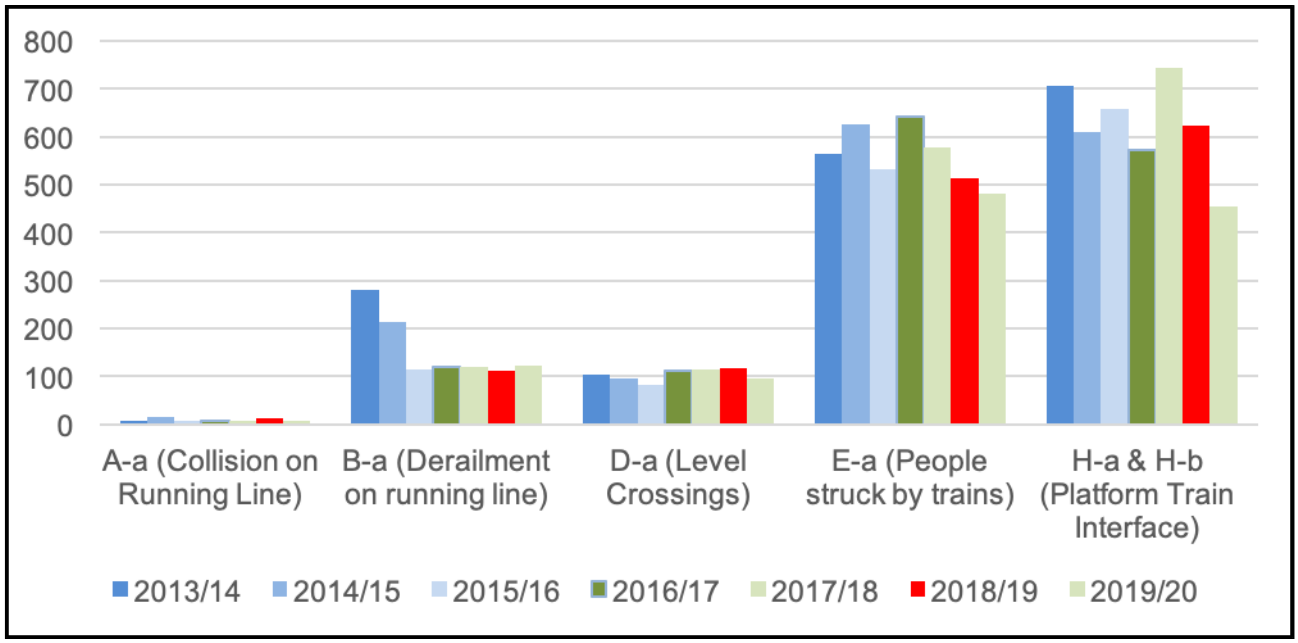


Figure 9: Number of safety occurrences as per the RSR Top 5 strategic areas of focus

Table 6:The 2014/15 - 2019/20 recorded operational fatalities and injuries

Operational occurrences recorded fatalities 2014/15 to 2019/2020							Operational occurrences recorded injuries 2014/15 to 2019/20					
SANS CAT/RP	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
A	0	20	2	2	4	4	157	639	629	392	1266	85
B	0	0	3	5	1	0	12	26	13	22	29	72
C	0	0	0	0	0	0	0	1	0	0	0	1
D	17	6	7	34	25	18	68	27	62	336	75	59
E	410	370	414	343	284	264	250	180	240	244	223	206
F	2	11	17	18	6	9	320	336	315	152	164	127
G	21	17	20	25	18	20	134	118	121	140	156	96
H	8	10	11	4	9	10	569	651	555	737	605	431
I	0	0	2	0	1	0	156	126	104	113	107	65
J	15	19	18	23	26	44	20	9	17	24	21	24
K	0	0	0	0	1	0	29	0	1	0	0	0
L	0	0	1	0	0	0	31	177	22	7	14	44

Table 7: FWI index for all operational safety occurrence categories

Occurrence c Operational occurrences category FWI	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Total
A	20.4	118.2	42.0	2.7	15.7	83.9	64.9	41.2	130.6	12.5	**532.1**
B	13.1	4.3	2.2	1.4	1.2	2.6	4.3	7.2	3.9	7.2	**47.4**
C	-	-	-	-	-	0.1	-	-	-	0.1	**0.2**
D	57.4	17.8	45.3	24.6	23.8	8.7	13.2	67.6	32.5	23.9	**314.8**
E	383.9	372.3	378.1	414.1	435.0	388.0	438.0	367.4	306.3	284.6	**3 767.7**
F	8.8	13.6	7.7	23.4	34.4	44.6	48.5	33.2	22.4	21.7	**257.9**
G	19.8	15.0	29.6	24.0	34.4	28.8	32.1	39.0	33.6	29.6	**285.9**
H	77.8	97.7	93.3	75.9	64.9	75.1	66.5	77.7	69.5	53.1	**751.5**
I	12.4	6.5	7.6	18.3	15.6	12.6	12.4	11.3	11.7	6.5	**114.9**
J	11.8	14.6	8.8	17.5	17.0	19.9	19.7	25.4	28.1	46.4	**209.2**
K	-	-	-	-	2.9	-	0.1	-	1.0	-	**4.0**
L	5.0	3.0	4.1	3.9	3.1	17.7	3.2	0.7	1.4	4.4	**46.5**
FWI	**610.4**	**663.0**	**618.7**	**605.8**	**647.6**	**682.0**	**702.9**	**670.7**	**641.0**	**490.0**	6332.1

Table 7 presents the recorded operational fatalities and injuries from the 2014/15 to the 2019/20 reporting period. Table 7 and Figure 10 show the FWI index for all occurrence categories since the 2010/11 reporting period. Figure 11 shows the FWI breakdown for the 2019/20 reporting period.

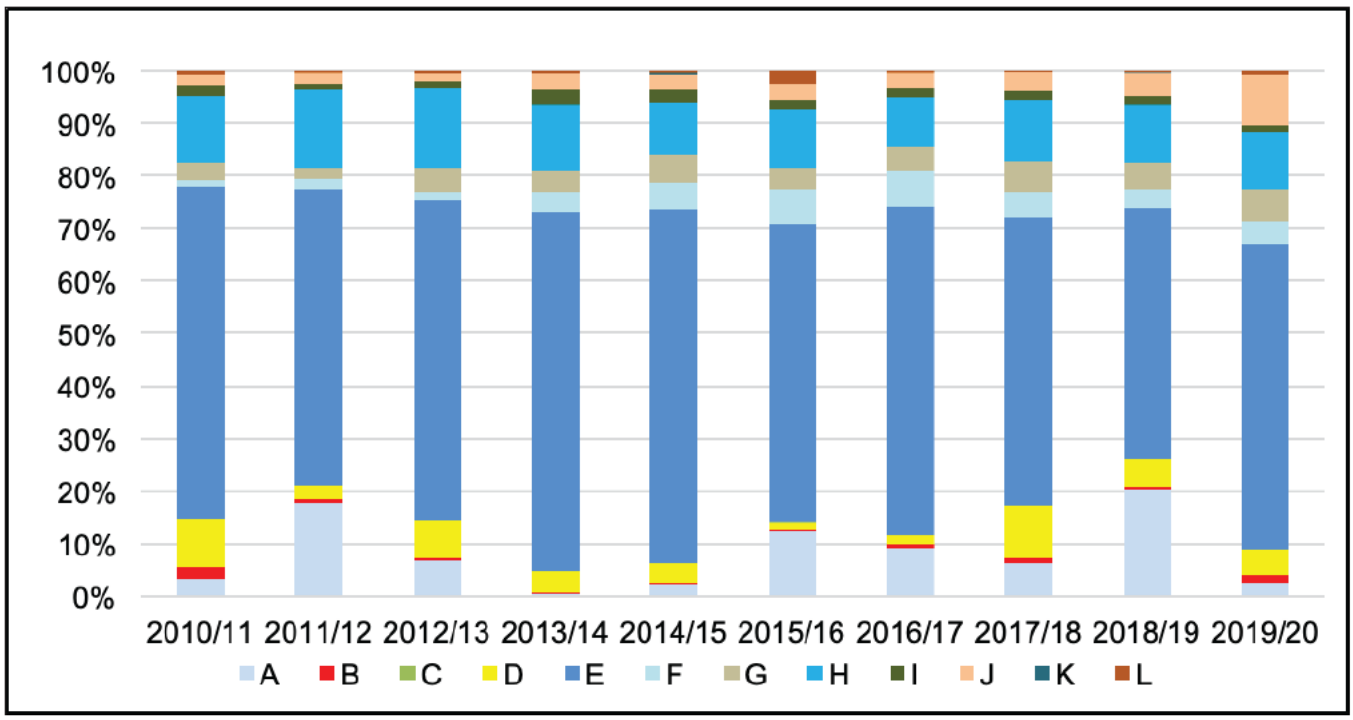


Figure 10: Relative contribution to FWI of operational safety as per the SANS occurrence categories

Annually, on average, 430 actual and equivalent deaths resulted from operational occurrences since the 2010/11 reporting period. Of these, 60 per cent resulted from category E (people struck by trains during movement of rolling stock). Figure 11 is a representation of these figures.

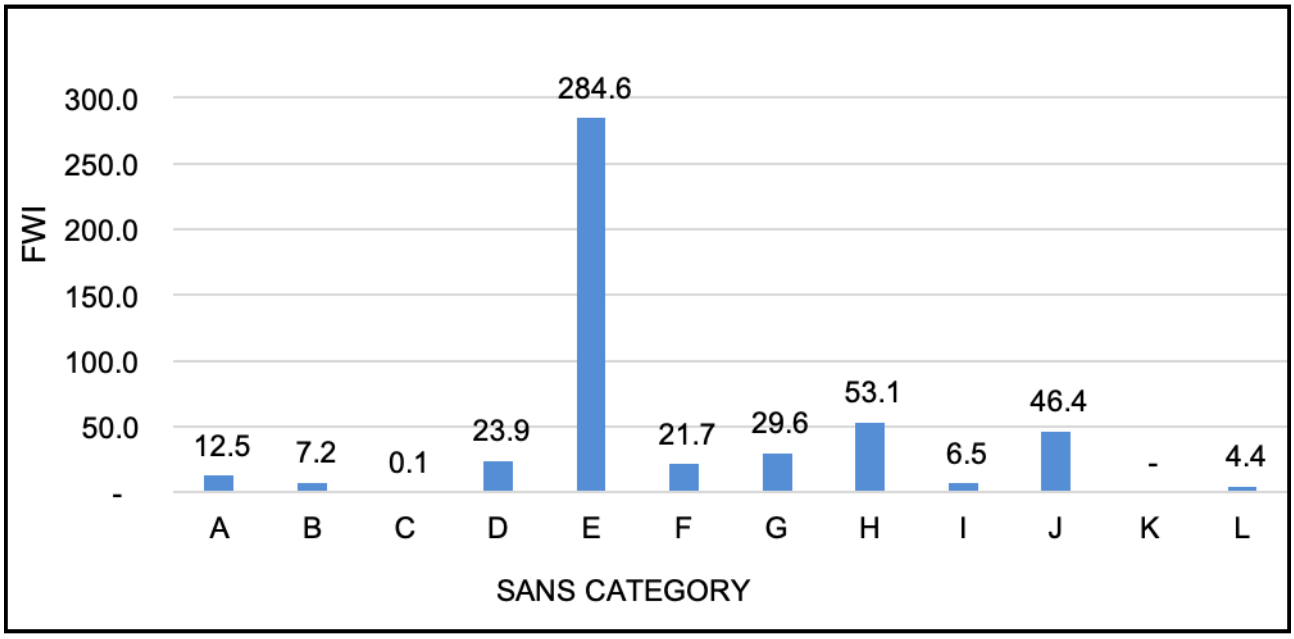


Figure 11: FWI for each SANS Category for 2019/20

Figure 12 illustrates how the FWI for all the operational safety SANS occurrence categories vary per geographical location. The three large metropolitan cities in Gauteng, KwaZulu-Natal and Western Cape provinces, with high commuter traffic volumes, recorded 88 per cent of the FWI.

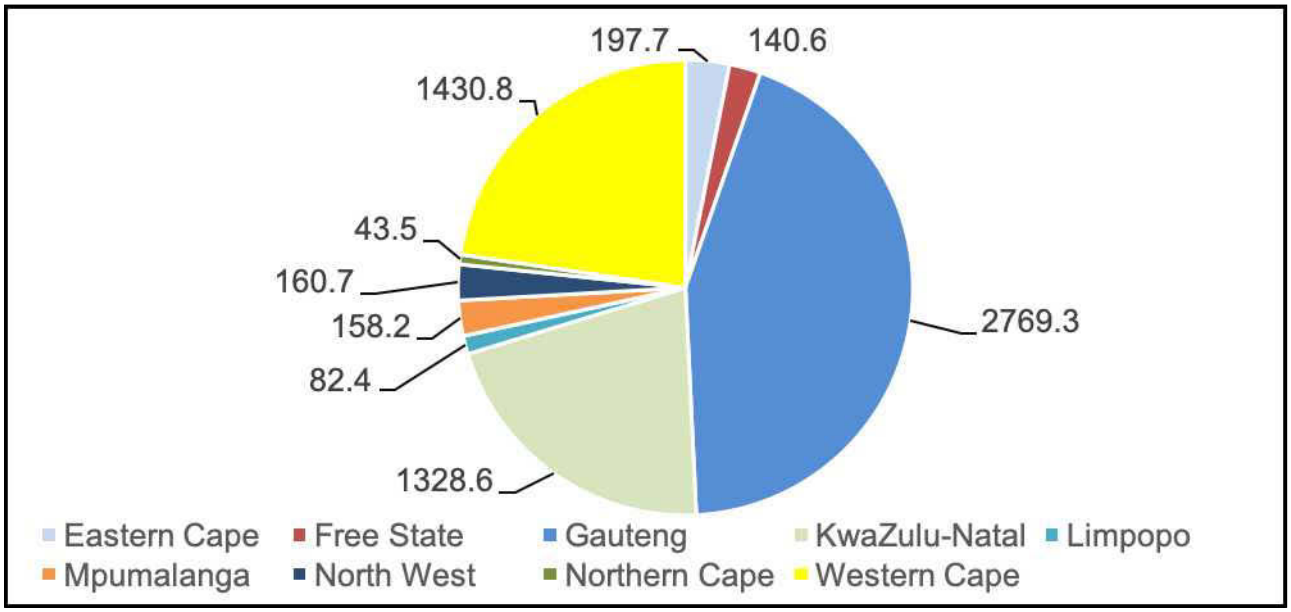


Figure 12: FWI for all safety occurrence categories per province 2010/11 - 2019/20

Persons affected by operational occurrences

Figure 13 shows the FWI for the 2010/11 to 2019/20 reporting periods.

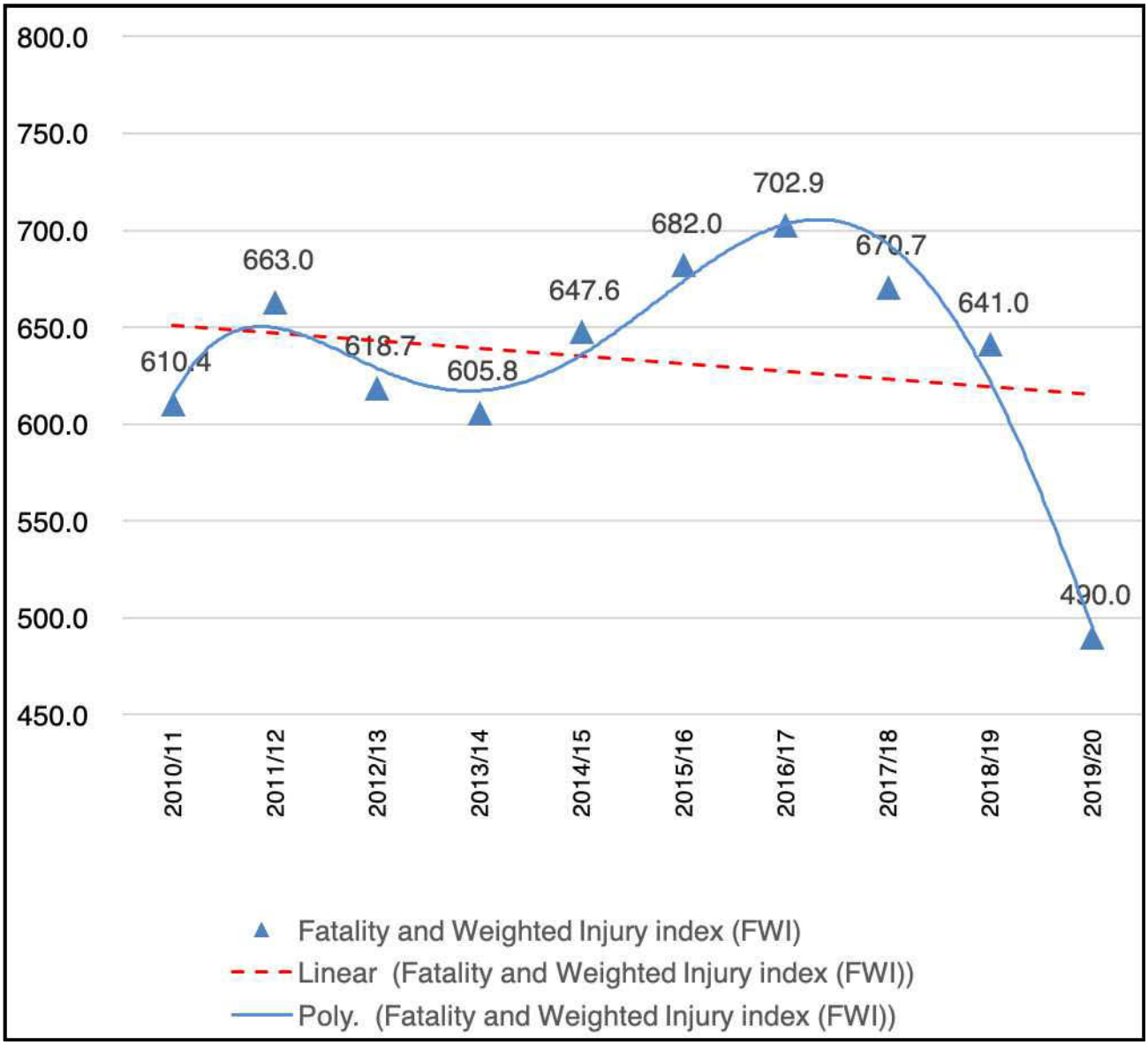


Figure 13: FWI trend for 2010/11 - 2019/20

The FWI trend for 2019/20 reduced dramatically and near perfect curve fit and a simple linear trend are is shown in Figure 13. Figure 14 shows a marked decrease in harm to passengers and a reduction in harm to the general public since the 2016/17 reporting period.

Since PRASA ran fewer trains and transported fewer passengers in 2019/20 compared to the 2018/19 reporting period, operational occurrences and security-related incidents reflect improvements in harm to people. The reader is however cautioned not to take this as a true reflection of less harmful operations.

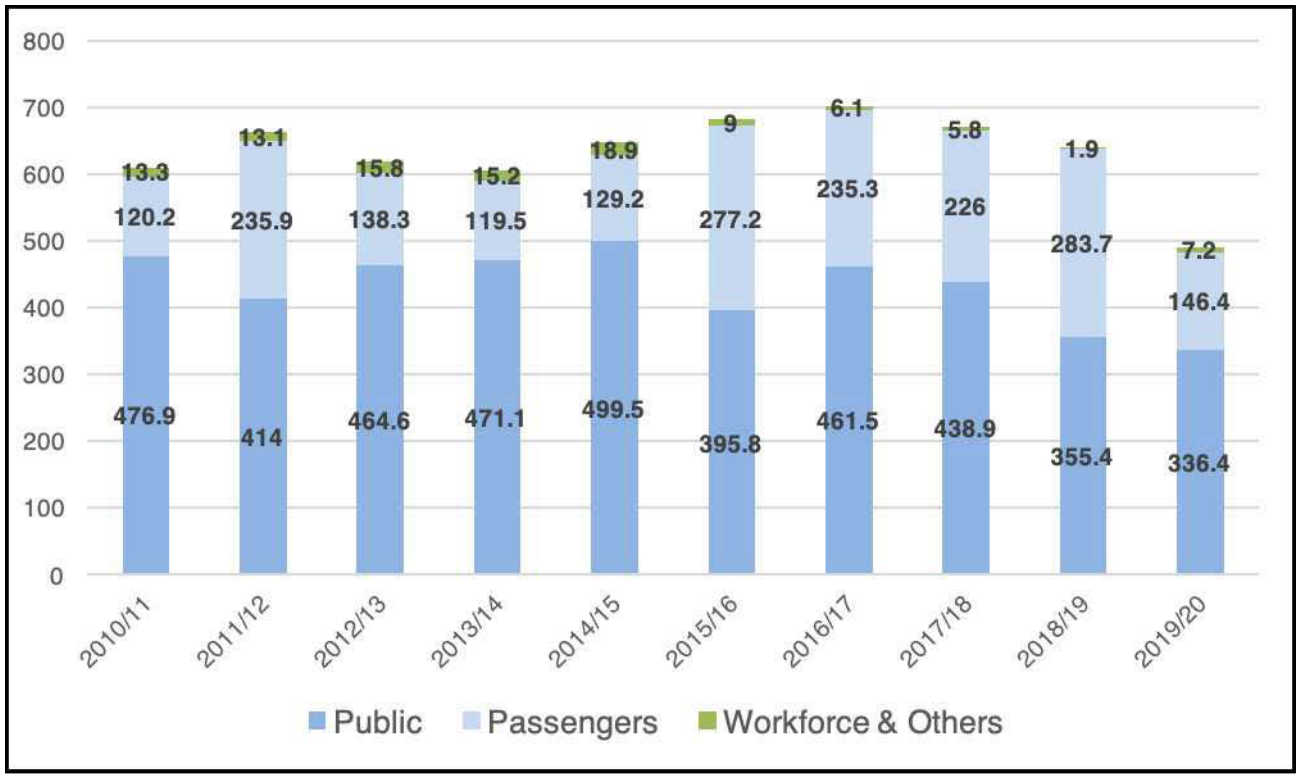


Figure 14: Persons in harm's way 2010/11 to 2019/20

Safety of Passengers [1]

During the 2019/20 reporting period, 3 445 million passenger km were recorded compared to 6 174 million passenger km recorded during the 2018/19 reporting period. Figure 15 illustrates that passengers account for 30 per cent of the FWI recorded during the 2010/11 to 2019/20 reporting period. Therefore, a decreasing trend can be observed in the passenger FWI for this period.

[1] The following SANS 3000-1, 2009 occurrence reporting categories were used to identify passenger harm: [A], [B], [F-a], [G], [H-a], [H-b], [I-b], [J-d] and [L]

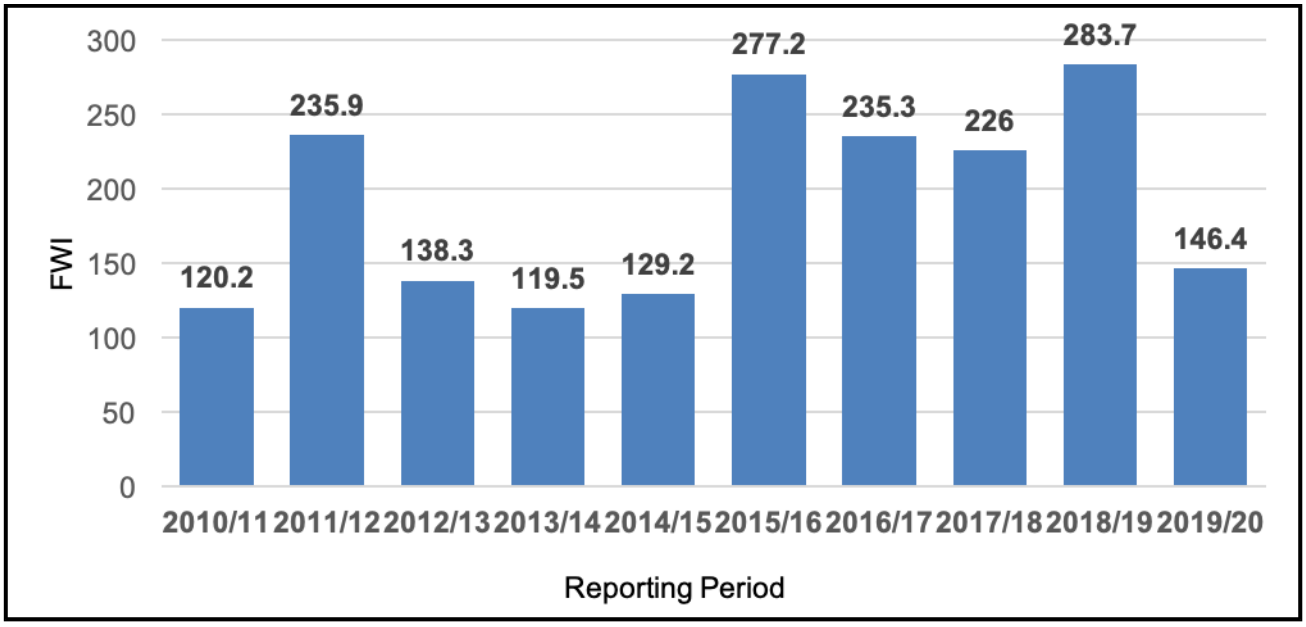


Figure 15: The 2010/11 to 2019/20 FWI for passengers

A total of 30 per cent (146.4 FWI) of all (490 FWI) persons harmed as a result of operational safety occurrences in the 2019/20 reporting period were passengers. This is a significant reduction from 46 per cent recorded during the 2018/19 reporting period. Figure 16 illustrates the risk profile for passengers for the 2010/11 to 2019/20 reporting period.

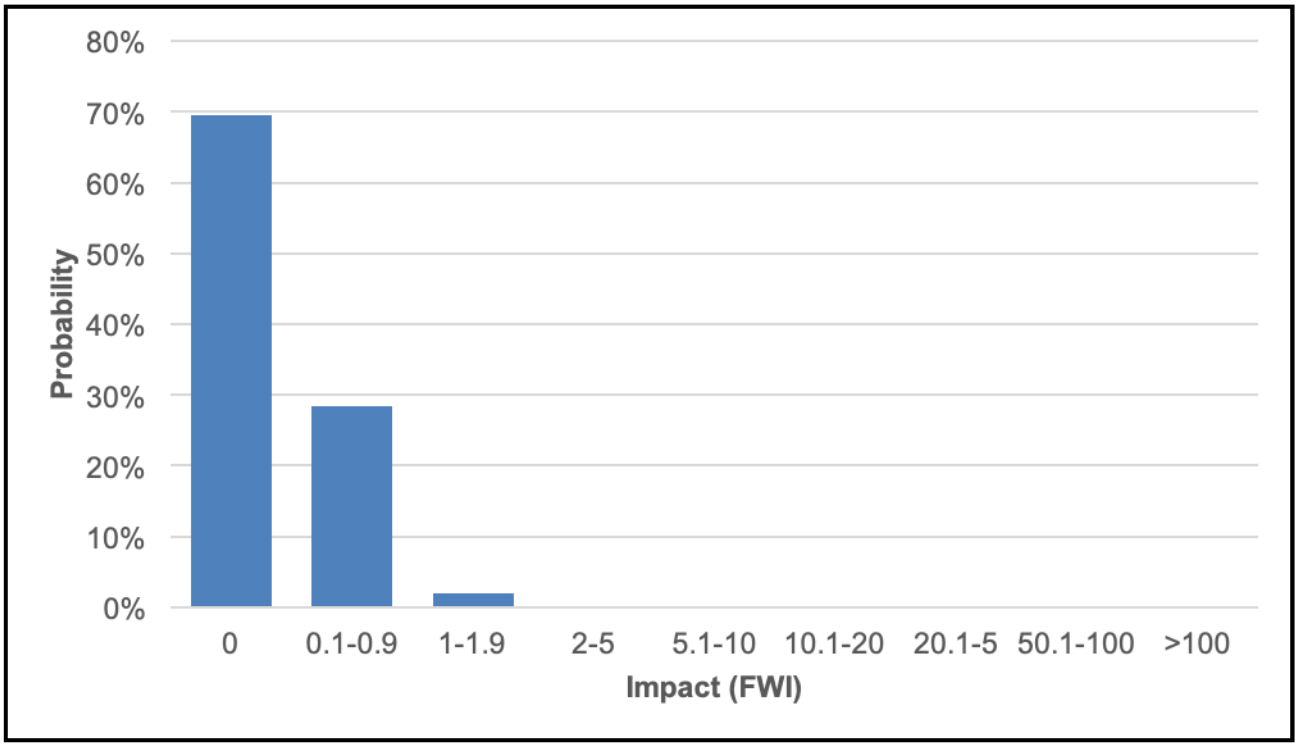


Figure 16: **Risk profile for passengers (2019/20)**

Based on the FWI Index, the 2019/20 reporting period risk profile for passengers show that once there is a passenger-related operational safety occurrence the following can be mentioned:

- Of these operational safety occurrences recorded, 69,49 per cent of passengers were harm-free;
- Less than one passenger FWI occurred in 28,33 per cent of the operational safety occurrences;
- Between one and 1,9 passenger FWI occurred in 1,94 per cent of the operational safety occurrences; and
- Operational occurrences associated with more than two passenger FWI have a probability of approximately 0,24 per cent.

Safety of the workforce [2]

From an operational occurrence perspective, the railway operators in South Africa ensure a safe working environment for employees and contractors. Figure 17 illustrates the calculation for workforce FWI for the 2010/11 to the 2019/20 reporting period. The lowest FWI values for workforce harm were recorded respectively in the 2017/18 and 2018/19 reporting periods. Of all the (490 FWI) persons harmed during the 2019/20 reporting period as a result of operational safety occurrences, only 1,4 per cent (7,1 FWI) were suffered by employees and contractors.

The 2019/20 reporting period risk profile for workforce (employees and contractors) in Figure 18 show that once workforce-related operational occurrences happen, based on a FWI Index basis, the following can be mentioned:

- The workforce was not harm free. One FWI occurred in 63 per cent of the cases and two FWI in 37 per cent of operational safety occurrences; and
- Operational occurrences associated with more than two workforce FWI have a probability of zero.

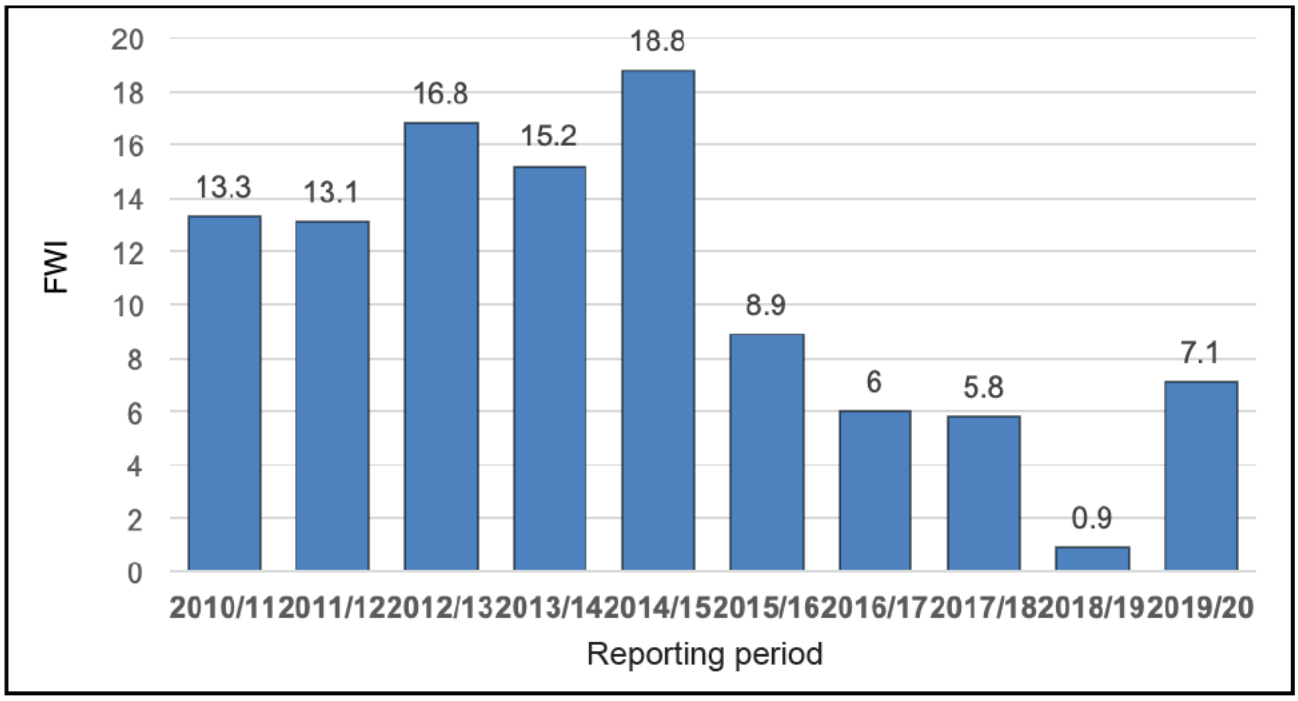


Figure 17: workforce FWI for 2010/11 - 2019/20

[2] The following SANS 3000-1, 2009 occurrence reporting categories were used to identify workforce harm: [E-b], [E-c], [E-e], [E-f], [F-b], [F-c], [H-c], [H-d], [H-e], [H-f], [I-c], [I-d], [I-e], [I-f], [J-b], [J-c], [J-e], [J-f], [J-h], [J-i], [J-k] and [J-l]

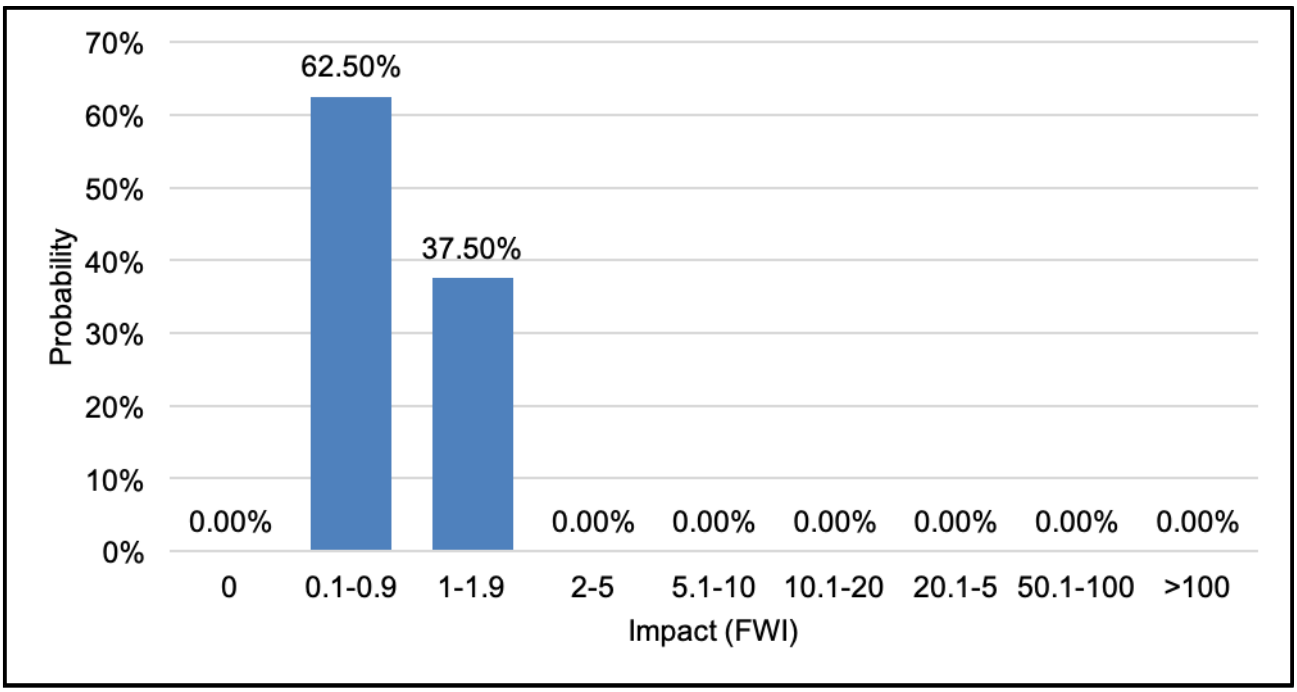


Figure 18: **The 2019/20 risk profile for the workforce (Employees and Contractors)**

Safety of the public [3]

In contrast to the workforce, FWI for the public remain higher, largely due to occurrence Category E (people struck by trains during movement of rolling stock). From an operational occurrence perspective, the railway operators in South Africa do not provide a safe passenger rail environment for the public. Figure 19 illustrates the calculation for public FWI for the 2010/11 to 2019/20 reporting period. Public FWI for the 2019/20 reporting period is 22 per cent lower than the average since the 2010 calendar year.

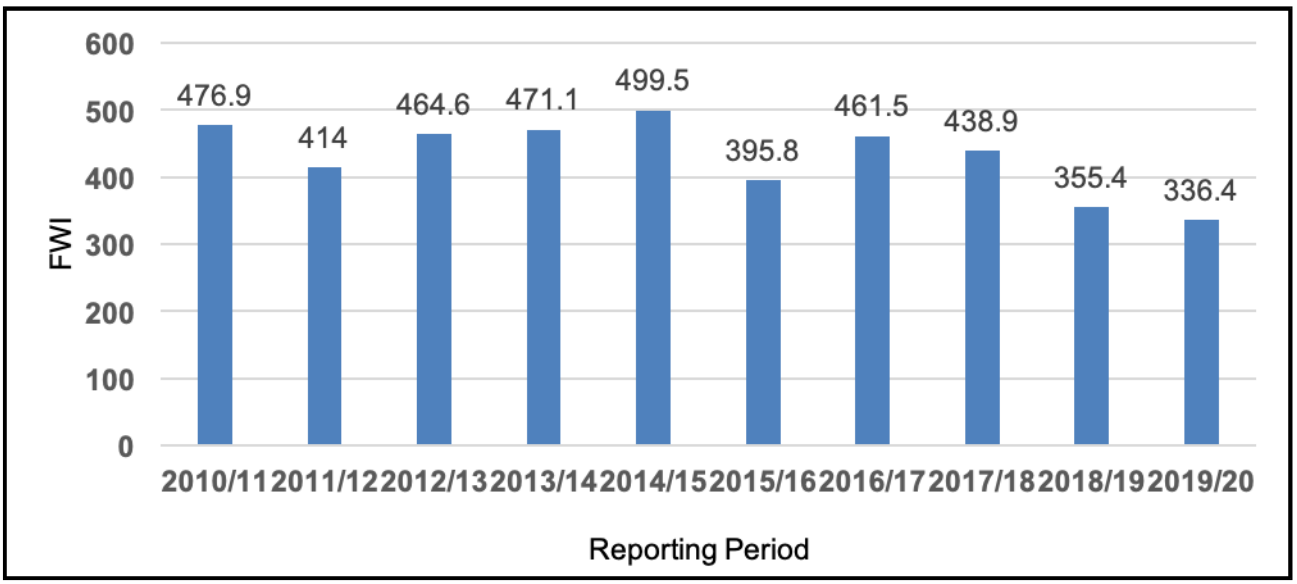


Figure 19: Public FWI for 2010/11 - 2019/20

[3] The following SANS 3000-1, 2009 occurrence reporting categories were used to identify public harm: [D], [E-a], [E-d], [I-a], [J-a], [J-g] and [J-j]

A concerning issue in this analysis is that of all (490 FWI) persons harmed during and as a result of operational safety occurrences, 68 per cent (336,4 FWI) were suffered by the members of the public. This is worse than the 57 per cent in the 2018/19 reporting period. The 2019/20 reporting period risk profile for the public presented in Figure 20 shows that once public related operational occurrences happen, based on an FWI index basis:

The public was harm-free in only 14,29 per cent of the recorded operational safety occurrences;
Less than one public FWI occurred in 38,25 per cent of the operational safety occurrences;
Operational occurrences associated with one to two public FWI have a probability of 45,87 per cent; and
Operational occurrences associated with more than two public FWI have a low probability (1,59%).

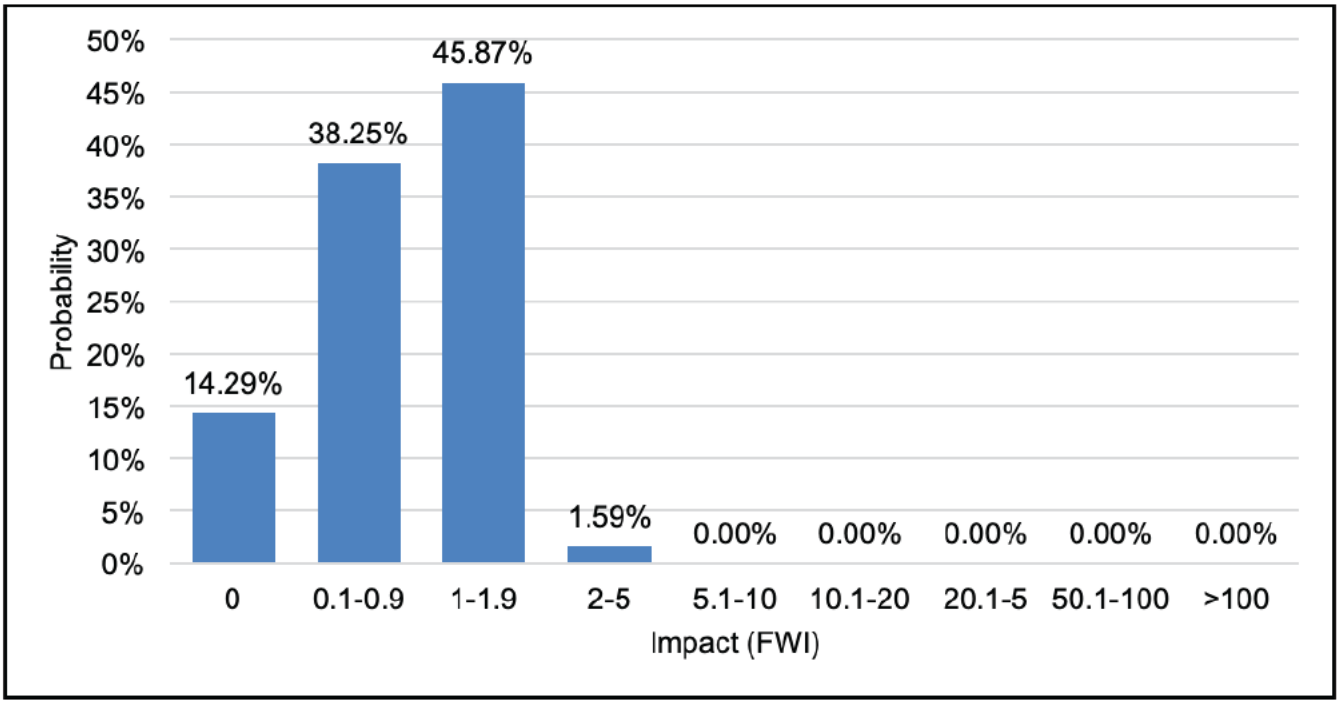


Figure 20: Risk profile for the general public (2019/20)

Security performance

The Act acknowledges that safety and security matters are interconnected, with the Regulator playing a supporting role in railway security. Risk profiles and FWI values for passenger, workforce and public harm have not been calculated for this sub-section as they do not provide any further insights into the nature and severity of the security-related incidents reported to the RSR.

Commencing with the overall fatalities and injuries recorded during the 2014/15 to 2019/20 reporting as a result of security-related incidents reported to the RSR presented in Table 8, Table 9 shows an overall increase in security-related incidents of eight per cent between the 2017/18 and 2018/19 reporting periods. Table 9 also shows a 142 per cent increase in the number of security-related incidents since the 2012/13 reporting period and 57 per cent since the 2010/11 reporting period. Note that Figure 7 earlier confirmed a 201 per cent increase in the number of security-related incidents per train km for the same period.

Table 8: 2014/15 to 2019 security-related fatalities and injuries

SANS CAT/ Reporting period	Security-related incidents Fatalities 2014/15 to 2019/20						Security-related incidents Injuries 2014/15 to 2019/20					
	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
1	0	1	0	0	0	0	4	0	1	2	2	1
2	2	1	0	2	1	0	34	10	9	9	5	3
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	1	0	0
5	0	0	0	0	0	0	2	0	0	1	0	0
6	0	0	0	0	0	0	9	0	1	0	5	0
7	1	2	3	5	9	3	340	251	277	250	292	240
8	5	5	7	8	12	16	165	166	181	224	210	157
9	4	5	6	7	8	9	52	39	56	65	70	57
TOTAL	**12**	**14**	**16**	**22**	**30**	**28**	**606**	**466**	**525**	**552**	**584**	**458**

Table 9: Security-related Incidents per SANS Category

Reporting year	2013/14	2014/15	2015/16	2016/17	2018/19	2019/20	2019/20				
SANS CATEGORY	All	All	All	All	All	All	All	TFR	PRASA	Other	Trend
1: Theft of assets	3068	4213	3600	4379	4984	6291	7180	4269	2906	5	+14%
2: Malicious damage (vandalism)	1019	1094	1158	1162	1717	1810	1884	831	985	68	+4%
3: Threats of operational safety	6	0	2	0	75	66	64	63	0	1	-3%
4: Train kidnapping or hijacking	Note: Train kidnapping or hijacking has been recorded as category 3 Threats of operational safety , as the descriptions of the incidents pertained to threats to operational safety and not the SAPS definition of 'kidnapping' and/or 'hijacking.'										
5: Crowd-related occurrences	7	2	0	0	13	35	11	11	0	0	-69%
6: Industrial action	4	4	1	8	25	35	28	27	0	1	-20%
7: Personal safety on trains	283	516	368	408	398	461	389	6	382	1	-16%
8: Personal safety on stations	247	278	305	312	401	429	312	19	291	2	-27%
9: Personal safety outside station platform area	69	115	86	109	124	141	128	32	94	2	-9%
TOTAL	4703	6222	5520	6378	7737	9268	9996	5258	4658	80	+8%

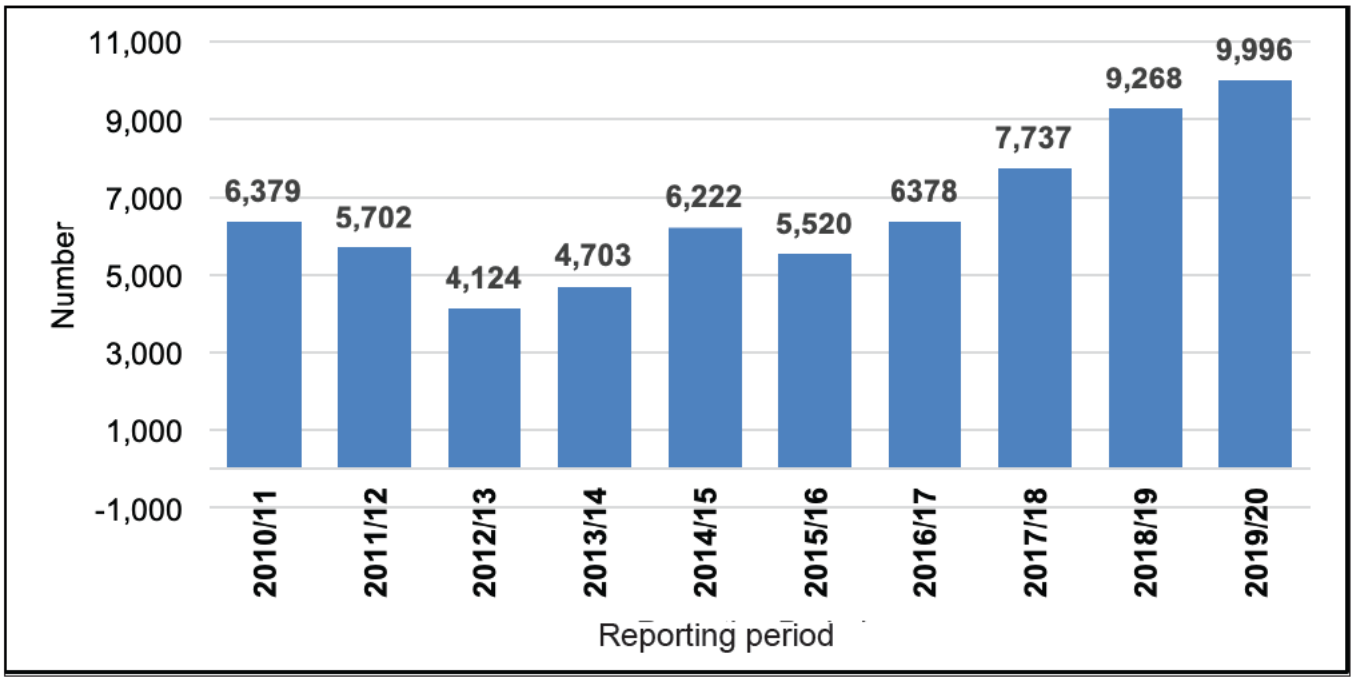


Figure 21: Total number of security-related incidents reported by all operators from the 2010/11 to 2019/20 reporting periods

Figure 22 shows the breakdown of security-related incidents since the 2010/11 reporting period. The area of the pie chart is scaled to the number of security-related incidents for a specific year. Theft increased from approximately 33 per cent of all security-related incidents during the 2010/11 reporting period to almost 60 per cent in the 2019/20 reporting period. Malicious damage to property (vandalism) remains the second largest number of reported security related incidents.

	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	2018/ 19	2019/ 20	2019/20 vs 2010/11
PRASA Security-related Incidents	1 219	2 026	1 106	1 825	3 614	2 826	3 511	4 432	4 627	4 658	282%

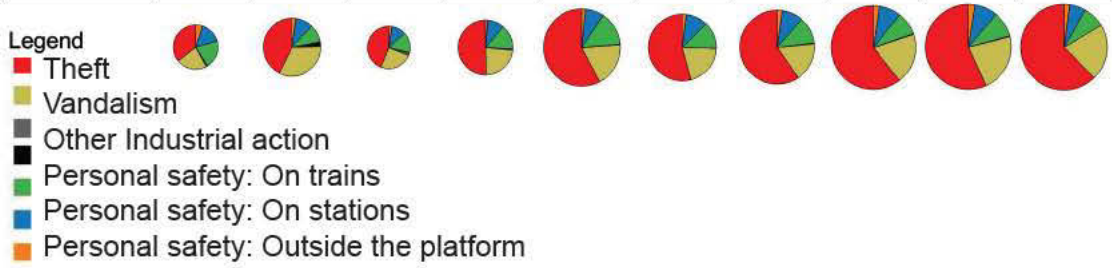


Figure 22: Breakdown of security-related Incidents since 2010/11

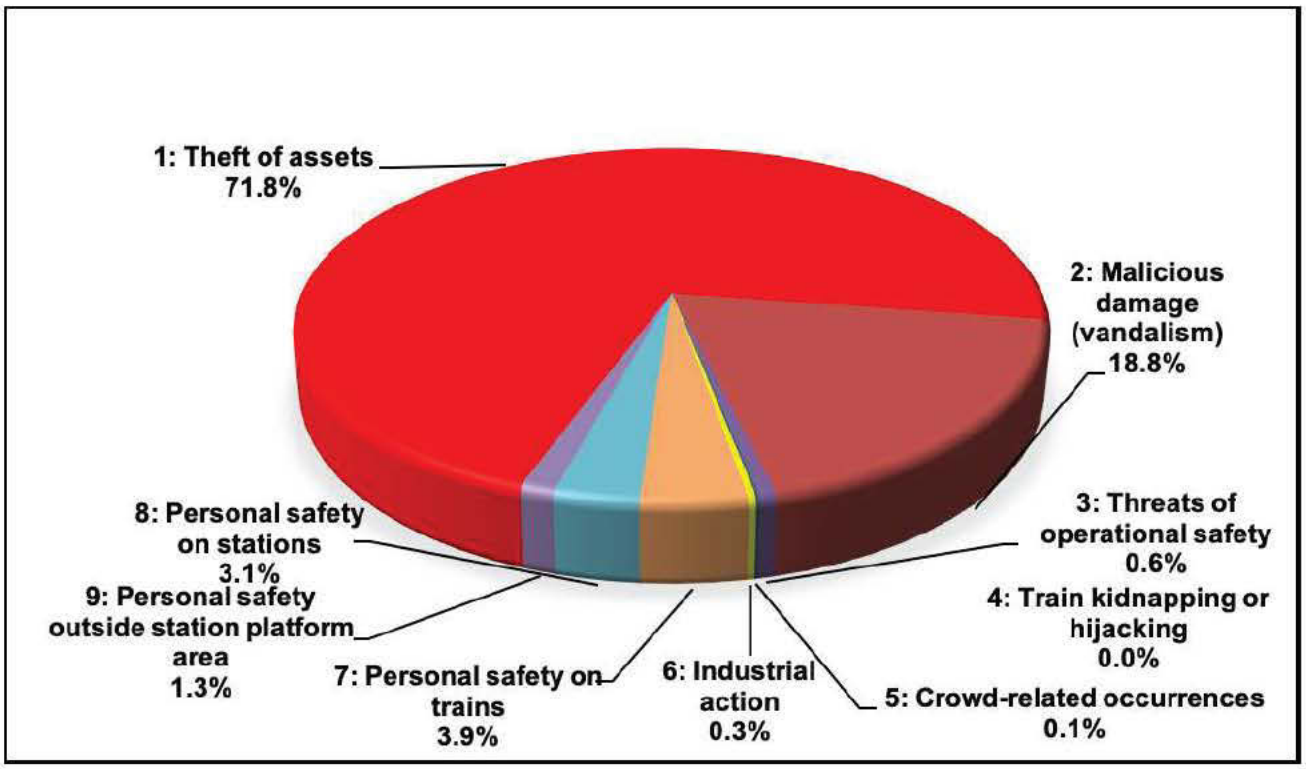


Figure 23: The 2019/20 security-related incidents percentage distribution as per SANS category

Deducing from Figure 24 and Table 9, there is a 12,5 per cent difference in the number of recorded security-related incidents between TFR and PRASA for the 2019/20 reporting period, compared to only two per cent in the 2018/19 reporting period. While TFR experienced 18,5 per cent less vandalism than PRASA, TFR experienced 46,9 per cent more theft than PRASA.

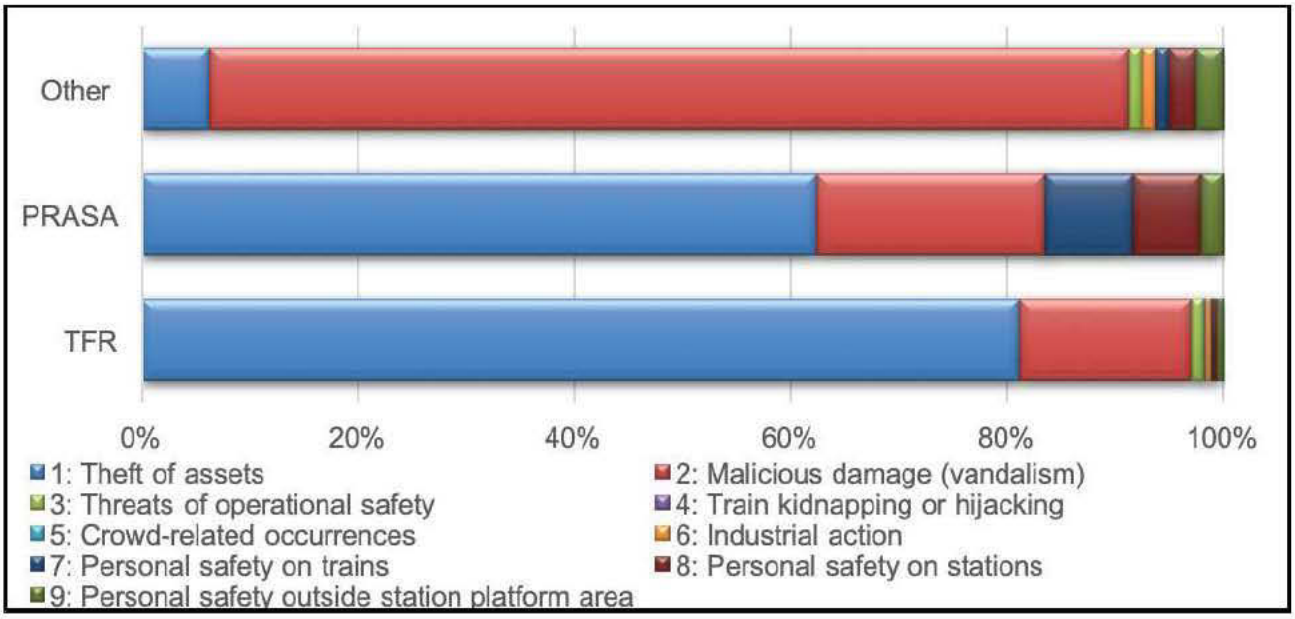


Figure 24: Number of security-related incidents per operator for 2019/20

Figure 25 (fatalities) and Figure 26 (injuries) indicate that most security-related incidents resulted from risks to personal safety.

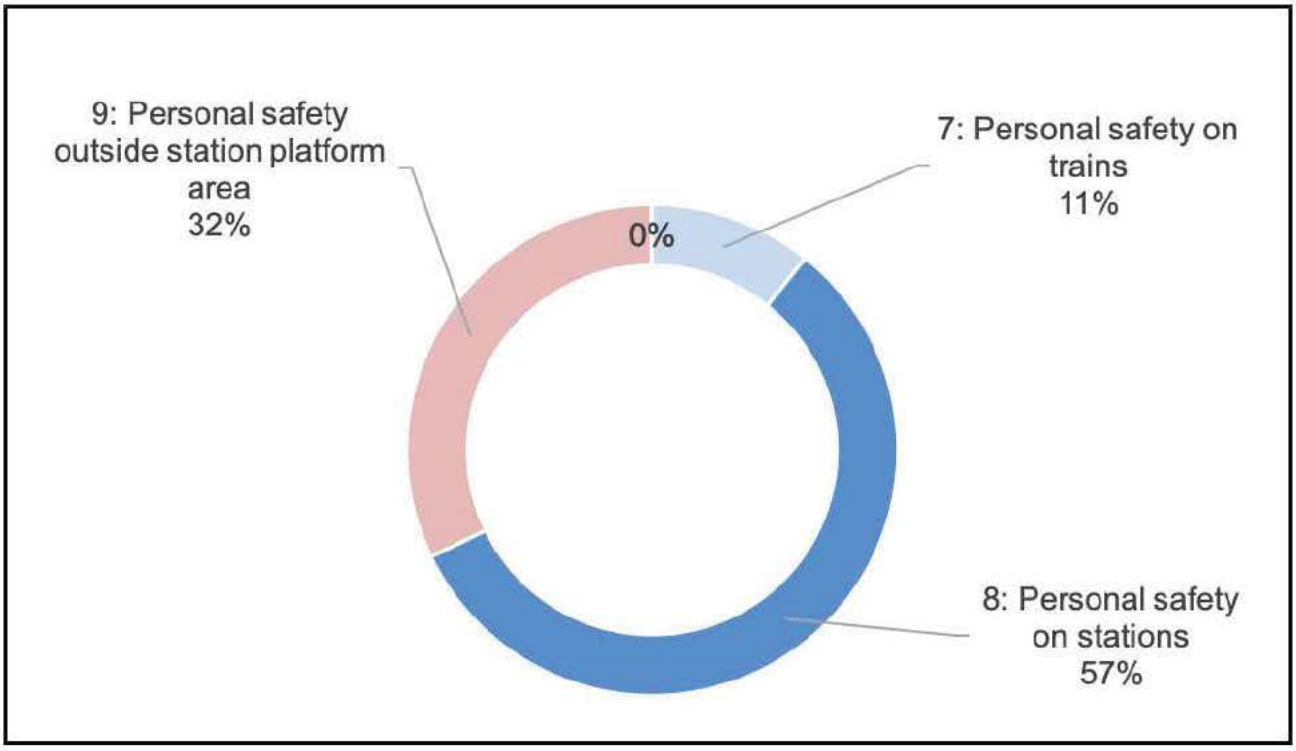


Figure 25: The 2019/20 security-related fatalities per SANS category

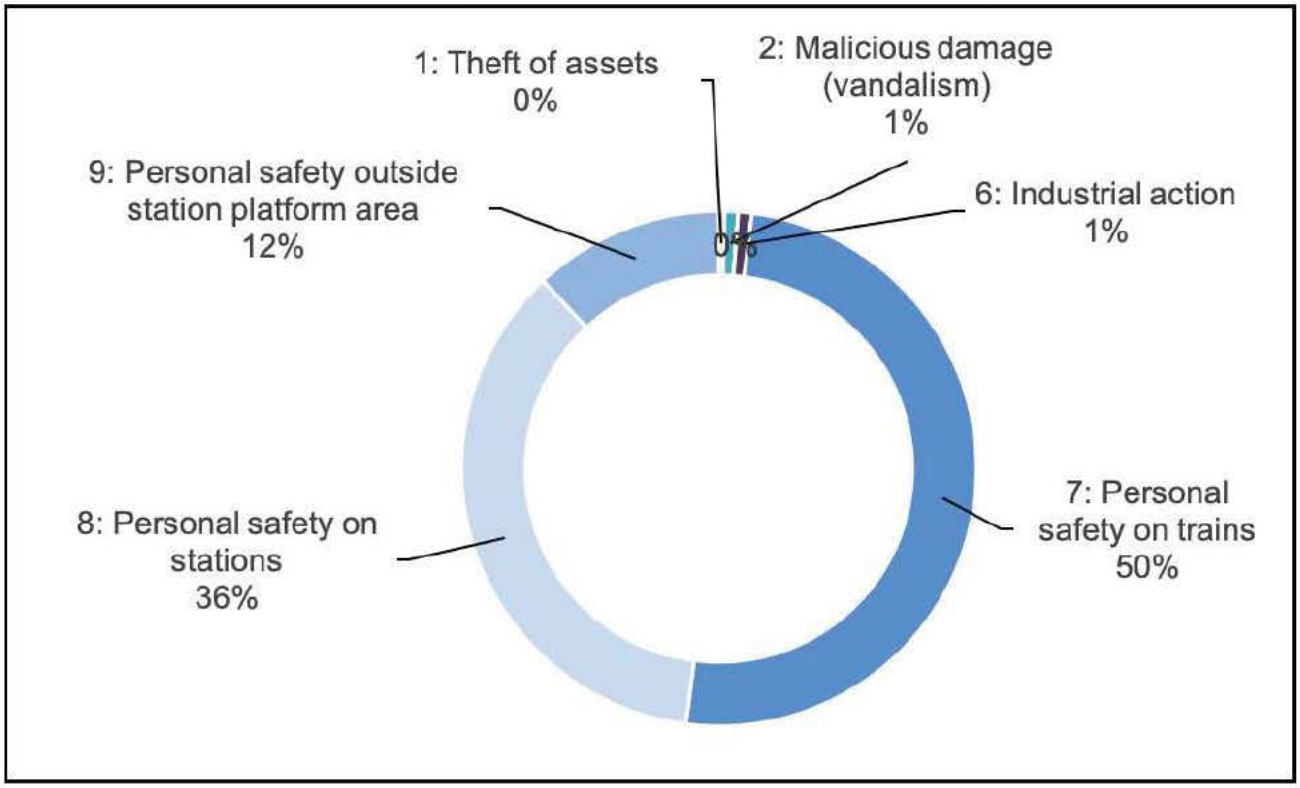
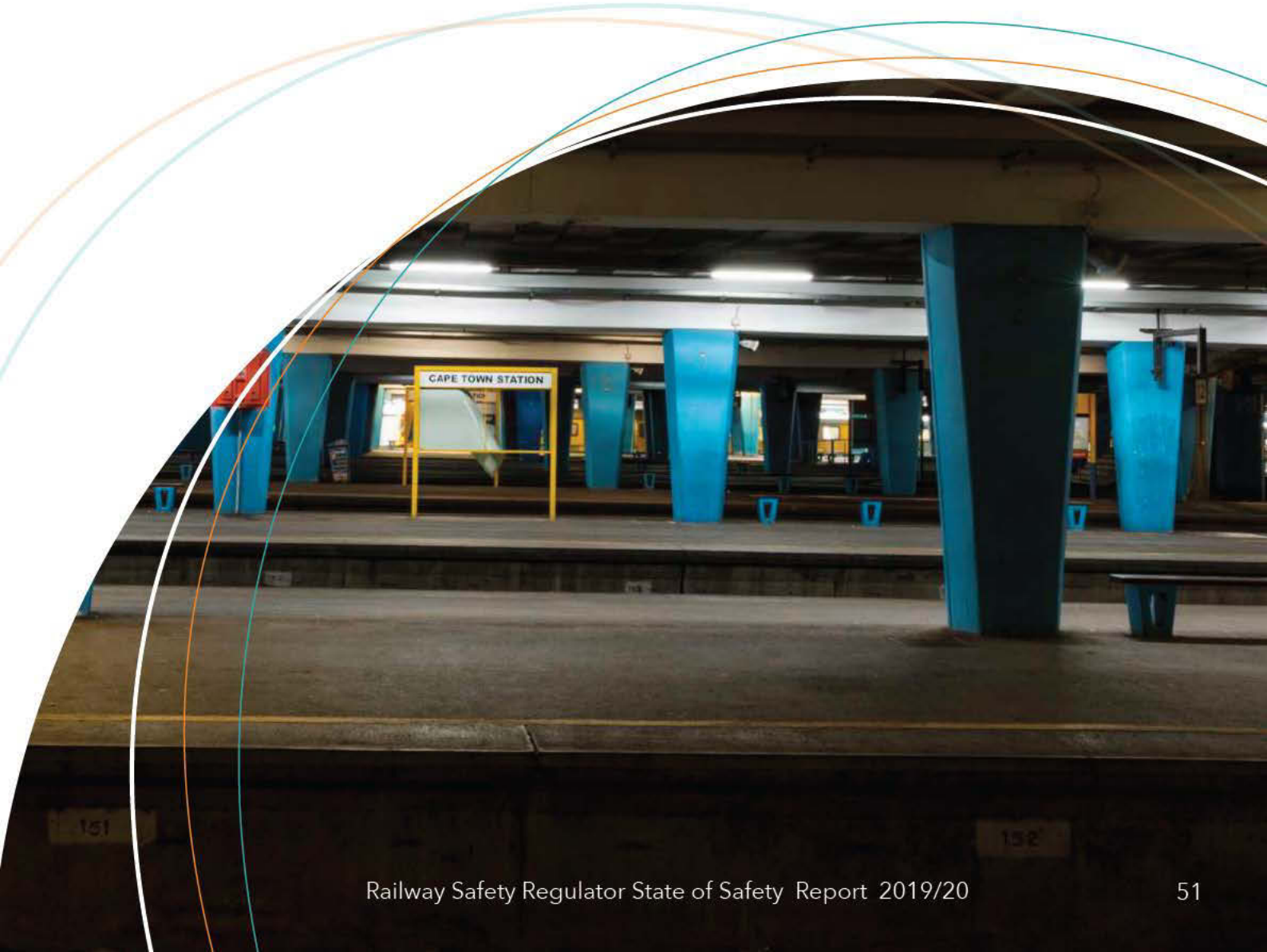


Figure 26: The 2019/20 injuries as a result of security-related incidents per SANS category



CHAPTER 3

TRAIN COLLISIONS

This chapter covers the safety risks related to collisions during movement of rolling stock. Collisions are typically caused by speed and SPADs. The SANS occurrence Category A covers 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. Special attention is given to collisions between rolling stock on running lines [A-a] as this sub-category presents with the greatest overall risk. Running lines includes railway tracks in the yards, depots and the mainline.

Whereas the 2019/20 reporting period witnessed a 15 per cent decrease in total train collisions when compared to the 2018/19 reporting period, on a per million train km normalised basis, this only represents a two per cent decrease. Since the 2010/11 reporting period, the 17,7 FWI value has increased more than seven-fold to 130,6 during the 2019/20 reporting period.

2019/20 Headlines

- A total number of 847 collision occurrences recorded during the 2019/20 reporting period.
- A total of 86 per cent of the 11 712 collisions that occurred between the 2008/09 and 2019/20 reporting periods, were reported under SANS subcategory A-b: A collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock).
- Per million train km, operators recorded 6.7 per cent increase in SANS Category A collisions between rolling stock on a running line occurrences during the 2019/20 reporting period.
- Despite a 24 per cent overall reduction in train km since the 2010/11 reporting period, collisions between rolling stock on a running line occurrences increased by 28 per cent in the 2019/20 reporting period.
- In the 2019/20 reporting period, collisions between rolling stock on a running line [A a] was 7,5 times more likely to result in an FWI than collisions of rolling stock with obstructions on a running line [A-b].
- A total of 88 per cent of all train collision harm since the 2010/11 reporting period can be attributed to the Gauteng province.
- While the 2018/19 reporting period resulted in 29 per cent of all harm since the 2010/11 reporting period, the 2019/20 reporting period resulted in only three per cent of all harm.

Safety performance

Table 10 shows that 86 per cent of the 11 712 collisions that occurred between the 2008/09 and 2019/20 reporting periods were recorded in subcategory A-b: a collision of rolling stock with an obstruction on a running line (including road vehicles that collide with rolling stock).

Table 10: Total collisions recorded between 2008/09 to 2019/20 per subcategory

Collisions Subcategories	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	Variance 2018/19
A-a	22	10	18	20	17	6	14	6	8	7	12	6	-50%
A-b	947	781	705	666	714	850	933	1000	924	938	797	771	-3%
A-c	7	6	4	10	14	4	3	2	4	2	1	2	+100%
A-d	125	87	73	67	67	39	40	33	26	27	19	30	+58%
A-e	69	60	33	66	69	55	53	43	32	33	36	25	+31%
A-f	32	33	35	31	36	22	16	16	12	20	8	13	-63%
Total	1202	977	868	860	917	976	1059	1100	1006	1027	873	847	-3%

On a normalised basis (per million train km), Figure 27 shows that operators recorded a 27,9 per cent increase in SANS Category A: collisions between rolling stock on a running line occurrences since the 2010/11 reporting period and a 7,8 per cent increase since the 2018/19 reporting period. These are graphically presented as follows in Figure 29 below.

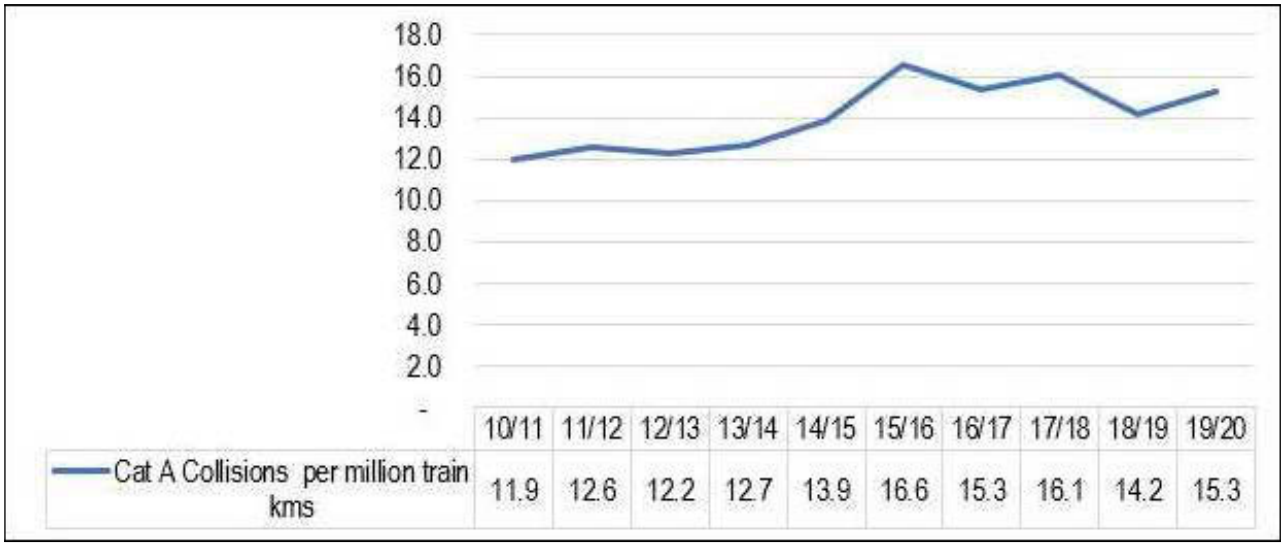


Figure 27: All SANS Category A collisions occurrences per million train km

Table 11 shows TFR and PRASA's collisions data normalised per million train km for 2019/20 reporting period. Since the 2010/11 to the 2019/20 reporting period, TFR reported 1,5 times more collisions than derailments. Similarly, since the 2010/11 to the 2019/20 reporting period, PRASA reported 1.7 times more collisions than derailments.

Table 11: Collisions normalised per million train km for TFR and PRASA

COLLISIONS (NORMALIZED PER MILLION TRAIN KM)									
Reporting Period	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2018/19	2019/20
TFR	16.2	15.2	16.5	18.0	19.6	25.6	24.0	22.9	21.7
PRASA	1.79	2.01	1.79	2.24	2.34	1.98	2.10	2.20	2.79

TFR produced 29 per cent fewer train km since the 2010/11 reporting period, and five per cent fewer collisions per million train km in the 2019/20 reporting period. PRASA produced 32 per cent fewer train km since the 2010/11 reporting period, yet it recorded 27 per cent more collisions per million train km in the 2019/20 reporting period. Figure 28 shows the provincial breakdown of FWI due to collisions since the 2010/11 reporting period. This indicates that the FWI was dominated by the Gauteng province.

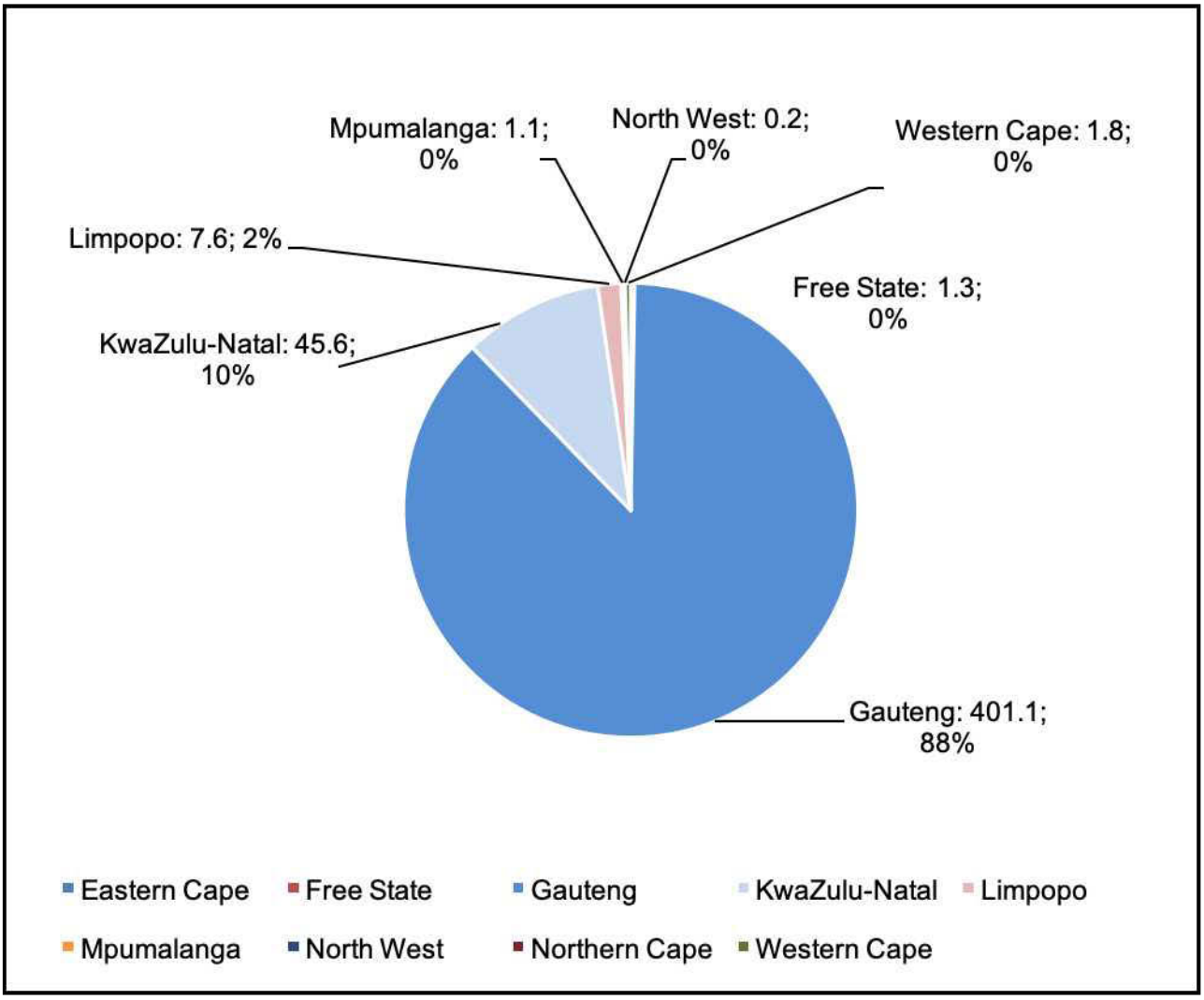


Figure 28 The 2010/11 to 2019/20 FWI arising collision per province

Figure 29 illustrates how each of the SANS subcategories contributes (actual number and in percentage) to the total amount of collisions during the movement of rolling stock recorded for the the 2010/11-2019/20 reporting period. Collisions with an obstacle on a running line (including road vehicles colliding with rolling stock) contributed to 87 per cent of all the train collisions that occurred during the 2010/11 – 2019/20 reporting periods. Both collisions of rolling stock other than on a running line [A-d] and collision of rolling stock with an obstruction other than on a running line [A-e] contributed nine per cent to the overall number of the train collisions that occurred during the reporting period. Collisions between rolling stock on a running line [A-a] were responsible for only one per cent of the total number of train collisions.

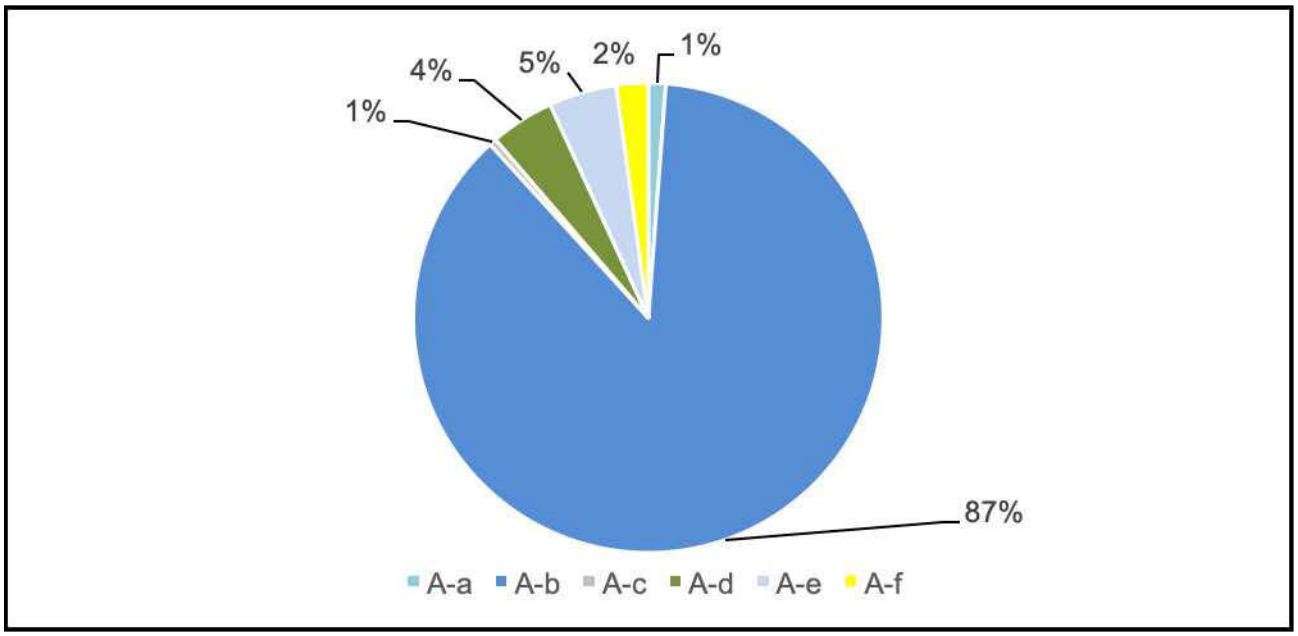


Figure 29: The 2010/11 to 2019/20 percentage distribution of train collisions as per SANS sub-categories

Figure 30 illustrates that collisions between rolling stock on a running line [A-a] contributed most to the overall FWI for train collisions during the reporting period. Collisions with an obstacle on a running line (including road vehicles colliding with rolling stock) and collision of rolling stock other than on a running line contributed to a very small percentage of the overall FWI. This follows the notion that the FWI indicator is designed to amplify largescale injury-prone events such as passenger train derailments or collisions.

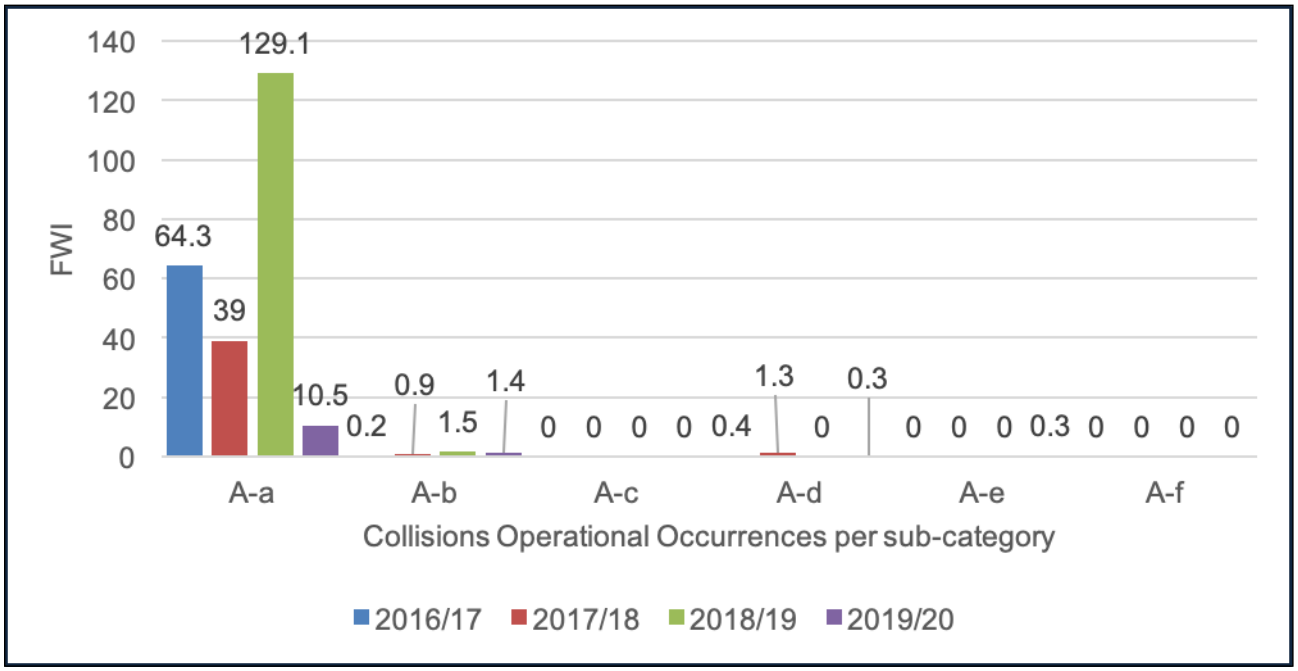


Figure 30: The 2016/17 to 2019/20 reporting period percentage contribution of train collisions as per SANS sub-category to the overall FWI for train collisions

Figure 31 shows that overall harm from collisions between rolling stock on a running line (A-a) was substantially lower at 10,5 FWI during the in 2019/20 reporting period compared to the 16,9 FWI recorded during the 2010/11 reporting period. FWI is sensitive to large events. Occurrences such as the PRASA train accident on the mainline near Kroonstad in the 2018/19 reporting changes the actual FWI.

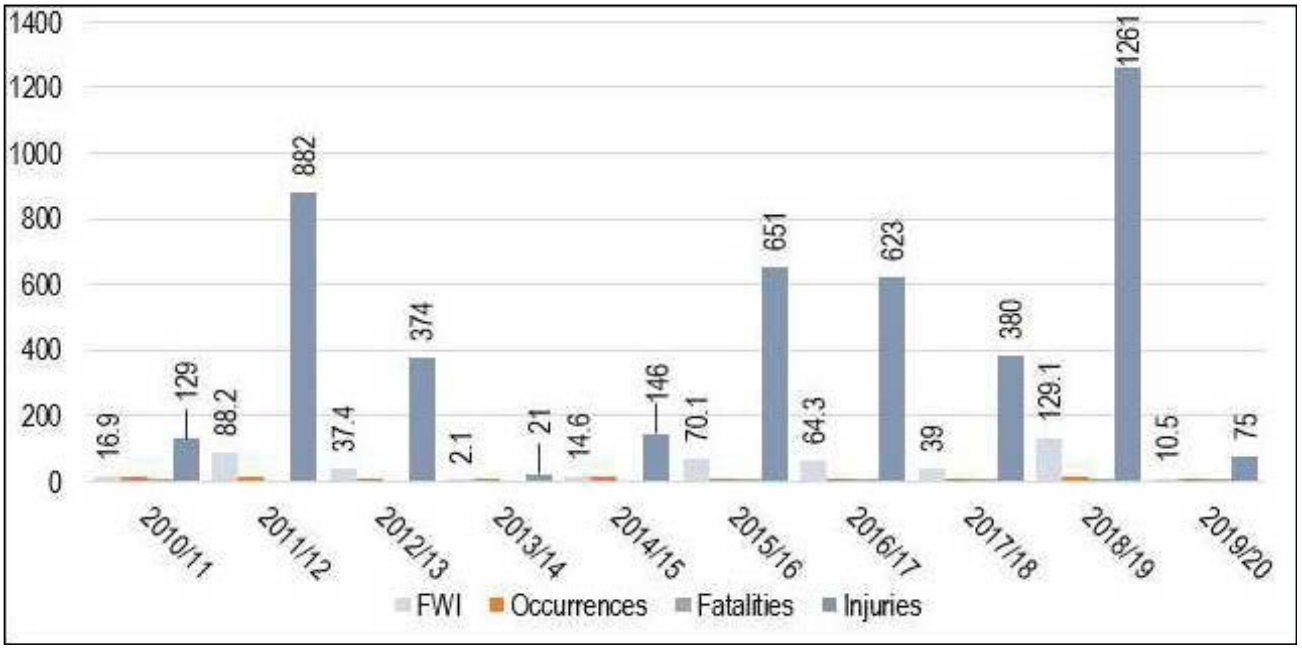


Figure 31: The 2010/11 to 2019/20 harm from collisions between rolling stock on running lines

Figure 32 indicates that the 2019/20 reporting period had the lowest harm (12,5 FWI) score since the 2011/12 reporting period during which 17,7 FWI were recorded.

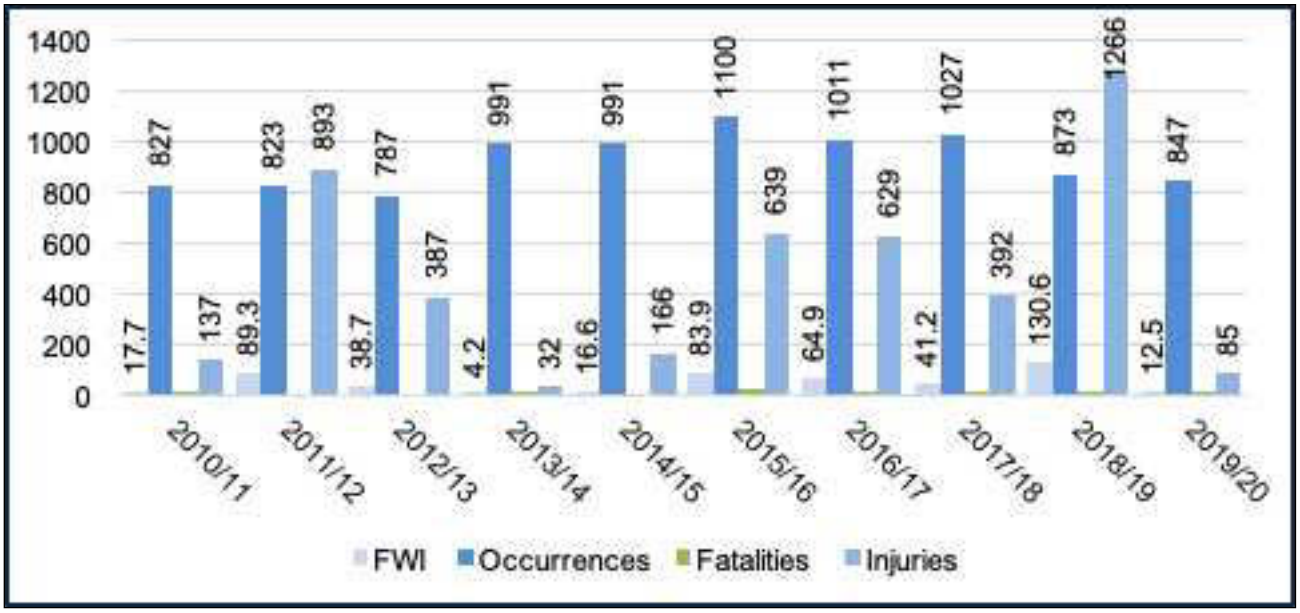
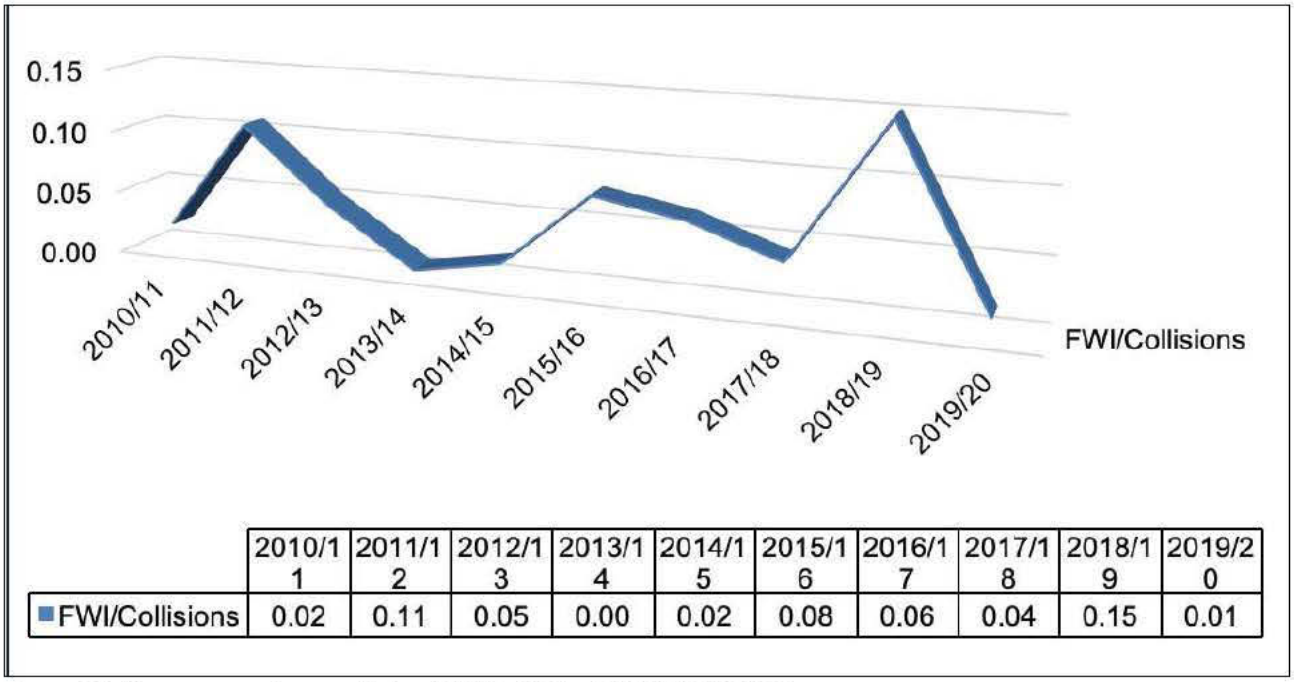


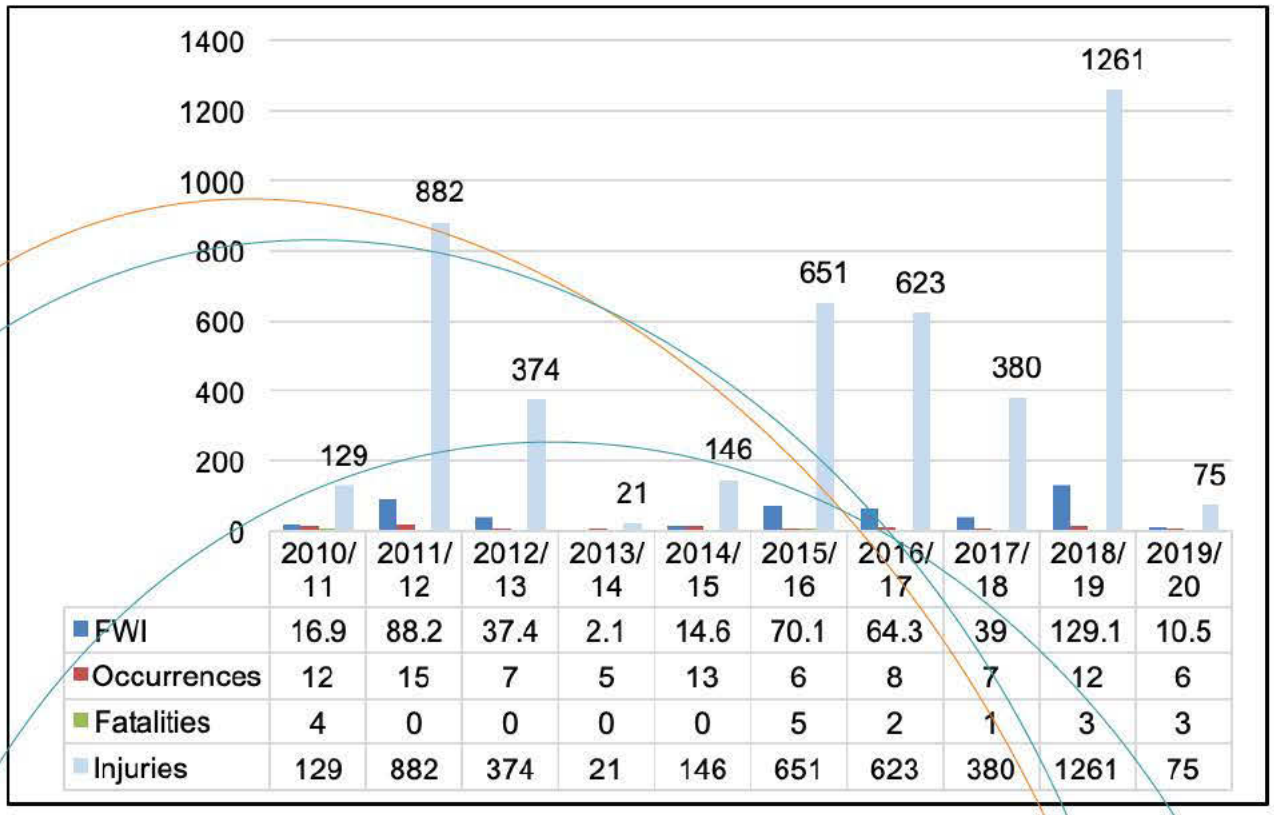
Figure 32: Number of train collisions, related fatalities and injuries 2010/11 – 2019/20

Figure 33 reflects relative harmless collisions in South Africa at the aggregate level. This is largely attributable to the dilutive effect of the TFR operations with many collisions where very few people were involved.



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
FWI/Collisions	0.02	0.11	0.05	0.00	0.02	0.08	0.06	0.04	0.15	0.01

Figure 33: Harm caused per collision (FWI/Collision) 2010/11-2019/20



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
FWI	16.9	88.2	37.4	2.1	14.6	70.1	64.3	39	129.1	10.5
Occurrences	12	15	7	5	13	6	8	7	12	6
Fatalities	4	0	0	0	0	5	2	1	3	3
Injuries	129	882	374	21	146	651	623	380	1261	75

Figure 34: Fatalities and injuries for train-on-train collisions on running lines

As can be seen in Figure 34, there was an exceptionally high number of injuries in the 2011/12 2012/13 and 2015/16 - 2018/19 reporting periods resulting from train-on-train collisions. Fatalities and injuries for train-on-train collisions on running lines for the 2010/11 and the 2019/20 reporting periods are quite similar.

CHAPTER 4

DERAILMENTS

This chapter covers the safety risks related to derailments during movement of rolling stock, SANS occurrence Category B which covers 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.

The Derailments chapter covers safety risks of derailments during movement of rolling stock on a running line and during tippler activities (SANS occurrence Category B). The chapter also presents information on the risk presented to passengers and the public. Included in this analysis are risks to the train crew and contractors when they are engaged in activities related to the movement of trains.

2019/20 Headlines

- There were 382 derailment occurrences indicating a three per cent increase in total train derailments during the 2019/20 reporting period compared to the 2018/19 reporting period.
- A 15 per cent increase in total train derailments per-million train km in the last year.
- A 29 per cent decrease in derailments per million train km since the 2010/11 reporting period.
- Derailments of rolling stock on a running lines account for only 25 per cent of all the recorded derailments but resulted in 85 per cent of FWI (78% of all fatalities and 88% of injuries) since the 2010/11 reporting period.
- Gauteng (7,6%) and KwaZulu-Natal (16%) provinces account for the majority of FWI harm to persons.

Safety Performance

Figure 35 shows a 29 per cent decrease in all derailments per million train km since the 2010/11 reporting period. The train kilometres also decreased since the 2010/11 reporting period by 24 per cent, effectively neutralising the improvement in derailments per million train km.

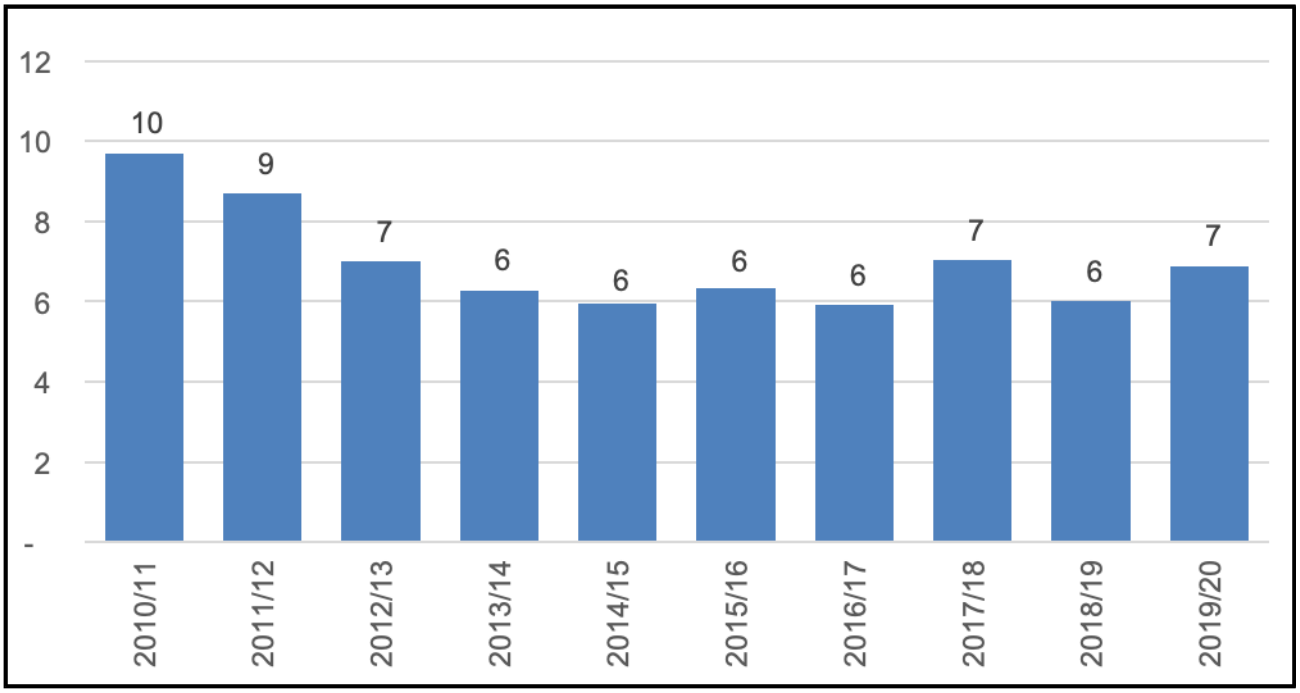


Figure 35: Number of train derailments per million train kilometres[4]

On a year-on-year basis derailments per million train km at Transnet Freight Rail increased by 23 per cent for the 2019/20 reporting period compared to the 7 per cent for the 2018/19 reporting period. Derailments per million train km at PRASA decreased by 2 per cent for the 2019/20 reporting period compared to an increase of 15 per cent for the 2018/19 reporting period. Derailments per million train km tracked to date since the 2010/11 reporting period show a 37 per cent decrease at Transnet Freight Rail, and an increase of 111 per cent at PRASA.

Table 12 shows the total derailments normalised per million train km for TFR and PRASA because they are the largest two operators in South Africa. The FWI value has decreased by 55 per cent since the 2010/11 reporting period but increased by 55 per cent since the 2018/19 reporting period. On a per million train km normalised basis this represents a 29 per cent decrease since the 2010/11 reporting period and a 15 per cent increase since the 2018/19 reporting period.

Table 12: Total derailments normalised per million train km for TFR and PRASA

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	201819	2019/20	Var 10/11	Var 18/19 to 17/18	Var 18/19
TFR	10,7	8,3	8,3	7,7	6,5	7,5	6,9	5,9	6,3	7,7	-37%	7%	23%
PRASA	1,1	1,2	0,9	1,5	1,4	2,0	1,3	2,1	2,4	2,4	111%	5%	-2%

[4] Note that since only train kilometres from the dominant operators TFR, PRASA and Gautrain are considered, the indicated performance presents the worst-case scenario.

Figure 35 depicts the overall number of train derailments and their respective consequences (fatalities, injuries, and FWI) for the 2010/11 to 2019/20 reporting period. During the 2017/18 reporting period, a flattening out decreasing trend is observed for occurrences, fatalities and FWI commencing from the 2010/11 reporting period. By design, FWI is 10 times more sensitive to death than injury showing a compounding effect in the 2010/11 and the 2017/18 reporting period. High FWI values are calculated for the 2010/11, 2017/18, and the 2018/19 reporting periods respectively.

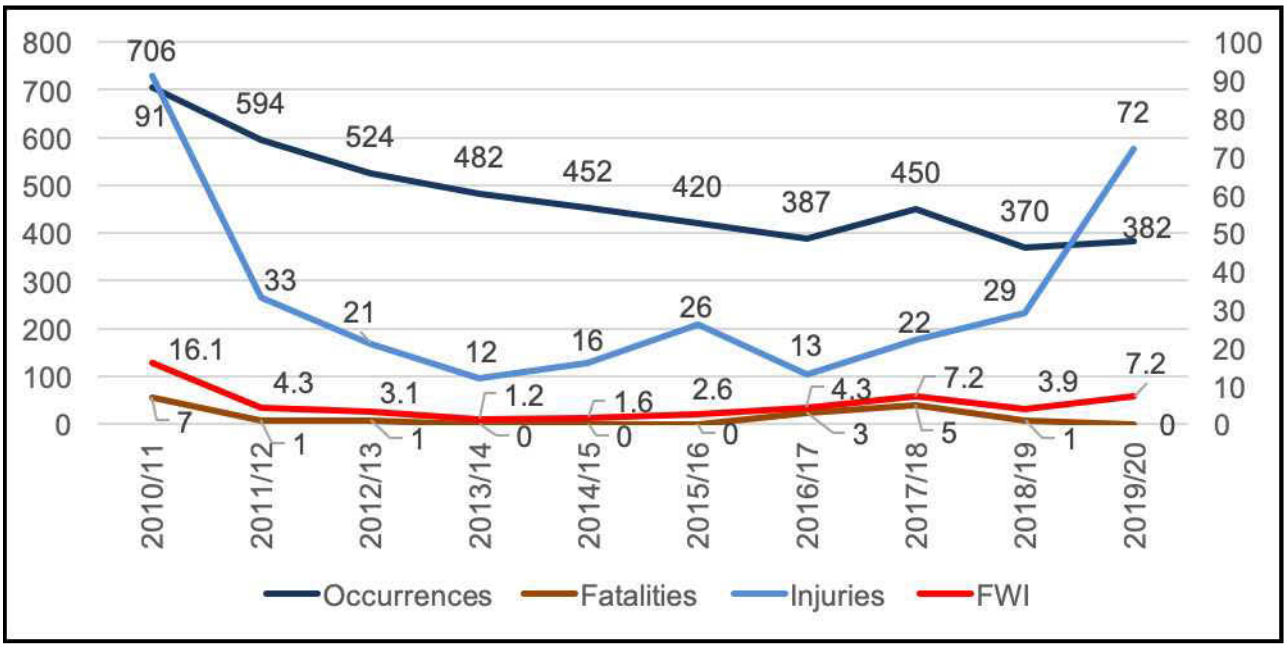


Figure 36: Number of train derailments and related fatalities, injuries 2010/11 to the 2019/20 and FWI from reporting period

Despite derailments of rolling stock on a running line (shown in Figure 36) accounting for only 25 per cent of all derailments, it resulted in 85 per cent of FWI. This represents a 78 per cent of all the RSR recorded fatalities and 88 per cent of injuries since the 2010/11 reporting period.

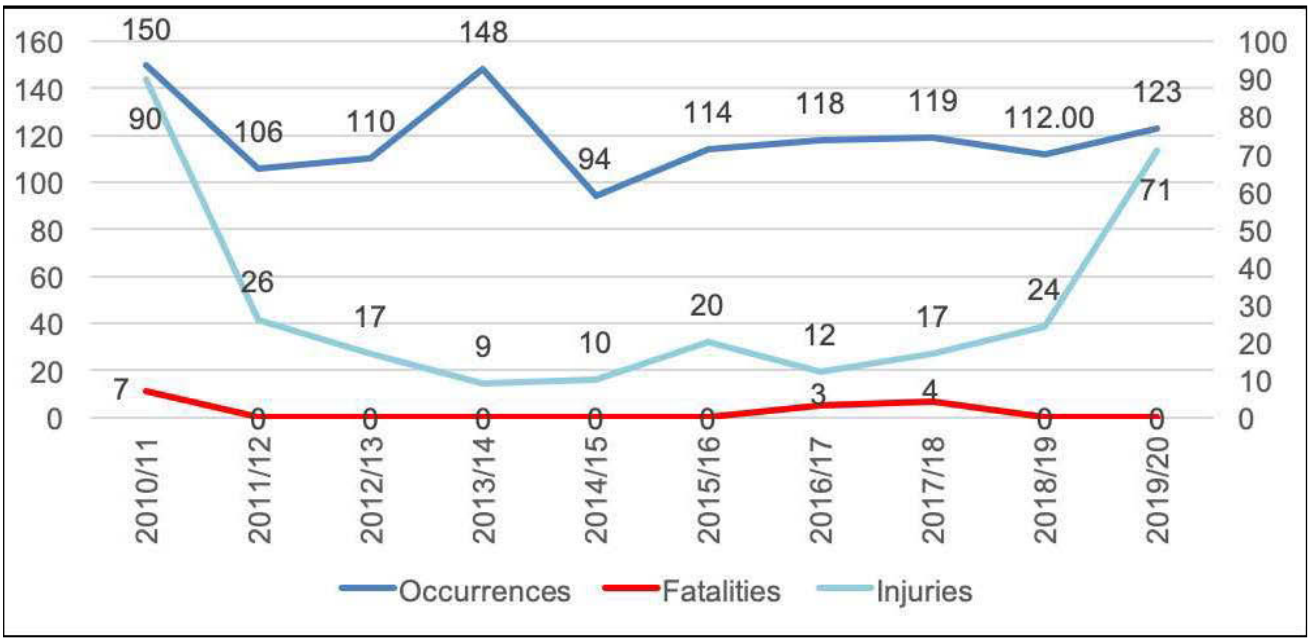


Figure 37: Total number of 2010/11 to 2019/20 fatalities and injuries related to train derailments on running lines between the 2010/11 to the 2019/20 reporting periods.

Figure 37 shows the relative distribution of the consequences of derailments expressed as FWI by province.

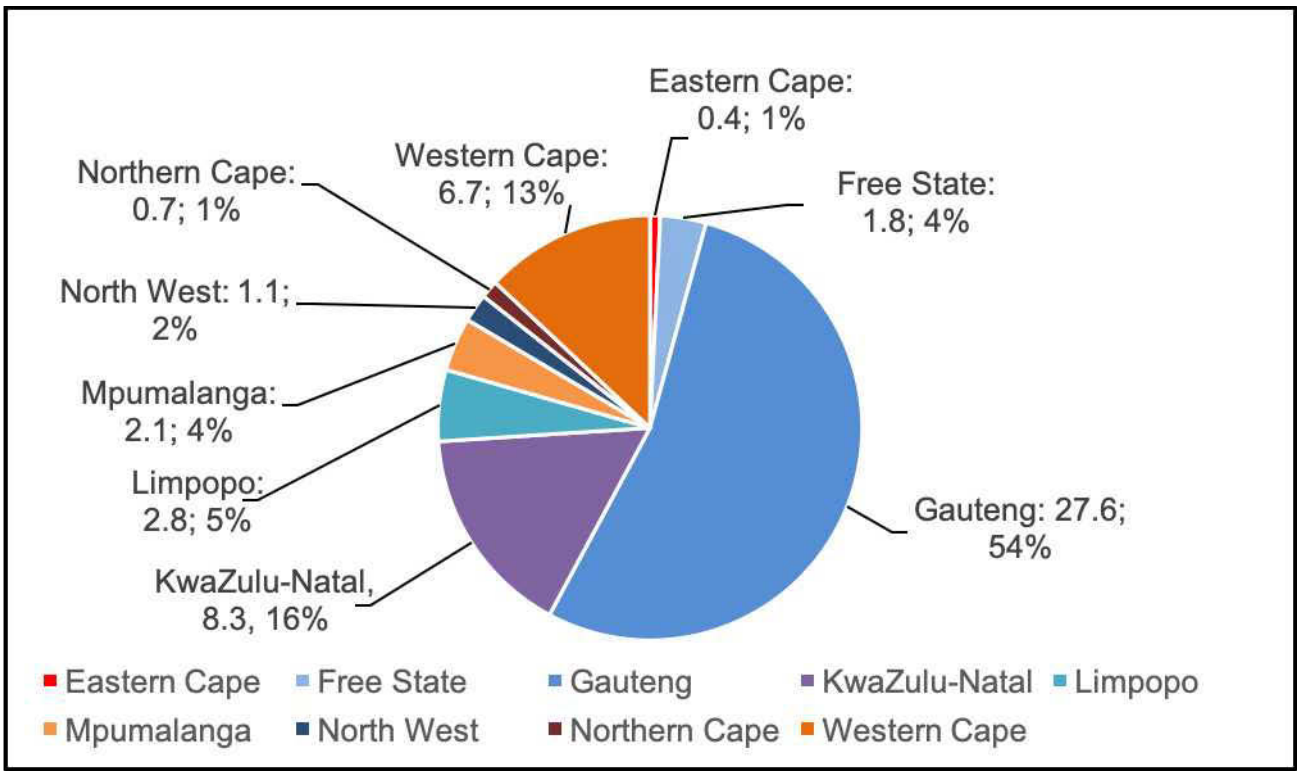


Figure 38: Geographical distribution of consequences due to derailments expressed as FWI

The Gauteng and KwaZulu-Natal provinces account for the majority of the FWI consequences with Gauteng accounting for 27,6 per cent (24,7% in 2018/19) and KwaZulu-Natal for 16 per cent (18% in 2018/19).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CHAPTER 5

LEVEL CROSSINGS

This chapter covers the safety risks related to occurrences at level crossings. SANS occurrence Category D covers the following:

a) Collisions between rolling stock and road vehicles (including motor vehicles, bicycles and animal-drawn vehicles) at a recognised 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 recognised level crossing;
c) Persons struck by rolling stock at a recognised pedestrian level crossing; and
d) Persons struck by rolling stock at a recognised road level crossing.

The Level Crossings chapter looks at the risks arising from train accidents at level crossings. It also examines the relationships between occurrence sub-categories and their respective consequences. Distinctions are made between train passengers, pedestrians and road vehicle users (i.e. the public) and workforce (train drivers and assistants) for the 2019/20 reporting period to understand the risks borne by different road-rail user groups. The chapter also examines level crossing occurrence patterns using time-series analysis (inclusive of seasonal variation and geographical distribution). A risk profile for level crossings illustrates the probability of a certain consequence class.

2019/20 Headlines

- A total of 104 level crossing occurrences were recorded.
- North West, KwaZulu-Natal and the Western Cape accounted for 53 per cent of all level crossing occurrences.
- There was a 22 per cent reduction in level crossing occurrences from the 2018/19 to the 2019/20 reporting period.
- Level crossing occurrences are 20 per cent higher than the lowest level in 2015/16.
- Level crossing occurrences decreased by 22,5 per cent overall since the 2010/11 reporting period.
- The long term average number of level crossing occurrences is 115.
- The number of level crossing occurrences for the 2019/20 reporting period increased by 20 per cent over the 2014/15 reporting period low point.
- Since the 2015/16 reporting period, which was the best performing year, level crossings occurrences per million train km increased steadily by 16 per cent per annum. The turnaround in the 2019/20 reporting period reduces this growth to nine per cent. The upward trend is amplified as the largest operators produced fewer train km over the same period, with TFR and PRASA accounting for six per cent and nine per cent of the reductions respectively.
- A total of 25 fatalities and 59 injuries were recorded due to level crossing occurrences during the 2019/20 reporting period.
- Since the 2010/11 reporting period there were 1 156 level crossing occurrences which resulted in 240 deaths, 1010 injuries, and 342 FWI.
- The overall level of harm at level crossings recorded in the 2019/20 reporting period was 32,9 FWI compared with the 32,5 FWI harm for the 2018/19 reporting period and a long term average harm of 29,9 since the 2010/11 reporting period.
- Most level crossing risk in the 2019/20 reporting period arose from road user behaviour.

Safety performance

Table 13 suggests a 22 per cent reduction in level crossing occurrences from the 2018/19 to the 2019/20 reporting period. Since the 2010/11 reporting period, the average number of level crossing occurrences was 115. The level in the 2019/20 reporting period is, however, 20 per cent higher than the lowest level of 87 level crossing occurrences recorded during the 2015/16 reporting period.

Table 13: Level crossing occurrences by province since 2010/11

PROVINCE/RP	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	Total	Last year
North West	32	16	22	23	11	17	19	29	27	32	228	+19%
KwaZulu Natal	27	27	24	8	17	11	25	18	24	15	196	-38%
Western Cape	18	18	20	18	12	15	21	30	24	13	189	-46%
Gauteng	20	13	11	13	21	14	23	23	13	7	158	-46%
Mpumalanga	23	11	7	12	10	10	20	9	14	15	131	+7%
Free State	3	9	13	8	11	6	4	8	9	8	79	-11%
Eastern Cape	16	13	2	5	7	5	6	0	11	5	70	-55%
Limpopo	11	5	5	11	8	5	5	6	7	5	68	-29%
Northern Cape	2	4	3	6	4	4	3	3	4	4	37	0%
Grand Total	152	116	107	104	101	87	126	126	133	104	1 156	-22%

The North West (20%), KwaZulu-Natal (17%), and the Western Cape (16%) provinces account for 53 per cent of all level crossing occurrences (Figure 39).

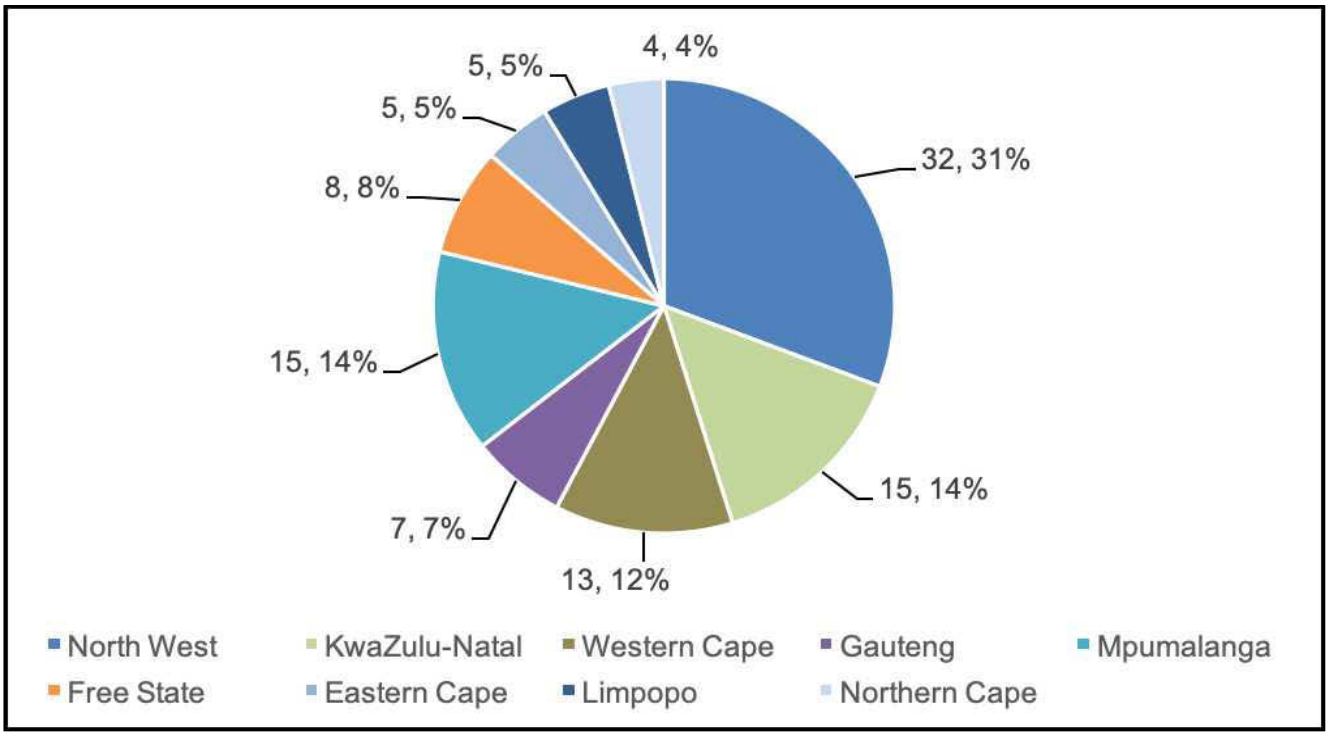


Figure 39 Level crossing occurrence by province recorded during 2019/20

Figure 40 shows the number of level crossing occurrences and their respective consequences (fatalities and injuries) between the 2010/11 and the 2019/20 reporting periods.

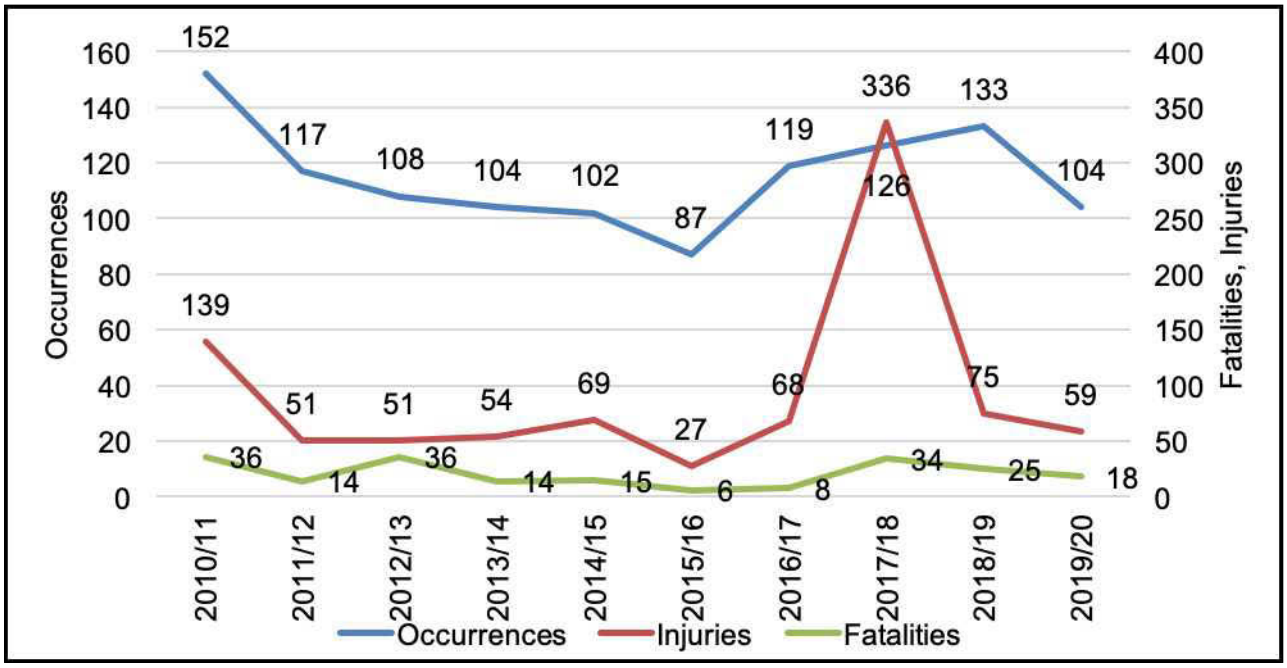


Figure 40: Respective fatalities and injuries consequences associated with the number of level crossing occurrences between the 2010/11 and 2019/20 reporting periods

Although on average 22 people pass away tragically from level crossing occurrences annually, the FWI per level crossing occurrence is significantly low at 0.25. By implication, this means there is one FWI recorded for every four level crossing occurrences.

This variation in the overall trend for level crossing occurrences derives from level crossing occurrence subcategory Collisions between rolling stock and road vehicle/s on a running line (Figure 41).

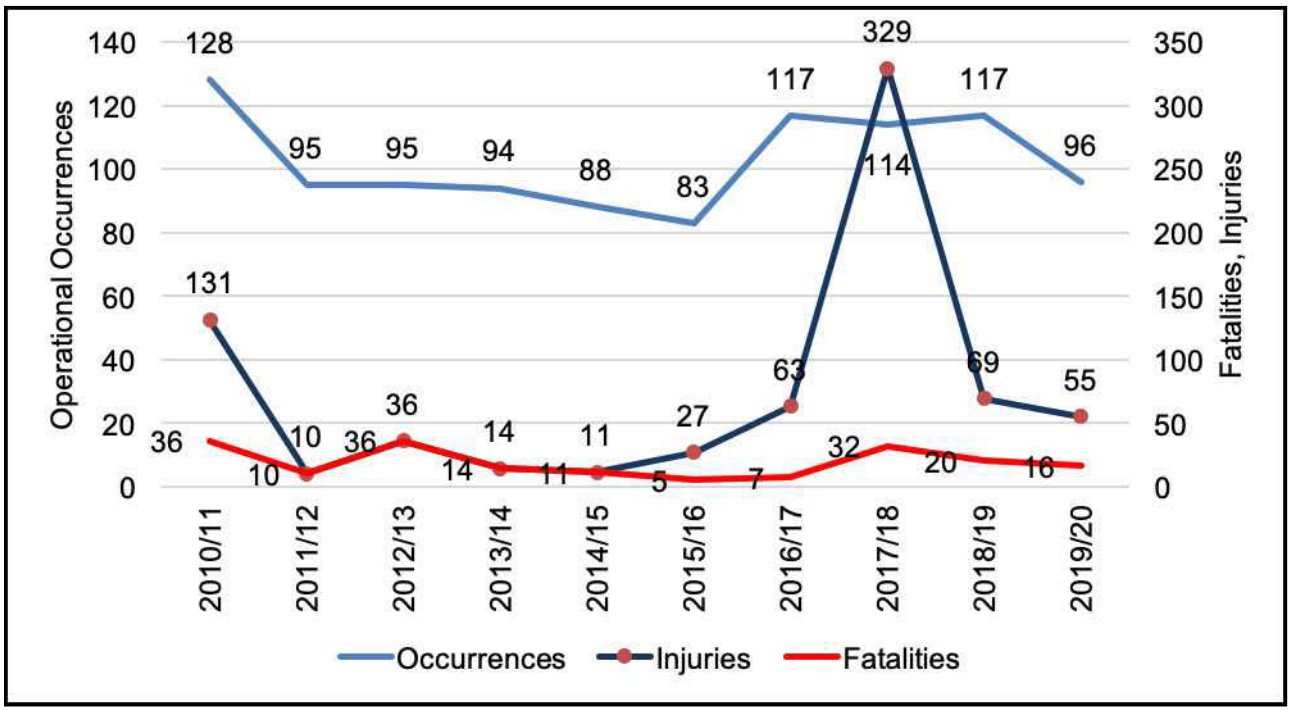


Figure 41: Total collisions between rolling stock and road vehicles on running line with related fatalities and injuries between the 2010/11 to the 2019/20 reporting periods

A detailed analysis of the reported occurrences illustrated that the events of a single occurrence, with extraordinarily high consequences, dominated the time-series of consequences. These were occurrences such as the one on 31 July 2010 which resulted in three fatalities and 33 injuries, the occurrence on 25 August 2010 which resulted in eight fatalities and eight injuries as well as the occurrence on 13 July 2012 between Impala and Hectorspruit, Mpumalanga, resulting in 26 fatalities. Lastly, is the level crossing occurrence of the 4 January 2018 at Geneva, Free State, resulting in 24 fatalities and 263 injuries.

In cases where such high consequences were observed, the data indicated a minibus or school bus was involved, or that the train collided with a lorry (truck). This typically resulted in a derailment and fire, as seen in the Geneva level crossing occurrence during the 2018/19 reporting period. The nature of these occurrences reveals that a decrease in level crossing occurrences will not necessarily result in a decrease in fatalities and injuries.

A more detailed analysis of the various level crossing occurrence categories that examined the relationships between occurrences and consequences indicated that most level crossing occurrences with substantial consequences occur on a running line and comprise of collisions between rolling stock and road vehicles (Figure 41).

In the 2019/20 reporting period, this subcategory contributed 92 per cent of the level crossing occurrences compared to the 88 per cent during the 2018/19 reporting period. This translates into 89 per cent of the recorded fatalities during the 2019/20 reporting period compared to 80 per cent in the 2018/19 reporting period and 93 per cent of the injuries compared to 92 per cent in the 2018/19 reporting period. Thus, the level crossing FWI recorded in the 2019/20 reporting period was 97 per cent compared to 83 per cent during the 2018/19 reporting period.

Analysis of the seasonal distribution of the level crossing occurrence data since the 2008/09 reporting period shows that a significant number of operational occurrences took place during the second quarter of the reporting period (July to September). However, during the 2019/20 reporting period, level crossing operational occurrences peaked in the temperate in the first quarter (April to June) and again in the temperate-to-hot third quarter (October to December). The reason for this change requires an investigation so that meaningful interventions can be implemented.

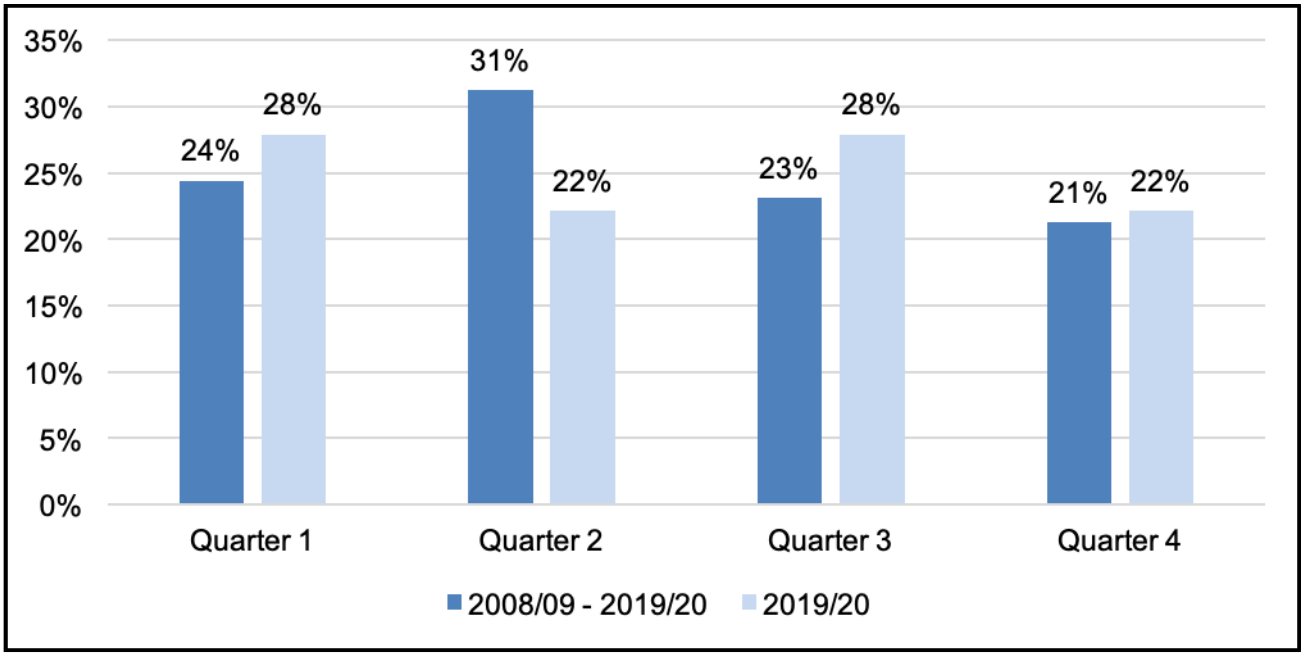


Figure 42: Quarterly distribution of level crossing occurrences since the 2008/09 reporting period

Table 11 indicates that for the 2011/12 – 2019/20 reporting periods, each of the provinces reveals differing trends for level crossing occurrences. Figure 43 graphically presents this trend.

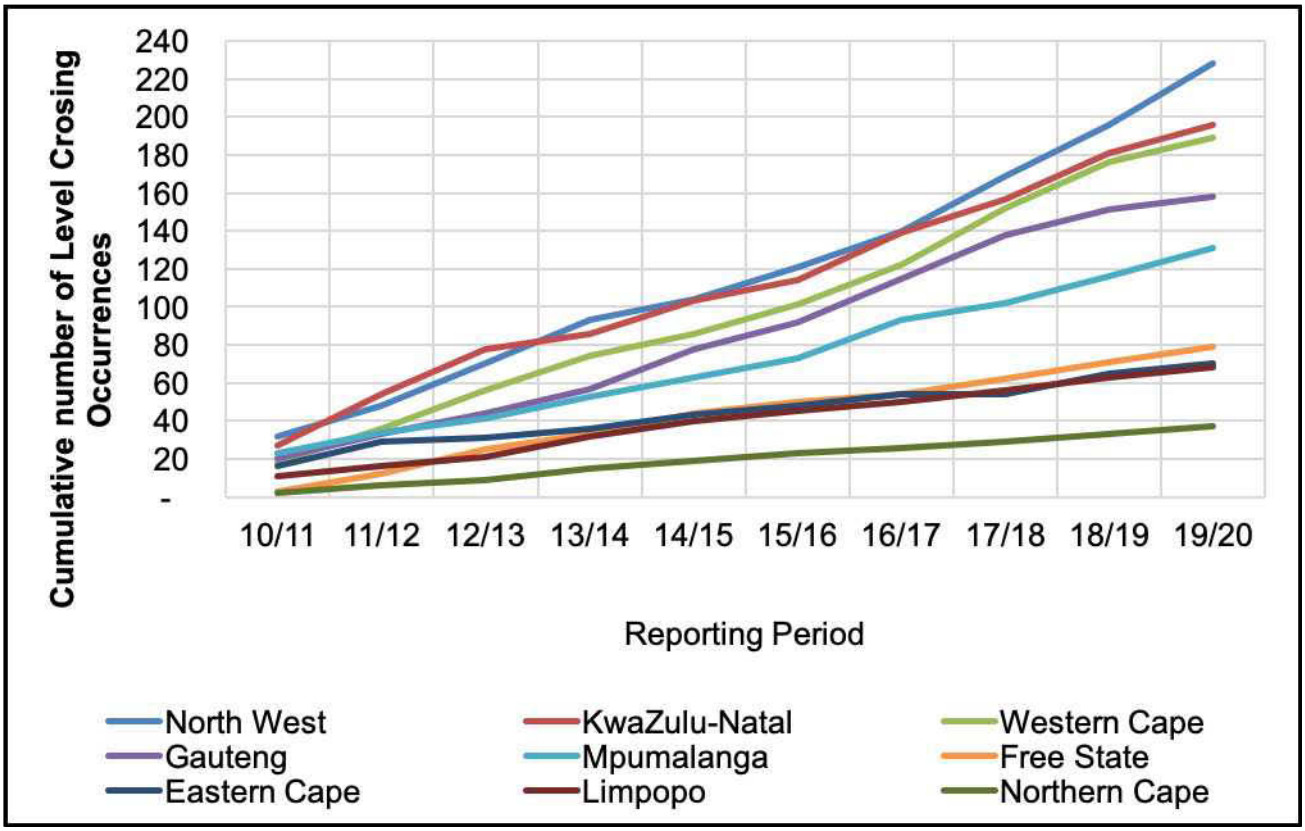


Figure 43: Cumulative number of level crossings by province since the 2010/11 period

As illustrated in Figure 44, a decreasing trend for the 2011/12 – 2015/16 reporting periods can be observed. This was followed by an increasing trend (peak) for the 2016/17 to the 2018/19 reporting period and some recovery during the 2019/20 reporting period. This increase can be attributed to level crossing occurrences wich took place in the Western Cape and Gauteng provinces. Since the 2010/11 reporting period, both these provinces recorded the highest occurrence levels in the 2016/17 and the 2018/19 reporting periods. Since the 2010/11 reporting period, both these provinces recorded the highest occurrence entries in the 2016/17 and 2018/19 reporting period. The North West, KwaZulu-Natal and Mpumalanga provinces contributed to the increasing trend to a minor degree. When examining the distribution of occurrences by province for the 2010/11-2019/20 reporting periods, the North West, KwaZulu-Natal, Western Cape, Gauteng, Mpumalanga provinces contributed 78 per cent of the total level crossing occurrence in the 2019/20 reporting period.

Since the 2015/16 reporting period, the best performing year, level crossing occurrences per million train km increased steadily by 16 per cent per annum. In the the 2018/19 reporting period, this trend has turned around by 13 per cent. The 43 per cent increase in level crossings occurrences per million train km since the 2015/16 reporting period is amplified as the two largest South African operators produced fewer train km over the same period. TFR recorded a 16 per cent decrease in train kilometres while PRASA recorded a 20 per cent decrease.

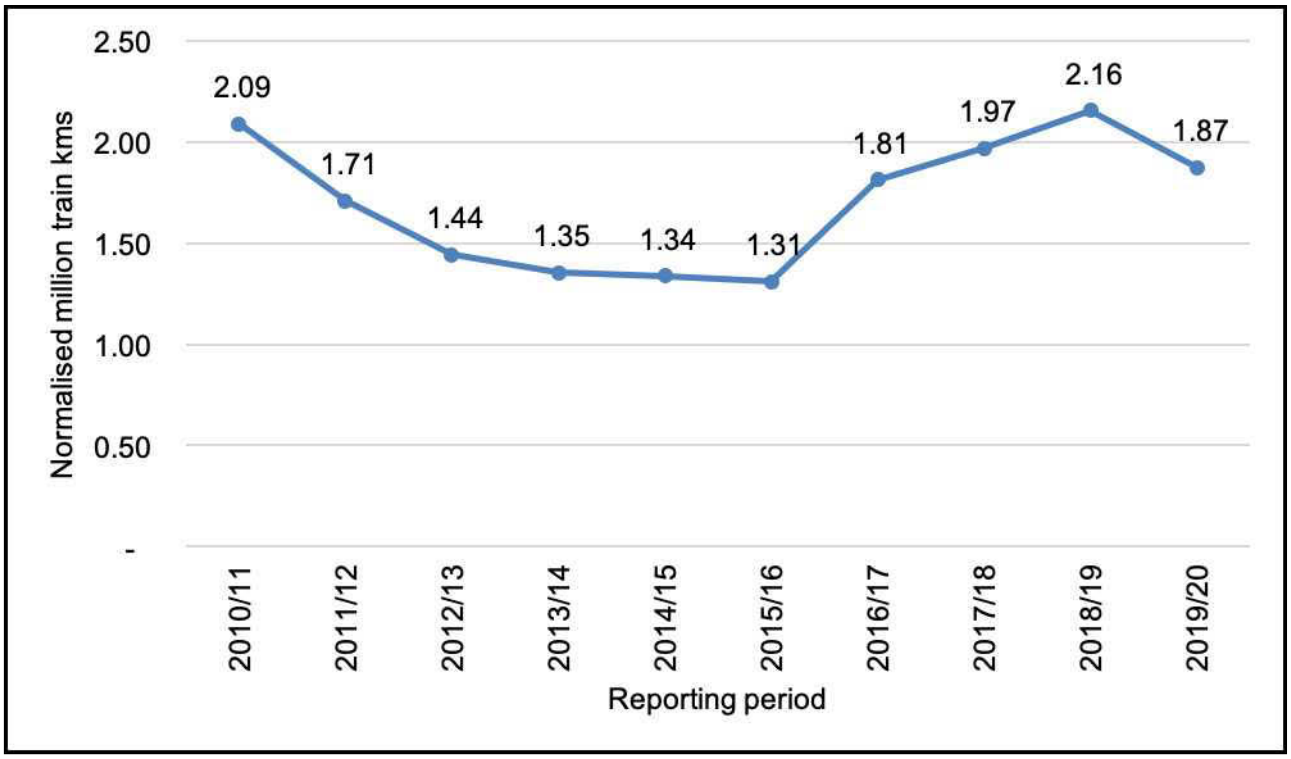


Figure 44: All operators 2010/11 to 2019/20 level crossing occurrences per million train km

CHAPTER 6

PEOPLE STRUCK BY TRAINS

This chapter covers the safety risks related to derailments during movement of rolling stock, SANS occurrence Category E which covers 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).

The People Struck by Trains chapter looks at the safety risks related to people struck by trains and excludes pedestrian level crossing occurrences as these are accounted for in the level crossings chapter. Inclusive in this occurrence category are members of the public, railway employees and railway contractors. Because the majority of risk is borne by members of the public when interacting with a running line, the outcomes of the time-series (inclusive of time-of-day analysis and geographical distribution) and risk analysis primarily focuses on those occurrences where a member of the public is struck by rolling stock on a running line.

2019/20 Headlines

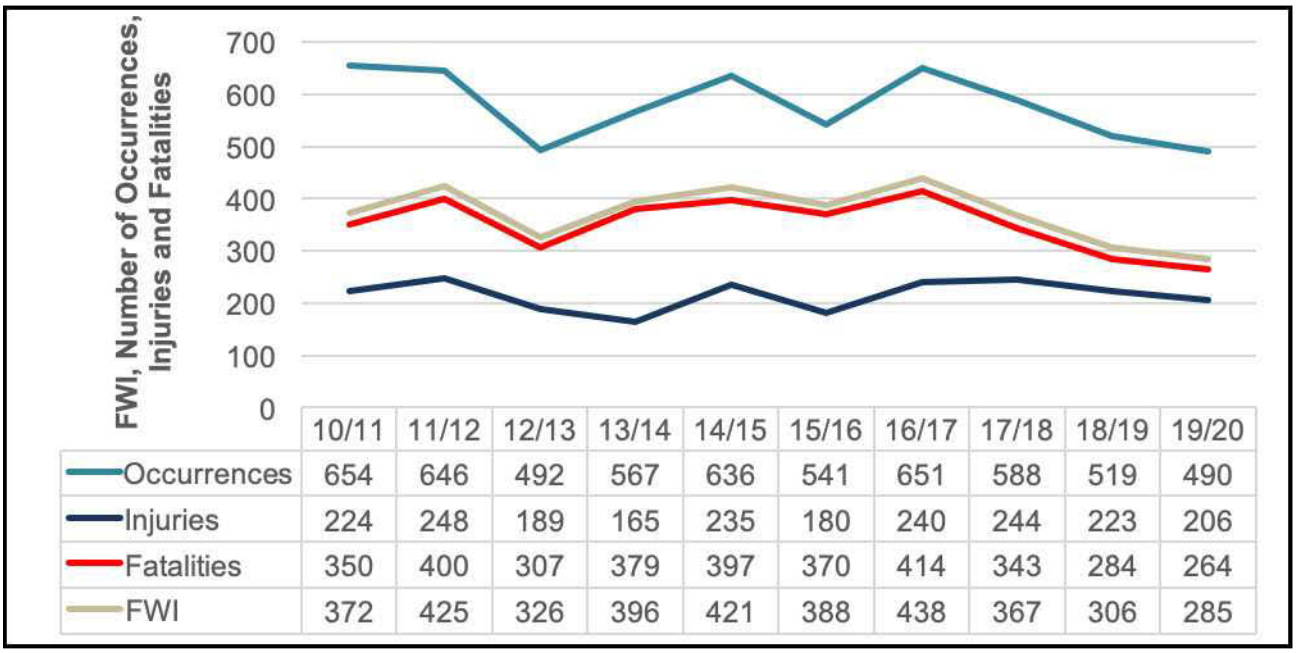
- A total number of 490 PSBT occurrences were recorded during the 2019/20 reporting period.
- While the number of people struck by trains occurrences reduced by 25 per cent and the calculated FWI count decreased by 187 per cent between the 2010/11 and 2019/20 reporting periods, the FWI per million train km reduced only by 0.4 per cent.
- PSBT occurrences are lethal with one fatality occurring daily on average since the 2010/11 reporting period. The FWI Index level on average is only six per cent higher than actual fatalities.
- The Gauteng, Western Cape and KwaZulu-Natal provinces recorded 78 per cent of the PSBTduring movement of rolling stock occurrence category, lower than the long-term trend of 88 per cent.
- While all people struck by trains occurrences per million train km increased by 4 per cent since the 2018/19 reporting period, it decreased by 2 per cent since the 2010/11 reporting period). Note that since most people struck by trains occurrences occur on the PRASA network, the impact of a 11 per cent reduction in PRASA train km last year distorts the statistics favourably.
- The long-term average of harm is 5,47 FWI per million train km.

Safety performance

The number of PSBT occurrences and their respective consequences (fatalities and injuries) and the calculated FWI for the 2010/11 to 2019/20 reporting periods is illustrated in Figure 45.

During the 2018/19 reporting period, the number of PSBT reduced by six per cent and the calculated FWI count decreased by seven per cent. Between the 2010/11 and 2019/20 reporting periods, the number of people struck by trains occurrences reduced by 25 per cent when compared to the 21 per cent reduction during the 2018/19 reporting period. During the same period, the calculated FWI count decreased by 24 per cent.

People struck by trains occurrences are lethal with one fatality occurring daily on average since the 2010/11 reporting period. This is evidenced by the FWI level that on average is only 10 per cent (6% in 2018/19) higher than the actual fatalities.



	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20
Occurrences	654	646	492	567	636	541	651	588	519	490
Injuries	224	248	189	165	235	180	240	244	223	206
Fatalities	350	400	307	379	397	370	414	343	284	264
FWI	372	425	326	396	421	388	438	367	306	285

Figure 45: Number of PSBT operational occurrences and related harm to persons

Since the 2010/11 reporting period, Gauteng, Western Cape and KwaZulu-Natal provinces recorded 85 per cent of the people struck by *trains* during movement of rolling stock occurrences category. This is being illustrated in Figure 46

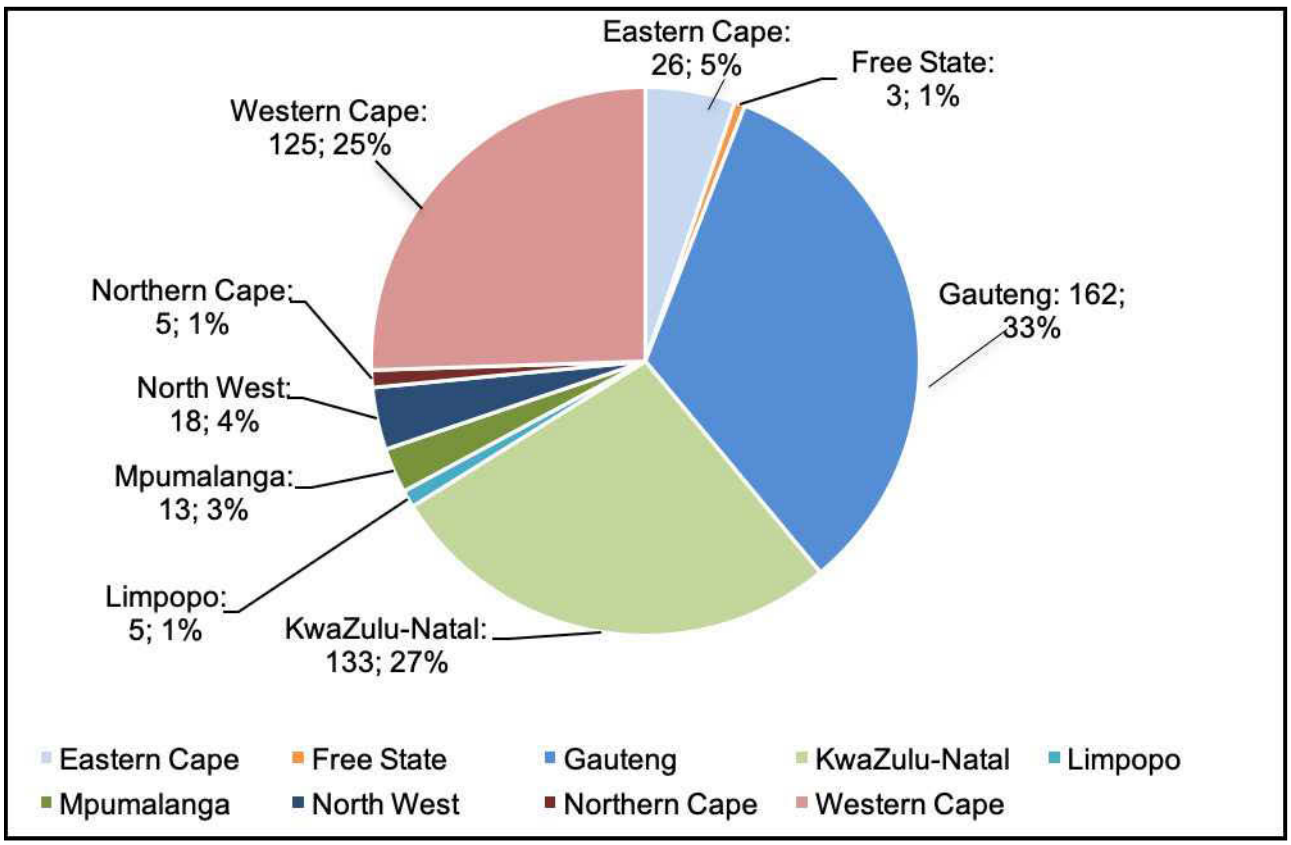


Figure 46: The distribution of PSBT operational occurrences by province between the 2010/11 to the 2019/20 reporting periods

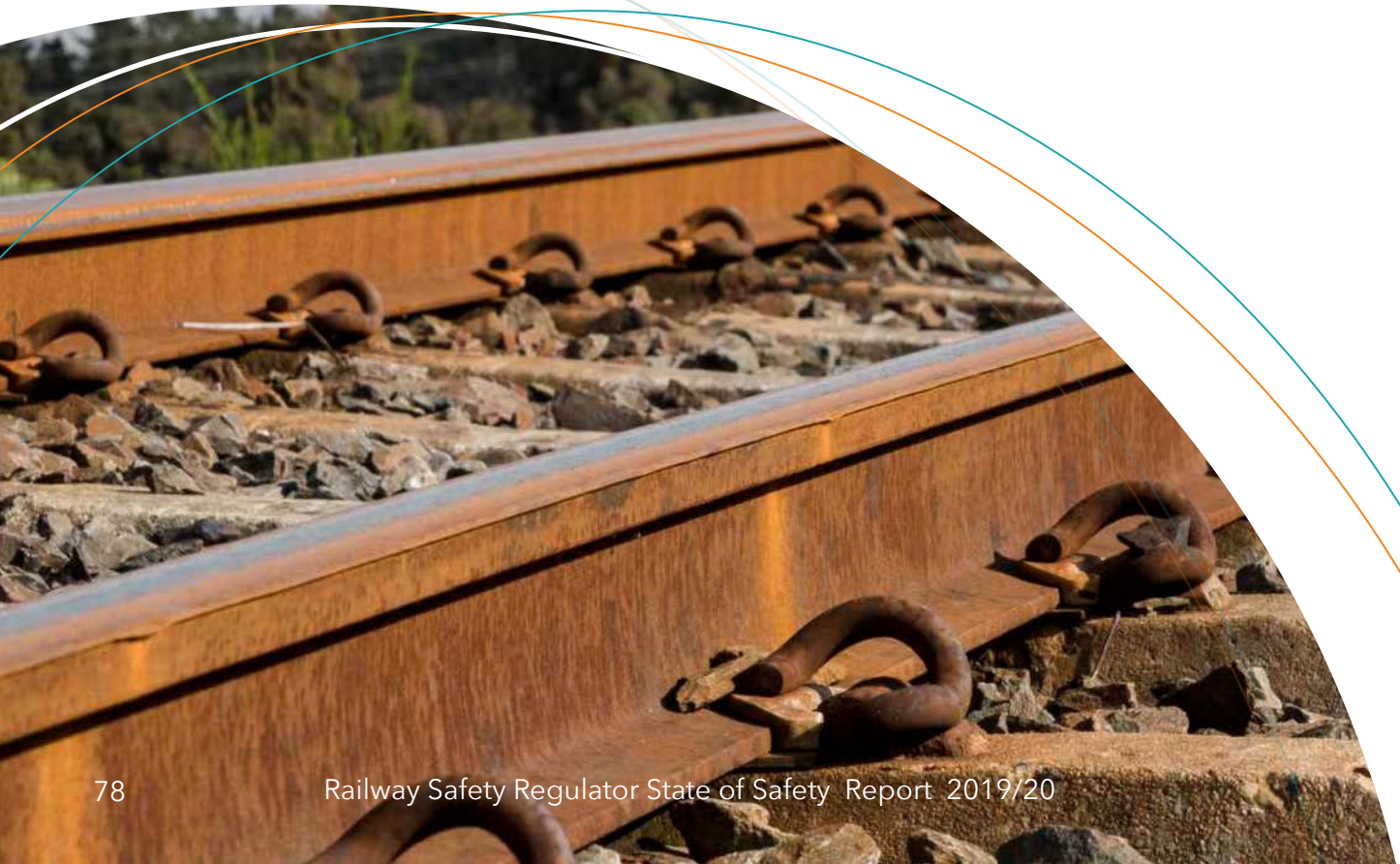


Figure 48 shows a continued dominance of people struck by trains during movement of rolling stock occurrences by the three largest metros during the 2019/20 reporting period. As presented in Figure 47, during the 2019/20 reporting period, the Gauteng, Western Cape and KwaZulu-Natal provinces made up 88 per cent of the people struck by trains during movement of rolling stock occurrences category.

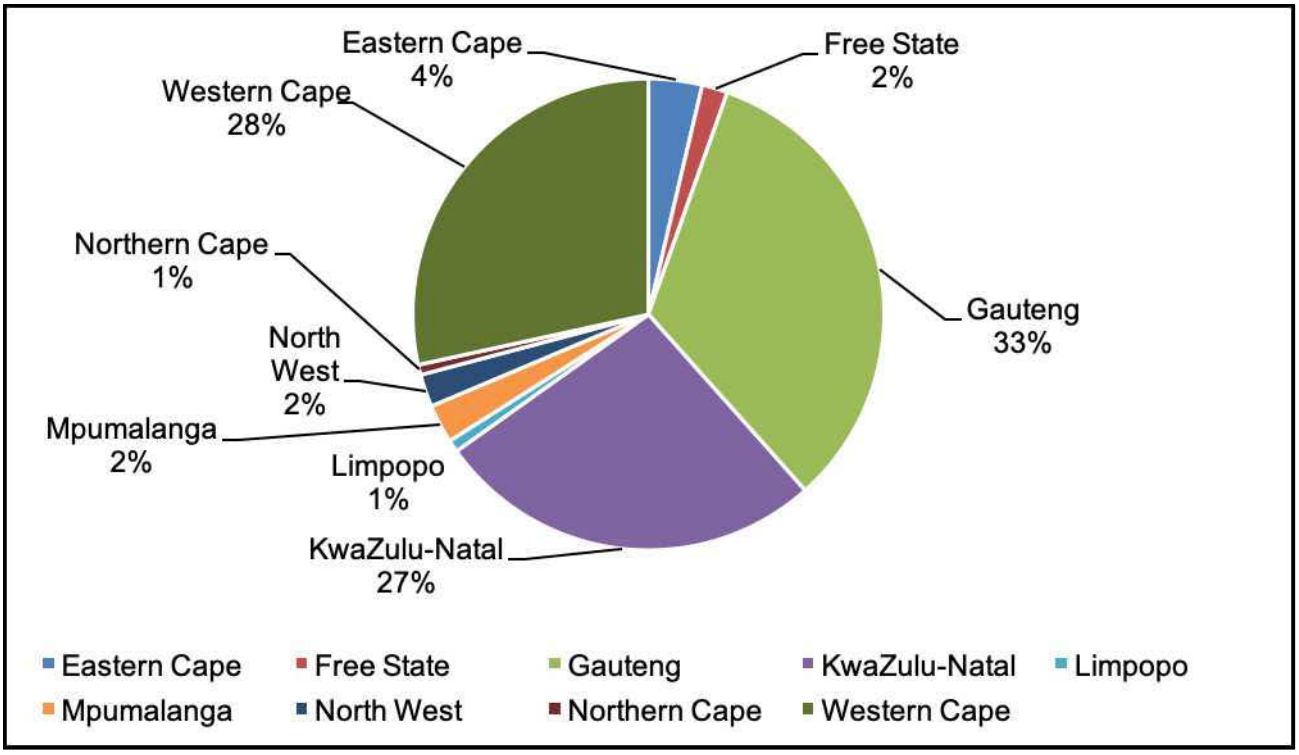


Figure 47: The 2019/20 provincial percentage distribution of people struck by trains occurrences

The time-of-day analysis in Figure 48 indicates that the public is most at risk during the night and morning peak hours 06H00-08H00 (16% of the daily people struck by trains during movement of rolling stock occurrences) and the extended evening peak between 16H00 20H00 (13%), when the daily Metrorail train density is at its highest. This is indicative of people commuting between work and places of learning. The results also suggest illegal crossing and trespassing on the running line.

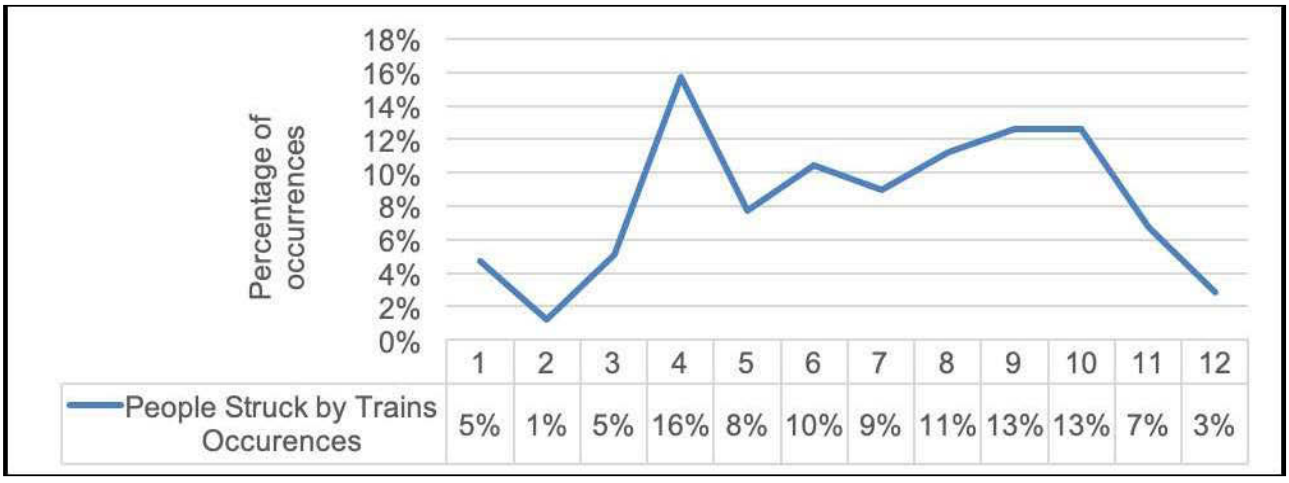
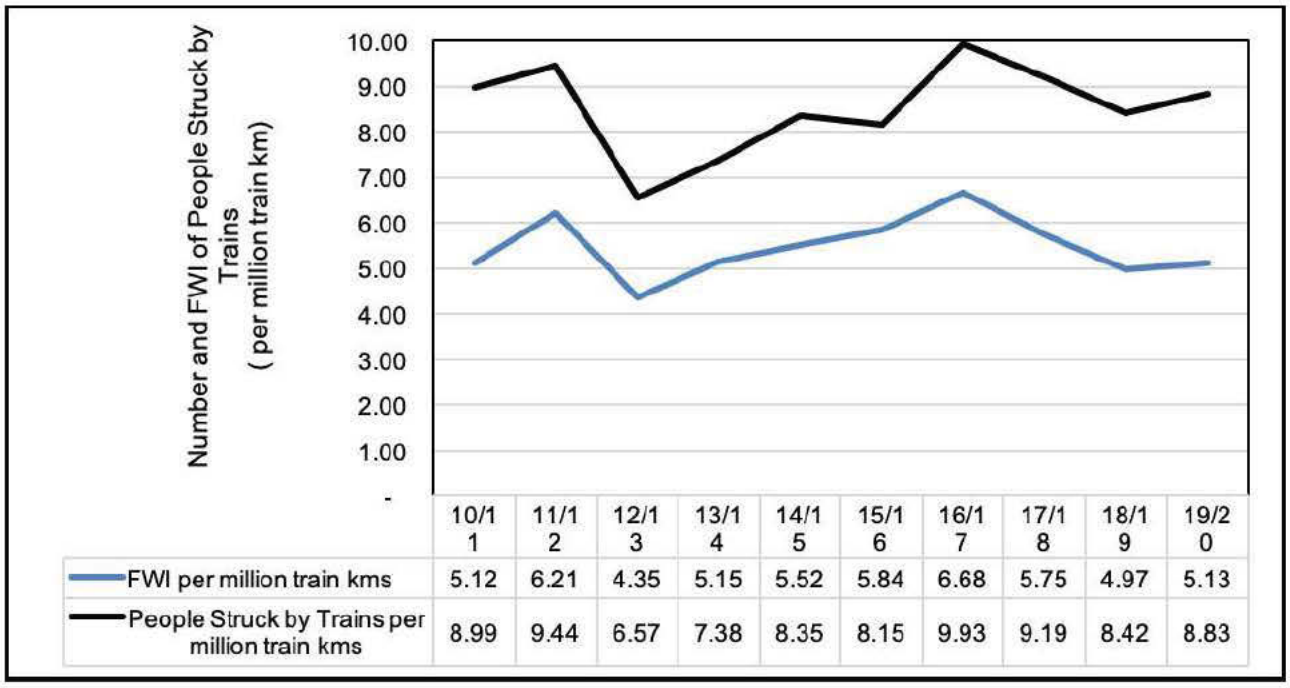


Figure 48: The 2019/20 time-of-day analysis for people PSBT operational occurrences.

Time of day Key: 1= 00:00-01:59; 2 = 02:00-03:59; 3 = 04:00-05:59; 4 = 06:00-07:59; 5 = 08:00-09:59; 6 = 10:00-11:59; 7 = 12:00-13:59; 8 = 14:00-15:59; 9 = 16:00-17:59; 10 = 18:00-19:59; 11 = 20:00-21:59; 12 = 22:00-23:59



	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20
FWI per million train kms	5.12	6.21	4.35	5.15	5.52	5.84	6.68	5.75	4.97	5.13
People Struck by Trains per million train kms	8.99	9.44	6.57	7.38	8.35	8.15	9.93	9.19	8.42	8.83

Figure 49: All 2010/11 to 2019/20 people struck by trains operational occurrences and FWI per million train km

Figure 49 shows that in the 2018/19 reporting period the occurrences per million train km of all people struck by trains increased by four per cent compared to a decrease of two per cent since the 2010/11 reporting period. The FWI per million train km increased by two per cent in the 2018/19 reporting period compared to a 0.4 per cent increase since the 2010/11 reporting period.

For all people struck by trains occurrences since the 2010/11 reporting period, the average FWI indicates that 36 per cent of all people struck by trains occurrences are harmless. The long-term average of FWI per million train km is 5,47.

CHAPTER 7

PLATFORM-TRAIN INTERCHANGE

This chapter covers the safety risks related to derailments during movement of rolling stock, SANS occurrence Category H which covers 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

f) occurrences where a contractor or a contractor's employee fell on the platform whilst entraining/detraining a stationary or moving train.

The Platform-Train Interchange (PTI) chapter focuses on those occurrences that occur at the station or on the platform as passengers and workforce entrain and detrain stationary or moving trains. It follows the same approach used to look at the safety risks related to people struck by trains. Because most of the risk is borne by train passengers, the outcomes of the time-series (inclusive of time-of-day, day-of-week and geographical distribution analyses) and risk analysis primarily focuses on train passengers as opposed to the workforce.

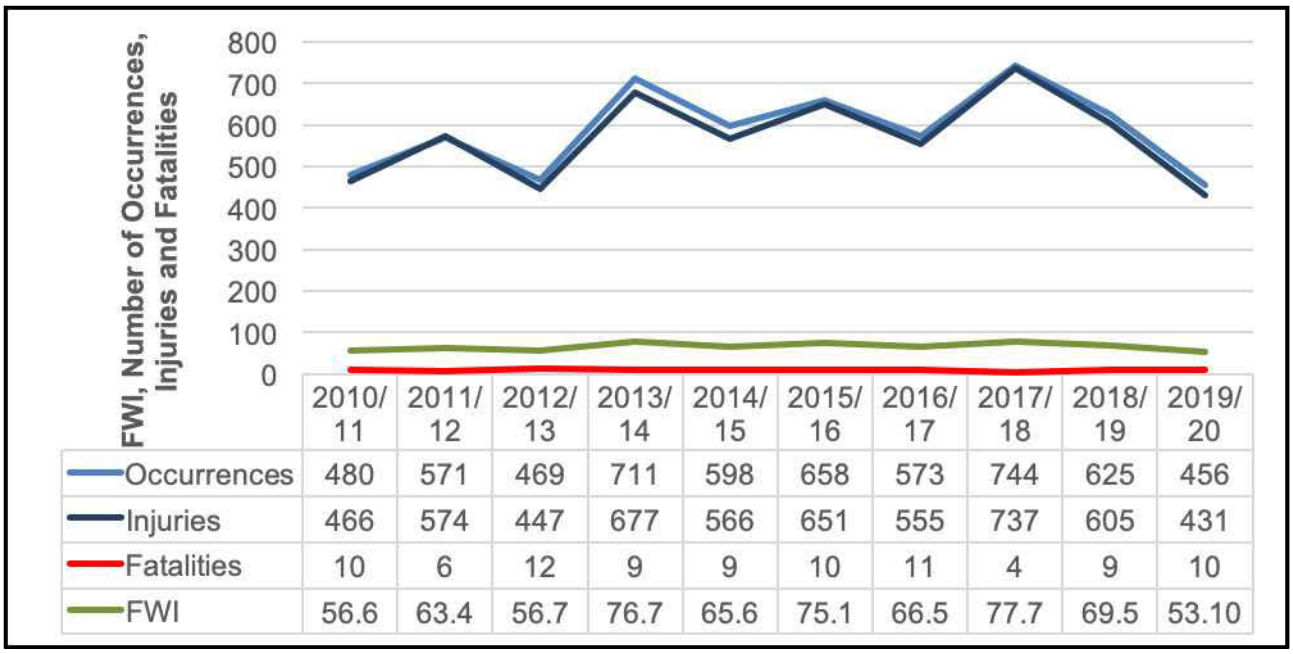
2019/20 Headlines

- A total of 456 PTI occurrences recorded during the 2019/20 reporting period
- While the 2019/20 reporting period PTI occurrences reduced by 27 per cent compared to the 2018/19 reporting period, PTI occurrences contributed to 13 per cent of the overall recorded operational occurrences in the 2019/20 reporting period.
- PTI occurrences on average result in nine fatalities annually; and 97 per cent of PTIs resulted in injuries.
- PTI occurrences are a weekday, peak hour phenomena indicating overcrowding of stations as a major concern.
- The Gauteng province represents more than half of all PTI occurrences, followed by KwaZulu-Natal and the Western Cape. The three large metropolitan areas represent 99 per cent of 2019/20 reporting period PTI occurrences.
- Despite a 12 per cent reduction in the 2019/20 reporting period PTI occurrences compared to the 2018/19 reporting period, drastically increased by 54 per cent since the 2010/11 reporting period. This increase is amplified by a six per cent reduction in TFR train km and a nine per cent reduction in PRASA train km.
- PTI occurrences have increased by 28 per cent since the 2010/11 reporting period.

Safety performance

PTI occurrences account for a significant number of occurrences recorded at train stations within South Africa. The total number of PTI occurrences recorded for the 2019/20 reporting period were 465. This represents a decrease of 27 per cent when compared to the 16 per cent recorded during the 2017/18 – 2018/19 reporting period. During the 2019/20 reporting period, this category contributed to 13 per cent of the overall recorded operational occurrences. A significant proportion of these occurrences may be attributed to PRASA Rail.

Figure 50 shows that since the 2010/11 reporting period, PTI occurrences on average result in nine fatalities and 571 injuries annually. This can be presented as 1,53 per cent and 97 per cent respectively.

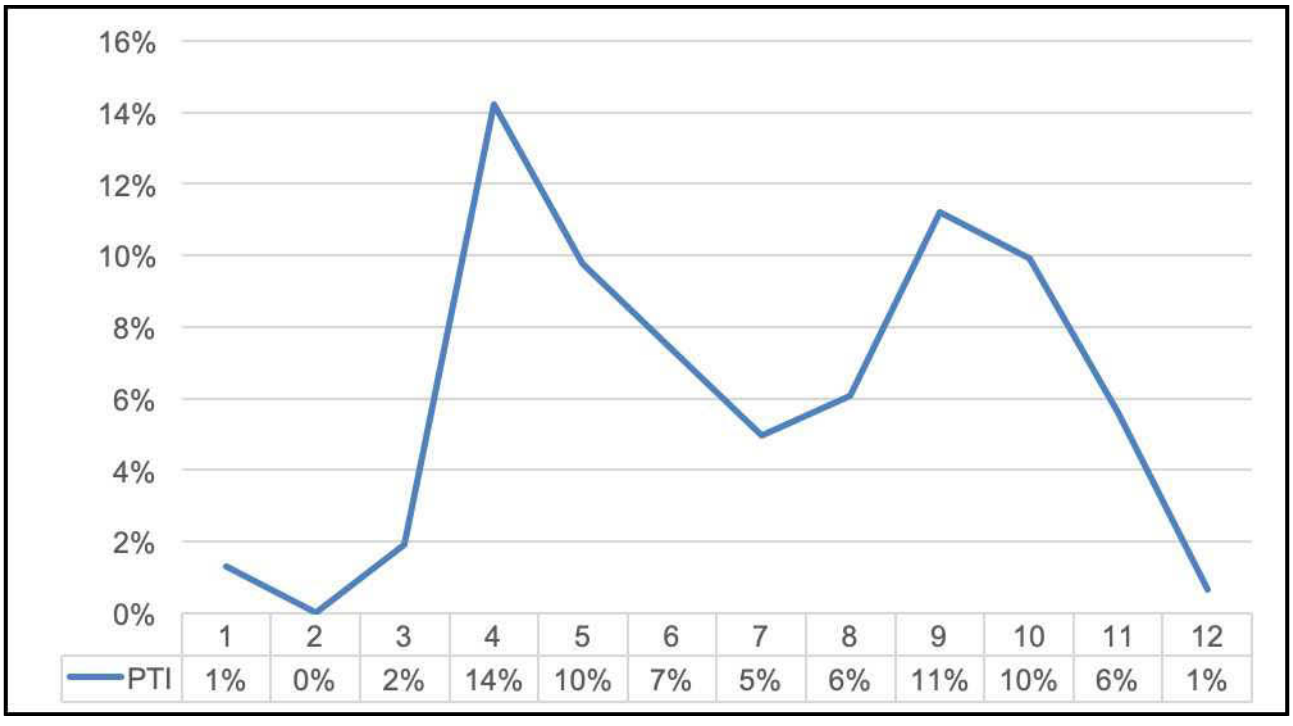


	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Occurrences	480	571	469	711	598	658	573	744	625	456
Injuries	466	574	447	677	566	651	555	737	605	431
Fatalities	10	6	12	9	9	10	11	4	9	10
FWI	56.6	63.4	56.7	76.7	65.6	75.1	66.5	77.7	69.5	53.10

Figure 50: Total number of PTI operational occurrences and related fatalities and injuries time series PTI analysis in terms of time of day

PTI analysis in terms of time of day

The time of day analysis illustrated in Figure 51 indicates that most of the PTI occurrences tend to take place during the morning and afternoon peak hours. The morning peak times that recorded the highest number of occurrences is between 06:00-08:00 whereas the afternoon peak times are between 16:00-20:00. This pattern is indicative of overcrowding at stations during peak travel hours.



	1	2	3	4	5	6	7	8	9	10	11	12
PTI	1%	0%	2%	14%	10%	7%	5%	6%	11%	10%	6%	1%

Figure 51: The 2019/20 reporting period time-of-day analysis for PTI operational occurrences

Time of day Key: 1= 00:00-01:59; 2 = 02:00-03:59; 3 = 04:00-05:59; 4 = 06:00-07:59; 5 = 08:00-09:59; 6 = 10:00-11:59; 7 = 12:00-13:59; 8 = 14:00-15:59; 9 = 16:00-17:59; 10 = 18:00-19:59; 11 = 20:00-21:59; 12 = 22:00-23:59

Weekday examination of PTI occurrences indicates a tendency for such occurrences to occur during the week with peak levels on Wednesdays as depicted in Figure 52. Further analysis of the data revealed a decrease in such occurrences on Sundays. This pattern was also evident for the people struck by trains operational occurrence category. This analysis serves to confirm that overcrowding is a major contributing factor to this occurrence category.

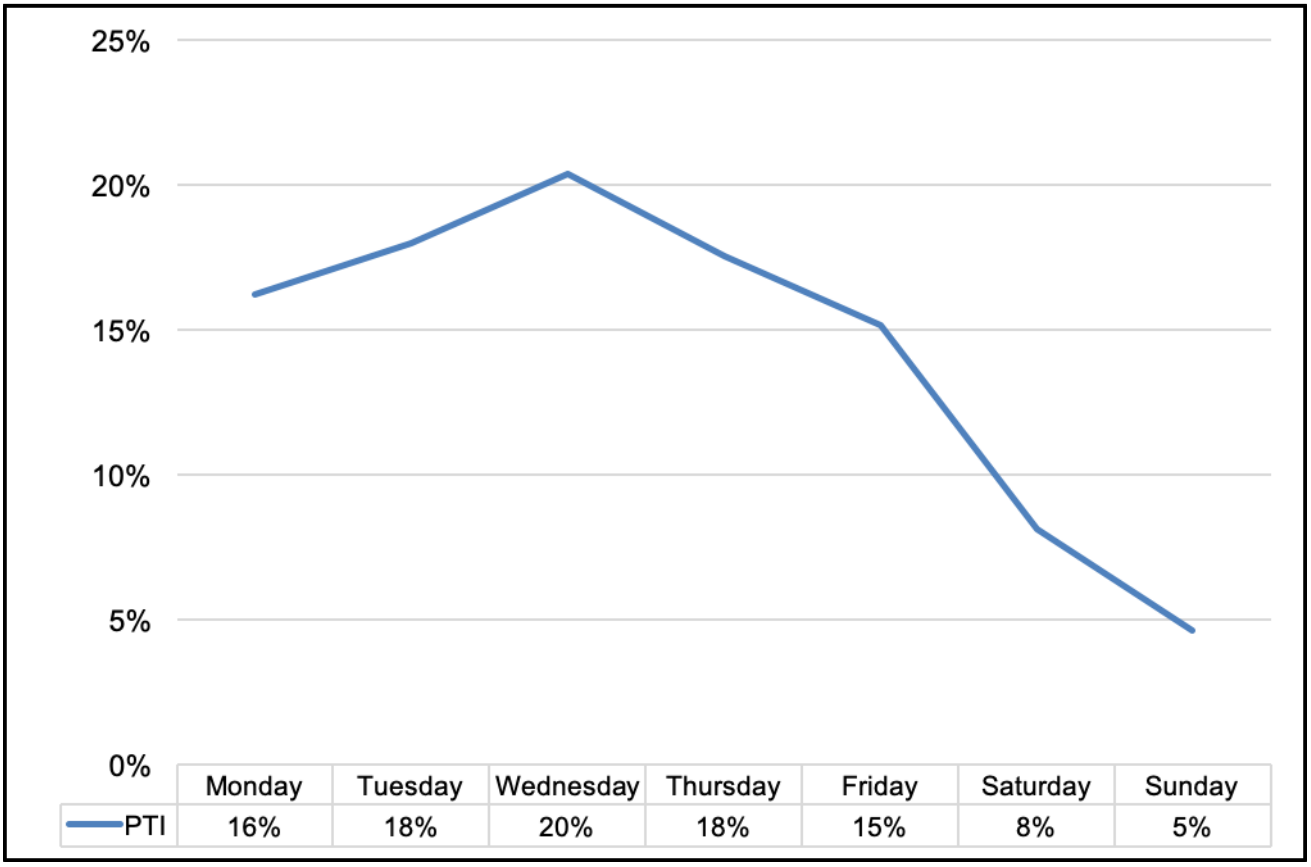


Figure 52: The 2019/20 analysis for day-of-week PTI occurrences

PTI analysis in terms of province

Further analysis of these occurrences was done to establish in which provinces these occurrences are taking place. The Gauteng province dominated in terms of the PTI occurrences during the 2010/11 to 2019/20 reporting period, with the other large metropolitan areas, namely KwaZulu-Natal and the Western Cape following closely as presented in Figure 53. As in the case of people struck by trains, most of the PTI operational occurrences occurred in the Gauteng province. Figure 54 shows a slight reduction in Gauteng and a slight increase in the Western Cape during the 2019/20 reporting period.

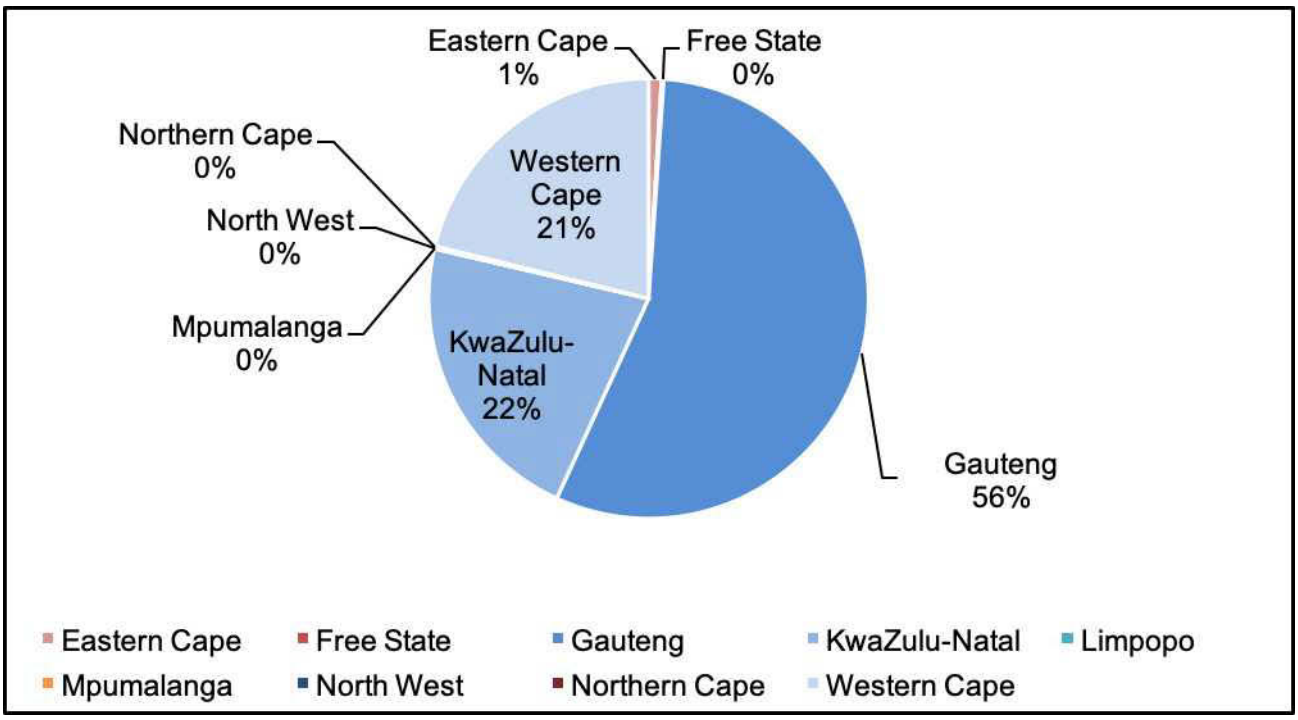


Figure 53: The 2010/11 to 2019/20 distribution of PTI occurrences by province

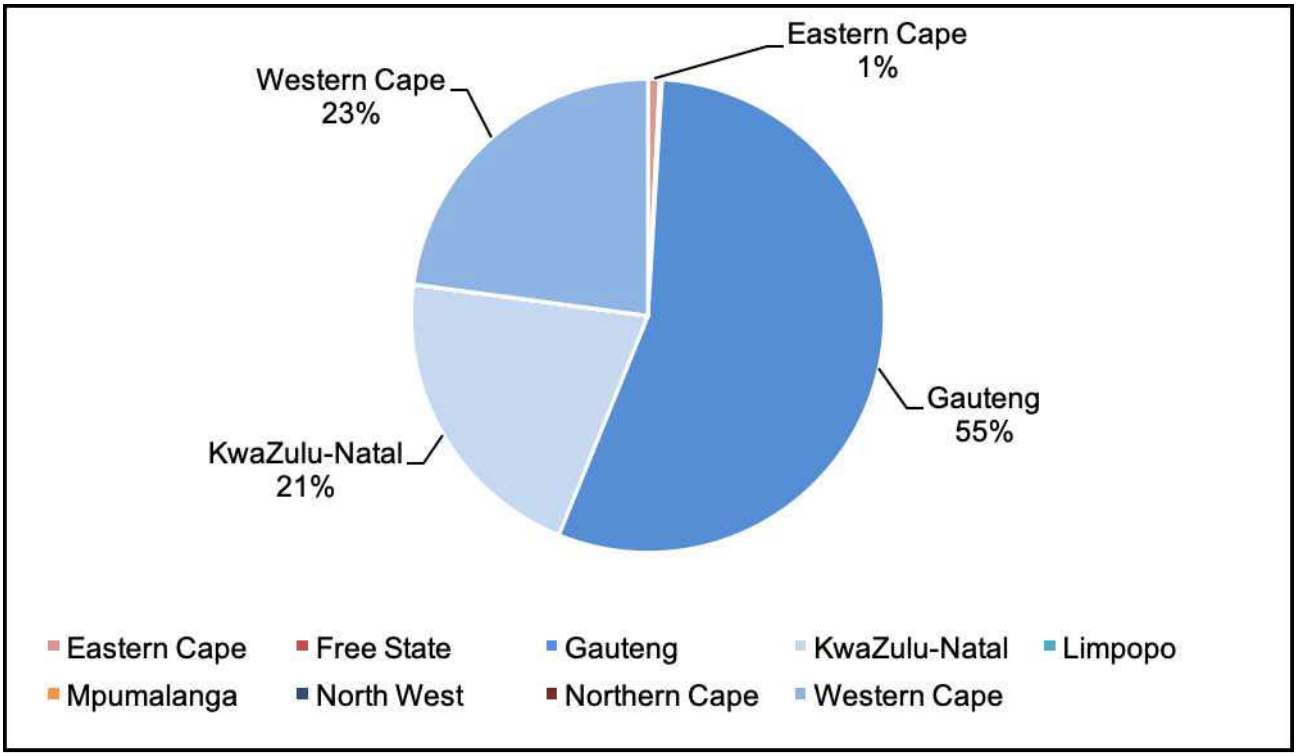


Figure 54: The 2019/20 distribution of PTI operational occurrences by province

The Gauteng province represents more than half of all PTI occurrences. This was followed by the Western Cape and KwaZulu-Natal which suggests a reversal since the 2018/19 reporting period. The three large metropolitan areas represent 99 per cent of the 2019/20 reporting period PTI occurrences.

Figure 55 shows that despite a 27 per cent decrease in PTI occurrences in the last year (9% reduction for 2018/19), PTI occurrences still only decreased by five per cent since the 2010/11 reporting period. Figure 55 also shows that despite a 20 per cent decrease in PTI occurrences per million train km in the 2018/19 reporting period for all operators, occurrences still increased by 25 per cent since the 2010/11 reporting period.

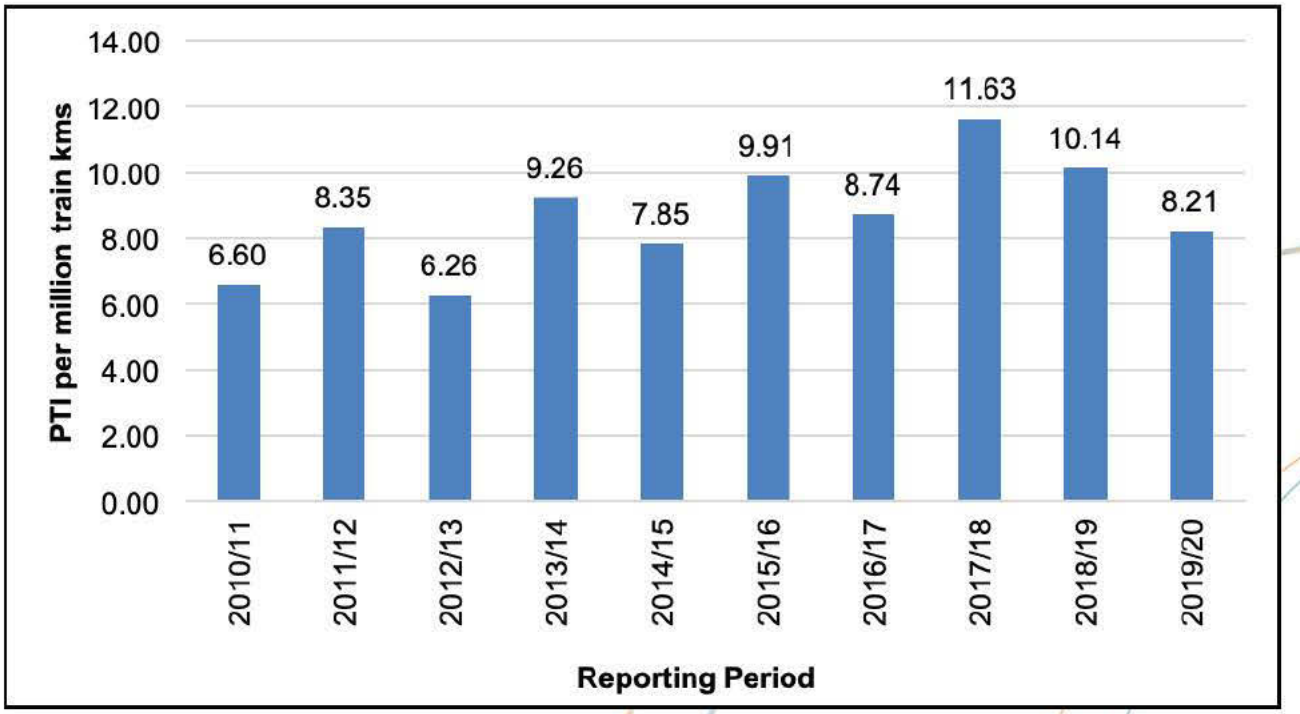


Figure 54: All PTI operational occurrences per million train km

PRASA Rail accounted for between 97 per cent and 100 per cent of all PTI occurrences annually between 2010/11 and 2019/20 reporting period. This is albeit PRASA Rail recording an 18 per cent decrease in PTI occurrences per million train km since the 2018/19 reporting period. These figures still suggest a long-term increasing trend of 44 per cent since the 2010/11 reporting period.

CHAPTER 8

RAILWAY SECURITY

This chapter covers assets and human security risks reported in nine security-related categories as stipulated by SANS 3000 as follows:

Category 1 security-related 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 inspections;
f) Overhead traction equipment in yards and sidings;
g) Train authorisation and control systems and equipment in sections;
h) Train authorisation 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).

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

a) Rolling stock components inspections;
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 inspections;
f) Overhead traction equipment in yards and sidings;
g) Train authorization and control systems and equipment inspections; and
h) Train authorization and control systems and equipment in yards and sidings; and
i) Ancillary equipment including, pa systems, information boards and CCTV.

Category 3 security-related 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.

Category 4 Security-related incidents cover the kidnapping of train crews and the hijacking of:

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

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

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

Category 7 Security-related 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.

Category 8 security-related 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.

Category 9 security-related 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.

The Railway Security chapter looks at the railway security-related incidents reported to the RSR by railway operators. It examines the most prevalent security concerns and provides a geographical overview of the overall harm arising from security-related incidents. Due to the nature and format of reporting security-related incidents, neither risk analysis per rail user group nor risk profiles can be calculated.

2019/20 Headlines

- During the 2019/20 reporting period, 9 996 total security-related incidents were recorded by the RSR.
- Security-related incidents increased by eight per cent overall between the 2018/19 and 2019/20 reporting period.
- Compared over the long term since the 2013/14 reporting period, it is fair to state that the 2019/20 reporting period levels of all security-related incidents are out of control.
- The FWI Index for security-related incidents increased by 280 per cent since the 2012/13 reporting period.
- The overall harm to persons deteriorated by 21 per cent since the 2018/19 reporting period.
- The operational impact that 91 per cent incidences of theft and vandalism have on train operations is significant and could be evidence of the high amount of manual train authorisations at both TFR and PRASA. This important safety metric will be reported by the RSR going forward.
- Security-related incidents resulted in 458 injuries and 28 fatal injuries during the 2019/20 reporting period.

Overview performance

Table 14 presents all recorded security-related incidents between the 2013/14 and 2019/20 reporting period. Compared to the 2018/19 reporting period, the RSR recorded an eight per cent increase in security-related incidents. This is 113 per cent higher than in the 2013/14 reporting period. When compared over the long term since the 2013/14 reporting period, it is justifiable to state that the level of the 2019/20 reporting period security-related incidents are out of control.

Categories 1, 2, 7 and 8 continue to dominate the number of security-related incidents.

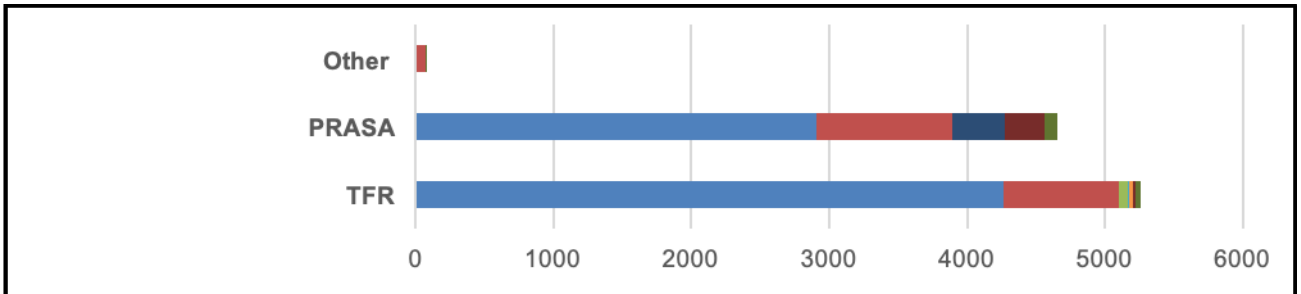
Category 1: Theft of assets, 2: malicious damage (*vandalism*), 7: personal safety on trains and 8: personal safety on stations continue to dominate the number of security-related incidents. Figure 56 shows that Category 1 (*theft of assets*) contributed to 72 per cent of the 2019/20 reporting period compared to the 68 per cent contribution during the 2018/19 reporting period. Category 2 (*malicious damage (vandalism*)) incidents contributed 19 per cent in the 2019/20 reporting period compared to the 20 per cent during the 2018/19 reporting period.

Table 14: Security-related incidents recorded for 2013/14 – 2019/20

Reporting Year/ SANS Category	13/14	14/15	15/16	16/17	17/18	18/19	2019/20					
	All	All	All	All	All	All	TFR	PRASA	Other	All	19/20 vs. 13/14 %	19/20 vs. 18/19 %
1: Theft of assets	3068	4213	3600	4379	4984	6291	4269	2906	5	7180	134	14
2: Malicious damage (vandalism)	1019	1094	1158	1162	1717	1810	831	985	68	1884	85	4
3: Threats of operational safety	6	0	2	0	75	66	63	0	1	64	967	-3
4: Train kidnapping or hijacking	0	0	0	0	0	0	0	0	0	0	-	-
5: Crowd-related incidents	7	2	0	0	13	35	11	0	0	11	57	-69
6: Industrial action	4	4	1	8	25	35	27	0	1	28	600	-20
7: Personal safety on trains	283	516	368	408	398	461	6	382	1	389	37	-16
8: Personal safety on stations	247	278	305	312	401	429	19	291	2	312	26	-27
9: Personal safety outside station platform area	69	115	86	109	124	141	32	94	2	128	86	-9
TOTAL	4703	6222	5520	6378	7737	9268	5258	4658	80	9996	113	8

The personal safety incidents seem to have had relatively low percentages during the 2019/20 reporting period. This is suggested by Category 7 (personal safety on trains) incidents contributing four per cent compared to the five per cent contributed during the 2018/19 reporting period; Category 8 (personal safety on stations) contributed three per cent compared to five per cent during the 2018/19 reporting period.

The overall harm to persons (Categories 3 to 9) improved from 13 per cent since the 2018/19 reporting period to nine per cent during the 2019/20 reporting period.



	TFR	PRASA	Other
1: Theft of assets	4269	2906	5
2: Malicious damage (vandalism)	831	985	68
3: Threats of operational safety	63	0	1
4: Train kidnapping or hijacking	0	0	0
5: Crowd-related occurrences	11	0	0
6: Industrial action	27	0	1
7: Personal safety on trains	6	382	1
8: Personal safety on stations	19	291	2
9: Personal safety outside station platform area	32	94	2

Figure 56: The 2019/20 recorded security-related incidents

Figure 56 shows the split of security-related incidents for the 2019/20 reporting period with 91 per cent just from theft and vandalism compared to the recorded 87 per cent during the 2018/19 reporting period. The operational impact on train operations is significant and could be evidence of the high amount of *manual train authorisations* at both TFR and PRASA. This important safety metric should be reported by the RSR going forward.

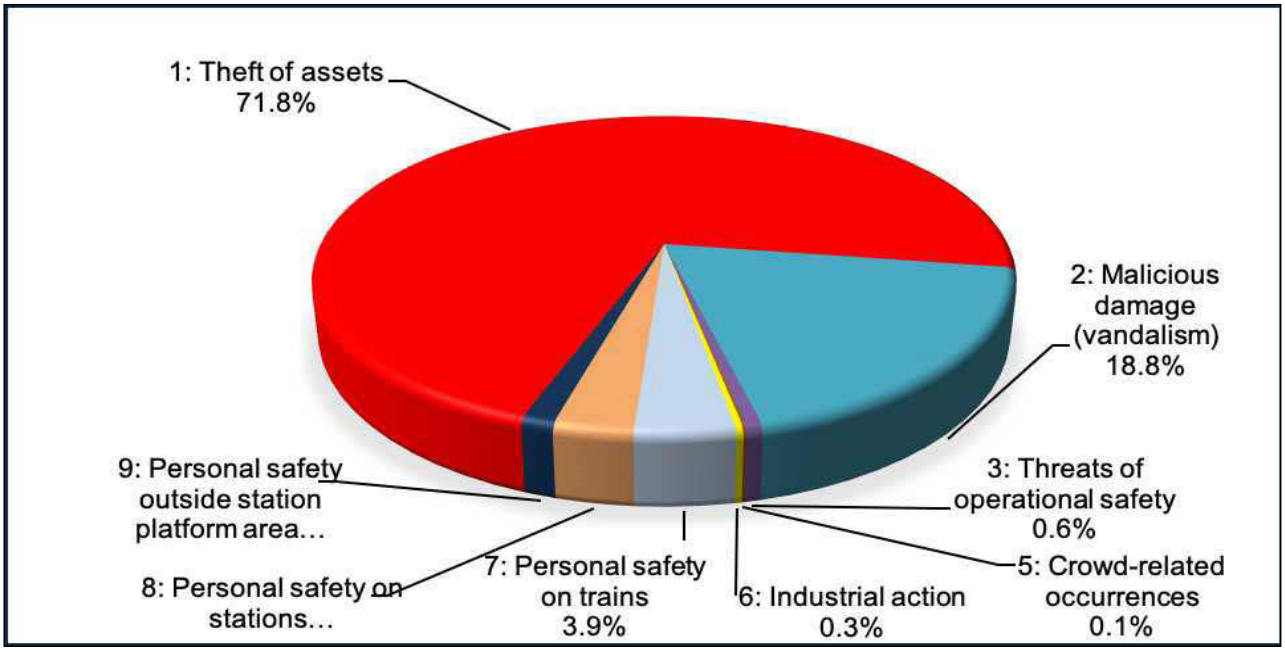
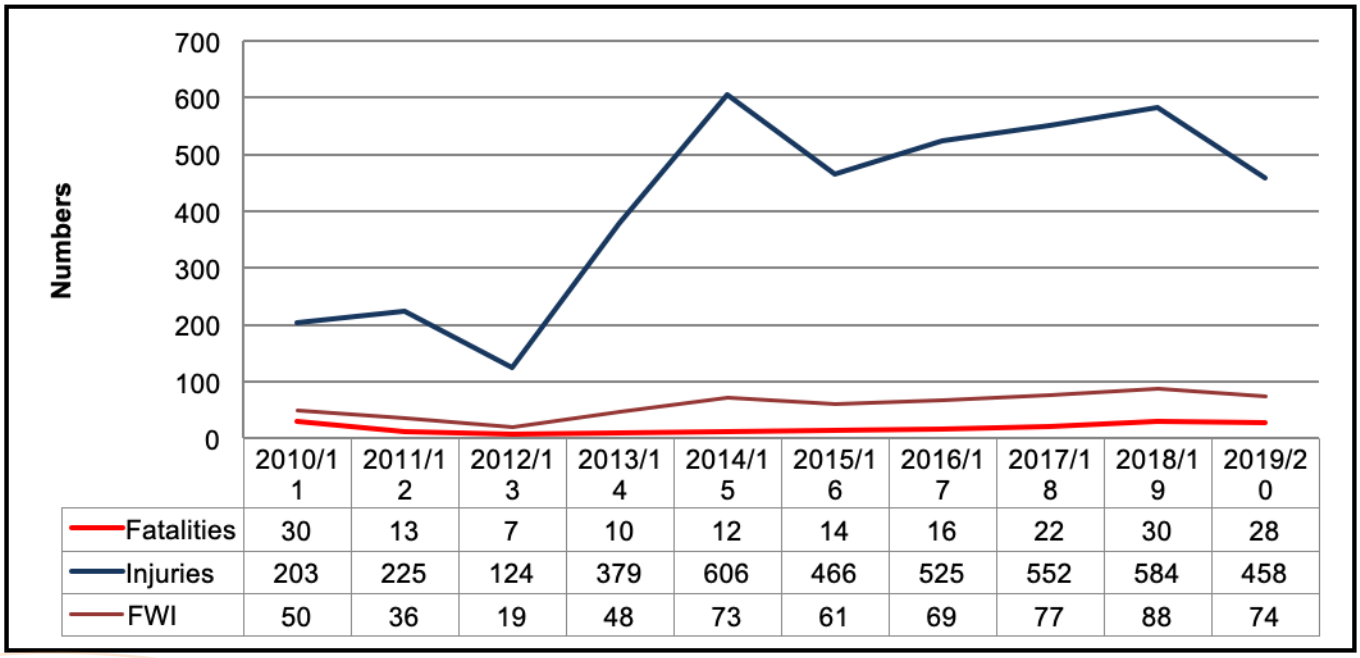


Figure 57: Breakdown of 2019/20 security-related incidents by category

In terms of security-related harm to persons, the 2012/13 reporting period was the best performing year. Figure 58 shows that both the 2018/19 and the 2019/20 reporting periods' injuries and fatalities increased by more than 200 per cent. During the 2018/19 and the 2019/20 reporting periods, 400 per cent and 271 per cent increases were respectively recorded compared to the 2012/13 reporting period. The 2019/20 reporting period FWI index increased by 280 per cent compared to the 2012/13 reporting period.



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
Fatalities	30	13	7	10	12	14	16	22	30	28
Injuries	203	225	124	379	606	466	525	552	584	458
FWI	50	36	19	48	73	61	69	77	88	74

Figure 58: The 2010/11 to 2019/20 security-related harm to persons

Table 15: SANS category breakdown of security-related harm to persons in 2019/20

Sans category & subcategory	Category description	Count	Fatalities	Injuries	FWI
Security-related Incidents		**440**	**28**	**458**	**73,8**
1: Theft of assets		**1**	**0**	**1**	**0,1**
1-g	Theft of train control equipment (signalling) in section	1	0	1	**0,1**
2: Malicious damage (vandalism)		**2**	**0**	**3**	**0,3**
2-a	Malicious damage (vandalism) of rolling stock components in section	2	0	3	0,3
3: Threats of operational safety		**0**	**0**	**0**	**0**
4: Train kidnapping or hijacking		**0**	**0**	**0**	**0**
5: Crowd-related occurrences		**0**	**0**	**0**	**0**
6: Industrial action		**0**	**0**	**0**	**0**
7: Personal safety on trains		**225**	**3**	**240**	**27**
7-a	Murder	2	2	0	2
7-b	Attempted murder	7	0	8	0,8
7-d	Assault	145	1	157	16,7
7-f	Aggravated robbery	67	0	70	7
7-g	Common robbery	4	0	5	0,5
8: Personal safety on stations		**155**	**16**	**157**	**31,7**
8-a	Murder	14	14	2	14,2
8-b	Attempted murder	7	0	7	0,7
8-d	Assault	70	0	80	8
8-f	Aggravated robbery	60	2	64	8,4
8-g	Common robbery	3	0	3	0,3
8-h	Theft	1	0	1	0,1
9: Personal safety outside station platform area		**57**	**9**	**57**	**14,7**
9-a	Murder	7	6	1	6,1
9-b	Attempted murder	7	1	6	1,6
9-d	Assault	12	0	12	1,2
9-f	Aggravated robbery	29	1	37	4,7
9-g	Common robbery	2	1	1	1,1
plus Unspecified events		**143**	**44**	**108**	**54,8**
plus Operational Occurrences		**1328**	**369**	**1210**	**490**
All events		**1911**	**441**	**1776**	**618,6**

Table 14 shows the SANS category breakdown of security-related harm to persons in the 2019/20 reporting period. This deteriorated by 21 per cent since the 2018/19 reporting period.

Table 16: Distribution of theft of assets by province for 2019/20

Category 1. Theft of Assets (2019/20)	1-a	1-b	1-c	1-d	1-e	1-f	1-g	1-h	1-i	Total
Eastern Cape	0	2	2	0	6	2	108	3	8	131
Free State	4	6	8	1	32	0	41	2	4	98
Gauteng	200	236	271	66	1052	44	1104	31	45	3049
KwaZulu Natal	28	4	82	8	272	10	829	18	20	1271
Limpopo	2	3	9	4	42	3	38	2	3	106
Mpumalanga	13	29	59	5	229	18	536	21	76	986
North West	9	2	50	2	162	6	188	5	11	435
Northern Cape	5	1	3	1	38	1	64	1	2	116
Western Cape	92	36	144	2	176	12	482	21	23	988
Grand Total	**353**	**319**	**628**	**89**	**2009**	**96**	**3390**	**104**	**192**	**7180**

Table 16 shows the distribution of theft of assets by province for the 2019/20 reporting period while Table 17 shows the distribution of malicious damage (vandalism) by province.

The data in Table 16 suggests that 60 per cent of the theft incidents occur within the Gauteng and KwaZulu-Natal provinces combined.

Table 17: Distribution of malicious damage (vandalism) by province for 2019/20

Category 2. Malicious damage (vandalism)										
Province/SANS CAT	2-a	2-b	2-c	2-d	2-e	2-f	2-g	2-h	2-i	Total
Eastern Cape	19	4	6	0	5	1	32	1	2	70
Free State	9	0	3	0	3	0	8	0	2	25
Gauteng	88	95	110	7	204	6	208	7	18	743
KwaZulu-Natal	52	2	17	2	39	1	161	2	4	280
Limpopo	1	0	4	0	11	0	6	0	3	25
Mpumalanga	10	1	17	2	18	3	49	4	4	108
North West	26	0	9	3	14	1	13	0	2	68
Northern Cape	15	1	0	1	8	0	11	0	4	40
Western Cape	237	23	27	4	51	5	169	5	4	525
Grand Total	**457**	**126**	**193**	**19**	**353**	**17**	**657**	**19**	**43**	**1884**

According to the figures presented in Table 17, the Gauteng and Western Cape provinces contributed 67 per cent of the malicious damage to property incidents (i.e. vandalism) during the 2019/20 reporting period

South African Police Service Rapid Rail Police Intervention

The 2019/20 reporting period security-related data suggests that there was an overall increase of 113 per cent on the total number of incidents recorded between the 2013/14 and 2019/20 reporting periods. Between the 2018/19 and the 2019/20 reporting periods, the RSR recorded an eight per cent increase in security-related incidents.

Contrary to this, the RRP data suggests that there was a 10.98 per cent decrease in cable theft during the same period under review. The RRP data further suggests a 23,24 per cent decrease in malicious damage to property between the 2018/19 and the 2019/20 reporting periods. In respect to illegally crossing of the railway lines alluded to earlier, the RRP data indicates that there was a reduction of 33.04 per cent in incidents when comparing the 2018/19 and the 2019/20 reporting period data. This suggests that there is a gap between the SAPS RRP and the Regulator s security-related statistics. Efforts are being made through the NRCCF to close this gap, taking cognisance that the SAPS records all incidents on the Crime Administration System (CAS) while the RSR receives the data from the operators as per the requirements of the Act and amplified in the SANS.

Nonetheless, the RRP recorded 2 801 incidents of persons illegally crossing the railway lines during the 2019/20 reporting period. This translates to the significant number of non-railway persons in the railway environment with a potential of being struck by trains and/or contributing to theft or vandalism of railway assets since non-railway persons are not supposed to be within the railway environment at any given time, unless authorised . The RRP also identified Pretoria North, Germiston, Bishop Lavis, Swartkops, Brighton Beach, Potchefstroom, Kimberley and Blinkpan among the high incident frequency areas in which most railway-related security incidents take place. These are areas with a high volume of commuters and in most instances, enclosed by informal settlements.

To establish the contributing factors to railway crimes, the RRP identified unused railway buildings, train delays, angry commuters, overgrown vegetation, encroachments, unvetted operator security personnel and unmaintained service roads to be among the main generators of railway-related criminal activities. Of concern is a total of 15 criminal record cases registered by the RRP for train torchings during the 2019/20 reporting period of which PRASA was the primary victim. Train torchings reduce the available resources and the impact is realised when services are to be rendered.


Exit

CHAPTER 9

RSR INTERVENTIONS

This chapter presents the intervention efforts by the RSR during the 2019/20 reporting period.

Legal Basis

The RSR is a public entity and custodian of railway safety in South Africa. The RSR was established in terms of Section 4 of the Act and is governed and controlled by a board of directors, appointed by the Minister of Transport of the Republic of South Africa.

Regulatory Framework Development Activities

In terms of Section 5 of the Act, the objects of the RSR are to give effect to its oversight function; promote improved railway safety performance; monitor and ensure compliance; and develop regulations. A review of the RSR's oversight role established that the term oversight functionally implies that of directing and guiding.

The RSR is, therefore, legally responsible for the guidance and direction of safety operations within the railways, thereby making train operators directly accountable to the RSR with regards to their safety performance and management rules, policies, procedures, and systems. To execute its legislative mandate, the Regulator develops, implements, and enforces various legislative tools which are inclusive of Safety Management System (SMS) determinations, railway safety standards, railway safety regulations and compulsory notices to mention a few. In furthering its mandate, the Regulator has developed various regulatory tools for implementation by the operators.

The Safety Management System Requirements

The Safety Management System (SMS) Determination which was published by the RSR during the 2018/19 reporting period provides the requirements of the format, form and content of an SMS that is required to be implemented by the operators. At the core of a safety permit lies the SMS of an operator. The RSR has, therefore, embarked on various initiatives which are aimed at ensuring that an operator's SMS is robust enough to mitigate the risks arising from railway operations, which will also ensure continuous safety improvement and the achievement of excellence in railway operations.

The RSR initiatives include continued participation at the South African Bureau of Standards (SABS) for the development of railway safety management standards, continuous operator training on the SMS requirements, review of existing tools where applicable, the development of new regulatory tools and working with the Department of Transport (DoT) and the industry to develop the required regulations.

The following regulatory tools are currently under development by the RSR in consultation with the industry: Common Safety Method for Risk Assessment (CSM-RA), Railway Management Maturity Model (RM3), Verbal Safety Critical Communication Protocol (VSCC), Interface Agreement Framework, SANS 3000-2-2-1 and SANS 10229. These various regulatory tools are further detailed below.

Railway Management Maturity Model

The Railway Management Maturity Model is a tool for assessing and managing a railwa (RM3) y operator's ability to control safety risks, to help identify areas for improvement and provide a benchmark for year-on-year comparison. The RM3 assists in guiding the rail operator towards excellence in safety risk management. The RSR is in the process of engaging operators for inputs in developing and customising the tool for introduction in the South African railway industry.

Common Safety Method for Risk Assessment

The Common Safety Method for Risk Assessment (CSM-RA) provides a harmonised methodology for risk evaluation and assessment to be applied by the industry when significant changes are introduced to the railway systems. These changes could be related to the introduction of new works and significant changes to railway techniques/technologies, operational procedures/ rules/standards and organisational structure. The RSR together with the identified operators has identified projects which are targeted for use to pilot the framework.

Verbal Safety-Critical Communication Protocol

The Verbal Safety-Critical Communication (VSCC) protocol has been developed primarily to achieve a uniform and seamless verbal safety-critical communication within the railway industry in South Africa. Non-adherence to appropriate VSCC has contributed to numerous railway occurrences, including collisions and signals passed at danger (SPAD), and this renders VSCC a crucial component of safe railway operations.

This protocol outlines the minimum requirements for the management of VSCC, including the framework to be implemented for safety-related personnel in the execution of their operational activities. Following the publication of the VSCC Protocol in the government gazette, written comments were received from operators. The RSR subsequently incorporated the inputs into the draft protocol where applicable and obtained the approval from the Socio-Economic Impact Assessment (SEIAS) report. A determination on VSCC was subsequently published in the government gazette on 20 March 2020 to provide the applicable requirements to the industry.

Interface Agreement Framework

Despite the various regulatory instruments utilised by the Regulator, the railway industry continues to experience several occurrences. Based on the findings from the Board of Inquiries (BOIs) some of the contributory causes relates to poor management of interoperability due to non-availability or inadequate interface agreement between the different operators.

The Interface Agreement framework has been developed primarily to provide a standardised framework or template to be used by railway operators and other affected parties at the interface of railway operations. Following the industry consultations planned in the 2020/21 and 2020/22 financial years, the framework will be published for use to provide requirements for compliance by the applicable operators.

The following regulations are also under review/ development: (i) Regulations Regarding Infrastructure or Activity Affecting Safe Railway Operations (Railway Reserve Management Regulations), (ii) Security Management Regulations, (iii) Occurrence Management Regulations, (iv) Standards Development Regulations.

The purpose of the Act is also to promote the harmonisation of the railway safety regime of the Republic with the objectives and requirements of SADC for the operation of railways. To this extent, the RSR continues to provide SADC with regional support on the activities related to the harmonisation of railway safety management requirements throughout the SADC region.

To date, the RSR together with LATRA has facilitated and conducted training on harmonised safety standards for all the SARA members. The RSR also plays a key role in the development of the framework/guideline for the establishment of the Regional Regulatory Association of Southern Africa (RRASA).

Safety Compliance Activities

Safety permit issuance

All the active rail operators are required to have a valid safety permit to legalise their rail operations. In line with the mandate, the RSR continues to identify active rail operators who require safety permits, to legitimise their operations. Several projects aimed at increasing the level of industry compliance were completed, leading to more operators being issued with safety permits and more interface agreements being entered into by various operators.

This is aimed at making sure that the Annual Safety Improvement Plan permit application requirements and annually amended requirements include, inter alia, the latest published standards. This requires operators to indicate how their safety management systems make provision for adherence to all published standards. This approach allows for the monitoring of progress made by operators with the implementation of standards developed and provides a basis for audits and inspections to be conducted.

The Regulator's Board resolved that all safety permits will have a validity period of 3-5 years. This implies that all permits issued in the 2019/2020 financial year period have revised expiry dates. According to Section 24 (2) of the National Railway Safety Regulator ActNo. 16 of 2002 (as amended), the CEO may impose any condition in a safety permit, including a condition relating to the term of validity of a safety permit among others. In line with both the Board decision and the mandate provided to the CEO in terms of the Act, the safety permits' expiry dates were revised according to the different operator permit classifications. The revised safety permit validity periods are as follows:

- Group A = 3 years
- Group B = 3 years
- Group C = 5 years

The following criteria are used to classify railway operations:

Class A (Large, high-risk operators)

- All operators involved with the movement of passengers
- All operators involved with the movement of dangerous goods exceeding 50 000 net tons per annum
- All operators involved with the movement of general freight exceeding 500 000 net tons per annum
- Railway manufacturing and maintenance companies involved with the movement of locomotives, empty wagons/ coaches, and any other rail-bound maintenance vehicles equal exceeding 500 000 gross tons per annum

Class B (Medium, medium-risk operators)

- All operators involved with the movement of dangerous goods less than or equal to 50 000 net tons per annum
- All operators involved with the movement of general freight less than or equal to 500 000 net tons per annum
- Railway manufacturing and maintenance companies involved with the movement of locomotives, empty wagons/ coaches, and any other rail-bound maintenance vehicles less than or equal to 500 000 gross tons per annum

Class C (Small, Low-Risk Operators)

- All operators involved with the movement of general freight less than 200 000 net tons per annum
- Railway manufacturing and maintenance companies involved with the movement of locomotives/empty wagons/ coaches and any other rail-bound maintenance vehicles less than 200 000 gross tons per annum

The table below depicts the number of permit holders per province and class for the 2019/20 Financial Year:

Table 18: Number of safety permit types issued

Province	Permit Class				Grand Total
	A	B	C	T*	
Eastern Cape	4	1	1	0	6
Gauteng	27	19	25	4	75
Kwa-Zulu Natal	15	7	17	2	41
Mpumalanga	26	5	8	2	41
Western Cape	12	11	12	0	35
	84	43	63	8	198

**Temporary safety permit: Temporary safety permits are issued only to currently active railway operators for operations not yet covered by an existing permit as an interim arrangement pending the application and issuing of a Group A, B or C Safety Permit.*

Safety permit assessments

In terms of the Act, all active rail operators are required to have a valid safety permit to legalise their rail operations. A safety permit is issued based on a SMS that meets the requirements as provided for in the relevant legislation and applicable standards.

Technology developments and new works reviews and approvals

During railway operations, changes to the SMS and railway systems (variously referred to as new works and technology developments) are often necessary and inevitable over the useful life of these operations. As stipulated in the SMS Determination of 2018, these changes to the SMS and concomitant changes to operating conditions must be communicated to the RSR as they may have an impact on the risk profiles of the operators.

The mandate and Section 30 of the Act authorise the RSR to conduct reviews on the new works and technology developments. This is to fulfil the oversight role required by the RSR Act. These reviews intends to ensure compliance with the requirements of applicable legislation and standards and to promote the tenets of systemic engineering. The reviews identify safety risks associated with the projects that are implemented, as well as to ensure that safety levels are improved through mitigation of known risks.

The above-mentioned changes encompass all modifications, upgrades, configuration changes and improvements that may have a significant impact on railway safety. The changes, inter alia, include the construction of new lines, changes to operating speeds, significant changes to operating procedures, changes to train authorisation and control systems or equipment, changes to the type of motive power used and introduction of new or modified rolling stock.

To further ensure that the mandate is fulfilled, the RSR has an approach for providing regulatory oversight for all railway operations including major rail projects through the development of standards to guide operators on their duties and obligations relating, inter alia, new works project activities.

For example, the SANS 3000 suite of standards stipulate that all changes to operators' SMS must be reported to the RSR through all life cycles of projects. .

The RSR technology review intends to establish whether the operators have met the requirements on the following key aspects:

- defining the impact of the scope of the intended action from a life cycle and systemic point of view;
- identifying the safety risks associated with the intended action;
- proposing appropriate mitigating actions; and
- improving the state of safety.

Where changes involve new or modified assets, plant, equipment, or information technology the project under consideration must be subject to processes that consider the entire life cycle of the project, including:

- concept and feasibility;
- definition of requirements;
- design;
- implementation;
- installation and commissioning;
- operations and maintenance;
- modification; and
- decommissioning and disposal

The SMS Determination stipulates that in addition to a risk assessment the effected change must be documented and internal sign off must be obtained from an appropriate authorised independent person or persons within the rail operator.

During the 2019/20 reporting period, various operators submitted their new works and new technological development projects at different life cycle stages as tabulated below in line with the SMS Determination and standards:

During the 2019/20 reporting period, the rail operators in particular the major operators, experienced unprecedented levels of theft and vandalism of infrastructure. This challenge was more visible at PRASA with far-reaching consequences on the operator's ability to provide a safe, reliable and affordable service to commuters. During this period, PRASA developed intervention plans and engineering plans to improve the organisation's safety plans which were submitted to the RSR as part of the safety permit conditions.

As stipulated in the SMS Determination of 2018, several projects were submitted by various operators, including PRASA and Transnet. These projects' objectives were mainly informed by past occurrence data and their causes. These projects were to be implemented to mitigate the various risks the operators are continuously exposed to. For illustration purposes the table below lists a few projects implemented by Transnet and PRASA to mitigate risks related to collisions, Signal Passed at Danger (SPAD) theft and vandalism.

Table 19: Reviews conducted

PROJECT CATEGORY	REVIEWS CONDUCTED
Level crossing	17
Perway	47
Rolling stock	49
Infrastructure	12
Signals and telecommunications	45
Electrical	12
TOTAL	182

20: Projects submitted by PRASA and Transnet

Project	Operator	Project Objectives	Mitigated Risks
1. Resignalling project in the Western Cape Province (Thales), KwaZulu-Natal (Bombardier -The project was suspended due to contractual issues) and Gauteng (Siemens)	PRASA	• Improved repair turnaround time; • Reduced lengths of copper cables; • Reduced component count and • Reduce manual train Authorisations.	• Collisions; • Theft and vandalism and • Non-availability of spares.
2. On-Board-Computer (OBC) to Visual Display Unit (VDU) warrant system.	Transnet	• Improve safety across dark territories; • Obtain the physical location of the leading locomotive; • The system alerts the TCO if the maximum allowable speed is exceeded and • System can automatically apply the brakes if the speed is exceeded.	• Over speeding; • Signals Passed at Danger (SPAD); • Derailments and • Collisions.
3. Replacement of AC Track Circuits with ML Track Circuits and apparatus cases with concrete enclosures for Vereeniging Infra Depot.	Transnet	• Replace obsolete AC Track circuits with ML Track Circuits; • Improve Repair turnaround time and hence improve system availability and • Install anti-vandal concrete enclosures.	• Poor availability of the systems; • Theft and Vandalism and • Collisions.
4. Decommisioning of the wooden staff method of train control and replacing it with VDU Track Warrant System at Umtata, Amabele, Wolseley, Prince Alfred Hamlet, Hermon and Porteville.	Transnet	• Mitigation against over-speeding and exceeding the limits of authorised movements • Allow the TCO to have a graphical view of the location of the train.	• Derailments and • Collisions;
5. Replacement of obsolete jointless Reed track Circuits with jointless ML Track Circuits at Glencore.	Transnet	• Replace obsolete equipment to provide reliable, available, affordable, and safe network; • Allow more train slots; • Reduce Track Circuit failures and Mean Time to Repair (MTTR) and • Reduce Manual Train Authorisations.	• Collisions.
6. Replacement of obsolete Schronen FSDT with plug and play vital 21 system between Kaapmuiden and Phalaborwa.	Transnet	• Install a new FSDT to reduce the increased reported faults of the obsolete Schronen FSDT; • Improve the availability of the system and • Reduce manual train Authorisations.	• Collisions

Project	Operator	Project Objectives	Mitigated Risks
7. Installation of the Electronic Interlocking between Bellville and Wellington.	Transnet	• Replace the obsolete mechanical Signaling; • Improve reliability, availability, affordability, and safety of the system; • Reduce manual train authorisations and • Reduce the lengths of copper cables.	• Collisions; • Theft and vandalism and • Unavailability of spares.
8. Installation of crossovers, uplifting of turnouts.	PRASA	• Renew the infrastructure; • Reduce Manual Train Authorizations and • Reduce theft and vandalism incidents.	• Collisions and • Derailments

Audits and inspections activities

Section 33 of the Act empowers the RSR to conduct audits and inspections of the operator's SMS. The oversight role of the RSR is undertaken through Safety Management audits and inspections. The objective of these activities is to critically assess the SMS and processes employed by operators. The result is an in-depth knowledge and understanding of the required interventions to enable continuous improvement of railway operational safety.

During the 2019/20 reporting period, the RSR Regional Offices conducted 237 SMS audits and 233 inspections across all its operational regions. The common key findings from these activities included:

- Non- adherence to maintenance and Inspection schedules in operator's SMS
- Noncompliance to manual authorisation processes, and
- Theft and vandalism due to lack of security

Enforcement activities

Section 36 of the Act empowers the RSR inspector with tools to deal with unsafe condition. In line with this mandate, the RSR issued 70 improvements directives for the 2019/20 reporting period.

The safety threats that necessitated the issuing of the directives are:

- The high vacancy rates in the safety-critical grade positions in the CTC;
- Lack of supervision resulting is task observation not being conducted; and
- Inadequate maintenance.

RSR regional offices highlights

RSR Central Region

Overview of the Region

The Central Region comprises of the Gauteng, North West, Mpumalanga, Limpopo, Free State and a part of KwaZulu-Natal provinces. It is responsible for a total of 139 operators, a total of 462 sites and 22 major depots. This includes the three large operators namely TFR, PRASA and BOC.

Audits and inspections

A total number of one hundred and 127 Audits and 115 inspections were conducted, and the applicable reports were issued to the operators.

Key findings

The reports reveal that despite good policies and procedures being developed by the operators, the operators are still struggling with infrastructure maintenance. The following are key/common findings observed under element 10 of the SMS (Process for operational activities):

- Vegetation on railway lines and sidings;
- Signal failures;
- Noncompliance to manual authorisation processes;
- Theft and vandalism (lack of security);
- Blocked culverts and drains;
- Faded mast pole numbers; and
- Lack of maintenance of infrastructure and rolling stock

Directives

The region issued 15 directives in the 2019/20 reporting year. Approximately 70 per cent of these directives were issued to TFR and PRASA. The directives issued were related to the following:

- Perway – Poor or lack of maintenance such as vertical alignment deviations/joint slacks, overgrown vegetation, joggled rail joints with gaps more than 6mm maximum permissible rail joint gap and level crossing not maintained
- Signals – Track circuits are not displaying accordingly when the section is occupied; signals lenses are dirty and out of focus, incorrect manual authorisation, signal equipment such as points machines, signal transformer boxes and apparatus cases are not labelled
- Electrical – Defective surge arresters at sub-station, shaded mast pole number, corroded mast-to-rail bonds and lightning arrestors were damaged, and the tails were loose
- Security – Lack of security on the railway lines;

The regional office has ensured that the operators closed 40 per cent of Improvement Directives that were issued during the 2019/20 reporting period. A further 41 per cent emanating from the previous reporting periods were also closed in 2019/20 reporting period.

RSR Coastal Region

Overview of the Region

The Coastal Region comprises of the Western Cape, Eastern Cape, Northern Cape and a part of the Free State province. It consists of 48 operators with 144 sites. It should be noted that the two big operators, namely PRASA and TFR's safety permits are monitored by the Central Region, however, some of their operations and sites are located and monitored by the Coastal Region.

Audits and inspections

The Coastal Regional Office conducted 59 Audits, 63 Inspections follow-ups on all the outstanding audit and inspection findings. The conducted audits and inspections comprised of 20,5 per cent of the small operators and 79,5 per cent of the big operators namely, TFR and PRASA. Based on the findings of previous audits and permit application conditions, the focus of these audits and inspections was on risk management, documentation and corrective action development as prescribed by the SMS Determination as well as guided by the Safety Intervention Implementation Plan.

Key findings

The key findings for this regional office were on the following SMS elements:

- Documentation (element 9.4)
- Maintenance and Inspection issues (element 10.1 and 10.2)
- Risk Management (element 8.2)

Directives

Twenty-two (22) Improvement Directives were issued by the Coastal Region office; 41 per cent were issued the small operators while 59 per cent were issued to big operators. The key findings identified included:

- non-compliance with the required standards and procedures during maintenance of private sidings
- Substandard illumination at train stations
- tree branches hanging over the Optic Fibre Cables and OHTE cables
- non-filling of critical vacancies

RSR Eastern Region

Overview of the Region

The Eastern Regional office comprises of the KwaZulu-Natal province and some parts of Mpumalanga and Free State provinces. The safety permits of the two big operators, namely, PRASA and TFR, are monitored by the RSR s Central Regional office however, some of their operations and sites fall within the area of responsibility of the Eastern Region..

Audits and Inspections

The region conducted fifty (50) Audits and fifty (50) Inspections during the 2019/20 reporting year.

Key findings

The key findings for the region were on the following issues:

- Theft and vandalism (lack of security)
- Maintenance and Inspection issues

Directives

The Eastern Regional office issued thirty-three (33) directives during the 2019/20 reporting year. A total of twenty-three (23) were issued to TFR and seven (7) to PRASA.

Most of the operational safety deficiencies identified during Inspections and audits were mainly due to:

- substandard conditions with respect to the permanent way infrastructure
- lack of signalling, electrical and crossing maintenance
- increased informal settlement (of people) near the railway lines and other unsafe encroachments of the railway reserve.

The Eastern Regional office continued to monitor the implementation of operators remedial action plans which vary from short to long term. To date five (5) directives have been closed.

Occurrence response

The RSR conducted a total of10 occurrence investigations in the 2019/20 reporting period. The occurrence investigations were based on collisions, derailments, level crossing incidents and prolonged manual authorisations. The common key findings from the occurrence response activities are:

Inadequate communication of safety critical information
Lack of supervision
Speed limits during manual authorisations
Non-adherence to rules of the road in level crossings
Poor or no maintenance of the rail infrastructure

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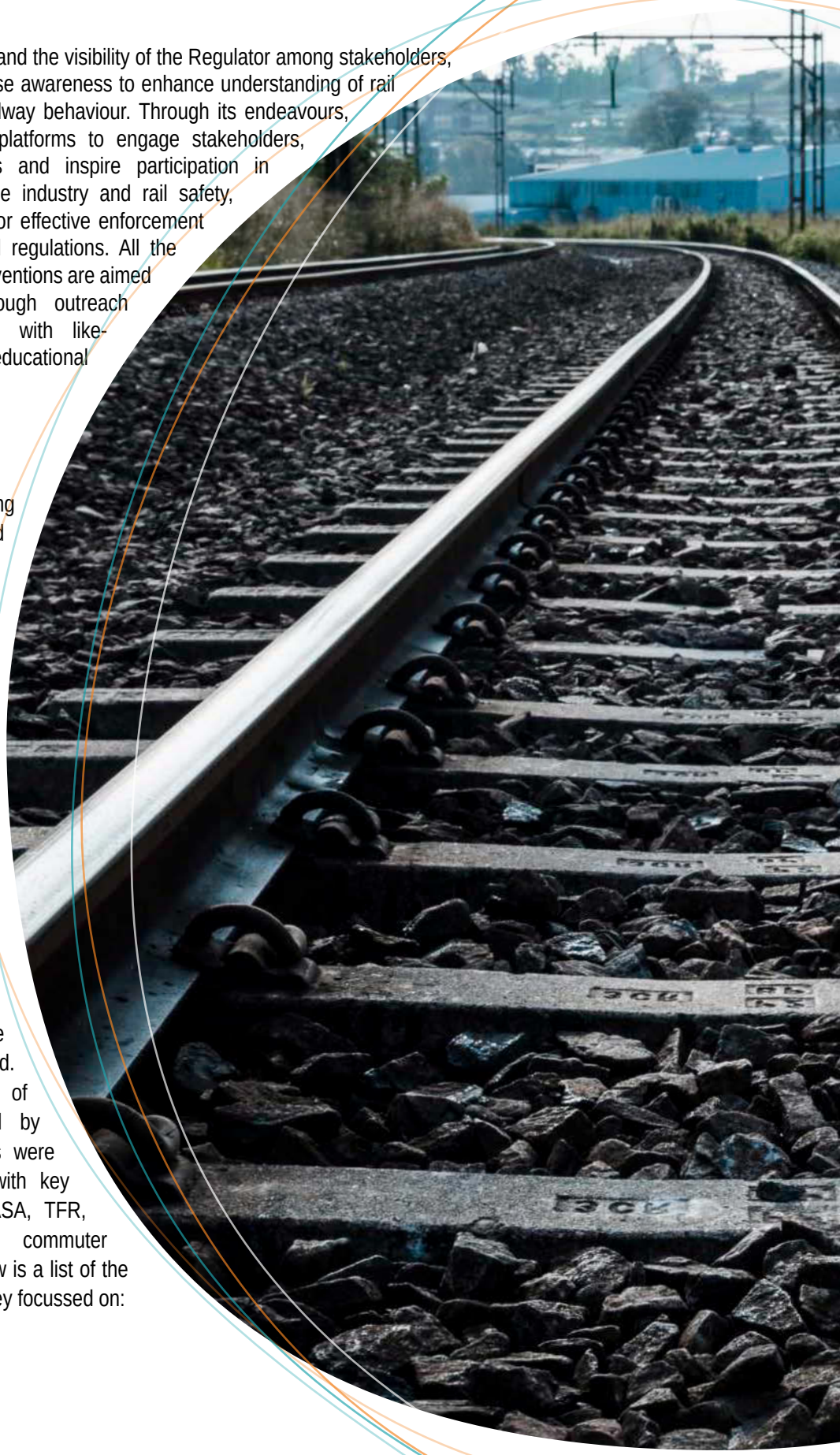
Education and Awareness

The RSR endeavours to expand the visibility of the Regulator among stakeholders, industry role players and raise awareness to enhance understanding of rail safety and promote safe railway behaviour. Through its endeavours, the RSR has established platforms to engage stakeholders, communicate developments and inspire participation in interventions that impact the industry and rail safety, while encouraging support for effective enforcement and relevant standards and regulations. All the RSR's public education interventions are aimed at raising awareness through outreach engagements, partnerships with like-minded stakeholders and educational initiatives and programmes.



Rail Safety Promotions

During the 2019/20 reporting period, the RSR continued to collaborate with interested and affected rail stakeholders to conduct rail safety promotions. These were conducted in and around the rail intensive regions, focussed on diverse stakeholders and were guided by the ASoS report with a focus on some of the Regulator's focus areas i.e. level crossings, people struck by trains and platform-train interface. In total, 22 rail safety promotions were conducted during the 2019/20 reporting period. To reach a wider section of the communities impacted by rail, some of the initiatives were conducted in partnership with key stakeholders such as PRASA, TFR, RRP, municipalities and commuter forums, among others. Below is a list of the promotions and the areas they focussed on:

Table 21: List of promotions

#	Name of Rail Safety Promotion	Province	Focus area
1	Dr Moroka Level Crossing campaign	North West	Level crossing safety
2	Rondebult Level Crossing campaign	Gauteng	Level crossing safety
3	Magaliesburg Level Crossing campaign	Gauteng	Level crossing safety
4	Witbank Level Crossing campaign	Mpumalanga	Level crossing safety
5	Rolle Level Crossing campaign	Mpumalanga	Level crossing safety
6	Buffelshoek Level Crossing campaign	Mpumalanga	Level crossing safety
7	Koedoespoort Station Campaign	Gauteng	People struck by trains, platform-train interface and level crossing safety
8	Park Station Campaign	Gauteng	People struck by trains, platform-train interface and level crossing safety
9	Zonnebloem NEST Senior School Campaign	Western Cape	People struck by trains, platform-train interface and level crossing safety
10	Cape Town Station Campaign	Western Cape	People struck by trains, platform-train interface and level crossing safety
11	Simonsvlei Level Crossing Campaign	Western Cape	Level crossing safety
12	Steenberg Level Crossing Campaign	Western Cape	Level crossing safety
13	Bergkelder Level Crossing Campaign	Western Cape	Level crossing safety
14	Dobsonville Level Crossing Campaign	Gauteng	Level crossing safety
15	Magaliesburg Level Crossing Campaign	Gauteng	Level crossing safety
16	Hamanskraal Level Crossing Campaign	Gauteng	Level crossing safety
17	Luka Level Crossing Campaign	North West	Level crossing safety
18	Solomondale Level Crossing Campaign	Limpopo	Level crossing safety
19	Pienaarspoort Station Campaign	Gauteng	Commuter engagement
20	Zuurbekom Level Crossing Campaign	Gauteng	Level crossing safety
21	Swartklip Combined School Campaign	Mpumalanga	Promotion of RSR as a rail safety authority
22	Veritas Secondary School Campaign	Northern Cape	Promotion of RSR as a rail safety authority

Rail Safety Survey

The RSR also conducted rail safety surveys to assess the knowledge commuters possess about railway safety across Gauteng, KwaZulu-Natal and the Western Cape. Respondents were invited to complete self-administered questionnaires which provided valuable insights to the Regulator. Of those surveyed, 43 per cent of the participants were male, 54 per cent were female and gender of three per cent of the participants could not be determined.

The survey indicated that commuters were not completely unaware of railway safety issues and measures. However, the survey indicated that for safety messages to be more effective, it should be shared with the commuters by using several different mediums. The survey results suggested that the commuters know the desired safety behaviours and when they embark on risky behaviour, they are also aware that their behaviour is unsafe.

Stakeholder Engagements

As part of its stakeholder engagement initiatives, the RSR continued to reach out to stakeholders across various platforms such as the Annual Rail Safety Conference, State of Safety Dialogues and industry engagements.

Annual Rail Safety Conference

The RSR hosted the Annual Rail Safety Conference (ARSC) from 01-03 October 2019 at the Devonvale Golf and Wine Estate in the Western Cape. A total of 170 delegates, representing a cross-section of the rail sector, including sponsors, exhibitors, commuter forum representatives, members from the Portfolio Committee on Transport as well as members from the local and national media attended the conference.

Living up to the theme of the conference, Collaborating to ensure the future of rail safety in the 4th Industrial Revolution, the RSR extensively engaged attendees by means of a Mobile App leading up to and during the conference. The App not only exposed delegates to seamless registration and payment facilities but also allowed delegates to perform a myriad of activities, from access to safety information and presentations to interacting with specialists in attendance at the conference.

State of Safety Dialogues

Two State of Safety Dialogues were conducted during the 2019/20 reporting period. The first was held in Gauteng during November 2019 while the second session was held in KwaZulu Natal in March 2020. The dialogues provided a platform for operators to engage the RSR on issues of concern and encouraged industry players to respond to rail challenges as a collective. The sessions were a huge success, despite the attendance of the KwaZulu Natal session being slightly impacted by the COVID-19 pandemic.

Media outreach and brand positioning

Media outreach and brand positioning remain an integral part of the RSR's endeavours to heighten rail safety among its key audiences. During the 2019/20 reporting period, the RSR participated in 16 brand positioning initiatives with the intent to share crucial rail safety-related information. These include, but were not limited to:

- Exhibiting and speaking at prominent rail conferences;
- Publishing articles and videos in industry publications with the aim to engender discussions;
- Hosting discussions about rail-related careers at secondary schools; and
- Inspections and train rides in collaboration with the Minister of Transport to uphold the RSR as a rail safety authority.

The initiatives listed above have seen the RSR's senior technical officers present papers at conferences locally and abroad. High ranking officials such as the CEO and various executives conducted interviews with prominent media houses and trade publications.

APPENDIX OPERATIONAL OCCURRENCES AND SECURITY-RELATED INCIDENTS REPORTING CATEGORIES

RAILWAY OPERATIONAL OCCURRENCE AND SECURITY-RELATED INCIDENTS CATEGORIES	
CATEGORY	DESCRIPTION
OPERATIONAL OCCURRENCES	
CATEGORY A	COLLISIONS DURING MOVEMENT OF ROLLING STOCK
A-a	Collision between rolling stock on a running line
A-b	Collision of rolling stock with an obstruction on a running line (including road vehicles colliding with rolling stock)
A-c	Collision with a stop block on a running line
A-d	Collision of rolling stock other than on a running line
A-e	Collision of rolling stock with an obstruction other than on a running line
A-f	Collision with a stop block (other than on a running line)
CATEGORY B	DERAILMENTS DURING MOVEMENT OF ROLLING STOCK
B-a	Derailment of rolling stock on a running line
B-b	Derailment of rolling stock on a line other than a running line
B-c	Derailment during tippler activities
CATEGORY C	UNAUTHORISED MOVEMENTS (ROLLING STOCK MOVEMENT EXCEEDING THE LIMIT OF AUTHORITY)
C-a	Signal passed at danger (SPAD) on a running line
C-b	Signal passed at danger (SPAD) on any other line
C-c	Physical token passed on a running line
C-d	Physical token passed on any other line
C-e	Verbal authority exceeded on a running line
C-f	Verbal authority exceeded on any other line
C-g	Written authority exceeded on a running line
C-h	Written authority exceeded on any other line

CATEGORY D	LEVEL CROSSING OCCURRENCES
D-a	Collision between rolling stock and a road vehicle(s) (including motor vehicles, bicycle or animal-drawn vehicles) at a recognized level crossing on a running line
D-b	Collision between rolling stock and a road vehicle(s) (including motor-powered, bicycle or animal-drawn vehicles) on any line other than a running line (including yards, sidings and private sidings) at a recognized level crossing
D-c	A person(s) struck by rolling stock at a recognized pedestrian level crossing
D-d	A person(s) struck by rolling stock at a recognized road level crossing
CATEGORY E	PERSONS STRUCK DURING MOVEMENT OF ROLLING STOCK (OTHER THAN AT LEVEL CROSSINGS)
E-a	Occurrence where a member of the public is struck by rolling stock on a running line
E-b	Occurrence where an employee is struck by rolling stock on a running line
E-c	Occurrence where a contractor or contractor's employee is struck by rolling stock on a running line
E-d	Occurrence where a member of the public struck by rolling stock on a line other than a running line
E-e	Occurrence where an employee is struck by rolling stock on a line other than a running line
E-f	Occurrence where a contractor or contractor's employee is struck by rolling stock on a line other than a running line
CATEGORY F	PEOPLE RELATED OCCURRENCES: TRAINS OUTSIDE STATION PLATFORM AREAS (IN SECTION)
F-a	Occurrence where a person fell or was pushed from inside a moving or stationary train
F-b	Occurrence where an employee fell or was pushed from inside a moving or stationary train
F-c	Occurrence where a contractor or contractor's employee fell or was pushed from inside a moving or stationary train
CATEGORY G	PASSENGER RELATED OCCURRENCES: TRAVELLING OUTSIDE DESIGNATED PASSENGER AREA
G-a	Category G occurrences covers the number of occurrences as a result of passengers travelling outside the designated passenger area of the train
CATEGORY H	PEOPLE RELATED OCCURRENCES: PLATFORM-TRAIN INTERCHANGE
H-a	Occurrence where a passenger fell between the train and the platform whilst entraining/ detraining a stationary or moving train
H-b	Occurrence where a passenger fell on the platform whilst entraining/detraining a stationary or moving train
H-c	Occurrence where an employee fell between the train and the platform whilst entraining/detraining a stationary or moving train
H-d	Occurrence where an employee fell on the platform whilst entraining/detraining a stationary or moving train
H-e	Occurrence where a contractor or contractor's employee fell between the train and the platform whilst detraining a stationary or moving train
H-f	Occurrence where a contractor or contractor's employee fell on the platform whilst entraining/detraining a stationary or moving train

CATEGORY I	PEOPLE RELATED OCCURRENCES: STATION INFRASTRUCTURE
I-a	Occurrence resulting in injuries and fatalities to public due to infrastructure defects in a public area of the station
I-b	Occurrence resulting in injuries and fatalities to passengers due to infrastructure defects in a passenger area of the station
I-c	Occurrence resulting in injuries and fatalities to an employee due to infrastructure defects in a public area of the station
I-d	Occurrence resulting in injuries and fatalities to an employee due to infrastructure defects in a passenger area of the station
I-e	Occurrence resulting in injuries and fatalities to a contractor or contractor's employee due to infrastructure defects in a public area of the station
I-f	Occurrence resulting in injuries and fatalities to a contractor or contractor's employee due to infrastructure defects in a passenger area of the station
CATEGORY J	ELECTRIC SHOCK OF PEOPLE OCCURRENCES
J-a	Electrical shock to a member of the public on the network infrastructure
J-b	Electrical shock to an employee on the network infrastructure
J-c	Electrical shock to a contractor or contractor's employee on the network infrastructure
J-d	Electrical shock to the member of the public including passengers whilst on or in rolling stock
J-e	Electrical shock to an employee whilst positioned on or part of rolling stock
J-f	Electrical shock to a contractor or contractor's employee whilst positioned on or part of rolling stock
J-g	Electrical shock to the member of the public in the public area of a station
J-h	Electrical shock to an employee in the public area of a station
J-i	Electrical shock of a contractor or contractor's employee in the public area of a station
J-j	Electrical shock to the member of the public in the passenger area of a station
J-k	Electrical shock to an employee in the passenger area of a station
J-l	Electrical shock of a contractor or contractor's employee in the passenger area of a station
CATEGORY K	SPILLAGE/LEAKAGE, EXPLOSION OR LOSS OF DANGEROUS GOODS
K-a	Spillage or leakage of dangerous goods en route
K-b	Spillage or leakage of dangerous goods during shunting operations
K-c	Spillage or leakage of dangerous goods whilst staged
K-d	Missing consignment of dangerous goods
K-e	Theft of dangerous goods
K-f	Explosion of dangerous goods
CATEGORY L	FIRE OCCURRENCES
L-a	Fires on a fixed operational asset (for example, station buildings, in a tunnel, in a relay room and in a sub-station)
L-b	Fire of freight
L-c	Fire of rolling stock
L-d	Veld fires that threaten operational safety

SECURITY INCIDENTS CATEGORIES	
CATEGORY 1	THEFT OF ASSETS IMPACTING ON OPERATIONAL SAFETY
1-a	Theft of rolling stock components in section
1-b	Theft of rolling stock components in yards (staged)
1-c	Theft of civil infrastructure components in section
1-d	Theft of civil infrastructure components in yards and sidings
1-e	Theft of overhead traction equipment in section
1-f	Theft of overhead traction equipment in yards and sidings
1-g	Theft of train control equipment (signalling) in section
1-h	Theft of train control equipment (signalling) in yards and sidings
1-i	Theft of ancillary equipment including public address systems, information boards, CCTV
CATEGORY 2	MALICIOUS DAMAGE (VANDALISM) TO PROPERTY IMPACTING ON OPERATIONAL SAFETY
2-a	Malicious damage (vandalism) of rolling stock components in section
2-b	Malicious damage (vandalism) of rolling stock components in yards and sidings (staged)
2-c	Malicious damage (vandalism) of civil infrastructure components in section
2-d	Malicious damage (vandalism) of civil infrastructure components in yards and sidings
2-e	Malicious damage (vandalism) of overhead traction equipment in section
2-f	Malicious damage (vandalism) of overhead traction equipment in yards and sidings
2-g	Malicious damage (vandalism) of train control equipment (signalling) in section
2-h	Malicious damage (vandalism) of train control equipment (signalling) in yards and sidings
2-i	Malicious damage (vandalism) of ancillary equipment including public address systems, information boards, CCTV
CATEGORY 3	THREATS OF OPERATIONAL SAFETY
3-a	A bomb threat to network
3-b	A bomb threat to station
3-c	A bomb threat to rolling stock
3-d	Threats due to electrical power outages
3-e	Threats other than bomb and power outage threats
CATEGORY 4	TRAIN KIDNAPPING OR HIJACKING
4-a	Kidnapping or hijacking of passenger trains
4-b	Kidnapping or hijacking of freight trains
4-c	Kidnapping or hijacking of other rolling stock
CATEGORY 5	CROWD-RELATED OCCURRENCES
5-a	Crowd related occurrence and includes stampede action
CATEGORY 6	INDUSTRIAL ACTION
6-a	Industrial action that causes a threat to security or safe railway operations or to security

CATEGORY 7	PERSONAL SAFETY ON TRAINS
7-a	Murder
7-b	Attempted murder
7-c	Rape
7-d	Assault
7-e	Indecent Assault
7-f	Aggravated robbery
7-g	Common robbery
7-h	Theft
7-i	Bomb explosion
CATEGORY 8	PERSONAL SAFETY ON STATIONS
8-a	Murder
8-b	Attempted murder
8-c	Rape
8-d	Assault
8-e	Indecent Assault
8-f	Aggravated robbery
8-g	Common robbery
8-h	Theft
8-i	Bomb explosion
CATEGORY 9	PERSONAL SAFETY OUTSIDE STATION PLATFORM AREA (IN SECTION BETWEEN STATIONS, INCLUDING YARDS, SIDINGS AND DEPOTS)
9-a	Murder
9-b	Attempted murder
9-c	Rape
9-d	Assault
9-e	Indecent Assault
9-f	Aggravated robbery
9-g	Common robbery
9-h	Theft
9-i	Bomb explosion

Notes

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