GENEVA STATION LEVEL CROSSING COLLISION BOARD OF INQUIRY REPORT		
OPERATOR	**PASSENGER RAIL AGENCY OF SOUTH AFRICA (PRASA)**	
PERMIT NUMBER	**ASP 0002 NTS**	
INVESTIGATION SUBJECT	**INVESTIGATION REPORT INTO THE LEVEL CROSSING COLLISION OF 04 JANUARY 2018 CLOSE TO GENEVA STATION INVOLVING A MAIN LINE PASSENGER SERVICES (TRAIN NUMBER 37012) AND A ARTICULATED TRUCK (REGISTRATION JCW 868 NW).**	
DATE OF OCCURRENCE	**04 JANUARY 2018**	
REFERENCE NUMBER	**RSR/20180104/002**	
BOARD OF INQUIRY MEMBERS		
CHAIRPERSON	**MR PHATUDI MAPONYA**	**MAPONYA INCORPORATED**
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1. PART A

1.1 ACKNOWLEDGEMENTS AND OVERVIEW

1.1.1 This is a report of a team comprising of technical experts and officials from the Railway Safety Regulator ("the RSR"). The team is grateful to all organisations that provided documents and background information. These organisations include the Passenger Rail Agency of South Africa ("PRASA"), the Road Traffic Management Corporation ("RTMC"), Transnet (SOC) Limited ("Transnet" or "TFR"), Sheltam (Pty) Ltd ("Sheltam") and Premifield (Pty) Ltd ("Premifield").

1.1.2 Section 38 (4) of the National Railway Safety Regulator Act 16 of 2002, as amended ("the RSR Act") provides that the Regulator may, or upon receipt of a directive from the Minister must, investigate any railway occurrence for the purposes of preventing similar occurrences in the future. Section 38 (8) of the RSR Act further provides that the Regulator may appoint a suitably qualified person to carry out any investigation referred to in subsection (4) of the RSR Act.

1.1.3 This report is accordingly submitted pursuant to the appointment of a Board of Inquiry ("BOI") in accordance with Section 38 (8) of the RSR Act. The report is further submitted in compliance with Section 38 (9) which requires that an investigator appointed in terms

of subsection (8) must furnish a written report to the Regulator upon completion of the investigation.

1.1.4 The thrust of the report and the investigation relates to the level crossing collision which occurred on 04 January 2018 between Hennenman and Kroonstad in the Free State Province involving a Main Line Passenger Services' ("MLPS") train and a articulated truck. The mandate of the BOI is fully contained in the terms of reference provided by the RSR. A comprehensive discussion of these terms of reference shall be made in this report.

1.2 DEFINITIONS

1.2.1. In this report, unless the context otherwise requires, the expressions defined below shall bear the meanings set out hereunder.

1.2.1.1 “BOI” denote the Board of Inquiry;

1.2.1.2 “CEO” denote the Chief Executive Officer;

1.2.1.3 “CTC” means the Central Train Control;

1.2.1.4 “MCC” means Mainline Command Centre

1.2.1.5 “Geneva level crossing” refers to the place of occurrence;

1.2.1.6 “EAP” refers to Employee Assistance Programme;

1.2.1.7 “km/h” means Kilometre per hour;

1.2.1.8 “PRASA” refers to the Passenger Rail Agency of South Africa;

1.2.1.9 “RSR” means the Railway Safety Regulator;

1.2.1.10 “the RSR Act” refers to the National Railway Safety Regulator 16 of 2002 as amended;

1.2.1.11 “TCO” means the Train Control Officer”;

1.2.1.12 “Train” means the train set 37012; and

1.2.1.13 “MLPS” means Main Line Passenger Services (formerly Shosholoza Meyl).

1.2.1.14 “Rolling Stock” means Locomotive and Coaches

1.2.1.15 “TFR” means Transnet Freight Rail

1.2.1.16 “RCAT” means Root Cause Analysis Technique

1.3 EXECUTIVE SUMMARY

Introduction

1.3.1 On 04 January 2018 at 08h58, MLPS Train 37012 hauling eighteen (18) coaches ("the train"), collided with the second trailer of an articulated truck. The truck combination consisted of two trailers. The collision occurred at a railway level crossing (LX02265) on the S175 road, which is approximately 20km from the Kroonstad station, in the Free State Province. From the said occurrence, twenty-four (24) passengers from the train lost their lives and more than two hundred and sixty (260) passengers suffered serious to moderate bodily injuries.

Background events prior to the occurrence

1.3.2 The events before the occurrence indicate that the train driver was scheduled to report for duty on 03 January 2018 at 21h00 at the Kroonstad station. The train driver was booked to operate Train 74013 which was coming from Johannesburg to East London in the Eastern Cape. He was scheduled to take this train from Kroonstad station to Bloemfontein station. The train would have left Kroonstad at around 21h30 intended to arrive in Bloemfontein at around 00h51. However, this train was delayed and could not arrive at the Kroonstad station on scheduled time.

1.3.3 In view of the delay in respect of Train 74013, the train driver was requested by the section manager, to report for duty at the Kroonstad Station only at 00h00 instead of the pre-arranged 21h00. The driver indeed signed in for duty at 00h00 on 04 January 2018. On signing in at the Kroonstad station, the Section Manager was absent and no fitness or substance abuse tests were performed on either the train driver or the train assistant.

1.3.4 At the Kroonstad station, the train driver then took over the Train 47014 to Henningspruit station. Henningspruit station and Kroonstad station are 30 kilometres apart from each other. He was requested to do so as his planned train, namely Train 74013 was delayed and he was therefore available to assist on other trains. The delayed Train 74013 only arrived later at Henningspruit station. From there, the train driver then operated Train 74013 to Bloemfontein station.

1.3.5 From the Bloemfontein station, the train driver operated the train under investigation (Train 37012) which had been travelling from Port Elizabeth to Johannesburg. This train departed from Bloemfontein at around 06h30 and it would have taken a period of 2h48 minutes for it to arrive at the Kroonstad station. According to the records provided, the train had approximately 547 passengers at departure from Kroonstad.

Brief details on the affected train (Train No 37012)

1.3.6 The train was taken over by the train driver from another train driver a certain Mr Kevin Maswali ("Kevin"), who had been the driver of the train when it arrived in Bloemfontein. During the hand over process, the train driver was informed that there was a fault on the locomotive in that it could not move faster than 86 km/h. It will trip at a speed of 86km/h, causing the train to lose power.

1.3.7 The train was hauled by a locomotive, C34-3018. This locomotive is a diesel locomotive leased by PRASA from Sheltam. The diesel locomotive uses diesel engine to drive the generator that produces the required electrical energy to power the traction motors which then drives the wheels. In contrast, an electrical locomotive draws power directly from the electricity at a distant power station through overhead catenaries and pantograph. Unlike an electrical locomotive, a diesel locomotive does not interface with the overhead wires and has no pantograph.

1.3.8 The train set was structured or configured as follows:-

1.3.8.1 The locomotive C34-3018
1.3.8.2 1 x Car coach
1.3.8.3 1 x Power Car
1.3.8.4 7 x Economy Car (Sitter coaches)
1.3.8.5 1 x Dining Car
1.3.8.6 1 x Kitchen Car
1.3.8.7 6 x Sleeper Coaches

1.3.8.8 1 x Luggage Van

Brief details related to the scene of the occurrence

1.3.9 As the train went through the Geneva station approaching level crossing LX02265 at a speed of 78 km/h, the train driver indicated that he saw the truck from his right hand side approaching the level crossing by road S175 from the southern direction. He saw the truck from a distance of about 500 meters from the point of impact. The S175 road emanates from a “T” junction, on a relatively straight flat section of the road, where it intersects with the railway track at a slight angle. The relevant section of the road has a gravel surface which is in good condition. The road signage on the section is clear and unobstructed. The traffic is controlled by a stop sign on either sides of the road.

1.3.10 Having seen the truck, the train driver indicated that he started blowing his whistle before the first whistle board which is situated 400 meters from the point of impact. He stated that he hooted again continuously from the second whistle board which is located 117 meters from the point of impact. Despite the hooting, the truck crossed the railway crossing and its second trailer (still on the railway line) was struck by the train which dragged the trailer along the railway for about 140 meters.

1.3.11 The locomotive’s black box report (CPU report) revealed that the train driver did not apply the brakes at any point since observing the truck which was approaching the

level crossing. The locomotive's black box report further unveiled that the train was moving at a speed of 78 km/h at the time of impact. Following the impact, ten (10) coaches derailed. The derailment was as a result of the train's instability resulting from the collision between the train and the truck.

Derailed Rolling Stock and Nature of Damage is as follows:

No	Type	Damage
C34-3018	Sheltam Locomotive	Derailed and Body Damages
21102	Car Van	Derailed and Body Damages
20503	Power Van	Derailed and Body Damages
36302	Economy Car/Sitter	Derailed, Body Damage and Caught Fire
36227	Economy Car/Sitter	Derailed and Body Damage
26725	Economy Car/Sitter	Derailed, Body Damage and Caught Fire
36010	Economy Car/Sitter	Derailed, Body Damage and Caught Fire
36148	Economy Car/Sitter	Derailed and Part of Roof Caught Fire
36274	Economy Car/Sitter	Derailed and Part of Roof Caught Fire
36203	Economy Car/Sitter	Derailed
104	Dining Car	Derailed

1.3.12 A few minutes after impact, a fire arose which caused damage to rolling stock. Four coaches were burnt and extensively damaged due to the fire, either to the interior and/or the exterior. A fifth coach had signs of lesser damage to the exterior.1

Brief details after the occurrence

1.3.13 Soon after the accident occurred, emergency services' personnel arrived at the scene and took over the scene to provide medical assistance to the injured as well as attending to all emergency requirements to mitigate against further damage and loss.

1.3.14 From the information received from the RTMC, the members of the South African Police Services first arrived at the scene of the occurrence at 09h04. The entire scene was cordoned off and was under the supervision of a Rail Incident Command team consisting of officials from PRASA, TFR, Police, forensics, Department of Health and other interested stakeholders. The investigators from the Railway Safety Regulator arrived at about 17h45 on the scene.

1.3.15 Several emergency procedures were undertaken to assist the injured passengers including the recovery of the deceased at the scene of the occurrence. The scene was also being cleared to restore the service.

1.3.16 The several rail incident command team reports as well as the meetings held by the team illustrate that there were no complains or impediments in activating, executing and managing the scene of the occurrence by both PRASA and TFR. There is also no report of PRASA and TFR being unable to cooperate with each other when managing the occurrence and clearing the section to restore services.

1.3.17 There was also no impediments from both PRASA and TFR in informing the RSR of the occurrence. Both organisations have been candid in providing the RSR with the details surrounding the occurrence as well as providing their own preliminary investigation reports in respect of the occurrence.

1.3.18 PRASA has also acted satisfactorily in activating its call centre to assist the public in obtaining information regarding the occurrence as well as the whereabouts of the injured and deceased passengers. Likewise, information was also made available to the media which assisted in providing details regarding the occurrence.

Causes of the occurrence and the fire

1.3.19 The truck driver did not stop at the compulsory stop sign and did not observe the oncoming train when he was required to do so;

1.3.20 The truck driver proceeded across the railway line while the train was approaching; and

1.3.21 The arcing of the 3kV DC overhead track equipment which did not switch off or detected the fault during the collision caused the fire soon after the accident. The heat generated by the arcing onto the exterior of the coaches caused the interior to catch fire.

Contributory causes to the occurrence

1.3.22 The underlying causes which likely contributed to the deaths and injuries of passengers include the following:-

1.3.22.1 The unavailability of adequate emergency exits in the coaches;

1.3.22.2 The lack of fire resistant material to the coaches which caught fire on contact with arcing overhead equipment allowed the fire to propagate in the coaches;

1.3.22.3 The ineffectiveness of fire fighting equipment on board of the train during the accident; and

1.3.22.4 Lack in emergency training of the train staff.

1.3.22.5 No emergency briefing of the passengers as they embarked the train at the start of their journey.

Findings

1.3.23 In view of the foregoing aspects, the BOI makes the following findings as related to the occurrence:-

1.3.23.1 The driver of the truck did not stop at the obligatory stop sign to allow the train to cross the level crossing as it had right of way.

1.3.23.2 From the interpretation of the black box report, the train driver did not apply any brakes prior to impact. Instead, it appears that he only throttled down from notch T8 to notch T1.

1.3.23.3 The train was moving at a speed of 78 km/h at the time of impact.

1.3.23.4 There was overgrown vegetation along the level crossing, the visibility of the truck driver, on approach to the level crossing would have been influenced by the vegetation. However the line of sight at the compulsory stop sign (which is about 5 meters to the point of occurrence) was not obstructed.

1.3.23.5 The track was in good conditions and the track line is straight for a distance measuring 500 meters away from the point of impact. The train driver's line of sight was therefore clear to observe any oncoming motor vehicles intending to cross the level crossing.

1.3.23.6 The vegetation next the road, on approach to the level crossing, would have influenced the train driver's ability to observe approaching traffic.

1.3.23.7 The level crossing was protected by advanced warning signs and a compulsory stop sign.

1.3.23.8 The RSR had granted conditional approval to PRASA to operate the locomotive involved in the occurrence.

1.3.23.9 The locomotive has 3000 HP at 1050 rpm traction power. It was demonstrated that this power is sufficient to haul 22 loaded coaches in worst gradients.

1.3.23.10 The locomotive's maintenance was up to date at the time of the occurrence.

1.3.23.11 The maintenance of the coaches involved in the incident was up to date.

1.3.23.12 The coaches involved in the occurrence did not have adequate emergency exits.

1.3.23.13 The windows on the coaches are so small that a human being could not escape through them.

1.3.23.14 The material covering the coaches is not fire resistant or retardant. The material is made of vinyl material which is a synthetic man-made material. This is a type of plastic made from ethylene (crude oil) and chlorine which are both not fire resistant.

1.3.23.15 The arcing of the 3kV DC overhead track equipment which did not switch off due to not detecting the fault during the collision most likely caused the fire soon after impact. The heat generated by the arcing onto the exterior of the coaches caused the interior of the coaches to also catch alight.

1.3.23.16 The fire did not spread from one coach to the other through heat radiation. Each coach was set alight separately on contact with the overhead track equipment.

1.3.23.17 From the evidence gathered, the fire extinguishers in the coaches were not enough to dowse the fire. Some of the extinguishers did not operate properly either.

1.3.23.18 No risk assessments was conducted before the introduction and the use of the affected locomotive by PRASA.

1.3.23.19 The train driver, train assistant and the train crew did not have any safety training which would have guided them on how to react during an accident of this nature.

1.3.23.20 Passengers to the trains were not offered any safety briefing on how to evacuate or react in case of an accident or an emergency.

1.3.23.21 The section manager for the Kroonstad section has no personnel to relieve her of her duties during her absence.

1.3.23.22 The section manager provide falsified documents to proof that she performed task and equipment observation on the 3rd of January 2018.

1.3.23.23 The Employee Assistance Programme ("EAP") provided to the train driver and the train assistant may not have been adequate.

1.3.23.24 The response by the RSR investigators to the scene of the incident was found to be a concern.

1.3.23.25 From the evidence of the passengers, there may have been overloading in some of the coaches especially those with third class tickets.

1.3.23.26 The process leading to the granting of the permit(s) to operate the locomotives leased by PRASA during December 2017 by the RSR is a concern especially in circumstances where the approval was granted with conditions which appear not to have been met by PRASA.

1.3.23.27 It was established that there was a previous level crossing occurrence at the level crossing under scrutiny on 26 September 2014 where a driver of a truck failed to stop resulting in a train colliding with the said truck. No injuries were reported on

that incident. In this incident, the investigations revealed that the truck driver did not adhere to the stop sign which required him to stop at the level crossing.

1.3.23.28 The measurements at the level crossing show that the nearest whistle board was only 117m from the level crossing. Standards require a minimum of 125m.

Recommendations

1.3.24 PRASA must improve staff training on emergency reaction and procedures especially in cases of major emergency situations.

1.3.25 PRASA must address and implement a comprehensive system to deal with the possibility of overloading passengers and to deal with a management system for passenger ticket sales.

1.3.26 PRASA must prioritise the filling of safety critical vacancies, and in particular, personnel to relieve the section manager responsible for the section where the occurrence took place.

1.3.27 PRASA must with immediate effect introduce a safety briefing to all passengers when boarding trains to ensure that they are trained on how to react during a case of emergency.

1.3.28 PRASA must place enough serviced fire extinguishers in the coaches. Fire extinguishers to be calibrated as per the specified schedule(s).

1.3.29 PRASA must conduct a wide-ranging risk assessment on all its rolling stock. In particular, this should cover issues related to emergency exits, fire resistance, and suitability of construction material and evacuation procedures.

1.3.30 The EAP given to the train crew, particularly the train driver and train assistant involved in this incident must be reviewed with the intention of providing further EAP. PRASA must establish a comprehensive system to monitor the effectiveness of EAP provided to employees involved in incidents of this nature and to allow continuous and further EAP to such employees should it be found that they require it for prolonged periods.

1.3.31 PRASA must fully comply with RSR conditions of approval as far as Sheltam locomotives class C-34 are concerned and a written report must be provided to the RSR.

1.3.32 TFR must initiate a program to roll out risk assessments of level crossings to determine the level of protection and safety risks at each of them. This must be done in conjunction with the local roads authorities.

1.3.33 TFR must perform condition assessments at each level crossing to ensure that the level crossing meet the standard determined during the risk assessments.

1.3.34 The RSR must investigate the reason for the failure of the OHTE to be switched automatically after the accident. Evidence that was provided show that a lack of maintenance might be a contributing factor.

1.3.35 The RSR must improve on their responses and reaction to incidents of this nature. For example, by developing an internal policy that provides guidance on these aspects.

1.3.36 The RSR must review the training of their investigators who are sent to site to investigate incidents of this nature.

1.3.37 The RSR must standardize the equipment to be used for capturing evidence at occurrence scenes when their investigators carry out investigations on site.

1.3.38 The RSR must review or put in place a standard monitoring system to approve changes to operators' permits and safety management systems.

1.3.39 Sheltam must provide a report to the RSR on the damage that was observed under the locomotive after the accident.

2. PART B: STATEMENT OF PURPOSE AND PRIVILEDGE

2.1 The BOI was mandated to investigate and examine the cause of the collision involving the train and the truck at Geneva in the Free State Province on 04 January 2018. The investigation is aimed at the following:-

2.1.1 Establishing the facts regarding the collision;

2.1.2 Determining the instant and primary causes of the collision; and

2.1.3 Make recommendations to avoid or diminish the risk of recurrence of collisions of this nature.

2.2 This report should not be used for any other purpose other than as expressly permitted by the Railway Safety Regulator and should not be distributed to any other party or parties without a prior written consent from the Railway Safety Regulator.

3. PART C: TERMS OF REFERENCE AND METHOD OF INVESTIGATION

3.1 The Board of Inquiry is mandated to investigate, make findings and report on the following:-

3.1.1 The immediate and root/underlying causes leading up to and surrounding the incident and, in particular taking account of previous occurrences (if any) at Geneva level crossing as well as the recommendations made from previous occurrence investigations at this level crossing. In particular this aspect must address the following concerns:

3.1.1.1 The appropriateness of the train consist at the time of the occurrence and the service worthiness of the rolling stock prior to the occurrence;

3.1.1.2 The competency of the PRASA Rail employees involved in the occurrence (train driver, train driver assistant, train manager and power van technician), including relevant route knowledge and fitness for duty;

3.1.1.3 The effectiveness, adequacy and knowledge of the relevant procedures and training background with respect to the footplate personnel involved in this incident, including their activities pertaining to the adherence to, specifically applicable train operating procedures by the train drivers concerned as set out in

local instructions, General Appendix and other applicable directives;

3.1.1.4 The appropriateness of the deployment of diesel locomotives by Shosholoza Meyl for the particular route in question and to which extent the usage thereof is in compliance with PRASA Rail's Safety Management System's Report and relevant Interface Agreements concluded;

3.1.1.5 The appropriateness of the deployment of Premier Class, including a power van between Johannesburg and Port Elizabeth in line with MLPS agreed marketing and route strategy;

3.1.1.6 The appropriateness of the grade level crossing next to Geneva station with respect to the rail and road signs, including the effectiveness of the line of sight for both the truck driver and train driver to ensure the safe passage of road vehicles; and

3.1.1.7 The competency and fitness of duty of the truck driver prior to the occurrence, including relevant route knowledge and awareness of the level crossing in question.

3.1.2 The immediate and underlying causes leading up to the rolling stock being set alight. In particular this aspect must address the following concerns:

3.1.2.1 Compliance of the rolling stock with applicable National legislation, standards and regulations with respect Fire Protection and mitigation;

3.1.2.2 Adequacy of the fire protection equipment on-board of the Shosholoza Meyl fleet to mitigate fires, and in particular the fire which took place after the occurrence; and

3.1.2.3 In the absence of 3.1.2.1 and 3.1.2.2 above the Board shall consider best practice with respect to the design of the rolling stock, essential and basic fire risk mitigation for passenger trains, including training and awareness of staff and passengers with respect to fire emergencies on board trains.

3.1.3 The effectiveness of the Interface Agreements between Prasa rail and Transnet Freight Rail with respect to the activation, execution and management of the emergency and clearing up process as set out in local contingency plans and relevant directives. In particular, attention should be paid to the effectiveness of the occurrence reporting of PRASA Rail's occurrence reporting processes to the RSR following the occurrence, including the escalation thereof.

3.1.4 The adequacy and effectiveness of PRASA Rail's communication to the general public at large regarding the occurrence and whereabouts of injured passengers, including the establishment and activation of call centres.

3.1.5 The circumstances surrounding PRASA Rail's current Safety Permit as it relates to why the RSR was not informed of changes to their Safety Management System. The Board should consider whether the RSR should be reasonably informed to changes of PRASA Rail's operations, the nature of their operations as well as contractual arrangements between PRASA Rail and their contractors as it relates to procurement or lend-lease agreements for the deployment of rolling stock on the shared network.

3.1.6 The effectiveness of the response of the RSR Inspectorate to the occurrence and their reporting processes to RSR Executive management as it relates to the seriousness of the event reported by PRASA Rail.

3.1.7 The Board is further mandated to make robust recommendations in order to prevent, reduce the risk of, and/or mitigate the consequences of recurrence of the occurrence.

3.1.8 The Board of Inquiry is requested to formulate their recommendations in such way that:

3.1.8.1 The recommendations are clear, specific and unambiguous as to what is expected from whom;

3.1.8.2 The recommendations are measurable, practical and attainable; and

3.1.8.3 The recommendations are results orientated and coupled to specific time frames.

3.2 The methodology adopted for gathering evidence by the BOI included site visits, parts inspection, interviewing relevant witnesses and documentary evidence provided by several role players and affected organizations.

3.3 For investigations related to rolling stock, the Root Cause Analysis Technique ("RCAT") was adopted in this investigation. This technique consists of the following eight (8) steps:

3.3.1 Identifying the type of incident;

3.3.2 Identifying all consequences or losses resulting from the incident or event;

3.3.3 Identifying the way in which the contact occurred as well as the agency for each loss that was due to exposure to or contact with a source of energy or with a substance;

3.3.4 Determine the risk for the incident;

3.3.5 Gather evidence;

3.3.6 Identify possible immediate causes of the incident;

3.3.7 Identify possible root causes of the incident; and

3.3.8 Identify possible inadequate system control factors that may have led to the incident.

3.4 A comprehensive outcome of the investigation in line with RCAT, shall be provided below in this report.

4. PART D: DETAILS AND THE NARRATIVE RELATING TO THE OCCURENCE

4.1 On 04 January 2018 at 08h58, MLPS Train 37012 hauling eighteen (18) coaches ("the train"), collided with the second trailer of an articulated truck. The truck combination consisted of two trailers. The collision occurred at a railway level crossing on the S175 road, which is approximately 20km from the Kroonstad station, in the Free State Province. In the said occurrence, twenty-four (24) passengers from the train lost their lives and more than two hundred and forty (240) passengers suffered serious to moderate bodily injuries.

4.2 At the time of departure, the train crew consisted of the following team:-

GRADE
Act: Train Manager
Assistant Train Manager
Chief Stewart
Chef
Tranship Porter
Tranship Porter
Passenger Assistant
Passenger Assistant
Passenger Assistant
Passenger Assistant
Passenger Assistant
Passenger Assistant

4.3 The coaches were hauled by locomotive C34-3018. This is a diesel locomotive leased from Sheltam by PRASA. The diesel locomotive uses diesel engine to drive the generator that produces the required electrical energy to power the traction

motors which then drives the wheels. Unlike an electrical locomotive, a diesel locomotive does not interface with the overhead wires and has no pantograph.

4.4 The coaches coupled to the locomotive consisted of the following:-

4.4.1 1 x Car Carrier

4.4.2 1 x Power Car

4.4.3 7 x Economy Car

4.4.4 1 x Dining Car

4.4.5 1 x Kitchen Car

4.4.6 6 x Sleeper Car

4.4.7 1 x Luggage Van

4.5 The train involved in the accident was configured as follows:-

Order	Number	Description
1	C34- 3018	Sheltam Locomotive
2	21102	Car Truck/Van
3	20503	Power Van
4	36302	Economy Car/Sitter
5	36227	Economy Car/Sitter
6	26725	Economy Car/Sitter
7	36010	Economy Car/Sitter
8	36148	Economy Car/Sitter
9	36274	Economy Car/Sitter
10	36203	Economy Car/Sitter

11	104	Dining Car/Diner
12	334	Dining Car/Kitchen
13	32128	Sleeper Car
14	32131	Sleeper Car
15	32146	Sleeper Car
16	32092	Sleeper Car
17	32004	Sleeper Car
18	32091	Sleeper Car
19	21014	Luggage Van

4.6 The trip report given to the train driver indicated that the locomotive should not be driven at any speed beyond 86 km/h and there were no other mechanical faults or defects reported on the locomotive and the coaches. Although the train driver had testified that Sheltam locomotive had some faults causing locomotive to trip at speeds of about 86 km/h, this testimony was disputed by Sheltam Technical Partner who testified the tripping was not as a result of faults but as a result of travelling at high speeds. There are no reports or document evidence that suggest the locomotive had faults. The train departed from Bloemfontein station without any impediments being reported on rolling stock or anywhere else.

4.7 As the train was travelling towards Kroonstad after going through the Geneva station approaching level crossing LX02265, the train driver reported that he suddenly saw the truck from his right hand side approaching the level crossing by road S175 from the southern direction. He stated that he saw the truck at a distance

of about 500 meters from the point of impact. The S175 road emanates from a “T” junction, on a relatively straight flat section of the road, where it intersects with the railway track at a slight angle. The relevant section of the road has a gravel surface which is in good condition. The road signage on the section is clear and unobstructed. The traffic is controlled by a stop sign on either sides of the road.

4.8 The aforementioned railway level crossing on the S175 road is situated 20km on the Henneman road from the Kroonstad station. The level crossing is located on a gravel road which is protected by advanced warning signs and a stop sign for any vehicle requiring to pass over. Figure 1 illustrates the direction of the truck as well as the compulsory stop sign just next to the end of the arrow indicating the direction.

Figure 1: Direction that the truck was traveling.

4.9 In addition to the stop sign intended for the truck, there was also an advanced warning sign indicating that the truck driver is now entering the railway crossing. Figure 2 and Figure 3 illustrates the stop and warning signs.

Figure 2: Stop sign on the approach to the level crossing

Figure 3: Advance warning sign and stop sign on the approach to the level crossing.

4.9.1 Around the vicinity of the level crossing, there was vegetation on both the left and right side of the road. The vegetation on the left side where the train was coming from covers around 100 meters towards the level crossing. Figure 2 also depicts the said vegetation.

4.9.2 Notwithstanding the fact that there was vegetation at the time of incident, the view at the compulsory “STOP” sign (which is within 5m from the railway crossing) was not obstructed. Therefore the truck driver’s visibility could not have been obstructed if he had stopped at the compulsory stop sign. Figure 2 also depicts the truck visibility from the stop sign.

4.10 There were also two whistle boards at mast poles 22/03 and 21/16, which are located approximately 400 meters and 117 meters, respectively, before the level crossing. The purpose of these whistle boards is to ensure that the train driver blows the whistle before entering a railway crossing. **Figure** 4 and **Figure** 5 depicts the said whistle boards.

Figure 4: The first whistle board located 400 meters away from the level crossing

Figure 5: The second whistle board located 117 meters away from the level crossing

4.11 The signal, GVA 476 located between mast poles 21/16 and 21/15 gave the train a right of way. **Figure** 6 depicts the said signal.

Figure 6: This is signal GVA 476 which was green and allowed the train to pass through the level crossing

4.12 Having seen the oncoming truck, the train driver indicated that he started blowing the whistle just before the first whistle board which is situated 400 meters from the level crossing. He stated that he blew the whistle again continuously from the second whistle board which is located 117 meters from the point of impact.

4.13 Despite the blowing of the whistle, the truck crossed the level crossing before the train could pass over. During the crossing, the second trailer of the truck (still on the railway) was struck by the train which dragged the said trailer in the railway for about 140 meters.

4.14 Prior to the impact, the train driver did not apply his brakes when he realised that there

was a probable collision. The locomotive's black box report confirms that the train driver did not apply his brakes at any point since observing the oncoming truck. In addition, the locomotive's black box report demonstrates that the train was moving at 78 km/h at the time of impact which was within the permitted 90 km/h speed limit along the section. Figure 7 illustrate that the brakes were not applied and the train was moving at 78 km/h on impact.

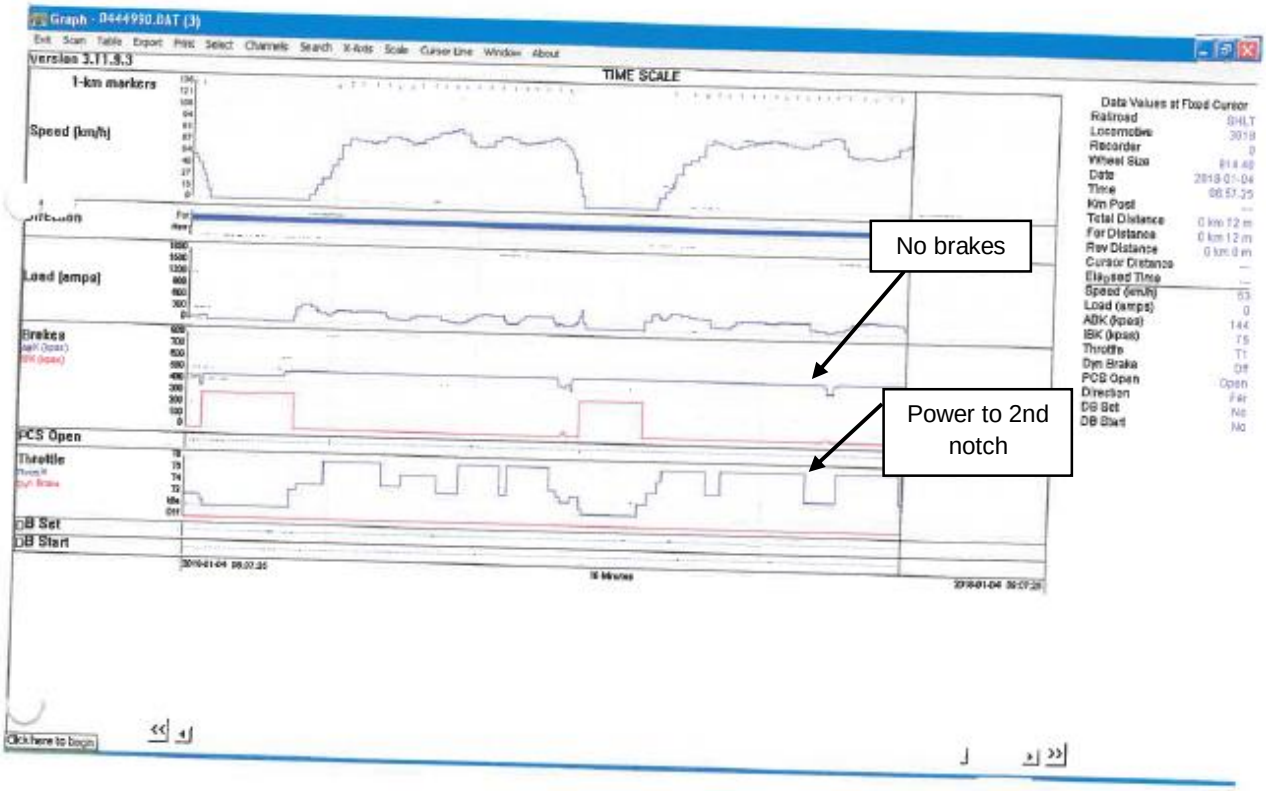


Figure 7 : This is CPU evidence from the locomotive illustrating the speed and braking analysis during impact

4.15 On impact, locomotive C34-3018 and following coaches derailed:-

4.15.1 21102 Car truck;

4.15.2 20503 Power Van;

4.15.3 36302 Sitter;

4.15.4 36227 Sitter;

4.15.5 26725 Sitter;

4.15.6 36010 Sitter;

4.15.7 38148 Sitter;

4.15.8 36274 Sitter;

4.15.9 36203 Sitter; and

4.15.10 104 Diner.

4.16 The track was in good condition. The track line leading to the incident scene is straight for a distance measuring 500 meters away from the point of impact. The train driver's line of sight was therefore clear to observe any oncoming vehicles intending to cross the level crossing.

4.17 The derailment was as a result of the train's instability resulting from the collision between the train and the truck. A few minutes after impact, a fire arose which caused damage to rolling stock, shown in Figure 8, and the following coaches were burnt:-

4.17.1 36302;

4.17.2 36227;

4.17.3 26725;

4.17.4 36010; and

4.17.5 36148.

4.18 The train's configuration after the occurrence can be explained by Newton's Laws of Motion which are:

4.18.1.1 Newton's Law of Inertia which states "*Objects will maintain their state of motion unless acted upon by an external force*" and

4.18.1.2 Newton's 3rd law of Motion which states "*If an object exerts a force on another object, then that object is going to exert an equal and opposite force on the first object*" or simply stated action reaction pairs".

4.18.1.3 In this case, the collision with the truck serves as the external force that actually stopped the train because the brakes were not applied. According to Newton's Law of Inertia, the coaches will maintain their state of motion unless they also experience the effects of the external force or impact.

4.19 According to Newton's 3rd law, the external force acted on the locomotive due to collision with truck will be transferred to the 1st coach, 2nd coach, 3rd coach, all the way to the back of the train. It is also important to note that the train is coupled by components known as couplers and draw gears which are designed to absorb these forces.

4.20 This means the magnitude of force transferred will gradually reduce from the front coaches to the rear coaches which also means the coaches will not stop simultaneously. Front coaches will stop before the rear coaches.

4.21 Based on this theory, it can be concluded that having car truck (21102) and power van (20503) in front of or before the sitter coaches have reduced that impact forces experienced by the sitter coaches. This also explains why the back coaches of the train did not experience damages or derail like the coaches at the front.

4.22 The magnitude of the external force determines if the train's equilibrium state will be disturbed or not. In this case a fully loaded train was moving at a speed of about 78 km/h. Thus, the magnitude of external/collision force was large enough to disturb the train equilibrium state which caused train instability which resulted in the derailment.

Figure 8: Aerial view of fire damage.

4.23 Evidence collected during the inquiry indicate that the fire started after the train derailed. Figure 9 show **the interior of** one of the coaches and the damage that was caused by the heat to the window frames.

Figure 9: Fire damage caused to the interior of the coach and window frames

4.24 The fire was caused by arcing of the 3kV DC overhead track equipment that did not switch. The heat generated by the arcing onto the exterior of the coaches caused the interior to catch alight. Figure 10 shows the cable in contact with one of the coaches and the damage that was caused by the heat due to the arcing. This damage is a clear indication that the heat was generated from the cable as it arced onto the body of the coach and was not caused form an external source.

Figure 10: Overhead cables in contact with a coach

4.25 The cause of the fire is further endorsed through evidence that was presented during the interview of the assistant train driver, and the train manager, who indicated that the fire started a few minutes after the accident. Figure 11 show that the fire did not spread from one coach to the other due to radiation. Each coach was set alight separately by an external source most likely to be the overhead track equipment. The circle in Figure 11 clearly shows how a small area on the coach was burnt.

Figure 11: Coaches caught by fire indicating that the coaches were set alight separately.

4.26 Interrogation of the switching data in the adjacent substations also showed that no breaker tripping was experienced in Holfontein tie-station or Henneman substation. This occurred as indicated in Figure 12.

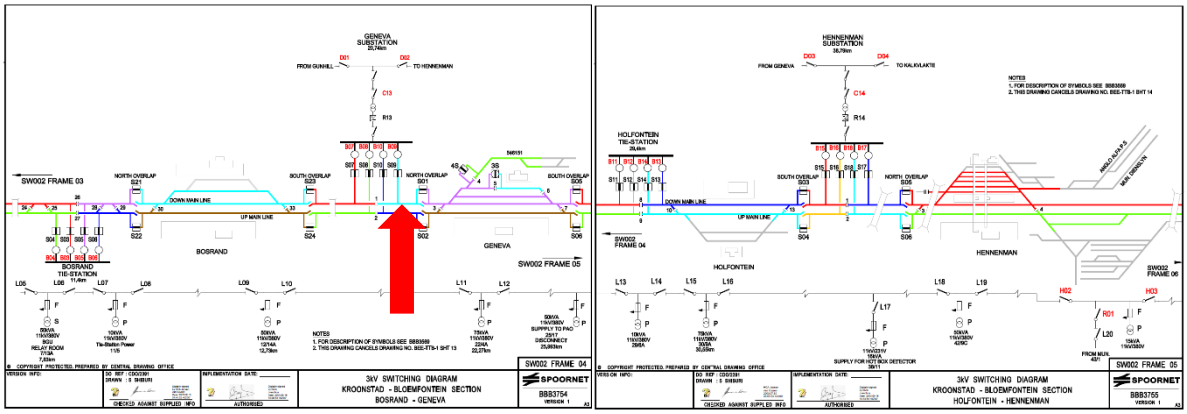


Figure 12: Electrical switching diagrams

4.27 It could reasonably be expected that breaker B09 and B10 in Geneva substation and B11 and B12 in Holfontein tie-station should have tripped due to the fault caused by the accident. Henneman substation should also have been prevented from feeding into the fault through the tripping of B15 and B16. An analysis of the trip data, received from Transnet show that no tripping occurred at Holfontein tie-station and Henneman substation between 08:56:26 and 10:03:39. Switch S05 and S06 was manually opened by an electrician at 10:03:39.

4.28 There are two possible reasons for the failure of the breaker to trip during the fault. It could also have been a combination of both. These are:

4.28.1 The high resistance of the fault caused the breaker to be unable to detect the fault; or

4.28.2 Lack of, or poor maintenance of the breakers, including incorrect calibration settings.

4.29 As soon after the collision, the emergency services took over the scene of the incident to activate and execute emergency procedures as required. Several people were declared dead at the scene of the occurrence whereas a number of passengers suffered bodily injuries and taken to hospital.

4.30 The several rail incident command team reports as well as the meetings held by the team illustrate that there were no complains or impediments in activating, executing and managing the scene of the occurrence by both PRASA and TFR. There is also no report of PRASA and TFR being unable to cooperate with each other when managing the occurrence and clearing the section to restore services.

4.31 There was also no impediments from both PRASA and TFR in informing the RSR of the occurrence. Both organisations have been candid in providing the RSR with the details surrounding the occurrence as well as providing their own preliminary investigation reports in respect of the occurrence.

4.32 PRASA has also acted satisfactorily in activating its call centre to assist the public in obtaining information regarding the occurrence as well as the whereabouts of the injured and deceased passengers. Likewise, information was also made available to the media which assisted in providing details regarding the occurrence.

5. PART E: A BRIEF DESCRIPTION OF THE SEQUENCE OF EVENTS

5.1 A brief description of the sequence of events leading up to the collision under investigation is as follows:-

5.1.1 On 04 January 2018, the train departed from Bloemfontein station towards the Kroonstad station. The train is a long distance train and was from Port Elizabeth travelling to Johannesburg.

5.1.2 It would have taken the train 2h48 minutes to travel from Bloemfontein station to Kroonstad.

5.1.3 When the train passed through the Geneva Station approaching level crossing LX02265, the train driver observed an oncoming truck which appeared not to have intentions to stop at the compulsory stop sign at the level crossing.

5.1.4 The train driver blew his whistle approximately 500 meters from the level crossing in an attempt to alert the truck driver that he should stop at the level crossing to allow it to pass over. The train had right of way and was not required to stop.

5.1.5 Despite the warnings, the truck driver did not stop at the level crossing. As the truck consisted of a freightliner combination with two trailers, the second trailer could not cross over the level crossing before the train could pass.

5.1.6 As the second trailer was still attempting to move out of the railway line, the train collided with the said trailer and dragged it for a distance of 140 meters.

5.1.7 The train was travelling at 78 km/h at the time of impact.

5.1.8 The train driver did not apply any brakes prior to the collision.

5.1.9 Ten coaches coupled to the locomotive derailed on impact with the trailer of the truck.

5.1.10 Soon thereafter, a fire arose from the overhead cabling equipment which was still powered and came into contact with the coaches thereby burning five coaches from the exterior into the interior of the said coaches.

5.1.11 Twenty four (24) passengers died and over two hundred and forty (240) passengers were reported to have suffered bodily injuries.

6. PART F: A SUMMARY OF THE EVIDENCE CONSIDERED

6.1 The evidence relied upon by the BOI is in the form of documentary evidence received from the relevant stakeholders as requested by the BOI.

6.2 In addition to the documentary evidence provided to the BOI, oral evidence has also been tendered by numerous individuals who were called to testify before the BOI.

6.3 Root Cause Analysis Technique ("RCAT") was adopted during the BOI investigation. This technique consists of the following 8 steps:

6.3.1 Identifying the type of incident.

6.3.2 Identify all consequences or losses resulting from the incident.

6.3.3 Identify the way in which the contact occurred as well as the agency for each loss that was due to exposure to or contact with a source of energy or with a substance.

6.3.4 Determine the risk for the incident.

6.3.5 Evidence gathering.

6.3.6 Identify possible immediate causes of the incident.

6.3.7 Identify possible root causes of the incident.

6.3.8 Identify possible inadequate system control factors that may have led to the incident.

6.4 The aforementioned analysis have been addressed thoroughly in the executive summary and above in the report. However a detailed analysis on the evidence gathered has not been provided above. Therefore, a comprehensive discussion of the evidence provided to the BOI shall be provided below.

6.5 RCAT requires 5 types of evidence to be gathered in order to correctly establish the root cause of the incident. The types of evidence are known as 5P's, which simply refers to the following:-

6.5.1 Position Evidence.

6.5.2 People Evidence.

6.5.3 Paper evidence.

6.5.4 Parts evidence.

6.5.5 Process/Environmental evidence.

6.6 Evidence was gathered through site visits, parts inspection and interviewing several individuals who possessed information which could assist the BOI in providing its report regarding the incident under review.

6.7 The evidence gathered is as follows:-

Position evidence

6.7.1 Position evidence is the exact location of the incident, also known as the point of incident.

6.7.2 The point of incident is required in order to properly reconstruct the incident.

6.7.3 The place of incident is the Geneva double railway Level Crossing No. LX02265, at mast location 21/14.

6.7.4 The point of incident is as appears more fully below:-

Figure 13: This is the point of incident

Figure 14: This is the aerial view of the point of incident

6.7.5 At the level crossing, there was a compulsory stop sign which required the truck to stop. (See Figure 2 in Part D of this report).

6.7.6 There was also vegetation on both sides of the gravel road just before the level crossing. (See Figure 2 and Figure 3 in Part D of this report).

6.7.7 The vegetation identified at the level crossing, could have obstructed the visibility of the truck driver while approaching the crossing. His visibility was unobstructed at the compulsory stop sign. (See Figure 2 in Part D of this report).

6.7.8 There were two whistle boards before the level crossing, situated at 400 meters and 117 meters, respectively. (See Figure 4 and Figure 5 in Part D of this report).

6.7.9 There was a warning sign for the truck that he was entering a level crossing and he would be required to stop at the compulsory stop sign ahead. (See Figure 3 in Part D of this report).

6.7.10 The hanging overhead wires which made contact with the coaches can be regarded as the cause of the fire in this incident. Below is a picture (Figure 15) of the hanging overhead equipment laying on top of the coach-

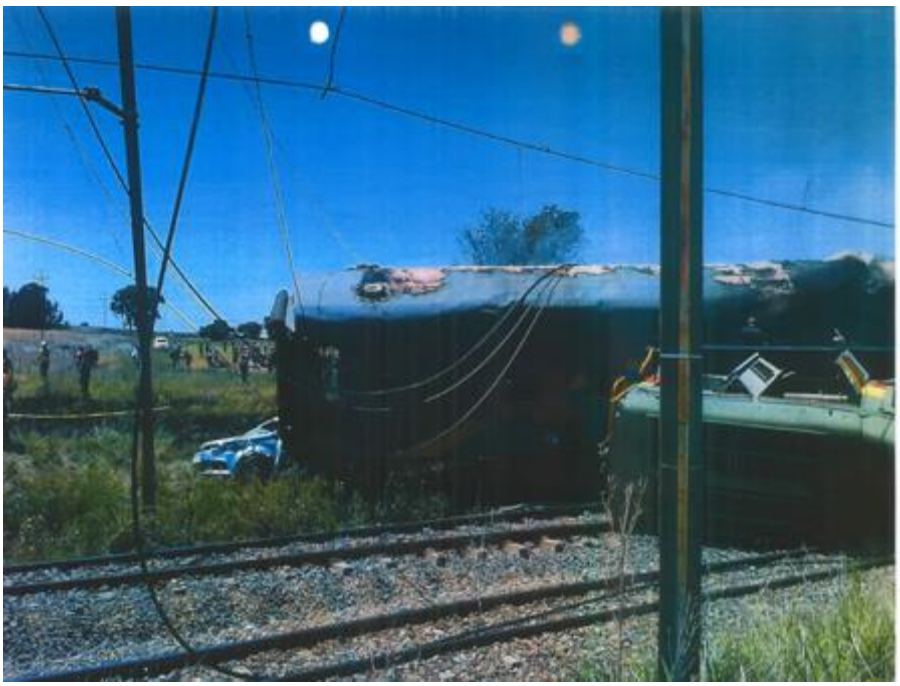


Figure 15: This is overhead hanging wires which made contact with the coaches

6.7.11 In view of the position evidence discussed above, the following conclusions can be made:

6.7.11.1 There were enough warning signs for both the train driver and truck driver that they were entering the railway level crossing.

6.7.11.2 The line of sight at the compulsory STOP sign was clear for the truck driver.

6.7.11.3 The line of sight was also clear for the train driver.

6.7.11.4 The overhead hanging wires which still generated power caused fire at contact with the coaches.

People evidence

6.7.12 The BOI invited the said individuals to testify and give testimony under oath in line with the provisions of section 38 (5) of the Act.

6.7.13 The witnesses who appeared before the BOI are as specified in the schedule hereunder:-

Date	Organisation	Designation
6 April 2018	PRASA	Operations Manager (Kroonstad)
	TFR	Electrical Engineer (Bloemfontein)
	TFR	Signals Engineer (Bloemfontein)
9 April 2018	PRASA	Train Driver
	PRASA	Train Assistant
	PRASA	Executive Manager – Operational Safety
	PRASA	Operational Safety Manager
	PRASA	Rolling stock Engineer
	PRASA	Section Manager
10 April 2018	RSR	Principle Inspector

23 April 2018	PRASA	Dining car Manager
	PRASA	Assistant Train manager
	PRASA	Train Manager
	TFR	Perway Technician (Bloemfontein)
	RSR	Acting Executive (Occurrence Investigation)
	TFR	Rail Incident Commander
24 April 2018	Premifield	Chief Executive Officer
	PRASA	Assistant Risk Manager
	PRASA	Senior Manager Train Operations
	PRASA	Service Executive Manager
	Sheltam	Technical Manager
25 April 2018	PRASA	Maintenance Manager MLPS
	PRASA	Acting CEO MLPS
	TFR	Electrical Control officer

6.7.14 The brief testimony of each of the witnesses is as follows:-

WITNESS NO: 1 – SIGNALLING TECHNICIAN

6.7.14.1.1 This witness testified that he is employed as a Signalling Engineer employed by Transnet Freight Rail ("TFR").

6.7.14.1.2 He reported that he has a Bachelor of Engineering in Computer Engineering from the North West University.

6.7.14.1.3 He testified that from March 2015 he joined TFR as a candidate Engineer and qualified as an Engineer during April 2017.

6.7.14.1.4 At the time of the incident under review, he was acting as a depot manager as the permanent depot manager was on leave.

6.7.14.1.5 His reporting line meant that he was reporting to the acting Infrastructure manager on the day of incident.

6.7.14.1.6 He testified that he was in Bloemfontein on the day of the incident.

6.7.14.1.7 He was informed there was an accident in Geneva at around 09:30 am.

6.7.14.1.8 As soon as he was informed of the collision, he travelled to the scene of the incident where he arrived at around 12h00.

6.7.14.1.9 As soon as he arrived at the incident scene, he started searching for emergency command centres.

6.7.14.1.10 At the time when he arrived at the scene, the fire was already extinguished.

6.7.14.1.11 He stated that he and his team were only allowed to move closer to the scene at around 13h00 to 14h00 as the scene was by then under the control of the emergency services including the police.

6.7.14.1.12 He reported that they assessed the damage to estimate the time of repair and to determine the point of impact. Notwithstanding the severe damage caused by the incident, the witness indicated that they determined that the point of derailment was between mast pole 111 and 112.

6.7.14.1.13 He also testified that the second rear trailer of the truck was dragged for about 100 meters by the train during impact.

6.7.14.1.14 The witness also stated that the speed limit for cargo trains at the section where the incident occurred is 80 km/h whereas for passenger trains is 90 km/h.

6.7.14.1.15 The witness indicated that the CS 90 report was used to calculate the speed.

6.7.14.1.16 The witness testified that the train driver had the right of way and there was no requirement for him to stop at the level crossing.

6.7.14.1.17 The witness also testified that the signalling system was functional on the date of the incident.

6.7.14.1.18 The signalling system at the section is a relay interlocking system. It is Remote controlled and communications are done through optic fibre to the control centre.

6.7.14.1.19 In his opinion, the witness testified that the driver of the truck did not stop at the stop sign when he was required to do so.

WITNESS NO: 2 – OPERATIONS MANAGER

6.7.14.1.20 The witness testified that he is employed by TFR as an Operations manager based in Kroonstad.

6.7.14.1.21 He testified that he has been employed by TRF for around 15 years.

6.7.14.1.22 He has been an operations manager for 8 years and has been in Kroonstad as Operations Manager for about 1 year.

6.7.14.1.23 The witness has an Employee Relations Diploma from the University of Free State. He has also has a SAMTRAC certificate and Safety Management qualification. He furthermore has Employee Relations and Certificate in Law from the University of South Africa.

6.7.14.1.24 He testified that he is responsible for safe running of trains to ensure all personnel are trained including to ensure that trains are departing on time.

6.7.14.1.25 He reported that the Geneva incident scene is not a busy area but operates about 4 trains in the morning, 4 trains in the afternoon and 2 trains at night.

6.7.14.1.26 The witness was on leave on the date of the incident. He had been on leave for about 1,5 months.

6.7.14.1.27 He testified that the train in issue was running late by 1 hour 20 minutes.

6.7.14.1.28 He indicated that he was informed about the incident by telephone.

6.7.14.1.29 He did not visit the incident scene on the date of the incident.

6.7.14.1.30 He only went to site on 24 January 2018 when the site was already cleared.

6.7.14.1.31 He testified that a certain Mr Mkhalipi was acting in his position at the time of the incident.

6.7.14.1.32 He testified that there was an incident at the same level crossing during 2012/2013.

6.7.14.1.33 In his view, there is a need for frequent level crossing awareness at the level crossing.

6.7.14.1.34 He also testified that the vegetation in the surrounding farms also obscure the level crossing and may also be a contributory factor to incidents.

6.7.14.1.35 He testified that he did not inquire from the train driver whether he blow his whistle prior to the collision.

6.7.14.1.36 He also testified that there was no risk assessment done for the level crossing prior to the incident under review.

WITNESS NO: 3 – ELECTRICAL ENGINEER TFR

6.7.14.1.37 The witness testified that he holds a Bachelor of Science degree in Electrical Engineering.

6.7.14.1.38 He stated that he is an Electrical Engineer by profession and based in Bloemfontein.

6.7.14.1.39 He reported that he qualified as an engineer in 2015.

6.7.14.1.40 He stated that his specialty is High Voltage where he works with heavy duty electrical equipment.

6.7.14.1.41 He stated that he has never been in an incident such as Geneva where they are called to assist in managing the incident scene.

6.7.14.1.42 He testified that he does not know what caused the fire but there is the possibility that live wires could have caused the incident.

6.7.14.1.43 The witness testified that he arrived at the scene of the incident at around 10:30 am to 11:00 am.

6.7.14.1.44 The witness testified that his mandate at the accident scene was not to investigate what caused the fire but just to recover the line.

6.7.14.1.45 He stated that when he arrived at the incident scene, he found that the burnt coaches were already extinguished.

6.7.14.1.46 He also testified that two mast poles were damaged, and were not in their right positions. They were skewed.

6.7.14.1.47 He testified that the Rail Incident Commander (RIC) directs the accident scene and gives direction on how the scene is managed.

6.7.14.1.48 As already indicated above, he stated that in his view, the fire to the coaches was as a result of the overhead wires which made contact with the coaches.

WITNESS NO: 4 – TRAIN DRIVER

6.7.14.1.49 The witness stated that he holds a matric qualification as his highest educational qualification.

6.7.14.1.50 He testified that he also holds a Train Driving qualification from Esselen Park College.

6.7.14.1.51 The witness indicated that he has been a train driver for around 15 years.

6.7.14.1.52 He stated that on the date of the incident, he was a train driver and drove the train in issue from Bloemfontein having taken over the reins from another train triver.

6.7.14.1.53 He stated that he was driving the train from Bloemfontein to Kroonstad where it would take some 2h48 minutes to arrive the destination.

6.7.14.1.54 He stated that he was assisted on the date by the train assistant.

6.7.14.1.55 He testified that there was no fitness or substance abuse tests done on him or the train assistant on the date of the incident as the relevant section manager was not present to administer the tests.

6.7.14.1.56 He confirmed that the train which he was scheduled to drive from Kroonstad to Bloemfontein, namely train 74013 was delayed and he was called by his manager to start his shift at midnight. His shift was for a period of 12 hours.

6.7.14.1.57 He stated that when he was called to start his shift at midnight, he was relaxing by his home.

6.7.14.1.58 He ought to have started his shift at 21h00 instead of midnight.

6.7.14.1.59 The train assistant, also received the same call to start her shift at mid night.

6.7.14.1.60 He testified that he was trained as a train driver on 6E and 5E locomotive in Esselenpark. He was trained for diesel locomotive (34 and 35 class) in Bloemfontein. He was trained on 30 class by PRASA. It was a two day theoretical training during 2015.

6.7.14.1.61 He stated that it was not necessary to do practical on class 30 locomotive because operations are the same with class 34 and 35 locomotives.

6.7.14.1.62 The emergency procedure is the same for both electrical and diesel electric locomotives.

6.7.14.1.63 The handing over process for the train involved notifying about any faults, and reports on the trip embarked upon.

6.7.14.1.64 He testified that he was only told the train had one fault, namely that, it was tripping power when the train move at a speed above 86 km/h.

6.7.14.1.65 In view of the above fault, he mentioned that he was therefore travelling at a speed between 75 km/h and 80 km/h throughout his trip.

6.7.14.1.66 He testified that there were no other train faults during his trip.

6.7.14.1.67 The witness testified that on the date of the incident he started hooting before the first whistle board which is about 400 meters. He had to hoot for 3 seconds between the whistle boards.

6.7.14.1.68 He indicated that he then continued hooting from the second whistle board which is about 175 meters away from the level crossing.

6.7.14.1.69 He testified that he saw the truck involved in the accident just before the first whistle board.

6.7.14.1.70 He testified that he was not allowed to stop the train at any time prior thereto as the train had a right of way.

6.7.14.1.71 Although he was not allowed to stop the train, he testified that he started applying the brakes about 200 meters from the crossing line.

6.7.14.1.72 He testified that as far as he is aware, it would take around 1 minute and 30 seconds to bring the train to a complete standstill.

6.7.14.1.73 He stated that he started applying the brakes when he was travelling at about 78 km/h.

6.7.14.1.74 He stated that when he realised that the train would not stop, he stood up still as he was terrified on foreseeing an unavoidable accident.

6.7.14.1.75 He stated that although he initially applied brakes, he could not recall at what speed the impact occurred because he was panicking.

6.7.14.1.76 There was no speed restriction in the Geneva section save to state that the legal limit for a train travelling in the section is 90 km/h.

6.7.14.1.77 The witness stated that he was satisfied with the train handling aspects.

6.7.14.1.78 The witness testified that he does not know if the train was over loaded at the time of the collision.

6.7.14.1.79 He testified that after the impact, he climbed out of the locomotive and saw a lot of smoke around the area.

6.7.14.1.80 He testified that he immediately requested the assistant train manager's (Mitchel) phone to contact the CTC and inform them of the incident.

6.7.14.1.81 The witness testified that the cause of the accident was due to the truck driver who did not stop at the compulsory stop sign.

WITNESS NO: 5 – TRAIN ASSISTANT DRIVER

6.7.14.1.82 Her highest qualification is Matric and an N6 in Electrical Engineering from Kathorus College in Katlegong.

6.7.14.1.83 She also did a three (3) months train assistant driver training at Bloemfontein while she was working for Transnet.

6.7.14.1.84 She is currently employed as a train assistant driver by PRASA.

6.7.14.1.85 While she is on duty, she is under the supervision of the train driver.

6.7.14.1.86 Amongst her roles, she has to clean the locomotive before departure, patrol the train 5 minutes from departure. She patrols the locomotive if it is a 6E and 18E class. She however does not patrol diesel upon departure because the parts are outside.

6.7.14.1.87 She stated that the locomotive involved in this incident was a Sheltam diesel locomotive.

6.7.14.1.88 Although she was not aware that there was a technician on the train, she testified that the technician communicates directly with the driver.

6.7.14.1.89 She seats on the left side of the locomotive whereas the driver sits on the right hand side of the locomotive.

6.7.14.1.90 The witness testified that she has not received any safety training and has no qualification related to safety.

6.7.14.1.91 In her evidence, the witness testified that the train driver hooted continuously from the first whistle board when he realised that there is a truck which would not stop on the level crossing.

6.7.14.1.92 The witness testified that she saw the truck when it had already crossed the up main line and it was entering the down main line which is on the left side.

6.7.14.1.93 The witness became disturbed about continuous hooting as it made her panic in view of the danger ahead.

6.7.14.1.94 The witness indicated that she did not scream or shout but stood up terrified with the train driver looking ahead of the potential danger.

6.7.14.1.95 She could not recall at what speed the train was travelling.

6.7.14.1.96 The witness testified that she sustained injuries on her right hand side.

6.7.14.1.97 She stated that she was traumatised by the accident. She confirmed that she received EAP counselling and she was certified to go back to work.

6.7.14.1.98 The witness testified that she had no training on how to react in emergency situations.

6.7.14.1.99 She also stated that there was also no provision to warn passengers in the coaches on possible dangers ahead.

6.7.14.1.100 The witness testified that the train driver himself did the hand over from the previous train driver. Therefore she was not aware of any faults on the train. She is normally supposed to be informed of any faults by the train driver.

6.7.14.1.101 She testified that she has been working along the Geneva section for around 10 years.

6.7.14.1.102 She testified that there was no task observation recently done along the Geneva section. It was done long time ago, more than a year before the accident.

6.7.14.1.103 She reported that she trained to assist in the 6E, 18E, Diesel 34 class and 36 class.

6.7.14.1.104 She testified that she is not qualified to operate on Sheltam locomotive such as the one involved in the collision.

6.7.14.1.105 She testified that she thinks the barriers such as a boom gate against the truck at the level crossing could have helped to prevent this accident.

6.7.14.1.106 She also stated that if there was a lower speed restriction for the train when it approaches the level crossing, then the accident could also be avoided or the impact minimised.

6.7.14.1.107 She testified that she was at home and off-duty on the 3 January 2018.

WITNESS NO: 6 – SECTION MANAGER

6.7.14.1.108 She testified that she is the section manager, and has been occupying that position since 2010.

6.7.14.1.109 She reported that her highest educational qualification is Matric.

6.7.14.1.110 She also reported that she has a rail management diploma from the University of Cape Town. This was a 2 years course. She completed the course it in 2015.

6.7.14.1.111 She testified that her duties as section manager includes the supervision of train drivers, train assistant and train monitoring personnel.

6.7.14.1.112 She indicated that she was off on the day of incident. The last time she was on duty was on the 3rd of January 2018. She knocked off at 23:00. She was expected to start her shift on the 4th of January 2018.

6.7.14.1.113 The incident happened on her way to work.

6.7.14.1.114 She is the only one section manager. Therefore she is working even at home. Effectively, there is no other person to relieve her of her duties.

6.7.14.1.115 She stated further that she actually works for 24 hours in a day as there is no other section manager in her area.

6.7.14.1.116 She reports to the train operations manager.

6.7.14.1.117 She stated that the train operations manager is aware of the difficulty that she has of not having anyone to relieve her of her duties.

6.7.14.1.118 She reported that she has 3 train drivers, 5 train assistants and 1 service driver under her supervision. There is a vacancy of 1 train assistant and 3 train drivers.

6.7.14.1.119 The witness testified that there is no backup if one of the officials is sick. They are operating on skeleton structure.

6.7.14.1.120 She stated that she remains on standby when her crew is working.

6.7.14.1.121 She confirmed that section managers are also trained on safety.

6.7.14.1.122 She reported that there is no system to warn passengers of emergency or any dangers ahead.

6.7.14.1.123 She indicated that her role involves dealing with locomotives.

6.7.14.1.124 Although she stated that fire extinguishers are there in the trains, she cannot certainly confirm whether the train in issue had fire extinguishers fitted into it.

6.7.14.1.125 She stated that she did not do any fitness or substance abuse tests on the train driver and assistant because the train was delayed and she was not on duty when the train departed, her shift had already ended.

6.7.14.1.126 The train driver and train assistant therefore signed on duty on their own without any supervision as the section manager was not on duty.

6.7.14.1.127 She also stated that if there were emergency exits, then the extent of damage caused by the incident would have been lessened. She stated that the coaches are too small to a point that people cannot escape.

6.7.14.1.128 The witness also testified that there are also no briefing on emergency procedures for the passengers, when they board the train.

6.7.14.1.129 On the incident, the witness testified that she suspects that the power van may have contributed to the fire because of the fuel. She feels if the power van could have been fitted with fire protection, then the fire may have been abated.

6.7.14.1.130 She acknowledged that she provided falsified documents as proof that she performed task and equipment observation on 3 January 2018.

WITNESS NO: 7 – ROLLING STOCK MANAGER

6.7.14.1.131 He holds an Engineering Degree (B-Tech) from University of Johannesburg.

6.7.14.1.132 He has been working for PRASA for the past 4 years in the Rolling Stock department.

6.7.14.1.133 His responsibilities includes the maintenance of main line passenger services, a division of long distances trains for PRASA.

6.7.14.1.134 The witness testified that he has 4 employees reporting to him which includes, 3 Engineering Technicians and 1 Planning Officer.

6.7.14.1.135 He confirmed that the locomotive involved in the accident was a rented Sheltam locomotive.

6.7.14.1.136 He does not know why they were using Sheltam locomotive. He reported that the MLPS Service Execution Manager would best be placed to provide reasons why PRASA decided to use or rent Sheltam locomotive.

6.7.14.1.137 He was only informed that the operations personnel which includes the train drivers were trained on the rented Sheltam locomotive.

6.7.14.1.138 He personally was not trained on Sheltam locomotive.

6.7.14.1.139 He testified that PRASA's rolling stock department does not maintain Sheltam locomotives.

6.7.14.1.140 He testified that he should have ordinarily been trained on the maintenance aspects of the rented locomotives from Sheltam.

6.7.14.1.141 He states that the decision to rent out the locomotives from PRASA was a unilateral decision from the Operations department and not in consultation with the rolling stock department which he manages.

6.7.14.1.142 He stated that their own technical department did not approve the introduction of these rented locomotives.

6.7.14.1.143 He described the locomotive involved in the collision as a 34 class locomotive.

6.7.14.1.144 He confirmed that these rented locomotives did not have radios which would allow communication to the coaches. He also testified that there was a need for intervention to install radios in the locomotives which could also allow communication to flow to the coaches.

6.7.14.1.145 He testified that there is no emergency exit in the coaches and the windows are too small that a human being cannot escape.

6.7.14.1.146 He testified that the doors to the coaches do not automatically open when there is a train accident.

6.7.14.1.147 He also stated that the fire extinguishers in the coaches are not user friendly. He stated that they may be wrongly located in the coaches.

6.7.14.1.148 He testified that he did not check the service records on the fire extinguishers in the train.

6.7.14.1.149 He indicated that there is an operations manager who maintains the trains on a daily basis.

6.7.14.1.150 He indicated that his role is also to define maintenance standards. He does not execute maintenance as that is executed by the operations manager.

6.7.14.1.151 He indicated that each coach is equipped with one fire extinguisher which is, in his view, not adequate.

6.7.14.1.152 He testified that he is not responsible for technical specifications but Transnet is responsible for such.

6.7.14.1.153 He testified that PRASA does not have technical specification of the rolling stock assets.

6.7.14.1.154 He stated that the design of each coach is that it has four (4) doors.

6.7.14.1.155 He testified that no study was done by PRASA on the evacuation of passengers during emergencies or accidents of this nature.

6.7.14.1.156 He also stated that there was no risk assessment conducted as related to rolling stock.

6.7.14.1.157 He indicated that the fire in the incident may have been caused by the mast pole falling and the wires touching the coaches.

6.7.14.1.158 He stated that the coaches do not have any fire resistant layer which could have positively prevented the fire.

WITNESS NO: 8 – EXECUTIVE SAFETY MANAGEMENT

6.7.14.1.159 He holds Master's degree in Public Administration from the Liverpool University.

6.7.14.1.160 He has been working for PRASA for 19 years.

6.7.14.1.161 Before his current occupation, he was an Executive Manager, responsible for business development at PRASA.

6.7.14.1.162 His role entails taking care of rail in relation to safety aspects.

6.7.14.1.163 He is also responsible for depots, rolling stock and infrastructure safety at PRASA.

6.7.14.1.164 He testified that the Human Capital department at PRASA is responsible for filling of vacancies including those related to safety.

6.7.14.1.165 He stated that he acknowledges that there are vacancies in safety critical grades and the issue has already been raised by stakeholders such as Railway Safety Regulator.

6.7.14.1.166 He reported that he cannot take responsibility for lack of filling the safety grades vacancies. In his view, senior managers must take measures to ensure that these vacancies are properly reported and that they are filled.

6.7.14.1.167 On the issue related to the Geneva section having one section manager, he stated that it was the responsibility of the Train Operations Executive to see to the sufficient human resources on the section.

6.7.14.1.168 He testified that fire extinguishers in the coaches are monitored on a yearly basis (12 month cycle).

6.7.14.1.169 He confirmed that not all the windows are emergency exits.

6.7.14.1.170 He testified that the Railway Safety Regulator approved the design of the coaches in the current form and no prohibition has been issued for the use of these coaches.

6.7.14.1.171 He also confirmed that there is no communication between the train drivers and the passengers during a train trip which could alert passengers of any dangers ahead.

6.7.14.1.172 He testified that the current model of the majority of their trains is based on technology developed around 1947.

6.7.14.1.173 He testified that they do emergency briefing on every train and deploy about 24 general personnel on every train.

6.7.14.1.174 He stated that Main Line Passenger trains (Long distance) should not be overloaded and each train must be configured according to the bookings made.

6.7.14.1.175 He testified that their policy prohibits the standing of passengers in the long distance trains.

6.7.14.1.176 He testified that the material or layer covering their coaches is not fire resistant.

6.7.14.1.177 He reported that the hiring of locomotives by PRASA from Sheltam was largely due to the shortage of locomotives.

WITNESS NO: 9 – OPERATIONAL SAFETY MANAGER

6.7.14.1.178 He reported that he has a National Diploma in Safety with UNISA.

6.7.14.1.179 He also reported that he holds a Bachelor Degree in Management.

6.7.14.1.180 His role and responsibility is to co-ordinate activities at PRASA Rail in terms of safety.

6.7.14.1.181 He reported that he cannot account on the introduction of Sheltam locomotives into PRASA during the festive season.

6.7.14.1.182 He testified that PRASA indeed submitted the request to the RSR about the introduction of Sheltam locomotives in December 2017.

6.7.14.1.183 He testified that the RSR granted conditional approval for the use of Sheltam locomotive.

6.7.14.1.184 He stated that the RSR required certain tests to be done but they were not all done, as far as he recalls.

6.7.14.1.185 He testified that certain tests which were requested by the RSR were eventually conducted but the emission tests results were negative.

WITNESS NO: 10 – PRINCIPAL INSPECTOR:

6.7.14.1.186 He indicated that he holds a Master's degree in Business Leadership.

6.7.14.1.187 He is currently employed as a Principal Inspector in the Occurrence Investigations unit of the RSR.

6.7.14.1.188 He is responsible for internal investigations on rail incidents involving rail operators.

6.7.14.1.189 He reported that he is aware of the incident that took place.

6.7.14.1.190 He was however on leave on the day of incident.

6.7.14.1.191 He received a sms from the RSR call centre notifying him about the Kroonstad accident at about 10:00.

6.7.14.1.192 He informed other investigators at the RSR about the incident but most of them were not available for the site visit as it was during the festive season.

6.7.14.1.193 He could not get any person from human factors department to visit the site.

6.7.14.1.194 He stated that he was ultimately able to get the inspector (from security division) at around 12h00 to go on site.

6.7.14.1.195 He stated that he contacted supply chain department in the RSR to arrange accommodation for the inspectors..

6.7.14.1.196 He stated that they left around 13h00 to the site and they arrived around 17h00 on the day of incident.

6.7.14.1.197 He reported that he did the preliminary report on behalf of the RSR.

6.7.14.1.198 He reported that their finding was that the truck did not stop at the stop sign to allow the train to pass.

6.7.14.1.199 He reported that he feels the responsiveness of his team was not compromised even though they arrived late due to logistics. He says if he needed the site not to be disturbed he would have instructed TFR not to disturb the site.

6.7.14.1.200 Although they arrived a bit late, he stated that there is no turnaround time to respond to an incident such as the one under review.

6.7.14.1.201 He reported that if there is car allowance and standby rooster to respond for the majority of employees at the RSR to attend to incidents of this nature, then the response from the RSR may be better.

6.7.14.1.202 He stated that at this stage only principal inspectors have car allowances and are better placed to respond to incidents such as this one speedily.

WITNESS NO: 11 – RIC FROM TRANSNET

6.7.14.1.203 He indicates that he has a Diploma in Theology.

6.7.14.1.204 He also has functional management certificate from Esselenpark School of Rail.

6.7.14.1.205 He was also trained as a Continuous Programme Learning (CPL) Assessor for a period of about 3 weeks.

6.7.14.1.206 He was also trained on Rail Incident Commanding for 3 days.

6.7.14.1.207 His job description includes certifying the yard personnel on yard activities which includes marshalling and shunting of trains.

6.7.14.1.208 He was the Rail Incident Commander on the day of the incident.

6.7.14.1.209 The CTC called the section manager and then section manager called him to inform him about the derailment.

6.7.14.1.210 He was at the Kroonstad yard in a meeting when he was called and told about the incident.

6.7.14.1.211 His colleagues brought the equipment needed for the investigation.

6.7.14.1.212 He arrived on site around 10:05 AM.

6.7.14.1.213 He states that when he arrived, the coaches were already on fire.

6.7.14.1.214 He reports that he assisted with clearing the site.

6.7.14.1.215 He started setting up the RIC tables on the site.

6.7.14.1.216 He also indicated that he was involved with the evacuation of passengers.

6.7.14.1.217 He went to the coaches which were not burning.

6.7.14.1.218 He confirmed that there are not enough emergency exits on the coaches.

6.7.14.1.219 The doors are quite heavy to be opened by the passengers even in a state of emergency.

6.7.14.1.220 They went through each and every coach to establish if it was possible for people to evacuate.

6.7.14.1.221 He reported that the windows on the coaches are very small and a human being could not evacuate.

6.7.14.1.222 He reported that it was not his first time in the train. He saw the risk of small windows when he was a passenger.

WITNESS NO: 12 – CIVIL ENGINEERING TECHNICIAN

6.7.14.1.223 The witness testified that he has a Technician Civil Engineering qualification from Wits.

6.7.14.1.224 He is a Technician employed by Transnet in the Rail Network and Perway Track Maintenance.

6.7.14.1.225 He is responsible for track maintenance. He also does off track maintenance on ad-hoc basis for the municipality.

6.7.14.1.226 He was employed by Transnet since 1989.

6.7.14.1.227 He testified that there was no problem with track maintenance in the section where the incident occurred. He reported that the line of sight was obstructed at intermittent sections due to the vegetation around the area.

6.7.14.1.228 There is a programme of works about clearing the vegetation.

6.7.14.1.229 He stated that there are boundaries for the train reserve. There were some vegetation within the rail reserves but the view was clear intermittently and at a critical point of 5m.

6.7.14.1.230 He indicated that clearing vegetation is not his responsibility. It is the responsibility of the Technical Support. Technical support cleared the vegetation after the incident.

6.7.14.1.231 Whistle boards are situated on the mast, thus they were visible to the train. They are situated on the mast because of the challenge of theft.

6.7.14.1.232 He has no knowledge of the previous incident which occurred along the section.

6.7.14.1.233 He does not know about the road traffic volumes but he believes

6.7.14.1.234 This type of railway crossing is a classification of 3A which require the stop sign/board, and advance warning board.

WITNESS NO: 13 – TRAIN MANAGER

6.7.14.1.235 The witness testified that he has Standard 8 educational qualification.

6.7.14.1.236 He is currently employed as a train manager.

6.7.14.1.237 His job is to allocate passengers in accordance with their respective bookings.

6.7.14.1.238 He has been on this job since 1994.

6.7.14.1.239 He is based in Johannesburg.

6.7.14.1.240 He testified that he does not know how many people where in the train.

6.7.14.1.241 The witness clarified that the train was both sleeper and a seater train.

6.7.14.1.242 He indicated that he himself was in the train.

6.7.14.1.243 He testified that the train was overloaded.

6.7.14.1.244 There were passengers without seats in the train from Bloemfontein to Johannesburg.

6.7.14.1.245 He stated that there were passengers in the passages of the coaches.

6.7.14.1.246 He reported that the train was not overloaded from Port Elizabeth as everybody had a ticket and a seat allocated.

6.7.14.1.247 They picked up more passengers along the way because the train was not full from Port Elizabeth at Cookhouse and Cradock were more tickets were issued. This caused the overloading.

6.7.14.1.248 There were too many people in the train when they were in Bloemfontein. These passengers had tickets. The train was full but they allowed people to go to the dining car.

6.7.14.1.249 He testified that it is difficult to control seating arrangement in the train.

6.7.14.1.250 He stated that PRASA employees were seating right at the back coach known as a staff coach.

6.7.14.1.251 He indicated that passengers in the passage would obstruct the evacuation should an emergency arise.

6.7.14.1.252 He knew the risk and he informed the operations officer about the train which is very full.

6.7.14.1.253 He only had a schedule for the sleeper part of the train. The customer service manager was supposed to give him the schedule for the seater side.

6.7.14.1.254 The train was coping even though it was over loaded.

6.7.14.1.255 He says the fire extinguishers were not working. They tested three (3) of them.

6.7.14.1.256 He reaffirmed that the train was equipped with fire extinguishers but they were not working.

6.7.14.1.257 There is no evacuation procedure in case of an incident or emergency.

6.7.14.1.258 There is no emergency exit in the coaches.

6.7.14.1.259 He reported that they had no skills to deal with the kind of incident which occurred.

6.7.14.1.260 He managed to evacuate the train and he also helped other colleagues because the coach was uncoupled.

6.7.14.1.261 There is no allocated Personnel Assistant (PA) in the seaters. PA are only allocated for sleepers.

6.7.14.1.262 There were 7 seaters in this train and 4 securities. The securities just patrol the coaches to check if the passengers are orderly.

6.7.14.1.263 There were also 6 police officers in the train, therefore he thinks the security were sufficient for this train.

6.7.14.1.264 The crew had enough rest before the train's departure.

6.7.14.1.265 There is a resting period within the long working periods.

6.7.14.1.266 He had a team of 14 members and some were seating in the dining car.

6.7.14.1.267 Emergency communication is non-existent in the train.

6.7.14.1.268 He testified that he was not aware that the train was about to crush. He was as surprised as everyone when it happened.

6.7.14.1.269 He went for counselling after the incident.

WITNESS NO: 14 – ASSISTANT TRAIN MANAGER

6.7.14.1.270 He reported that he holds a Management Certificate, N6.

6.7.14.1.271 He indicated that he started working for Transnet in 2005.

6.7.14.1.272 He started with PRASA in 2007 as a train assistant manager.

6.7.14.1.273 His job is to issue and verify tickets.

6.7.14.1.274 He testified that the train was overloaded.

6.7.14.1.275 He stated that they tried to deny people from entering the train but the train is too long for them to monitor.

6.7.14.1.276 He was trained for emergency plan. He has a first aid training but there was no first aid kit in the train.

6.7.14.1.277 He tried to operate the fire equipment but he did not know how to operate it. When he pressed there was liquid coming from it.

6.7.14.1.278 He saw the smoke in the power van.

6.7.14.1.279 He says the fire started on the coach pressed against power van as soon as the overheard wire touched the coach.

6.7.14.1.280 The train was overloaded and as a result people were standing between the seats.

6.7.14.1.281 The doors are too heavy for a person to open.

6.7.14.1.282 He stated that the windows on the coaches can also not be broken in a case of emergency.

WITNESS NO: 15 – DINING CAR MANAGER

6.7.14.1.283 The witness testified that he is the Dining Car Manager.

6.7.14.1.284 He stated that he has Grade 12 qualification.

6.7.14.1.285 He is in charge of food process in the train.

6.7.14.1.286 He was on the train involved in the accident.

6.7.14.1.287 By 05:00 he found the dining car was full of people. This was in Bloemfontein. He reported this matter but the people refused to move because the train was full.

6.7.14.1.288 They needed to serve the breakfast.

6.7.14.1.289 He was told the train was full and as a result the passengers did not move out of the dining car.

6.7.14.1.290 He indicated that as soon as the accident happened, he noticed overhead wires was lying on top of the whole train.

6.7.14.1.291 He was trained on first aid.

6.7.14.1.292 He was not trained on what to do in the event of emergency.

6.7.14.1.293 In his view the train was overloaded.

WITNESS NO: 16 – RSR HEAD ROLLING STOCK

6.7.14.1.294 The witness testified that he holds a Master's degree in Engineering Management from University of Pretoria.

6.7.14.1.295 He is the current Acting Executive Occurrence Investigations at the RSR.

6.7.14.1.296 He has three departments, Occurrence Investigations, Board of Inquiry and Security related Investigations.

6.7.14.1.297 He reports that PRASA was granted the approval to operate the train in issue on 22 December 2017, the application being made on 17 December 2017.

6.7.14.1.298 He however indicated that the RSR approval was with conditions.

6.7.14.1.299 The approval although granted, the testing of the locomotives failed some test including the braking tests.

WITNESS NO: 17 - CHIEF EXECUTIVE OFFICER

6.7.14.1.300 The witness testified that he is the Chief Executive Officer of Premifield which is the leasing agent of the locomotive that was involved in the accident.

6.7.14.1.301 The company has been in operation for 3 years.

6.7.14.1.302 He reported that he holds a Bachelor's Degree in Finance and Bachelor's Degree in Marketing – Clark Atlanta University in USA.

6.7.14.1.303 He testified that Sheltam is the owner of the locomotive involved in the incident.

6.7.14.1.304 He testified that Premifield was responsible for all negotiations regarding the leasing of the locomotives from Sheltam.

6.7.14.1.305 Premifield received the request for the leasing of the locomotives for PRASA in December 2017 from PRASA.

6.7.14.1.306 PRASA needed between 5 and 10 locomotive for peak period.

6.7.14.1.307 A date set for delivery was 15th of December 2017. The locomotives were then delivered to Braamfontein.

6.7.14.1.308 Some of the drivers were trained earlier in 2017 on the leased locomotives. This was a conversion training to certify the drivers eligible to operate the locomotives.

6.7.14.1.309 PRASA sends them a list of who needs to be trained.

6.7.14.1.310 The train driver was trained to operate the locomotive which was involved in the accident.

WITNESS NO: 18 – TECHNICAL PARTNER SHELTAM

6.7.14.1.311 The witness indicated that he has a standard 10 educational qualification.

6.7.14.1.312 He is a technical manager for Traxton Sheltam.

6.7.14.1.313 He testified that he has been in the railway business for 42 years. He worked for Transnet all those years.

6.7.14.1.314 He used to be a Mechanic (Diesel Electric Fitter). He has a lot of experience in maintenance.

6.7.14.1.315 He indicated that he is aware of Geneva accident.

6.7.14.1.316 He is not responsible for training of the drivers.

6.7.14.1.317 He is responsible to ensure that the locomotives are certified.

6.7.14.1.318 He testified that the brakes were not applied at all by the train driver.

6.7.14.1.319 In his testimony, he stated that the impact on collision occurred whilst the train was moving at about 80 km/h.

6.7.14.1.320 The burns on the traction motor were due to external fire burns coming from the ground.

6.7.14.1.321 He testified that Stopping distances tests were not conducted on the locomotive in issue.

6.7.14.1.322 He testified that the traction power of the locomotive involved in the accident can haul about 23 coaches in a worst-case scenario.

WITNESS NO: 19 - TRAIN OPERATIONS MANAGER

6.7.14.1.323 His highest qualification is Operations Management with UNISA. The course took 12 months to complete.

6.7.14.1.324 He is the Senior Manager in Train Operations – PRASA.

6.7.14.1.325 He is responsible for train operations which include managing personnel, recruiting, interfacing with internal and external stakeholders, involved with safety management, daily train operations, scheduling

6.7.14.1.326 He testified that all PRASA depots are under staffed.

6.7.14.1.327 His responsibility is to motivate and convince the business about the need to fill these vacancies.

6.7.14.1.328 He has done about three (3) motivations which were turned down.

6.7.14.1.329 He testified that his motivations to fill vacancies were turned down at the CEO level.

6.7.14.1.330 He says his motivation to fill in vacancies was turned down despite the safety critical nature of these positions.

6.7.14.1.331 Substance abuse is normally conducted in signing on duty. Vacancies affect this process.

6.7.14.1.332 The same applies to fitness checking. The vacancies affect these processes.

6.7.14.1.333 He is only responsible for the train driver and train assistant driver in terms of train crew.

WITNESS NO: 20 - DIVISIONAL OPERATIONS MANAGER

6.7.14.1.334 He is busy with Master of Business Learning with UNISA School of Business.

6.7.14.1.335 He is the Service Executive Manager.

6.7.14.1.336 He is responsible for stats, scheduling of trains, managing of rolling stock, and MCC operations.

6.7.14.1.337 He is responsible for yard personnel and Main Line Command Centre.

6.7.14.1.338 Safety training is offered by the colleges when they qualify as yard officials.

6.7.14.1.339 Medical screening is done once every year.

6.7.14.1.340 When the train is overloaded the train manager will contact MCC who falls under him.

6.7.14.1.341 They then report to the customer service department.

6.7.14.1.342 He is not aware the train was overloaded. In fact he is not convinced the train was overloaded because only 8 buses came and the numbers in the buses could not have overloaded the trains.

6.7.14.1.343 He is not under staffed in the service execution, but in the train crew side he believes they are under staffed.

6.7.14.1.344 He however testified that under staffing did not contribute to the cause of this accident.

WITNESS NO: 21 – SAFETY MANAGER

6.7.14.1.345 His highest qualification is a Diploma in Safety and Security Management from Oxbridge Academy. He also holds a Diploma in Industrial Relations from Damelin.

6.7.14.1.346 He is employed as the Assistant Risk Manager.

6.7.14.1.347 He is responsible for the whole MLPS Risk Management.

6.7.14.1.348 His duties include Occupational Health and Safety, stats, human factors management etc.

6.7.14.1.349 The only safety training he gives to train drivers is first aid and occurrence investigation.

6.7.14.1.350 The train drivers get safety training during their refresher training.

6.7.14.1.351 He is doing occurrence investigations, accident investigations and reporting for the operations.

6.7.14.1.352 He is a supporting department. They provide training upon request from departments provided such training is not part of their refresher training.

6.7.14.1.353 He is not aware of the fire extinguishers which were not working.

6.7.14.1.354 He is not responsible for train safety, the departments are customer service (represented by train manager), and engineering.

6.7.14.1.355 He is responsible for the safety and reservation procedures which controls the loading or overloading of trains.

6.7.14.1.356 The hand held system that was used before the Geneva accident did not have the capability to record the number of sales en-route.

6.7.14.1.357 He says the train was not overloaded. The numbers were verified by counting those who were in the buses, the ambulances and by downloading the data from the hand held device.

6.7.14.1.358 There was also a list of untraceable people which include the deceased. The list was about 83 people but 3 of those have not been traced. The forensic is still busy with the investigation.

6.7.14.1.359 At the time of incident there were 547 passengers.

WITNESS NO: 22 – ROLLING STOCK ENGINEER

6.7.14.1.360 He has a Diesel Electric Fitter Qualification which took three (3) years.

6.7.14.1.361 He also holds as well as MDP (NQF 6) which was a 1 year programme.

6.7.14.1.362 He started with Spoornet in 1999 as an apprentice.

6.7.14.1.363 He started working for PRASA in 2009 during the sales agreement when a part of Spoornet was acquired by PRASA.

6.7.14.1.364 His current position is a Maintenance Manager in the MLPS.

6.7.14.1.365 His job involved maintenance of the entire rolling stock for the long distance.

6.7.14.1.366 He must also manage resources which include manpower, budget, material etc.

6.7.14.1.367 He was on duty when the accident happened.

6.7.14.1.368 He was on his way to Pretoria when the accident happened. As soon as he heard of the accident he made a U-turn to go back to Johannesburg so that he can find a way to Kroonstad.

6.7.14.1.369 He went to the accident scene and he arrived around 13:00.

6.7.14.1.370 The technician on board must ensure short recovery in the event of fault.

6.7.14.1.371 He is not sure if there was any technician on board.

6.7.14.1.372 He is not trained on C30 Sheltam locomotive. He does not know anything about these locomotive.

6.7.14.1.373 According to the current lease they had no role on the Sheltam locomotives.

6.7.14.1.374 He has about 20 technicians nationally, therefore he has no understanding of the workings of these locomotives.

6.7.14.1.375 He thinks the whole lease agreement of locomotives was not handled correctly.

6.7.14.1.376 He is of the opinion that any new technology introduction should be properly communicated to all stakeholders.

6.7.14.1.377 He understands during the leasing process of these locomotives (Sheltam) there was also a parallel process of engaging Transnet to get locomotives which he feels this was wrong because the two processes were addresses the same problem.

6.7.14.1.378 PRASA has their own locomotives but the reliability and turnaround times is a problem. The issue is maintenance and support facilities is a challenge.

6.7.14.1.379 His department was not involved at all in introducing the Sheltam locomotives to PRASA. In fact technical department was not involved at all.

6.7.14.1.380 He believes these locomotives are very similar to C34 locomotives. They only conducted the tests about two months ago upon request from RSR. There still some outstanding tests.

6.7.14.1.381 There was no indication of fire coming from the car truck or the cars or the diesel engine but there was no fire coming from there.

6.7.14.1.382 He does not do the risk assessment on the coaches. The risk department must do it.

6.7.14.1.383 There is no emergency exit. You only use the doors which are 4 per coach. You cannot use the windows to evacuate under emergency.

6.7.14.1.384 Coach material Safety data shows there is some level of fire retardation.

6.7.14.1.385 The issue of train overloading was never reported to him.

6.7.14.1.386 There were 547 people at the time of incident.

6.7.14.1.387 No equipment to talk to passengers on board. Budgetary constraints has been an excuse for not putting these technologies in place. Engineering is very much aware of these concerns.

6.7.14.1.388 He has been raising a lot of safety issues without satisfactory response, some of the issues include air conditioning, heating system in winter but gradually they are installing these things, the issue of staffing (train crew).

6.7.14.1.389 There is no safety briefing in the train. There is also no policy to regulate.

6.7.14.1.390 Customer service surveys are conducted every second year. There are recommendations from customers but funding is a serious challenge.

6.7.14.1.391 Hand held device for selling tickets does not give real time information. That means the train driver cannot monitor how many people have purchased the tickets. Train Manager can only see physical tickets.

6.7.14.1.392 The maximum capacity of this train was 640. The allowed capacity per coach is 64 even though the maximum capacity is 72.

WITNESS NO: 23 – SENIOR CUSTOMER SERVICE MANAGER

6.7.14.1.393 He holds a Management Diploma from Wits. The course duration was 6 months.

6.7.14.1.394 He is the Senior Customer Service Manager.

6.7.14.1.395 His job involves interpretation of policy in relation to customer services, performance management nationwide, and safety of both the customers as well as employees at stations and on the trains.

6.7.14.1.396 His direct reporting include hospitality manager (catering).

6.7.14.1.397 His train safety responsibility has to do with policies.

6.7.14.1.398 The fire extinguishers are serviced every year.

6.7.14.1.399 The fire extinguishers in the Geneva train were not serviced.

6.7.14.1.400 Servicing of train equipment (including fire extinguishers) falls within engineering. They perform this when the trains are in the yards.

WITNESS NO: 24 – TECHNICAL SUPERINTENDED (ELECTRICAL CONTROL)

6.7.14.1.401 His highest qualification is Matric.

6.7.14.1.402 He is a Technical Superintendent.

6.7.14.1.403 He works in the control room.

6.7.14.1.404 He confirms there was live power at the time of accident because some of the breakers that should have tripped did not trip.

6.7.14.1.405 Although the breakers at Geneva tripped but the breakers from the other side did not trip.

WITNESS NO: 25 – PASSENGER [WRITTEN STATEMENT]

6.7.14.1.406 The above named witness submitted a written sworn statement to the South African police services on 04 January 2018, i.e. on the date of the occurrence.

6.7.14.1.407 The witness indicated that on the date of the occurrence, he was a passenger in the train from Hennenman Station to Johannesburg.

6.7.14.1.408 He states that he was with his mother, whom they were travelling together.

6.7.14.1.409 He states that his mother asked him to go and buy tea in the dining coach and left her mother in the coach at which they were seated.

6.7.14.1.410 He stated that before he went back to the coach where he had left his mother, he noticed that the train was “shaking and twisting badly as if it will fall or overturn”.

6.7.14.1.411 He further states that “within a wink of an eye” the train derailed.

6.7.14.1.412 He stated that he managed to get off from the train and immediately went to search for her mother whom he left when he went to get tea for her.

6.7.14.1.413 He stated that after a while she located her mother standing near the coaches and had sustained injury on the right side of her shoulder.

6.7.14.1.414 He indicated that he also suffered injury to his back side of his neck and on his head. He was then taken to Bongani hospital for medical treatment.

WITNESS NO: 26 – PASSENGER [WRITTEN STATEMENT]

6.7.14.1.415 The witness deposed a sworn statement dated 04 January 2018 which has been obtained from the South African Police Services.

6.7.14.1.416 The witness stated that on the date of the occurrence she was a passenger in the train from Eastern Cape to Vereeniging.

6.7.14.1.417 She had been travelling with her husband, her mother and two (2) children.

6.7.14.1.418 She stated that the train was full on the date of the incident.

6.7.14.1.419 She stated that the train was not travelling at a fast speed.

6.7.14.1.420 She stated that she had taken her child to the toilet and when she was returning to her seat she heard a strange sound from the train and suddenly a bang sound but cannot tell what happened.

6.7.14.1.421 She stated that she could only realise that the train wanted to fall and that is when she was hit against the wall of the train to her head and was thrown out from the coach to the outside.

6.7.14.1.422 She stated that she was thrown to nearby trees where she lost conscious and regained conscious at the hospital.

WITNESS NO: 27 – PASSENGER [WRITTEN STATEMENT]

6.7.14.1.423 The witness indicates that on 03 January 2018, at around 15h00, he boarded a train from Port Elizabeth to Germiston.

6.7.14.1.424 He indicated that he was with his wife and daughter in the said train.

6.7.14.1.425 The train left Port Elizabeth without any signs of fault.

6.7.14.1.426 He indicates that at around 09h00 on the date of the occurrence, he was walking from the dining area with his wife and daughter when he heard “a strange sound and a couple of banging sounds and movements of tables falling”.

6.7.14.1.427 He stated that he then heard a loud bang sound and moments later the train stopped.

6.7.14.1.428 He stated that he then walked with his family to their carriage and took their belongings and went out of the coach.

6.7.14.1.429 They then saw the train burning and people running out from the coaches.

6.7.14.1.430 He was then transported to Virginia hospital together with his family.

WITNESS NO: 28 – PASSENGER [WRITTEN STATEMENT]

6.7.14.1.431 The witness states that she boarded the train at Cookhouse station at around 20h30 on 03 January 2018 and was on her journey to Johannesburg.

6.7.14.1.432 She was travelling with her husband and a friend.

6.7.14.1.433 She states that a few moments after the train left Hennenman station, she heard a loud bang and felt the train shake and saw people “fly across” to the front of the carriage and then flame was coming into their coach.

6.7.14.1.434 She states that she rushed out through the door of the coach which had derailed and had fell on its side.

6.7.14.1.435 She was then taken to hospital for medical treatment.

WITNESS NO: 29 – PASSENGER [WRITTEN STATEMENT]

6.7.14.1.436 The witness indicated in the statement provided to the South African Police Services and dated 04 January 2018 that he boarded the train at Cookhouse station at around 20h30 and was travelling to Johannesburg.

6.7.14.1.437 He states that since he boarded the train, all was in order but the train was full and some people were standing on their feet.

6.7.14.1.438 He states that at the time of the occurrence, he heard a loud bang, and the train was shaking.

6.7.14.1.439 He indicated that he rushed to the door and managed to get out of the coach and saw people trying to take their items whilst the coaches were in flames.

6.7.14.1.440 He stated that he was taken to hospital for medical treatment.

WITNESS NO: 30 – PASSENGER [WRITTEN STATEMENT]

6.7.14.1.441 The witness delivered a statement to the South African Police Services in which she confirmed that she was a passenger in the train at the time of the occurrence.

6.7.14.1.442 She states that she boarded the train at Port Elizabeth and was travelling to Johannesburg.

6.7.14.1.443 She states that the train was full as many people had no place to sit in the coaches.

6.7.14.1.444 She states that after she had just ate, she had a “funny” sound as if the train was braking and heard people screaming and heard a bad bang, saw “red dust” and people running out of the coaches.

6.7.14.1.445 She states that people were stepping on each other when they were running out from the coaches.

6.7.14.1.446 She managed to go out of the coach which fell on its side and was taken to Virginia hospital.

WITNESS NO: 31 –PASSENGER

6.7.14.1.447 The witness appeared before the BOI on 01 August 2018 to provide testimony regarding the occurrence.

6.7.14.1.448 He stated that he was a passenger in the train at the time of the occurrence.

6.7.14.1.449 He had been travelling from Port Elizabeth to Johannesburg.

6.7.14.1.450 He had been travelling with his partner and had also purchased a ticket for his motor vehicle, a Volkswagen Polo Vivo which was transported in the train.

6.7.14.1.451 He had purchased a first class ticket.

6.7.14.1.452 Their coach was the next coach after the dining coach.

6.7.14.1.453 He stated that their train was delayed from Port Elizabeth to Johannesburg.

6.7.14.1.454 He states that there was no health and safety induction or safety briefing when passengers board on the train.

6.7.14.1.455 He also stated that the coaches have no emergency exits.

6.7.14.1.456 He stated that the train appeared to be overloaded and there was no proper system monitoring the number and allocation of seats to passengers.

6.7.14.1.457 He states that at Cookhouse station, there was pushing of passengers when they were boarding the train.

6.7.14.1.458 He indicated that at the time of the occurrence he heard two sounds of a bang.

6.7.14.1.459 He suspects that the first bang was when the train was attempting to brake and the second bang was when the train collided with the motor truck.

6.7.14.1.460 As soon thereafter, he saw people trying to evacuate from the coaches and he was also locating his belongings to evacuate.

6.7.14.1.461 Soon thereafter, he started assisting other passengers to evacuate from the train when a fire started from the first passenger coach of the train.

6.7.14.1.462 He indicates that post the incident, there was no co-ordinated system to advice passengers on what they had to do as a result of the occurrence.

6.7.14.1.463 He also stated that in his view, the train was overloaded and had that not been so, passengers could have evacuated as soon as the incident occurred.

6.7.14.1.464 He also suggested that there should be safety briefings for passengers in trains so that they are able to react during incidents of this nature.

6.7.14.1.465 He also proposed that there should be a system to check and weigh luggage by passengers as there was none and the unmonitored luggage may contribute to the overloading on the train.

6.7.14.1.466 Although he was a passenger in a first class coach, he proposed that the third class coaches should also be given priority on the passenger's wellbeing and overloading which was prevalent in these coaches.

Parts evidence

6.7.15 Parts or component evidence is gathered either through visual inspection (for any visible damages) or measurements or tests where necessary.

6.7.16 The following visual inspections were made on the rolling stock:-

6.7.16.1 Markings or identification on the rolling stock to determine manufacturing and maintenance information such as dates, technical specification, tare specification etc.

6.7.16.2 Body damages to establish type or nature of contact. Body damages could be as a result of :-

6.7.16.2.1 The impact or the fire that broke out.

6.7.16.2.2 Wheels Wear Patterns.

6.7.16.2.3 Brake Blocks Wear Patterns.

6.7.16.2.4 The traction motors damages.

6.7.16.2.5 The bogies damages.

6.7.17 The locomotive's visual inspection was conducted on the 5th of April 2018 at Rosslyn Municipality Railway Siding. It was fully covered at the time of visit. As such it was not

possible to properly inspect the body of the locomotive. It was only possible to inspect certain parts of the under frame which include bogies, wheels and brake blocks.

Figure 16: This is the locomotive covered at the time of the inspection

6.7.18 Figure 17 below is a picture of the brake blocks which illustrated that they were still within the wear limits as they had not reached the condemning mark

Figure 17: This is brake block still within wear limits

6.7.19 Locomotive wheels did not show any signs of abnormal wear patterns such as flange wear or hollow wear which could have caused the derailment of the train (see Figure 18 below)

Figure 18: Locomotive wheels with no signs of skid marks or soft spot

6.7.20 As already indicated above, several coaches caught fire from the exterior and into the interior of the coaches. Below is some of the burnt coaches:-

Figure 19: Burnt coach 26725 (exterior)

Figure 20: Burnt coach 26725 (Interior)

Figure 21: Burnt coach 36302 (exterior)

6.7.21 The coaches were fitted with Vinyl Seating Cover Material which have fire resistance of 60 mm/min. Test standard is ISO 7635/ MFVSS 302. The coaches also have a vinyl flooring material which is SANS 0177 and compliant as far as reaction to fire is concerned.

6.7.22 The foam inside the seats' material is known as Resiflex FX701/Desmodur 70WF 34(100/60) and has a flammability of 0 mm/min according to the supplier's material datasheet. This is understood to mean they are not flammable but it was obviously not the case with this

incident because in some coaches the seats were burnt beyond recognition.

6.7.23 The inside panel material is known as High Pressure Decorative Laminates (HPL) which are not flammable unless in an open flame situation according to the technical data sheet from the supplier (see attached Annexure “RS J” in rolling stock report). This material complies to European Standard EN 438 and with ISO 4586.

6.7.24 Notwithstanding the fact that the coaches’ material are in compliance to various standards (ISO 7635/ MFVSS 302, SANS 0177, European Standard EN 438 and to ISO 4586), they are not 100% fire resistant.

Paper evidence

6.7.25 Several documents were requested from the affected institutions to guide the BOI in understanding certain protocols relevant to the investigation of this accident.

6.7.26 The information received and registered included the following:-

Source	Description
PRASA	• PRASA Rail annual safety improvement plan 2016/2017 • PRASA Rail SMS Report 2016/2016 • Project change request form Capital Adjustment memo (PRJ2.2NA.17.006) • MLPS Vacancies Memo – Various e-mails dated in 2017 • Notification to run Premifield-Sheltam locomotives Ref no ASP0002NTS (18/12/2017) • Technical Specifications on products used for the refurbishment of the coaches. • Resubmission of PRASA's application for the safety permit (16/10/2016) • COC Certificate for the service of fire fighting equipment at Braamfontein depot (November 2017) • Roadworthy certificate for trainset 73011 (17/12/2017) • Roadworthy certificate for locomotive 3018 (14/12/2017) • MLPS Train composition diagram (30/04/2014) • Train manager's trip report for Algoa 37011 and 37012 • Kroonstad Driver roster • Sheltam train schedules • Locomotive technical specifications • Stopping distance details • CPU Raw data and technical report • Technical specifications for coaches • Maintenance records for coaches • Locomotive shedding schedules • Pre-trip authorization certificate • Brake test results of affected train

	• Passenger list for each coach • Train composition • RIO Rolling stock report • Preliminary report on the rail crossing – section accident at Geneva in Free State Province (04/01/2018) • Occurrence tracking matrix • Post derailment assessment of derailment site: Geneva • Train Driver's Journal • Statements from Train driver and assistant • Training and task observations for driver and assistant • Road knowledge certificate • Risk profiles of driver and assistant • Annual medical examinations • Refresher training • Rest periods and time on duty for specific trip • Substance tests • Coach design description • Dimensions and layout of coaches • Window location and design in relation to seat plan • Risk register for specific service between Port Elizabeth and Johannesburg • Sketch drawing of the incident • RIC report • Operators final investigation report • On-site investigation report compiled by Florence Molepo
TFR	• Section strip chart from IM2000 data (14/03/2017) • Breaker calibration calculations and calibration reports • Breaker trip analysis • Switching data • CS90 signaling playback data • Signaling cable diagrams • Railway Infrastructure asset condition assessment (BBC8199 Version 4) for the level crossing (12/01/2018) • OHTE Level crossing condition assessment report (BBC8897) for the level crossing (22/03/2017) • 24Hr Incident report, notification number 1002075779 • Line diagram for Geneva station (10/09/1996) • BBB0481 Track Manual • Switching diagram BBB3754 & BBB3755 • Geneva level crossing risk register (date unknown) • TFR Issue based risk assessment for Geneva Level crossing (13/02/2018) • Reports from TFR on the previous level crossing accident

RSR	• New works and technology developments: Submittal acknowledgement (RSR(MWC)817/22/12/17) • Occurrence investigation protocol – 11 October 2017 • Investigations procedure Version 3 – 27 July 2017 • Occurrence investigations Framework – 10 June 2014
Sheltam	• Dynamic Traction & Brake Test Report Sheltam GE C30 (13/03/2018) • Static Brake Test Report (09/03/2018) • Certificate of Competency – FTM Mdwekesha (19/12/2017) • Certificate of Competency – MF Molepo (19/12/2017) •
RTMC	• Road Crash Investigation Report (RTMC MCI 18 1103)
SANS	• Part 2-2-1:2012 Technical requirements for engineering and operational standards – Track, civil and electrical infrastructure – Level crossings

Environmental evidence/Factors

6.7.27 This evidence relates to the physical environment that may have contributed to the incident.

6.7.28 This incident took place at 08h58 in the morning. The weather was clear and it was not cloudy or rainy. The environment or weather conditions did not contribute to the incident.

6.7.29 The track conditions were favourable for the train to stop safely if there was any intention to stop the train.

6.7.30 The track towards the level crossing is straight for at least 500 m before the point of the incident which means the line of sight for train driver was very clear.

6.7.31 The level crossing is located on a gravel road that is protected by advanced warning signs and a stop sign. Furthermore, the railway line is equipped with whistle boards on either sides of the level crossing.

7. PART G: FACTORS FOR CONSIDERATION

7.1 The BOI weighed all evidence discussed above and identified the following factors for consideration:-

7.1.1 The probable immediate cause of the collision between the train and the truck.

7.1.2 The contributory elements to the collision between the train and the truck.

7.1.3 The competency of personnel on the train regarding each of their roles.

7.1.4 The competency of personnel on the train regarding the reactive procedures to an incident such as the collision under review.

7.1.5 The suitability of the train to travel along the Geneva Section where the incident occurred.

7.1.6 The causes of the fire which ignited and burnt some of the coaches enjoined to the train.

7.1.7 The adequacy of the fire extinguishing equipment on the train.

7.1.8 The determination of whether there was effective response by PRASA, Transnet, the emergency services and the RSR to the incident.

7.1.9 The utilisation of rented locomotives by PRASA and its consequent impact on its safety permit and operations.

7.2 In consideration of the aforementioned factors and the evidence gathered, the BOI came to the conclusions and findings to be specified below.

8. PART H: THE CONCLUSIONS WITH IMMEDIATE AND UNDERLYING CAUSES

Conclusions relating to the occurrence

8.1 The incident between the train and the truck occurred at 08h56 on 04 January 2018.

8.2 The train collided with the second and last trailer of the truck between mast pole 111 and 112 and dragged the said trailer for 140 meters.

8.3 The train driver did not apply any brakes prior to impact.

8.4 The train was moving at a speed of 78 km/h at the time of impact.

8.5 The driver of the truck did not stop at the obligatory stop sign to allow the train to cross the level crossing as it had right of way.

8.6 Although there was overgrown vegetation along the level crossing, the visibility of the truck driver to notice the oncoming train was not compromised at the stop sign.

8.7 The weather conditions were clear and it was not cloudy or rainy.

8.8 The track conditions were favourable and the track line is straight for a distance measuring 500 meters away from the point of impact. The train driver's line of sight was therefore clear to observe any oncoming motor vehicles intending to cross the level crossing.

8.9 The level crossing is located on a gravel road which is protected by advanced warning signs and a stop sign.

8.10 The railway line along which the train was travelling is equipped with whistle boards on either sides of the level crossing.

8.11 From the evidence gathered, the train driver blew the whistle from the first whistle board which is 400 meters prior impact.

8.12 The locomotive involved in the occurrence is a diesel locomotive. It was leased by PRASA from Sheltam. The RSR had granted approval to PRASA to operate the locomotive.

8.13 The locomotive's maintenance was up to date at the time of the incident. Notwithstanding the maintenance of the locomotive being in order, one identified defect or fault was reported, namely, that it could not travel at a speed beyond 86 km/h as that would result in its power failing and consequently bringing it to a stop. This is contained in the trip report and register from the train driver.

8.14 The maintenance of the coaches involved in the incident was up to date. Road worthy certificates for the coaches was issued.

8.15 The coaches do not have emergency exits and the doors are too heavy to be opened by a person in case of an emergency.

8.16 The windows on the coaches are so small that a human being cannot escape through them.

8.17 The external material of the coaches are not 100% fire resistant or retardant. The coaches' are made of vinyl material which is a synthetic man-made material. This

is a type of plastic made from ethylene (crude oil) and chlorine which are both not 100% fire resistant.

8.18 The arcing of the 3kV DC overhead track equipment which did not switch off or detect fault during the collision caused fire soon after impact. The heat generated by the cables that arced onto the exterior of the coaches caused the interior of the coaches to also catch alight. The fire did not spread from one coach to the other. Each coach was set alight separately on contact with the overhead track equipment.

8.19 From the evidence gathered, the fire extinguishers in the coaches were not enough to extinguish the fire although there is certification that they were functional and calibrated within the twelve (12) months compulsory period.

8.20 The train driver and the train assistant did not undergo fitness examination or test for substance abuse prior to commencing with their shifts on the date of the incident.

8.21 No risk assessments were performed for the use of the affected locomotive by PRASA.

8.22 The train driver, train assistant and the train crew did not possess any safety training which would have guided them on how to react during an accident of this nature.

8.23 Passengers to the trains were not offered any safety briefing on how to evacuate or react in case of an accident or an emergency.

8.24 The section manager responsible for the Kroonstad section is overworked and has no person to relive her of her duties during her absence.

8.25 The Employee Assistance Programme ("EAP") provided to the train driver and the train assistant has demonstrated not to have been effective or beneficial to them.

8.26 The response by the RSR investigators to the scene of the incident was concerning.

8.27 The several rail incident command team reports as well as the meetings held by the team illustrate that there were no complains or impediments in activating, executing and managing the scene of the occurrence by both PRASA and TFR. There is also no report of PRASA and TFR being unable to cooperate with each other when managing the occurrence and clearing the section to restore services.

8.28 There was also no impediments from both PRASA and TFR in informing the RSR of the occurrence. Both organisations have been candid in providing the RSR with the details surrounding the occurrence as well as providing their own preliminary investigation reports in respect of the occurrence.

Causes of the occurrence

8.29 The truck driver did not stop at the compulsory stop sign when he was required to do so.

Cause of fire

8.30 The arcing of the 3kV DC overhead track equipment which did not switch off or detect fault during the collision caused fire soon after impact. The heat generated

by the cables that arced onto the exterior of the coaches caused the interior of the coaches to also catch alight.

Contributory causes to the incident

8.31 The causes which may have likely contributed to the deaths and injuries of passengers include the following:-

8.31.1 There were no adequate emergency exits in the coaches.

8.31.2 The doors of the coaches are too heavy for a person to open and evacuate in the case of emergency.

8.31.3 The material on the coaches is not 100% fire resistant and could not prevent fire from spreading into the coaches.

9. PART I: THE RECOMMENDATIONS

9.1 SHORT TERM (0-6MONTHS)

9.1.1 PRASA must undertake risk assessments on the coaches (including as to their interior designs and fittings) and locomotives that are used for MLPS.

9.1.2 PRASA must immediately ensure that a safety briefing is provided to all passengers when boarding trains to ensure that they are educated on how to react during a case of emergency.

9.1.3 PRASA must place enough serviced extinguishers in the coaches. Fire extinguishers to be certified every twelve (12) months period.

9.1.4 PRASA must prioritise the filling of safety critical vacancies, and in particular, personnel to relieve the section manager responsible for the section where the occurrence took place.

9.1.5 The EAP given to the train crew, particularly the train driver and train assistant involved in this incident must be reviewed with the intention of providing further EAP.

9.1.6 The RSR must improve on their responses and reaction to incidents of this nature. There was a policy in place. However, there was no adherence to the policy.

9.1.7 The RSR must ensure that properly trained personnel are always available even during holiday periods to allow that they be sent to site to investigate incidents of this nature.

9.1.8 PRASA must fully comply with RSR conditions of approval as far as Sheltam locomotives Class C-34 are concerned and a written report must be provided to the RSR.

9.2 **MEDIUM TERM (6 MONTHS TO 12 MONTHS)**

9.2.1 PRASA must improve staff training on emergency reaction and procedures especially in cases of mass emergency situations.

9.2.2 PRASA must address and implement a comprehensive system to deal with overloading of passengers and to deal with a manageable system for passenger ticket sales.

9.2.3 The RSR must review or put in place a standard monitoring system to approve changes to operators' permits and safety management systems.

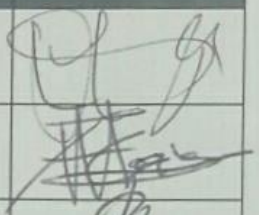
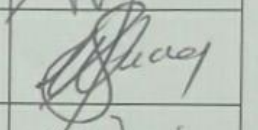
9.3 LONG TERM (12 MONTHS AND BEYOND)

9.3.1 PRASA must initiate a comprehensive study which focuses on the process of, and the installation of effective emergency exits on their coaches, if necessary to allow easy evacuation by passengers in case of emergencies such as in this occurrence.

9.3.2 TFR must initiate a program to roll out risk assessments of level crossings to determine the level of protection and safety risks at each of them. Consideration should be given to possible reduction in section speed where visibility is found to be an issue.

10. **PART:J**

BOARD OF INQUIRY MEMBERS SIGNATURES

NAME	MEMBER	COMPANY	SIGNATURE
Phatudi Maponya	Chairperson	Maponya Attorneys	
Given Mabaso	Rolling Stock Expert	MJT Consulting	
Willem Sprong	Electrical Expert	GIBB	
Moses Shaba	Human Factors Expert	Railway Safety Regulator