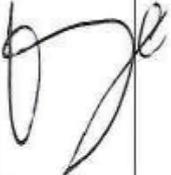


RSR BOARD OF INQUIRY REPORT	
OPERATOR	PRASA RAIL
PERMIT NUMBER	ASP0002NTS
INVESTIGATION SUBJECT	PRASA RAIL DENVER STATION REAR-END COLLISION OF 28 APRIL 2015
DATE OF OCCURENCE	28 APRIL 2015
REFERENCE NUMBER	RSR/20150428/011

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1. **PART A : OVERVIEW**

- 1.1. 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.
- 1.2. This report is 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.
- 1.3. This Board of Inquiry was mandated to investigate and examine the cause of the collision involving Metroplus Express Train 0600 and Business Express Train 1602 at the Denver Station, Johannesburg on 28 April 2015 at around 07h10. Both trains are operated by PRASA Rail.

RAILWAY SAFETY REGULATOR REF: **RSR/20150428/011**

TABLE OF CONTENTS

Alphabetical Part	Description	Page
1. PART A:	Overview with RSR Reference Number	4
1.1	Table of Contents	5
1.2	Executive Summary	6 – 22
1.3	Definitions	23 - 24
2. PART B:	Statement of purpose and privilege	25
3. PART C:	Terms of reference and method of investigation	26 - 27
4. PART D:	Details	29 - 30
5. PART E:	Brief description of the sequence of events	31 - 32
6. PART F:	Methodology and Summary of evidence	33 - 68
7. PART G:	Factors for consideration	69 - 71
8. PART H:	Conclusions with immediate and underlying causes	72 - 75
9. PART I:	Recommendations	76 - 79
10. PART J:	The names and signatures of the Board of Inquiry Members	80 - 81
11. PART K:	Annexures	81

2. EXECUTIVE SUMMARY

OBSERVATIONS AND COMMENTS BY THE BOARD OF INQUIRY

2.1. The Board of Inquiry reflects on the effectiveness and challenges faced in executing the mandate relating to the Terms of Reference of the Denver collision of 28 April 2015. It cannot be disputed that for the investigation to be conducted effectively, a number of role players should be involved to assist on a number of issues. The following are some of the issues observed by the Board of Inquiry during the execution of its mandate:-

2.1.1. The non-responsive and/or late response to requests for information by PRASA officials.

2.1.2. From the inception of this Board of Inquiry, members submitted various lists of information and/or documents. These lists were subsequently submitted to the appropriate PRASA official, the Nominated Manager. The majority of the information requested was only provided after the intervention and involvement of the RSR and PRASA Rail Chief Executive Officers.

2.1.3. PRASA was reluctant to arrange and confirm the attendance of the interviews and consultations by its officials. Some PRASA senior officials failed to attend the hearings on the scheduled dates and times without prior notification to the Board of Inquiry.

2.1.4. The members of the Board of Inquiry submitted their respective reports outlining their findings and recommendations in detail. These reports are annexed hereto as indicated in Part K of the report. The reports include those submitted by the respective members prior to further consultations with PRASA's executive management members.

2.1.5. The Board of Inquiry succeeded in extensive consultations with the identified witnesses, however, it must be highlighted that at the time of the hearings, the driver of Business Express Train 1602 was still in hospital. and the Board of Inquiry was therefore, not in a position to consult with her. The Board of Inquiry was advised by PRASA's Executive Management that

the driver of Business Express Train 1602 was undergoing medical rehabilitation and may not be in a state to engage on the events of 28 April 2015. The findings in this report are, therefore, based on available information provided by the witnesses that were consulted, including other documentary evidence provided by PRASA.

2.1.6. Nonetheless, the Board of Inquiry commends the driver of Metroplus Express Train 0600 for making himself available for the hearings despite not being in the employ of PRASA anymore. The driver was of assistance in providing important information.

2.1.7. The Board of Inquiry also notes the possible inability of the Nominated Manager to facilitate the provision of requested information and documents. The Board further observed the possible inability of the Nominated Manager to properly communicate with PRASA officials to attend the consultations as requested by the Board of Inquiry. In this regard, the Board recommends that the role of the Nominated Manager in facilitating communication between PRASA and the Regulator be reviewed in order to allow proper and efficient communication between them.

2.1.8. The Board of Inquiry is, however, appreciative and acknowledges all parties that played a role in this investigation.

2.2. TITLE OF THE SUBMISSION

This report is submitted in fulfilment of the investigation by the Board of Inquiry into the Denver rear-end train collision of 28 April 2015, involving Metroplus Express Train 0600 and Business Express Train 1602, both of which are operated by PRASA Rail.

2.3. PURPOSE

The purpose of this report is to succinctly detail the discoveries, findings and recommendations in relation to the rear-end train collision at the Denver Station on 28 April 2015 at around 07h10.

2.4. BACKGROUND AND REASON FOR INVESTIGATION

2.4.1. On 28 April 2015 at around 07h10, Business Express Train 1602, driven at the time by Ms M Sambo, collided with the rear-end of Metroplus Express Train 0600, which was driven by Mr M Mabuza. At the time of the accident, Ms M T Napo, was the Metro Guard in Metroplus Express Train 0600 and Mr S M Masombuka was the Metro Guard in Business Express Train 1602. The train collision occurred at Denver Station which is situated in the south eastern part of Johannesburg in the Gauteng Province.

2.4.2. Metroplus Express Train 0600 departed from Pretoria Station in the morning at around 06h00 and Business Express Metro Train 1602 departed from the same station at 06h15. Both trains departed on schedule and were en-route to Park Station in Johannesburg.

2.4.3. At approximately 07h06, Metroplus Express Train 0600 came to a standstill in front of signal number DN11 at the Denver Station .

2.4.4. The driver of Metroplus Express Train 0600 confirmed that he stopped at signal DN11 as a result of his inability to clearly see the aspect of signal DN11. After stopping, the driver proceeded to contact the local George Goch Centralised Traffic Control Office (CTC) to request a directive or authorisation to proceed. Metroplus Express Train 0600 was protected by signal DN2, which at the time of the accident was displaying a danger/red aspect. Signal DN1, which precedes signal DN2, was displaying a yellow aspect, which served as a caution to the driver of the Business Express Train 1602 to take certain actions from a train handling point of view in order to stop at the following signal, should that signal display a danger aspect.

2.4.5. Whilst in the process of contacting George Goch CTC, Business Express Train 1602, which had been proceeding in the same direction as Metroplus

Express Train 0600, passed a signal displaying a danger aspect and collided with the rear-end of Metroplus Express Train 0600, which was stationary at signal DN11.

2.4.6. PRASA concluded in its Board of Inquiry report that the accident was caused by the Business Express Train 1602, which failed to stop at signal DN2, displaying a danger aspect. As a result, it collided into the rear-end of Metroplus Express Train 0600.

2.4.7. Around 240 injuries were reported from both trains. The driver of Business Express 1602 was seriously injured and is reportedly still in a critical condition in hospital. The Metro Guard in Metroplus Express Train 0600 sustained fatal injuries.

2.5. SUMMARY OF THE FINDINGS

2.5.1. No faults or defects were reported on either of the trains on the date of the incident.

2.5.2. No reports of problems were reported on the signalling equipment at the Denver Station during any period prior to the incident.

2.5.3. Signals DN1, DN2 and DN11 were reportedly functioning properly at the time of the incident.

2.5.4. The aspect of signal DN11 may not have been clearly visible at the time of the incident, due to the sun shining directly into the lens of the said signal as alleged by the driver of Metroplus Express Train 0600.

2.5.5. There was a power failure at the George Goch CTC from approximately 01h00 to 12h00 on 28 April 2015.

2.5.6. The power failure affected the normal functioning of the George Goch CTC telephone lines as well as the trunk radio system.

- 2.5.7. Due to the power outage, the VoIP telephone and trunk radio system were not functioning at the time of the incident. The voice recording system was also not functioning at the time.
- 2.5.8. There is no backup power supply coupled to the VoIP telephone system and the trunk radio system at the George Goch CTC.
- 2.5.9. The Train Control Officers at the George Goch control centre had one cellular phone to communicate with Train Drivers in the section. This was the sole mode of communication between them and all Train Drivers in the section.
- 2.5.10. The driver of Metroplus Express Train 0600 did not have the alternative number(s) for the George Goch CTC and was, therefore, not successful in contacting the centralised traffic control centre.
- 2.5.11. The Traffic Control Officer on duty at the George Goch CTC did not have the contact details of the driver of Metroplus Express Train 0600.
- 2.5.12. The lack of communication and/or delayed communication between the driver of Metroplus Express Train 0600 and the appropriate Traffic Control Officer contributed to the delay in clearing Metroplus Express Train 0600 from signal DN11.
- 2.5.13. The driver of Business Express Train 1602 failed to adhere to signal DN1, which was displaying a yellow aspect (caution) and signal DN2, which was displaying a red (danger) aspect.
- 2.5.14. The driver of Business Express Train 1602 was driving at a speed of approximately 91 km/h in a 70 km/h speed restricted area and was, therefore, over the required speed limit for the section concerned.
- 2.5.15. The driver of Business Express Train 1602 only applied the brakes at approximately 332 metres from the point of impact. The distance (332 meters) was too short to bring the train to a complete stop without colliding with the stationary train.

- 2.5.16. Inadequate EAP support was given to the driver of Metroplus Express Train 0600 after the incident.
- 2.5.17. There is a shortage of personnel in the critical areas of the operator, which includes, but is not limited to Train Drivers, Technicians, Train Control Officers and Metro Guards.
- 2.5.18. Driver behaviour studies have been a topic of discussion within PRASA for a long time, however, implementation has been slow. These studies are crucial to eliminate the unsafe behaviours contributing to a number of accident(s) within the organisation.
- 2.5.19. The driver behaviour studies did not take place as planned due to the alleged lack of financial resources at PRASA. This delay has become detrimental to the safety of employees and commuters on the basis that emotionally challenged drivers have been allowed to drive trains without addressing the human root causes, which contributed to the incidents or accidents they have been involved in.
- 2.5.20. The Train driver of Metroplus Express Train 0600 was not tested for substance abuse before the beginning of his shift as per the procedural requirement. Poor supervision and verification by the line manager was identified in this regard.
- 2.5.21. There seems to be no employee standby policy, ensuring that if a Train Driver scheduled for duty fails to report for duty, the rooster is updated to reflect the substitution of the said driver.
- 2.5.22. There is a misalignment in that the Procurement Officers understand that the trunk radios that were procured are in good working condition, whereas the Operations Managers have mentioned that the trunk radios are still to be procured, hence they are currently dysfunctional.
- 2.5.23. The current Supply Chain Management Policy is being reviewed for improvement and to enhance efficiency in procurement.

- 2.5.24. The maintenance of the current infrastructure, both immovable and movable, appears to be very low in terms of the financial analysis on the allocated budgets.
- 2.5.25. PRASA Rail in its current form does not have sufficient revenue to cover all its operating expenses. Its biggest cost relates to personnel expenditure.
- 2.5.26. The overall maintenance costs are low. The average maintenance costs and its material costs are 1% and 5% respectively for the period between 2012 and 2016. Therefore, the overall maintenance expenditure is 6% of the total expenditure for the years mentioned above.
- 2.5.27. Staff costs and personnel expenditure are not maintenance expenditure and should not be classified as maintenance.
- 2.5.28. The 1% and 5% maintenance, as well as material expenditure, are illustrated by the following financial analysis report received from PRASA's financial manager:-

	<u>2013</u>		<u>2012</u>	
<u>Description</u>	<u>Budget</u>	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>
Maintenance	108 754 360	45 127 480	100 589 855	29 260 760
Material	60 395 331	95 848 715	60 480 361	88 740 903
Operating expenses	1 853 794 859	2 216 076 129	1 778 624 334	2 120 817 301
Maintenance %	6%	2%	6%	1%
Material %	3%	4%	3%	4%
%	9%	6%	9%	5%

2016

2015

2014

<u>Description</u>	<u>Budget</u>	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>	<u>Budget</u>	<u>Actual</u>
Maintenance	31 737 593	10 858 748	38 013 602	32 703 587	71 185 970	57 586 028
Material	114 269 557	61 637 908	76 116 131	102 294 619	95 211 939	89 392 564
Operating expenses	2 315 307 479	1 150 903 318	1 986 557 819	2 247 485 249	2 109 491 758	2 200 965 380
Maintenance %	1%	1%	2%	1%	3%	3%
Material %	5%	5%	4%	5%	5%	4%
%	6%	6%	6%	6%	8%	7%

2.5.29. PRASA Rail does not generate enough income to cover its operating costs and relies heavily on government funding to fulfil all the necessary expenditure commitments.

2.5.30. The cause of the collision under review can be attributed to human error on the part of the driver of Business Express Train 1602, who was speeding and failed to apply the brakes timeously to avoid the collision.

2.5.31. However, the lack of substance abuse tests on the driver of Metroplus Express Train 0600 may have also contributed to the incident in that the fitness of the driver cannot be ascertained as no proof of his fitness can be provided. In this regard, the mere fact that the driver of Metroplus Express Train 0600 could not see the aspect of signal DN11 must be considered with caution.

2.5.32. Below are pictures depicting the scene of the accident, the positioning of Business Express Train 1602, point of incident from Toronga side, Denver section layout showing the location of the incident and the speed limit just before the point of incident:-



Figure 1: View of point of incident from Toronga side



Figure 2: Damage to the leading motor coach of Business Express Train 1602

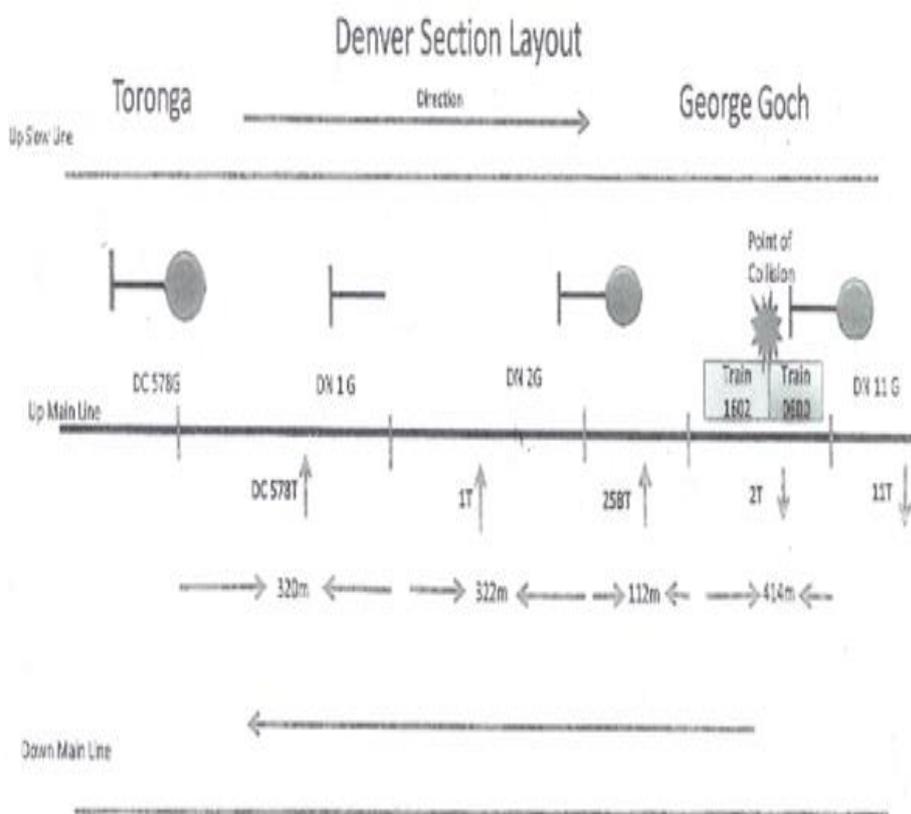


Figure 3 : Denver Section layout showing the location of the incident



Figure 4: Speed limit just before point of incident

2.6 SUMMARY OF RECOMMENDATIONS

- 2.6.1 The trunk radios must be used as the principal source of communication between Train Drivers and the respective Traffic Control Officers. The Regulator should be harsh in dealing with non-compliance regarding the resistance of instructions to use the trunk radio system. PRASA should provide the Regulator with an implementation programme relating to the trunk radio system's functionality and reliability.
- 2.6.2 PRASA must, as a matter of urgency, provide a separate power supply backup to the VoIP telephone system and the trunk radio system or couple these systems to the existing backup supply at all CTC's.
- 2.6.3 PRASA should implement a system where contact details of TrainDrivers and Train Control Officers are updated on a daily basis and given to the officials when they start their shifts.
- 2.6.4 The use of cellular phones between Train Drivers and Control Officers must be discontinued as soon as the trunk radio system is re-integrated and fully functional.
- 2.6.5 All trunk radios should be repaired and maintained on a regular basis and the Regulator must be provided with quarterly maintenance reports in this regard.
- 2.6.6 A competent contractor must be appointed to assist with the immediate maintenance and repairs of the existing trunk radio system and related equipment.
- 2.6.7 Risk assessments must be done on all searchlight signals. These signals must be replaced with 3-aspect signals or other resourceful signals.
- 2.6.8 PRASA must effectively prioritise the implementation of the Automated Train Protection System to avoid human errors, which cause incidents of this nature.

- 2.6.9 It is recommended that PRASA continue with the weekly and monthly railway inspections involving all internal departments within the business. Reports from these inspections must be detailed and the findings must be comprehensive and communicated as well as optimally implemented.
- 2.6.10 The EAP support given to the driver of Metroplus Express Train 0600 must be reviewed with a view of providing further wellness assistance to him.
- 2.6.11 PRASA should conduct driver behaviour studies as indentified in previous incidents and investigations to identify causal factors and human errors associated with train driving in general and SPADS, in particular.
- 2.6.12 PRASA should undertake further testing of Metrorail vehicles of all types to confirm braking performance in both tare and laden conditions and in both dry and wet conditions. These results should be provided to the Regulator upon request.
- 2.6.13 As a matter of urgency, PRASA must fill all critical grades vacancies, including Technicians, maintenance and other operational personnel as this incapacity impacts negatively on staff performance and operational safety and efficiency.
- 2.6.14 The EAP involvement with the affected parties, in case of incidents of this nature, needs to be reviewed to cater for a detailed, intensive programme post the incident to ensure that the affected parties are responding to the interaction. A follow-up programme should be put in place to assess the effectiveness of the treatment provided.
- 2.6.15 The EAP and Human Resources Departments need to review the consultation approach for accident victims and not wait for the victims to request the service. Rather, sessions should be compulsory to all who are exposed to these unfortunate situations.

- 2.6.16 PRASA should review the process of testing for substance abuse by introducing compulsory testing for all employees in safety critical roles including, but not limited to, Technicians, Train Drivers, Metro Guards as well as Section Managers. Testing should be conducted at the beginning and end of each shift. This is due to the fact that the driver of Metroplus Express Train 0600 was not tested for substance abuse on the date of the incident.
- 2.6.17 The current signing-on duty process is limited to a substance abuse test; PRASA must review this process to include fatigue management, declaration of medication, fitness for duty assessment and an updated medical surveillance report as required by the SANS 3000:4.
- 2.6.18 It is recommended that PRASA review the Train Driver and Train Control Officers' training material as well as the assessment of competency to ensure that it meets their current operational challenges. PRASA should ensure that training is updated based on any identified gaps.
- 2.6.19 The Regulator must speed up the implementation of the certification of safety critical grades.
- 2.6.20 PRASA must review the maintenance expenditure budget in light of the fact that the infrastructure is old and it needs high maintenance.
- 2.6.21 The backlog maintenance needs to be reviewed to ensure safety while the new capital investment is being rolled out.

2.7 PREVIOUS RECOMMENDATIONS

2.7.1 On perusing the previous investigation reports provided by the Regulator relating to incidents of this nature, it was noted that the previous Board of Inquiries set-up by the Regulator submitted detailed reports. These reports dealt specifically with the identified causes of such incidents. As an example, the Board of Inquiry noted in the report for the Cor Delfos and Kalafong Station collision in Pretoria that took place on 31 January 2013 that it was recommended that there is a need for Train Drivers to use train radio phones as a mode of communication with Train Control Officers, as opposed to cellular phones. The said Board of Inquiry recommended that the Regulator invoke the penalty regulation in the event that PRASA does not adhere to the rules.

The Board further notes that SPADS are among the leading causes of these types of incidents. The schedule below summarises the history of rear-end collisions.

History of rear-end collision Occurrences

Description	Date	Immediate/Root Causes
SARCC rear-end collision of Train 9019 and 9013 between Midway and Lenz	2 February 2009	<ul style="list-style-type: none"> • Signal Failure
Rear-end collision of Metro Train 9540 and Metro Train 9654 near Akasiaboom on 08 April 2011	8 April 2011	<ul style="list-style-type: none"> • SPADS • Speeding
Rear-end collision of Metro Train 0907 and TFR Goods Train 4663 near New Era on 02 January 2011	2 January 2011	<ul style="list-style-type: none"> • SPADS • Speeding
Rear-end collision of Metro Train 0907 and Metro Train 8882 near Alliance on 14 January 2011	14 January 2011	<ul style="list-style-type: none"> • SPADS • Speeding
Collision Springs - Brakpan	2 February 2009	<ul style="list-style-type: none"> • SPADS • Driver did not wear spectacles • Driver did not follow operating rules
Merafe Train-on-Train Collision	13 July 2005	<ul style="list-style-type: none"> • SPADS • Failing to adhere to train operating rules
Collision Wonderboom	8 May 2009	<ul style="list-style-type: none"> • SPADS • Signal passed showing no aspect • Speeding

Rear-end collision of Metro Train 9905 between Lebaleng and Soshanguve stations in Pretoria North	4 February 2012	<ul style="list-style-type: none"> • SPADS • Lack of supervision
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2.7.2 We find that in the accident under investigation, amongst other contributing factors, communication played a big role and contributed to the accident. The operator failed to implement the effective usage of the train radio system. The Board of Inquiry, therefore, recommends that the Regulator design a programme which will assist it in following up on the implementation of recommendations made to PRASA as it appears that the operator does not attend to recommendations.

2.8 FOLLOW-UP CONSULTATIONS WITH EXECUTIVE MEMBERS FROM PRASA

2.8.1 On 14 and 15 October 2015, at the request of the Chief Executive Officer of the Regulator, the Board of Inquiry conducted further consultations with the executive members of PRASA.

2.8.2 The following executive members were invited and attended:-

2.8.2.1 The Provincial Manager at PRASA Rail in Gauteng Province;

2.8.2.2 The Regional Manager at PRASA Rail in Gauteng West Region;

2.8.2.3 The Regional Manager at PRASA Rail in Gauteng North Region;

2.8.2.4 The Regional Finance Manager at PRASA Rail in Gauteng;

2.8.2.5 The Senior Manager responsible for budget at PRASA Rail;

2.8.2.6 The Executive Manager responsible for (Human Resources) Rail Operations and PRASA Rail; and

2.8.2.7 The Acting Executive Manager for Engineering Services.

2.8.3 The executive members' submissions were of assistance and the Board appreciates their inputs and participation in this Inquiry.

3. **DEFINITIONS**

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

3.1.1 “BOI” denote the Board of Inquiry;

3.1.2 “CEO” denote the Chief Executive Officer;

3.1.3 “CTC” means the Centralised Traffic Control;

3.1.4 “CPU” means Central Processing Unit;

3.1.5 “Denver Station” refers to the place of incident;

3.1.6 “EAP” means the Employees Assistance Programs;

3.1.7 “km/h” means Kilometre per hour;

3.1.8 “Metroplus Express Train 0600” refers to the stationery train which stopped at signal DN11;

3.1.9 “Business Express Train 1602” refers to the train, which collided with the rear part of Metroplus Express Train 0600;

3.1.10 “Mr Mabuza” refers to the Train Driver of the stationery Metroplus Express Train 0600;

3.1.11 “Ms Napo” refers to the deceased Metro Guard in Metroplus Express Train 0600;

3.1.12 “Ms Sambo” refers to the driver of Business Express Train 1602, which collided with Metroplus Express Train 0600;

3.1.13 “Mr Masombuka” refers to the Metro Guard in Business Express Train 1602, which collided with Metroplus Express Train 0600;

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

3.1.15 “RSR” means the Railway Safety Regulator;

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

3.1.17 “RCAT” means Root Cause Analysis Technique;

3.1.18 “TCO” means the Train Control Officer;

3.1.19 “UPS” means the Uninterruptible Power Supply;

3.1.20 “VoIP System” refers to the telephone technology of placing and transmitting telephone calls over an IP network.

4 PART B: STATEMENT OF PURPOSE AND PRIVILEGE

- a. The Board of Inquiry was mandated to investigate and examine the cause of the collision involving Metroplus Express Train 0600 and Business Express Train 1602 at the Denver Station, Johannesburg on 28 April 2015. The investigation is aimed at the following:
 - i. Establishing the facts regarding the collision;
 - ii. Determining the instant and primary causes of the collision; and
 - iii. Making recommendations to avoid or diminish the risk of recurrence of collisions of this nature.

- b. This report should not be used for any purpose other than as specified above and should not be distributed to any other party or parties without prior written consent from the Railway Safety Regulator.

5. **PART C: TERMS OF REFERENCE AND METHOD OF INVESTIGATION**

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

5.1.1. The adequacy, effectiveness and personnel knowledge of the relevant procedures and training;

5.1.2. Background regarding activities pertaining to adherence, specifically applicable train operating procedures by the Train Drivers and the Train Control Officers concerned as set out in applicable instructions as well as other applicable directives;

5.1.3. The adequacy and effectiveness of maintenance systems and procedures for signals and rolling stock;

5.1.4. The effectiveness of the Railway Safety Regulator's previous recommendations issued to the operator regarding a similar type of occurrence; and

5.1.5. The train crew's previous occurrence history.

5.2. The Board of Inquiry is further required to make robust recommendations to prevent and/or reduce the risk of, and/or mitigate the consequence of recurrence of the accident. Furthermore it is requested to formulate recommendations in such a way that:-

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

5.2.2. The recommendations are measureable, practical and attainable; and

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

5.3. The Board of Inquiry followed the following methodology in conducting the investigation:-

5.3.1. Obtained, reviewed and analysed various documents and statements made to the investigation by various officials from PRASA;

- 5.3.2. Conducted interviews with relevant personnel from PRASA to ascertain the cause of the collision;
 - 5.3.3. Documented the results of interviews conducted and detailed them in this report;
 - 5.3.4. Corroborated the representations of the interviews to assess the extent of the reliability of the representations;
 - 5.3.5. Conducted a final analytical review and assessment of the evidence gathered and drew conclusions, which are detailed at the end of this report; and
 - 5.3.6. Prepared this report summarising findings and recommendations.
- 5.4. Conducted site inspection by visiting PRASA's facilities to understand the operations procedures, in particular to observe and analyse how trains are operated.
 - 5.5. Representatives from PRASA, including Train Control Officers and Section Managers, were in attendance.
 - 5.6. The following guided the production of this report:-
 - 5.6.1. Train Working rules;
 - 5.6.2. National Railway Safety Regulator Act 16 of 2002 (as amended);
 - 5.6.3. Railway Safety Regulator Regulations; and
 - 5.6.4. Legal principles on the law of evidence.
 - 5.7. The Board also received and considered comments from PRASA on the preliminary draft report provided to them .

6. PART D: DETAILS

- 6.1. On 28 April 2015 at around 07h10, Business Express Train 1602 collided with Metroplus Express Train 0600 at the Denver Station, in the south eastern part of Johannesburg. Both trains are operated by PRASA Rail.
- 6.2. Both trains were travelling from the Pretoria Station to Johannesburg Station with the following itinerary:-
 - 6.2.1. Metroplus Express Train 0600 was scheduled to depart from Pretoria to Johannesburg at 06h00 with the following stopping stations and departure times:-
 - 6.2.1.1. Centurion (06h15);
 - 6.2.1.2. Birchleigh (06h37);
 - 6.2.1.3. Kempton Park (06h42);
 - 6.2.1.4. Isando (06h46);
 - 6.2.1.5. Germiston (06h58); and
 - 6.2.1.6. Arrival at Johannesburg Station at 07h14.
 - 6.2.2. Business Express Train 1602 was scheduled to depart from Pretoria to Johannesburg Station at 06h15 with the following stopping stations and departure times:-
 - 6.2.2.1. Centurion (06h25);
 - 6.2.2.2. Kempton Park (06h56); and
 - 6.2.2.3. Arrival at Johannesburg Station at 07h24.
- 6.3. Both trains departed on time from the Pretoria Station without any delays.
- 6.4. All the personnel from the two trains were booked to work their shifts on 28 April 2015, except for the driver of Metroplus Express Train 0600, Mr Mpho Mabuza. He was requested to stand in for another driver who called in sick on the morning

of 28 April 2015. Mr Mabuza was purportedly scheduled to attend a union meeting in Johannesburg on that day.

- 6.5. The officials on duty in the respective trains were the following:-
 - 6.5.1. Mr M Mabuza – driver of Metroplus Express Train 0600;
 - 6.5.2. Ms T Napo – Metro Guard in Metroplus Express Train 0600;
 - 6.5.3. Ms M Sambo – driver of Business Express Train 1602; and
 - 6.5.4. Mr S Masombuka – Metro Guard in Business Express Train 1602.
- 6.6. At around 07h05, Metroplus Express Train 0600 was to pass the Denver Station when the driver of the train indicated that he could not see the aspect of signal DN11 at Denver Station properly.
- 6.7. The signalling system used in the Denver area is the old type searchlight signals.
- 6.8. No Automated Train Protection systems are in place on any of the PRASA regions.
- 6.9. As a result of this visual inability, the driver of Metroplus Express Train 0600 stopped in front of signal DN11 to request authorisation from the George Goch CTC to move forward.
- 6.10. The actions of the Train Driver of Metroplus Express Train 0600 were appropriate and in conformity with clause 174 (1) and (2) of the Metrorail Train Working Rules. These clauses require that a driver must reduce speed of his/her locomotive if signals are not clearly visible to him/her. Thereafter he/she ought to report such case and request authority from the relevant Train Control Officer to proceed.
- 6.11. The attempts of the driver of Metroplus Express Train 0600 to contact the George Goch CTC were of no significant consequence for the following reasons:-
 - 6.11.1. There was a power outage/failure at the centre since around 01h08 on 28 April 2015;
 - 6.11.2. The trunk radio system was offline and dysfunctional;

- 6.11.3. The telephone system at the control office was dysfunctional due to the power outage; and
- 6.11.4. The driver did not have the Train Control Officer's cellular phone number to contact him/her directly for assistance.
- 6.12. In view of the inability to contact the George Goch CTC, the driver of Metroplus Express Train 0600 contacted the Operations Control Centre in Braamfontein directly for assistance.
- 6.13. The control centre in Braamfontein proceeded to contact the George Goch CTC on the Train Control Officer's cellphone to request assistance for the driver of Metroplus Express Train 0600.
- 6.14. As the control centre in Braamfontein was providing the contact details of the Train Driver involved, Business Express Train 1602 collided into the rear-end of the stationery Metroplus Express Train 0600.
- 6.15. This happened at approximately 07h10.
- 6.16. Approximately 240 people were injured and the Metro Guard in Metroplus Express Train 0600 suffered fatal injuries.

7 PART E: A BRIEF DESCRIPTION OF THE SEQUENCE OF EVENTS

TIME	DESCRIPTION	PERSON RESPONSIBLE
01:08	Power outage at George Goch Centralised Traffic Control	Mr Leon Sieberhagen (Acting TCO George Goch)
07:06:27	Metroplus Express Train 0600 stopped at Denver Station, Signal DN 11 for authorisation	Driven by Mr Mpho Mabuza
07:11:10	Business Express Train 1602 cleared Signal DN 1, which was on caution yellow	Driven by Ms M Sambo
07:11:22	Business Express Train 1602 cleared signal DN 2 at danger	Driven by Ms M Sambo
07:11:29	Business Express Train 1602 started braking to avoid colliding with stationary Metroplus Express Train 0600	Driven by Ms M Sambo

07:11:49	Business Express Train 1602 collided with the rear-end of Metroplus Express Train 0600	Driven by Ms M Sambo
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8. PART F: METHODOLOGY AND SUMMARY OF EVIDENCE

- 8.1. The Board of Inquiry in its investigative process commenced the process with a site inspection on 25 June 2015. The areas visited included Denver Station i.e. the place of the accident, George Goch CTC and Braamfontein depot.
- 8.2. A further physical footplate inspection on Metroplus Express Train 0600 was conducted on 17 July 2015. This inspection was conducted at the same time as the accident in question in order to observe the visibility of signal DN11.
- 8.3. In making its findings, the Board of Inquiry further utilised several documentary evidence provided by the Regulator and the operator.
- 8.4. The following are the common facts emanating from all documents submitted including, but not limited to, PRASA's investigative report for perusal and consideration:-
 - 8.4.1. The collision under review occurred at around 07h10 on the morning of 28 April 2015;
 - 8.4.2. There was no power supply at the George Goch CTC, which resulted in the telephone lines not being functional;
 - 8.4.3. There was/is no power backup system for the telephones at the George Goch CTC;
 - 8.4.4. No signalling related faults were reported at the Denver Station, particularly on signal DN11 and DN2 or DN1 prior to the collision;
 - 8.4.5. From the trip loggers of Business Express Train 1602, the driver started applying brakes at approximately 332 metres from the point of impact;
 - 8.4.6. Both trains, inclusive of all coaches connected to them measured 350 metres jointly, i.e. Metroplus Express Train 0600 measured 240 metres and Business Express Train 1602, 110 metres;

- 8.4.7. The driver of Metroplus Express Train 0600 acted appropriately in terms of the rules to stop at signal DN11 due to his inability to see the aspect on signal DN11;
- 8.4.8. Medicals for all personnel involved in the accident were up to date.
- 8.4.9. According to assessments conducted during January 2015, all train personnel involved in the accident had sufficient road knowledge ; and
- 8.4.10. All personnel on the two trains were tested for substance abuse, except the driver of Metroplus Express Train 0600, Mr Mabuza. The test undertaken revealed negative results.
- 8.5. The BOI conducted interviews with various witnesses in order to establish the facts and issues regarding the incident under discussion. These hearings were conducted in an orderly manner from 8 to 10 July 2015. The Regulator's responsible Principal Inspector was found to be more hands on and more involved in providing the required assistance. The Board consulted with the identified witnesses ranging from the Depot Manager, Safety Managers, Technicians, Human Resources Manager, EAP Practitioner, Nominated Manager, driver of Metroplus Express Train 0600 and the Metro Guard of Business Express Train 1602.
- 8.6. On 2 September 2015 the BOI called for a follow-up consultation hearing with the following persons: Ms M Sambo, Mr M Bopape, Mr A Rabakane and Mr T Kulu. Only one of the invited Senior Managers attended the hearing.
- 8.7. On 14 and 15 October 2015, the Board conducted further interviews with members of the executive team of PRASA to establish the root causes as well as several policy and operational factors which contributed to the origins of incidents similar to the Denver station accident of 28 April 2015.

WITNESSES STATEMENTS

8.8. GAUTENG NORTH DEPOT MANAGER

- 8.8.1. The witness testified that he was the current Depot Manager at the Scheiding Depot in Pretoria.
- 8.8.2. He indicated that he functions as the managerial authority of the Depot and reports to the Regional Manager.
- 8.8.3. He has eight Section Managers reporting to him.
- 8.8.4. The witness testified that he runs the Depot with approximately 43 Train Drivers. He indicated that he was supposed to have 63 Train Drivers.
- 8.8.5. He confirmed that the primary means of communication for Train Drivers is the signalling.
- 8.8.6. He reported that in the event the signalling is faulty, drivers make use of the company issued cellular phones to contact the relevant control office controlling the particular section.
- 8.8.7. Cellular phones have been issued to every Train Driver in the employ of PRASA. The phones are loaded monthly with airtime to the value of R200.00.
- 8.8.8. Drivers are responsible for ensuring that the allocated airtime is not exhausted before a particular month comes to an end.
- 8.8.9. He testified that the trunk radio system has been out of order for about four to five years.
- 8.8.10. The current trunk radio system is not yet fully functional and can therefore not be used as a means of communication between the Train Drivers and the relevant control office.
- 8.8.11. He indicated that at times, the Train Drivers cannot be reached, even by means of cellular phone communication. This may be in the event that the driver forgot to charge the battery or if it is off for whatever reason.

- 8.8.12. He confirms that there is no backup system for cellular phone communication.
- 8.8.13. He also indicated that there was no Communication Policy incorporating or regulating cellular phone communication.
- 8.8.14. The witness indicated that the Train Drivers normally work 14 – 15 hours per day. He, however, stated that the standard working hours are 10-12 hours a day. The drivers are entitled to a one hour lunch break after five hours of work.
- 8.8.15. He indicated that the reason for the shortage of train drivers is also fuelled by a moratorium dated March 2015, which provided that no train drivers should be appointed to fill vacant positions.
- 8.8.16. He stated that the moratorium seems to emanate from a problem of a financial nature.
- 8.8.17. The witness also indicated that overtime benefits were delayed during the month of April 2015. He reported that his was only paid in May 2015.
- 8.8.18. He stated that this late payment arrangement was only communicated to the employees on 22 April 2015.
- 8.8.19. He stated that the late payment placed strain on the employees and that their morale was subsequently affected.
- 8.8.20. In his view, the collision was caused as a result of human error on the part of the Train Driver of Business Express Train 1602 who may have failed to observe the signal(s) which cautioned her to stop.

8.9. METRO GUARD BUSINESS EXPRESS TRAIN 1602

- 8.9.1. He testified that he is currently employed as a Metro Guard by PRASA. He is based at the Scheiding Depot in Pretoria and joined PRASA in 2007 as a Metro Guard.
- 8.9.2. His day to day duties include checking when commuters get on and off the trains. This includes ensuring that the train doors are closed properly before a train departs.
- 8.9.3. The witness stated that he reports to section managers who are on duty at the beginning of his shift.
- 8.9.4. On the day of the incident, he was on duty on Business Express Train 1602. He was paired with train driver, Ms Sambo, whom he normally works his shifts with.
- 8.9.5. He signed in at approximately 05h30 on the day of the collision under review.
- 8.9.6. The Section Manager on duty on the day was Laurika Wesserman.
- 8.9.7. He stated that substance abuse procedures were performed on him and the driver of Business Express Train 1602, and that both of them tested negative for substance abuse.
- 8.9.8. He stated that he did the train preparation procedures with the driver. This preparation included doing a braking system test to determine whether the brakes are functioning properly.
- 8.9.9. He stated that the braking system as well as all other tests on the train were in order and did not reveal any deficiencies.
- 8.9.10. The train then departed from Pretoria at 06h15 to Johannesburg Station. The train was scheduled to arrive in Johannesburg at 07h30
- 8.9.11. He reported that the train stopped at Centurion and thereafter at Kempton Park.

- 8.9.12. According to him the train was moving at the normal acceptable speed, but he sensed that it was moving faster after departing from Germiston station. He reported that after Germiston station, and as they were approaching the Denver Station, he heard a hooter from their train and thereafter heard a loud sound. He indicated that he could not tell whether it was a collision.
- 8.9.13. He stated that he initially thought it was a wiring problem on the railway.
- 8.9.14. He checked through the window and then realised that their train had actually derailed.
- 8.9.15. Soon thereafter he called the Section Manager on duty in Pretoria to inform her of the derailment. The Section Manager was Laurika Wesserman who he reported to in the morning of the incident.
- 8.9.16. He further called the Control Office in Johannesburg and spoke to one Nicole Sihlangu notifying them of the collision.
- 8.9.17. He went to the front of the train and found that the Train Driver from his train was trapped between the train and a building.
- 8.9.18. He stated that the driver was conscious at the time and requested that she be freed from the entrapment.
- 8.9.19. He reported that since he started working on this particular train he has never identified any braking or mechanical problems.
- 8.9.20. He informed the BOI that since he was seated at the back of the train, he could not tell what the cause of the collision was.

8.10. SECTION MANAGER FOR TRAIN DRIVERS, PRETORIA

- 8.10.1. He stated that he was the Section Manager responsible for the Train Driver in Business Express Train 1602.

- 8.10.2. He joined PRASA in December 1980.
- 8.10.3. His work experience includes being a ticket examiner, train driver and metro guard.
- 8.10.4. He started working as a Section Manager in 2000.
- 8.10.5. His job description includes ensuring that the rules of the company and railway are observed and followed by the train drivers and metro guards.
- 8.10.6. He stated that all personnel involved in the incident, with the exception of the driver of Metroplus Express Train 0600, Mr M Mabuza, were tested for substance abuse . He was allegedly not tested for substance abuse as he was reportedly not scheduled to drive the train on the particular day and was therefore running late.
- 8.10.7. The witness indicated that according to him the incident under review was a result of a communication breakdown between the Train Driver and the George Goch CTC. This was as a result of the nonfunctioning telephones and trunk radio system.
- 8.10.8. He also indicated that he thinks the late payment of overtime benefits may have contributed to the crew members losing focus or concentration.
- 8.10.9. He stated that in his view, PRASA did not handle the late overtime payment issue properly.

8.11. SECTION MANAGER AND ACTING TRAIN CONTROL OFFICER AT GEORGE GOCH ON 28 APRIL 2015

- 8.11.1. The witness testified that he was the Section Manager based in Braamfontein.

- 8.11.2. He took control of the Cleveland-Denver panel in the George Goch Control Centre at approximately 06h05, after the scheduled Train Control Officer notified the office that he/she was delayed due to vehicle problems.
- 8.11.3. On the morning of the incident, no signalling related failures or concerns about the visibility of signals were reported for the particular section. Neither was any complaints received about the visibility of the signals in this area leading up to the day of the incident.
- 8.11.4. He stated that at George Goch CTC the primary means of TCO and train driver communication is the existing telephone system. In case of the primary communication system failing, the trunk radio system is used as a backup. On the day of the incident none of these systems were functional due to a power failure/outage.
- 8.11.5. None of these systems are coupled to the backup electricity supply that supports the signalling system in case of a power failure. This backup is maintained by the Signalling Infrastructure Department.
- 8.11.6. The lack of communication on the date of the incident as a result of the power failure was not officially reported to the Telecommunications Department. The concern about the effects of the power failure and the resultant lack of communication was, however, raised to management previously. No evidence of this, however, exists or was provided to the BOI.
- 8.11.7. The Operations Department is aware that the communication with train drivers by means of cellular telephones are not being recorded by the voice recorder.
- 8.11.8. The train control personnel at George Goch CTC have no list / database containing the drivers' contact details, including their cellular phone numbers.
- 8.11.9. He indicated that he had a cellular phone to assist five panels with communication at George Goch CTC on the morning of the incident.

- 8.11.10. He stated that on the date of the incident, the Braamfontein Office called him to assist with authorisation for the driver of Metroplus Express 0600.
- 8.11.11. He states that he was trying to obtain the cellular phone number of the driver of Metroplus Express 0600 when the Business Express Train 1602 collided into the rear part of Metroplus Express 0600.
- 8.11.12. In his view, Business Express Train 1602 was running ahead of schedule.
- 8.11.13. He confirmed that during a power failure at George Goch CTC only the signalling (panel and diagram) and the emergency lights function are operational. In his view the incident could have been avoided if communication with the driver of Metroplus Express Train 0600 was established quicker.

8.12 TRAIN TRAFFIC MANAGER

- 8.12.1 She testified that she is currently employed as a Traffic Manager and has seven Section Managers reporting to her.
- 8.12.2 Her duties include managing the Section Managers and ensuring that they do their work properly.
- 8.12.3 She reported that she is, however, short-staffed with section managers and as a result they perform both section manager duties and train control officers' duties.
- 8.12.4 She reported that the employees' morale started being low when the 45 hours weekly overtime arrangement was introduced.
- 8.12.5 She reported that the new overtime arrangement or policy was introduced around February or March 2015.
- 8.12.6 She, however, stated that the employees and or their unions knew of the overtime arrangement since October 2014 and it was to be implemented in January 2015.

- 8.12.7 She reported that they lost a lot of employees and are continuing to lose more due to the Overtime Policy.
- 8.12.8 She reported that every employee who was entitled to overtime benefits received a lump sum payment of R 10 000.00 in December 2014 to cater for this transition.
- 8.12.9 She confirmed that at George Goch CTC there was no backup system for telecommunications.
- 8.12.10 She reported that the reason for the non-functioning telephones at the George Goch CTC on the date of the incident was due to a power failure/outage.
- 8.12.11 She reported that not many SPADS or complains were reported at the Denver station railway line prior to the collision under review.
- 8.12.12 She testified that in her opinion, the train driver of the Business Express Train 1602 did not observe the signal and may have passed a signal at danger.

8.13 SIGNALS TECHNICIAN

- 8.13.1 During the investigations after the occurrence, the Signalling Department discovered nothing wrong with the visibility of Signal DN11.
- 8.13.2 They suspected that the lack of visibility on the date of the incident might have been caused by the rising sun shining into the lens of the signal.
- 8.13.3 The Signals Department has a maintenance schedule to clean signals every six months. The signals at Denver were last cleaned in December 2014.
- 8.13.4 Their current vacancies have little negative impact on the execution of the existing maintenance schedules.

- 8.13.5 Trolley inspections, involving all departments, are conducted monthly to inspect infrastructure. Signal aspect visibilities are also included as part of this inspection.
- 8.13.6 The Department is satisfied with the competence and skills of all their personnel.
- 8.13.7 In his view the searchlight signals (single lens) are less visible than the 3-aspect signals.
- 8.13.8 The UPS at George Goch CTC provides for eight hours of standby power in the case of the main power failing.
- 8.13.9 The Signalling Department has received no request to date to couple any telecommunication system (telephone or trunk radio) to the UPS at George Goch CTC.
- 8.13.10 He also confirmed that it was not the first time that they had experienced a total communication failure due to a power failure at George Goch CTC. He is, however, not sure if it was reported and escalated previously.
- 8.13.11 He reported that with reference to the visibility of signal DN11 at Denver Station, the voltage was adjusted to increase the visibility of this signal. The signal voltage measured 11 volt before, but it was increased to 12 volts.
- 8.13.12 He stated that if the Metroplus Express Train 0600 was stationary at signal DN11, the signal behind the train would definitely have been red and, therefore, would not permit any train to move forward.

8.14 SIGNAL MANAGER

- 8.14.1 The witness testified that he was the Signals Manager based at Elsburg Depot in the East Rand.
- 8.14.2 He indicated that his role included the maintenance of signals in the Gauteng South Region.

- 8.14.3 He stated that he has around eight technicians, one technical worker and three maintainers reporting to him.
- 8.14.4 He reported that he is short-staffed with five technicians, seven technical workers and requires a lot of process workers.
- 8.14.5 The Signalling Department is behind with their routine maintenance and this is aggravated by the amount of theft and vandalism incidents that the current staff complement need to attend to. The problem is further aggravated by the restriction of overtime.
- 8.14.6 In his view, the fact that the Signalling Department is behind with their routine maintenance schedules did not have an impact or influence on the incident.
- 8.14.7 There are currently a lot of searchlight signals still installed as part of the overall signalling infrastructure. This technology is extremely old and they (Signalling Department) are struggling with repairs and the availability of spares for these signals. They have executed small projects to replace some of these searchlight signals with 3-aspect signals.
- 8.14.8 The witness recommended that additional capital be made available to the Department to launch small projects to replace searchlight signals with 3-aspect signals to try and improve the visibility of the signals in general. Some funds have already been approved.
- 8.14.9 From the playback, it was evident that Metroplus Express Train 0600 was stationary for approximately 5 minutes before the incident occurred.
- 8.14.10 He has no recollection of any SPADS on this particular section in the past.
- 8.14.11 The witness did investigate the signal visibility in this section and could not find anything out of the ordinary. All signals were clearly visible.
- 8.14.12 The lack of communication at George Goch CTC during power failures has never been raised as a concern to him as Signal Manager.

8.14.13 No requests have been received to couple the telephone or trunk radio system to the UPS at George Goch CTC.

8.15 TELECOMMUNICATIONS MANAGER

8.15.1 He testified that he is the Telecoms Manager and was appointed into the position in January 2015.

8.15.2 His responsibilities include: Voice loggers, PA (Public Address) systems, trunk radio systems and telephones.

8.15.3 He currently has only four engineering technicians to assist with the entire Gauteng Region. They are also very inexperienced.

8.15.4 He has not been able to appoint any additional staff since his appointment and requires at least 12 engineering technicians to cover the whole region.

8.15.5 Currently they have no repair workshop for the radio equipment and the process they have to follow through Supply Chain is lengthy and frustrating.

8.15.6 He admitted that the Telecoms Department within PRASA is a fairly new department that never really existed within PRASA in the past.

8.15.7 They do have a maintenance project to try and implement the trunk radio system as a primary communication medium for train control.

8.15.8 This is, however, an ongoing process where the execution is difficult due to lack of personnel. He has made a recommendation to reappoint some of the previous sub-contractors to assist with faster rollout of the system across the region, which will also address the turnaround time of repairs.

8.15.9 Currently there is no formal process in place, as is the case with Transnet, with the testing and usage of the trunk radio system by train drivers and train control personnel.

- 8.15.10 The telephone system is currently the responsibility of Neotel. It is a VoIP system.
- 8.15.11 He has never been notified of any problems or concerns regarding the availability or functionality of the telephone or trunk radio system at George Goch CTC. He was not aware of the non-availability of these systems on the day of the incident.
- 8.15.12 Neither communication systems are currently coupled to the backup power supply, nor has requests been received to date to have them coupled to the backup power supply .
- 8.15.13 In his view, the trunk radio system should be considered as the primary means of communication, apart from the signalling, and the telephone system as the secondary or backup. This is not currently the norm due to negative perception by operations personnel towards the system. The trunk system is a Transnet-owned system with minimal collaboration between PRASA and Transnet.

8.16 ROLLING STOCK ENGINEER

- 8.16.1 This witness assisted the BOI with the information related to the condition and operation of rolling stock on the date of the incident. He is one of the authors of the rolling stock preliminary investigation report received from PRASA.
- 8.16.2 He was involved with maintenance of Business Express Train 1602, mainly the mechanical and electrical aspects.
- 8.16.3 The witness informed the BOI about how the vacuum brakes work and the applicable procedures to test brakes.
- 8.16.4 He also indicated that the brakes of Business Express Train 1602 were tested before the train departed and that no faults were reported.
- 8.16.5 CPU was used to retrieve most of the data post the incident. The CPU was preferred because it gives accurate results of the data. The CPU

data came from the second motor coach of Business Express Train 1602 due to the damage to the first motor coach. Some of the critical information retrieved included the following:-

8.16.5.1 The train was moving at 91km/h when the brakes were applied;

8.16.5.2 Impact occurred at 61km/h;

8.16.5.3 Braking distance was 332 meters. Business Express Train 1602 required 510 meters to come to a complete halt, coming from 90km/h; and

8.16.5.4 There were no brake faults in this train, which means the brakes were functioning and all brake components were in a good condition.

8.16.6 He also indicated that the maintenance of the Business Express Train 1602 was within the schedule. Thus there was no maintenance backlog.

8.16.7 He is of the opinion that the driver of Business Express Train 1602 had applied brakes too late and would not have brought the train to a safe stop from that distance of 332 meters.

8.17 ROLLING STOCK ENGINEER MANAGER: GAUTENG

8.17.1 He stated that he was responsible for the maintenance plan of the rolling stock at PRASA.

8.17.2 He reports directly to the Chief Engineer. At the time of the incident he was new in his current position.

8.17.3 The witness indicated that his department runs on a full staff compliment, which means there are no issues of staff shortages as is the case in other departments. The overtime is also managed well below the 40 hours.

8.17.4 Most evidence sought from him was given by the ninth witness, the Rolling Stock Engineer at 8.17 above.

8.18 ACTING ASSISTING MANAGER PROTECTION SERVICES: GERMISTON

8.18.1 The witness testified that he is responsible for safety management. This includes administration, site inspection, safety audits, etc. He supports all the departments.

8.18.2 He is of the view that overtime was not the contributing factor to this incident as employees were made aware in advance and it was introduced in phases.

8.18.3 He believes that the driver of the Business Express Train 1602 may have been distracted prior to the incident. He suspects media (i.e. Facebook, what's-up, etc) may have been the cause of distraction. This view is informed by the fact that there were similar cases of social media reported in the past.

8.18.4 He recommends a simulator to prevent re-occurrence of similar incidences in the future. He also proposes that vacancies be filled because supervisors are now driving trains due to a shortage of drivers. This means the supervision function is not performed as it should be.

8.19 OPERATIONS SAFETY MANAGER, GAUTENG NORTH

8.19.1 He reported that he is the current Operations Safety Manager for the Gauteng North Region.

8.19.2 He stated that he has a Junior Manager reporting to him and two subordinates reporting to the Junior Manager. They are responsible for administrative functions in their unit.

8.19.3 He stated that there was a need for train driver behavioural studies and that some employees use social media while on duty and this may pose safety risks.

8.19.4 He also stated that there was a need to fill vacancies at PRASA and that the moratorium placed on appointing new employees has to be lifted.

8.20 SAFETY MANAGER GAUTENG

8.20.1 He states that his role includes overseeing safety systems in the Gauteng Province.

8.20.2 He stated that on the date of the incident he arrived at Denver Station and took over the scene at approximately 07:58.

8.20.3 He reported that the police took over the incident scene soon thereafter to do an intensive investigation.

8.20.4 He also testified that they stopped all train movements from either side of the railway to deal with the incident.

8.20.5 He stated that in his view, the guard who was killed in the collision should have tried to evacuate the train as soon as he realised that the Business Express Train 1602 was not going to stop.

8.20.6 He reported that they assisted to have all injured commuters and crew taken to the hospital.

8.21 SUPPLY CHAIN MANAGER

8.21.1 He stated that his role involved sourcing and procuring material for PRASA.

8.21.2 He also stated that this included managing the entire tender process.

8.21.3 He indicated that since taking over the supply chain management function in December 2014, he had never received any request to purchase new trunk radio equipment.

8.22 EAP PRACTITIONER

- 8.22.1 The witness was asked to testify on the issues of employee wellness. The intention was to establish if there was any wellness issues that may have contributed to the incident.
- 8.22.2 She testified that at the time of the incident there was no pending EAP case for either of the drivers.
- 8.22.3 The witness also informed the BOI that the overtime situation may have created a problem because at the time of the incident, the overtime for April had not been paid yet. The overtime was only paid a week later.
- 8.22.4 She stated that her department spearheaded campaigns to create awareness and to sensitise employees about the Overtime Policy which was being revised. These campaigns were four hour education assessments.
- 8.22.5 While the attendance was not the same for every department, the attendance was satisfactory. The campaigns, which offered financial management education, involved consultations with creditors and credit bureaus.
- 8.22.6 The witness, however, indicated that there was not sufficient budget for wellness campaigns.

8.23 OCCUPATION HEALTH PRACTITIONER

- 8.23.1 She testified that she is the current Occupational Health Officer at PRASA.
- 8.23.2 Her duties include doing medical surveillance on a annual basis and chronic monitoring of the employees.
- 8.23.3 She reported that she was responsible for approximately 1 300 employees in the health environment.

8.23.4 This witness was interviewed to establish if both train drivers were fit for duty at the time of the incident. She confirmed that both drivers and Metro Guards were fit for duty at the time of the incident.

8.23.5 Their fitness certificates were still valid at the time of the incident.

8.24 HUMAN RESOURCE MANAGER

8.24.1 The witness testified that she was the current Senior Human Resource Manager.

8.24.2 The witness stated that she had 45 personnel in the Human Resource Department.

8.24.3 This witness assisted the BOI with the circumstances that led to the revision of the Overtime Policy.

8.24.4 She testified that a combination of factors led to the revision of the Policy. These included that abuse of overtime, as some employees at the depots were working abnormal hours, which means they were not resting, while others were underutilised. This Policy was therefore revised to achieve the efficiency of the business.

8.24.5 The directive was issued as far back as October 2014 to advise the departments that overtime will be limited to 80 hours per month. There was a lot of unhappiness about the overtime revision, but change management interventions were introduced to create awareness and to obtain buy-in from the employees. A 'sweetener' was even given to the employees in December 2014.

8.24.6 The BOI asked the witness about the overtime which was not paid in April 2015. The witness indicated that the overtime was not paid due to a technical fault with the reporting system which resulted in the system not calculating the hours correctly. According to the witness, the departments were notified about this.

8.24.7 The witness is of the view that enough was done to prepare the employees for the introduction of the revised Overtime Policy. It was suggested to the witness that maybe the time was not sufficient for employees to adjust to this reality but she does not think that is the case because change management interventions were put in place and that employees were notified as far back as 2014.

8.25 TRAIN DRIVER METROPLUS EXPRESS TRAIN 0600

8.25.1 The witness testified that he was the driver of Metroplus Express Train 0600 at the time of the incident.

8.25.2 This witness was mainly questioned about why he stopped Metroplus Express Train 0600 at signal DN 11. He stated that he has been driving trains for approximately 18 years, 8 years of which was spent at PRASA and the remainder at Spoornet.

8.25.3 At the time of this interview, the witness was no longer an employee of PRASA as he had resigned two weeks after the incident. He cited not getting counselling/EAP support on time as the reason for his resignation. EAP only contacted him two weeks after the incident and even then, they were not helpful. The incident was very traumatic for him as he was directly involved.

8.25.4 At the time of the incident, he was standing in for another driver as the driver of Metroplus Train 0600 called in sick. He was scheduled to attend his shop stewards meeting later on that day in Johannesburg.

8.25.5 He indicated that while they were signing in for duty, Business Express Train 1602 driver voiced her frustrations about overtime not being paid. Metroplus Express Train 0600 Metro Guard (i.e. the deceased) also complained about the same issue. The witness was their union leader and for that reason the employees were comfortable to discuss such matters with him.

- 8.25.6 The witness told the BOI that he stopped his train because he could not see the DN11 signal aspect clearly as he was obstructed by direct sunlight. The rules state that the driver must stop the train if he/she cannot clearly see the signal aspect. Thus, it was the right thing to do under the circumstances.
- 8.25.7 He immediately called the Train Control Officer at George Goch, but there was no answer. He then called the Operations Office in Braamfontein. It was during this time that he heard a long hooter and a loud bang.
- 8.25.8 His motor coach was derailed. He got out of the train to check on his colleague and noticed that the Business Express Train 1602 driver was trapped between her train and a building. She was calling for help. He asked her if she was fine and she once again voiced her frustrations with overtime not being paid and the problems it has created for her.
- 8.25.9 The witness also raised his concerns to the BOI about the EAP support as he really had bad experiences in the past. SATAWU, the Union, has also been complaining about the EAP interventions. In fact, he is of the view that the EAP is not effective and, therefore, this issue must be addressed as soon as possible.
- 8.25.10 The BOI asked for his opinion on emergency braking for Business Express Train 1602. He stated that at the speed Business Express Train 1602 was moving, the emergency brakes could not have safely stopped the train .
- 8.25.11 He also confirmed that cellular phones are the primary communication system due to the trunk radio system not being functional.
- 8.25.12 He is of the view that the signals and communication were the main contributors to this incident.

8.26 NOMINATED MANAGER

- 8.26.1 The witness stated that he was the current Nominated Manager at PRASA and is the line of communication between PRASA and the Railway Safety Regulator. He stated that he was responsible for safety at PRASA Rail.
- 8.26.2 He testified that signalling technology is very old and that some systems have been installed since 1947.
- 8.26.3 He stated that PRASA is currently spending a lot on the implementation of new signalling systems. Three projects are currently being implemented in the Gauteng, Durban and Cape Town regions, where all the old systems will be replaced with new electronic interlocking systems with light emitting diodes (LED) signal technology, which is much brighter than the existing technologies.
- 8.26.4 He also confirmed that parallel to this, smaller capital projects (regional) are being launched to replace the current signalling. For example, some of the searchlight signals are being replaced with 3-aspect signalling.
- 8.26.5 In addition to the new signalling systems, PRASA has also decided to implement the Automatic Train Protection System (ATP) in the different regions,. This has, however, not been advertised in the market as yet.

8.27 HEAD OF PROCUREMENT (SUPPLY CHAIN MANAGEMENT)

- 8.27.1 The witness testified that he is the current Head of Procurement Services at PRASA and reports directly to the Chief Executive Officer of PRASA Rail.
- 8.27.2 The witness stated that he manages PRASA Rail national contracts which apply in all Metro Rail regions.
- 8.27.3 He indicated that his duties include ensuring that all PRASA Rail regions comply with procurement procedures and implementation.

- 8.27.4 He reported that there were four PRASA Rail regions which he oversees, namely Gauteng, Western Cape, Eastern Cape and Kwa Zulu Natal.
- 8.27.5 He indicated that although he is the National Procurement Manager, the regions do their own procurement through procurement guidelines and Supply Chain Management Policies.
- 8.27.6 The witness testified that PRASA currently procures goods and services under the guidance of the Supply Chain Management Policy, which was last reviewed in 2013.
- 8.27.7 The witness informed the BOI that PRASA has commissioned Deloitte Accountants to review the current Supply Chain Management Policy. It is indicated that Deloitte was appointed to do this review in July 2015 and have apparently completed their work, but the findings and recommendations have not yet been released by the Board of Control at PRASA.
- 8.27.8 The witness stated that he does not know what the results of the review are.
- 8.27.9 He further informed the BOI that he does not know the decision of the Board of Control of PRASA to review the current Supply Chain Management Policy.
- 8.27.10 The witness testified that as far as he is concerned, there is no outstanding emergency request from PRASA Rail to Supply Chain Management with regards to any operations equipment, including trunk radios.
- 8.27.11 The witness also informed the BOI that any maintenance problems at PRASA cannot be due to procurement processes as they have no backlog regarding any procurement of equipment required on an urgent basis.

8.28 THE PROVINCIAL MANAGER – GAUTENG PROVINCE

- 8.28.1 The witness informed the BOI that she was the current Provincial Manager of Prasa Rail in the Gauteng Province.
- 8.28.2 The witness indicated that she reports directly to the Chief Executive Officer of Prasa Rail.
- 8.28.3 She is the Head of Prasa Rail Operations for the entire Gauteng Province.
- 8.28.4 Gauteng Province comprises of three regions, namely North Region, West Region and East Region.
- 8.28.5 Her role includes managing all three regions.
- 8.28.6 Her responsibilities include Infrastructure, Engineering, Rolling Stock, Finance, Security and Customer Services.
- 8.28.7 Each of the three regions is headed by a Regional Manager who reports to the Provincial Manager.
- 8.28.8 It was indicated that the primary means of communication with train drivers should be the signalling system. The trunk radio system should be used as a backup.
- 8.28.9 She also conceded that the Regulator requires optimal usage of the trunk radio system as a mode of communication between train drivers and train control officers.
- 8.28.10 She stated that in the absence of a functional trunk radio system, cellular phones are preferred as a mode of communication between the train drivers and the train control officers.
- 8.28.11 The witness indicated that due to the fact that the trunk radio system is not functioning, cellular phones are used .
- 8.28.12 She stated that the majority of trunk radios are not functioning.
- 8.28.13 She stated that they have procured trunk radios in 2014 and are in the process of implementing a new system..

- 8.28.14 The witness indicated that the delay in implementing the trunk radios is due to the network sharing difficulties between Transnet and PRASA.
- 8.28.15 She indicated that she was not aware of the negotiations with Transnet on the GSMR and other systems issue. She reported that these negotiations were dealt with at PRASA's corporate office.
- 8.28.16 She, however, indicated that PRASA is currently busy with projects to address and replace some of the existing searchlight signals with 3-aspect signals with LED technology. Additional funding has been made available for these projects, apart from the main Gauteng re-signalling project.
- 8.28.17 She reported, as part of the Gauteng re-signalling project, that PRASA will ensure that technical personnel are suitably trained by the main contractor to maintain the new technologies.
- 8.28.18 The witness confirmed that there is a major investment in signalling at PRASA.
- 8.28.19 The witness indicated that risk assessments were currently being conducted on searchlight signals. These assessments are performed on an ongoing basis.
- 8.28.20 She reported that she meets with teams on a monthly basis to inspect and consider the assessments.
- 8.28.21 She reported that in the instances where a risk is identified on a searchlight signal, such signals will be replaced with an LED signal.
- 8.28.22 The witness indicated that there is no comprehensive project to change all searchlight signals.
- 8.28.23 She reported that the practice is that they identify some of these signals during the trolley inspection and thereafter intervene, if necessary.

- 8.28.24 She reported that a contractor has been appointed in the North Region to effect the repairs and to replace dysfunctional signals. .
- 8.28.25 The witness indicated that she has no knowledge of the funding of a new trunk radio system as this is done at the corporate office.
- 8.28.26 She stated that she does not see difficulty in phasing out cellular phones as a mode of communication between train drivers and train control officers.
- 8.28.27 She, however, stated that in the absence of the trunk radio system, cellular phones must be used to allow communication between train drivers and the train control officers.
- 8.28.28 She stated that the maintenance budget is restricted and that it needs to be reviewed or reconsidered.
- 8.28.29 She reported that for the past four years the budget that they have received has consistently been lower than what they needed to ensure the smooth running of the business.
- 8.28.30 The witness testified that there were no plans to have a collision avoidance system fitted on the old or existing rolling stock.
- 8.28.31 She, however, indicated that the new rolling stock will be fitted with the necessary anti-crash or collision avoidance system.
- 8.28.32 The witness conceded that the current train drivers' training need to be reviewed. She reported that the current training only assists train drivers in knowing how to drive trains.
- 8.28.33 She suggested that a formal course be introduced, especially to train the drivers on safety and behaviour when driving trains.
- 8.28.34 She also recommended that the trainers must be specialists and that this course may need to be introduced at colleges or other institutions of higher learning.

- 8.28.35 The witness also indicated that the train driver certification process needs to be relooked to ensure that fit and proper people are appointed to drive trains.
- 8.28.36 The witness reported that there were a lot of vacant positions at all levels.
- 8.28.37 She indicated that the moratorium to fill vacant positions has not been lifted.
- 8.28.38 She, however, reported that in the event that a vacant position needed to be filled, a submission had to be made to the Head Office to request authorisation for such an appointment.
- 8.28.39 She indicated that when the submissions are made, the vacancies may be filled.
- 8.28.40 On the late payment of overtime to the employees, she stated that they should have done more in depth consultations at the depots regarding the issue .
- 8.28.41 She stated that an issue of system error was picked up in April 2015. This delayed the overtime payment that month. According to her, employees were informed through their unions.
- 8.28.42 There was, however, no structural intervention to prepare employees about the system errors and that overtime was not going to be paid.
- 8.28.43 When asked about the reasons behind the revision of the Overtime Policy she stated that the abuse of overtime by employees led to the Policy being revised.
- 8.28.44 In her view, the late payment of overtime was not the cause of the incident under review.
- 8.28.45 She indicated that most train accidents are caused by train drivers who do not observe signals, passing them at danger.

8.28.46 The witness advised the BOI that the driver injured in the accident, Ms Sambo, was still in hospital undergoing rehabilitation, which may take her two years to complete.

8.29 THE REGIONAL MANAGER – GAUTENG WEST REGION

8.29.1 He testified that he was the Regional Operations Manager in the Western Region of Gauteng Province, which includes Johannesburg to Naledi.

8.29.2 The Denver area, where the incident took place, falls under his jurisdiction.

8.29.3 His duties include management of operations and support with the movement of trains in the Gauteng Western Region.

8.29.4 He believes that cable theft is a great challenge which affects power supply to signalling. There are interventions on cable theft, but those interventions are not sufficient from a human factors point of view.

8.29.5 He is of the view that the signals are primary means of communication. The secondary means of communication is the trunk radio system, with cellular phones being the last option.

8.29.6 Gauteng struggles with the availability of the trunk radio system. However, a project is underway to procure a new trunk radio system.

8.29.7 He cannot account for the implementation of the trunk radio project as this project does not fall under the ambit of operations.

8.29.8 His responsibility in relation to the trunk radio system is to ensure that every train has a trunk system, but he can confirm that not every train has a trunk radio system.

8.29.9 He is of a view that trunk technology is a challenge. He thinks PRASA should look at alternative technology with the same capability.

- 8.29.10 He reported that the overtime payment delays in April 2015 did not affect the operations. Unions were engaged on the matter and employees knew that they would be paid in the off cycle.
- 8.29.11 He is of the view that the communication on overtime delays was done appropriately and it did not have a negative impact.
- 8.29.12 When asked about the training of train drivers, his response was that it takes almost 18 months to qualify as a train driver; he is of the view that the training is more than sufficient.
- 8.29.13 He indicates that the training is comprehensive and that it is in line with industry norms.
- 8.29.14 All train drivers have been through psychometric tests. He has been trained as the train driver himself.
- 8.29.15 When asked about the procedure for power blackouts, he responded that in the area where there is no uninterrupted power supply, UPS requires the team to shut down the line and clamp the line manually.
- 8.29.16 He states that the UPS project has not been approved, but the adjudication process is at its final stage. It has been through adjudication and is now at the recommendation stage.
- 8.29.17 He also indicated that PRASA is busy addressing the existing concerns relating to the power supplies, not only at train control centres, but also at existing signalling equipment rooms.
- 8.29.18 He stated that this project is also being executed separately and not as part of the Gauteng re-signalling project. He was, however, not familiar with the project timelines or specific budget details.

8.30 REGIONAL MANAGER – GAUTENG NORTH REGION

- 8.31.1 He testified that he was responsible for the Gauteng North Region's operations.

- 8.31.2 He reports to the Provincial Manager in the Gauteng Province.
- 8.31.3 His role is to look after the entire operations which ranges from security to train operations.
- 8.31.4 He reported that the primary means of communication is the signals. The trunk radio system only comes into effect when signals fail. Trunk radio is preferred because of its recording capability.
- 8.31.5 He stated that PRASA started having issues with the trunk radio system about two years ago, mainly on network coverage. The network coverage is owned by Transnet.
- 8.31.6 He stated that the issues of coverage have not been resolved at this stage as the intervention so far has been mainly on maintenance.
- 8.31.7 He reported that the interim solution for secondary communication is the use of cellular phones, but it was agreed the cellular phones must be recordable.
- 8.31.8 He stated that there are areas where the trunk radio system works, but the trunk radio system does not work in significant areas. He recorded that Transnet's trunk radio system is at an acceptable level, because they do not have similar problems of network coverage.
- 8.31.9 On the incident under review, he stated that he believes that swapping of shifts and the absence of substance abuse testing on the driver of Metroplus Express Train 0600 were the major contributors to this incident.
- 8.31.10 He indicated that it remains a mystery to him how the driver of Metroplus Express Train 0600 missed the substance abuse test.
- 8.31.11 The overtime system error has been an issue for some time, but he does not believe that overtime issues played part in this incident.
- 8.31.12 He stated that he is of the view that human error played part in this incident. In fact, he stated that 90% of rear-end collisions are due to human factors.

8.31.13 He indicated that to prevent re-occurrence of similar incidents, there is an urgent need for going beyond physical tests in signing on duty. The idea is to have some form of mental state examination.

8.32 THE REGIONAL FINANCE MANAGER FOR GAUTENG

8.32.1 He indicated that he reports to the Provincial Manager.

8.32.2 He stated that he is responsible for the budget in the Gauteng East, West and North Regions.

8.32.3 He reported that he manages a budget in excess of R2 billion.

8.32.4 He stated that all PRASA Rail Provincial Regions have their own Finance Managers.

8.32.5 He indicated that annually they normally have a budgeting gap of R500 million.

8.32.6 He indicated that the R2.3 billion budget that he oversees is only an operational budget and does not include capital budget.

8.32.7 He stated that the average for the past four years for capital budget has been R100 million of the allocated budget.

8.32.8 He conceded that the R100 million is not enough to cover their costs, including costs of security and safety.

8.32.9 He stated that they do not normally get the requested budget for the financial year. He indicates that the allocated budget is cut at all times.

8.32.10 He stated that most projects are deferred due to the non-availability of sufficient funds.

8.32.11 He stated that their turnover is normally around R900 million, which comes mostly from ticket sales.

8.32.12 He stated that their turnover never exceeds R1 billion.

- 8.32.13 He conceded that they do not have interaction with the corporate office on what should not be cut on the requested budget. He reported that they just receive the budget from the corporate office without indepth engagements with them.
- 8.32.14 He indicated that there is a budget for employees' wellness programmes, which is allocated to the Human Resources Department.
- 8.32.15 He stated that this budget has never been exhausted since he became the Finance Manager.
- 8.32.16 He stated that the costs of incidents are not done at regional level, but are assessed at the head office.
- 8.32.17 He stated that the damages suffered in the accident under review amounted to around R17.5 million.
- 8.32.18 He reported that having the required budget cuts hampers smooth operations. He, however, tries to persuade the Head Office to grant him the required budget.

8.33 EXECUTIVE HUMAN RESOURCES MANAGER

- 8.33.1 The witness indicated that he is the Acting Executive Manager for Human Resources at PRASA Rail and is based in Braamfontein.
- 8.33.2 It was indicated that no moratoriums have been placed on the filling of vacancies of critical grades, which include signalling staff.
- 8.33.3 The witness indicated that the criteria for placement of train drivers is that they must have matric with mathematics, they must pass a psychometric evaluation, practical assessment, brake tests etc.
- 8.33.4 He indicated that the training of train drivers is SAQA accredited and moderated.
- 8.33.5 He reported that trainee train drivers have mentors. Mentors have been subjected to an internal mentorship course.

- 8.33.6 He stated that a mentorship programme for train drivers has never been reviewed for effectiveness, but he is of a view that it is effective. He states that training of Engineering Technicians has been taking place since 2010.
- 8.33.7 He stated that a Retention Strategy, to retain staff of critical grades, has not been fully implemented yet. Retention strategies also differ between various departments.
- 8.33.8 On PRASA's Overtime Policy, he stated that the Policy states that overtime must not exceed 80 hours a week.
- 8.33.9 According to him, overtime can go beyond the stipulated 80 hours in case of unforeseen circumstances. But, it must be approved by the Regional Manager.
- 8.33.10 Approval of variation is a fairly quick process because the Regional Managers are located in the area.
- 8.33.11 The 80 hours is not a policy, but a variation agreement which was signed by all parties concerned, therefore, it is binding to all parties. This is a stand-alone document.
- 8.33.12 He stated that the moratorium did not affect filling of safety critical grades. In fact, the moratorium does not include safety critical grades.

8.34 SENIOR MANAGER BUDGET

- 8.34.1 He indicates that he is the Senior Manager responsible for budget at PRASA Rail.
- 8.34.2 The witness indicated that he reports to the Chief Financial Officer,
- 8.34.3 He indicated that he assists with budget and cash management issues.
- 8.34.4 He reported that they engage with regions when they allocate budgets.
- 8.34.5 He reported that he does monthly performance reports for all regions.
- 8.34.6 There are monthly meetings for reporting to the Chief Financial Officer.

8.34.7 He indicates that the performance reporting to the Chief Financial Officer is continuous.

8.35 ACTING EXECUTIVE MANAGER ENGINEERING SERVICES

8.35.1 The witness stated that he is the Acting Engineering Executive Manager.

8.35.2 He is responsible for infrastructure and rolling stock engineering and maintenance.

8.35.3 He stated that he recalls that the Regulator had issued a directive about trunk radio system usage and PRASA had since responded by purchasing the trunk radio system.

8.35.4 He stated that network coverage is a challenge in implementing the trunk radio system to the optimal. The network is owned by Transnet.

8.35.5 He reported that monthly interface meetings are held with Transnet Freight Rail to not only address the problems relating to the trunk radio system, but also various other technical issues.

8.35.6 He reported that at this stage there are, however, no performance agreements in place between PRASA and Transnet to address the existing problems with the trunk radio system.

8.35.7 He reported that trunk radio has been a challenge and in Gauteng it appears to be unique as areas such as Durban and Cape Town do not have this challenge.

8.35.8 He advised the BOI that a task team has been established within PRASA to investigate and address communication challenges and possible solutions.

8.35.9 He also indicated that the new GSM-R network has been completed within the Gauteng area and that the project will be implemented with the new rolling stock within two to three years time.

8.35.10 The witness also reported that PRASA has also implemented a project to purchase new generators over the next two financial years. This

project will also include the refurbishment of some of the existing backup power supplies.

- 8.35.11 He indicated that these backup power supplies will not only be allocated to the control centres, but are also for some of the equipment rooms.
- 8.35.12 He stated that as part of the telecommunication project, the coupling of the telecommunication equipment in the control centres to the backup power supply will be addressed.
- 8.35.13 With reference to the signalling, it was indicated that the Gauteng re-signalling project will be completed by 2019 to 2020.
- 8.35.14 The witness indicated that they also consider the searchlight signals as a serious problem. Visibility of these signals are problematic as well as the obsolescence of the equipment.
- 8.35.15 He indicated that with reference to the implementation of a collision avoidance system, they are still in the planning phases to implement an ERTMS level 2 type systems as a long term solution.
- 8.35.16 He indicated that this can, however, not be implemented as part of the existing re-signalling projects due to the risk of delays to the schedules, additional costs and the associated technical changes to the existing projects.
- 8.35.17 In the short term PRASA has identified a pilot project to improve information to the train drivers in terms of the route ahead as well as speeding, etc.

9 **PART G: FACTORS FOR CONSIDERATION**

9.1 Below are factors for consideration with regards to the investigation:

- 9.1.1 The preliminary findings from the interviews held with PRASA officials indicated that there is a shortage of work capacity which impacts the effective running of the business.
- 9.1.2 The BOI also revealed that there is a dysfunctional communication system at PRASA, particularly involving train crew members and the respective control officers during train movements.
- 9.1.3 It is clear from the witnesses that the old infrastructure on the railways, including the signalling system, is outdated and at times results in incidents of this nature.
- 9.1.4 A very low amount is allocated for the maintenance of the old infrastructure, both immovable and movable. This fact is alarming as insufficient maintenance to the old infrastructure raise high safety concern.
- 9.1.5 Evidence tendered by the witnesses revealed that the unavailability of a backup system to the telephone connectivity at the George Goch CTC contributed to the incident under review.
- 9.1.6 The evidence heard during the BOI revealed that the absence of a properly functioning train radio system or trunk system may result in further incidents of this nature.
- 9.1.7 It was clear that the use of company issued cellular phones are not recommended as the mode of communication between the train control officers and train drivers;
- 9.1.8 The BOI noted that the use of old infrastructure, particularly the searchlight signals is hazardous and these signals need to be replaced.
- 9.1.9 The BOI noted that the manner in which PRASA dealt with the late payment of overtime benefits is an issue of concern, which may have affected the level of concentration of the employees. At the time of the announcement of the decision to delay the overtime payment, it might

have been a bit late, especially if the employees were relying on that income. Such decisions should be planned, announced and executed on time, so that the employees could have sufficient time to make alternative arrangements. The Provincial Manager conceded that the manner in which the issue was announced to the employees could have been handled differently and in future they should consider a more consultative approach.

- 9.1.10 It was also noted during interviews that the counselling and wellness support of the employees involved in the incident under review was not effective or satisfactory.
- 9.1.11 Section Managers, who also work as drivers without any plans could affect the human mental capabilities and compromises the system.
- 9.1.12 Stand-in Section Managers/Safety Officers for the train control officers, who do not work on the panel on a daily basis, could lead to mistakes as there are no refresher training scheduled for stand-in employees.
- 9.1.13 There seems to be no policy regulating stand-by officials in cases where the scheduled train drivers fail to report for duty on scheduled dates and times. If such a policy exists, it appears that it is not strictly adhered to and this should be considered or reviewed to ensure that any standby lists or rosters are timeously prepared and updated.
- 9.1.14 Employees who are scheduled to be on standby on a particular date should be notified timeously in order for them to comply with health and safety requirements.
- 9.1.15 Improper supervision was identified due to a lack of an adequate number of staff in the specific departments.
- 9.1.16 Section Managers' roles are reportedly not fully performed and not as effective as it should be, due to them having to stand in to perform functions of train control officers.
- 9.1.17 From the information received relating to the signalling faults, it is evident that no signalling database or fault reporting system exists. There also

appears to be no indication that such a system is in the process of being implemented.

9.1.18 All the above scenarios and factors necessitate that radical measures be put in place to address the problems at PRASA as a whole in order to ensure that a safe and efficient commuter transport system is provided to the public.

9.1.19 It was also noted that the training in critical safety grades only offers competency for the technical aspect of the job requirements with minimal or no emphasis on safety regarding the training of these critical safety grades.

10 **PART H – CONCLUSION WITH IMMEDIATE UNDERLYING CAUSES**

- 10.1 The investigation revealed numerous organisational system deficits within PRASA. These include defective communication systems, use of old infrastructure, deficient employer and employee relations, inefficient employee wellness programmes, insufficient work capacity and failure to effectively monitor train personnel.
- 10.2 The BOI also noted that maintenance of the current infrastructure is performed at a very low level due to the insufficient budget allocated for maintenance.
- 10.3 The system deficits mentioned above are very serious. If left unattended, it poses a very dangerous risk to the wellbeing of those who use PRASA trains on a daily basis.
- 10.4 The BOI found that brakes in Business Express Train 1602 were applied very late. The evidence indicates that the driver of Business Express Train 1602 only started applying brakes 332 meters from the point of impact. Thus, the distance was too short to bring the train to a complete stop at the speed at which it was travelling. In fact, the impact occurred while the train was still moving at 61km/h, which means it needed more travelling distance to come to a complete stop.
- 10.5 The BOI concluded that the driver of Business Express Train 1602 was speeding at the time of the accident. The train was moving at a speed of 91km/h in a 70km/h zone.
- 10.6 It was revealed that the driver of Business Express Train 1602 passed a signal at danger. While Metroplus Express Train 0600 was standing on the platform, it was protected by signal DN 2, which was at danger and signal DN 1, which was on caution. It was discovered during this investigation that the train passed both signals before the impact. In fact, Business Express Train 1602 was still running at 61km/h at the point of impact.
- 10.7 The BOI concluded that there was a delayed communication on the date of the incident. The driver of Metroplus Express Train 0600 reported that the incident took place while he was trying to contact operations to advise them that the signal was not clear. The Section Manager at George Goch CTC also informed

the BOI that the incident took place while he was waiting for contact numbers of the driver of Metroplus Express Train 0600 from the operations office in Braamfontein. It took about six minutes between the first communication and impact, which suggests that the communication was extremely inefficient.

- 10.8 The BOI concluded that signal DN 11 and signals DN 2 as well as DN 1 were functioning properly on the date of the incident and no interlocking-related failures contributed to the incident.
- 10.9 The BOI however, further concluded that the driver of Metroplus Express Train 0600 may not have properly seen signal DN 11 due to the impaired vision from the sun, which might be prevalent during the time of the morning.
- 10.10 A physical footplate inspection on Metroplus Express Train 0600 was also conducted on 7 July 2015 to determine firstly, what the general visibility of the signals are on route between Germiston Station and Park Station. Secondly, to investigate what influence the rising sun has on the visibility of the signals in this particular section. It was found that all signals, except one at Jeppe Station, was clearly visible. The influence of the rising sun on the visibility of the signal seemed negligible. However, it must be noted that this inspection was conducted at a different time of the year when the sun rose at a different time, compared to the the time of year the accident occurred.
- 10.11 From the available information and evidence, the BOI therefore concluded that human factor or error was the major contributor to the incident. This human error was found on the part of driver of Business Express Train 1602 who seemed to have lost concentration at the time of the incident and, therefore, failed to respond to the signals displaying danger warnings.
- 10.12 The BOI made a further observation that the fact that the driver of Metroplus Express Train 0600 was not scheduled to drive the train on the morning of the incident, compromised the supposed safety processes being undertaken i.e. the driver of Metroplus Express Train 0600 was not tested for substance abuse and his fitness for duty was therefore not properly established.

CONCLUSION

This BOI in executing its mandate in terms of the Terms of Reference confirmed that the incident in question was caused by human error in conjunction with dysfunctional organisational systems within PRASA. It is confirmed that both drivers had sufficient road knowledge and received adequate training in their respective positions. The BOI is concerned by the fact that one of the drivers was not tested for substance abuse, which might have been as a result of a lack of planning for instances where a scheduled driver does not report for duty. It was found that this lack of planning creates room for safety risks as it could not be confirmed whether the driver had sufficient rest and was fit prior to driving the train.

It was further established that both drivers had in the past received warnings *viz*, Mr Mabuza received the first warning for passing a signal at danger in October 2010 and also for overshooting a platform in April 2014. Ms Sambo received a warning during October 2010 for late arrival for duty and subsequent late departure of the train and she received a 3 months serious written warning.

The BOI was provided with the maintenance records which were considered for purposes of establishing the maintenance stages and intervals of the trains. It is confirmed that although the maintenance records of both motor coaches were not complete, the data presented to the BOI confirms that maintenance for Metro Business Express Train 1602 was within schedule.

In conclusion, the Board made an observation that recommendations made by previous BOI's in incidents of a similar nature were not implemented. On consultation with Senior Managers from PRASA, it was established that recommendations to PRASA are directed to the office of the Nominated Manager and are often not brought to the attention of other Senior Managers to enable them to be part of the organisational programme for effective implementation.

PRASA is encouraged to review their processes regarding communication between the corporate unit, operations, human relations and all other issues of corporate

governance. PRASA is therefore urged to provide a plan of action on implementation of all the recommendations made by the previous Board of Inquiries at the instance of the Regulator, including the recommendations contained in this report.

11 PART I – RECOMMENDATIONS

11.1 SHORT-TERM CORRECTIVE MEASURES (0 – 6 MONTHS)

- 11.1.1 The current signing-on duty process is limited to a substance abuse test; PRASA must review this process to include fatigue management, declaration of medication, fitness for duty assessment and an updated medical surveillance report as required by SANS 3000:4.
- 11.1.2 PRASA must develop a Stand-by Policy to regulate the management of employee stand-by.
- 11.1.3 A risk assessment must be done by PRASA on all searchlight signals. This exercise should clearly identify the high risk signals and interventions must prioritise the high risk areas.
- 11.1.4 The two-way radio communication system between train drivers and control officers must be reintegrated with immediate effect. A competent contractor must be appointed for repairs, maintenance and implementation.
- 11.1.5 PRASA must prohibit the use of cellular phones by drivers as soon as the trunk radio system as well as its power backup supply is implemented and effected.
- 11.1.6 The RSR must follow up all PRASA's safety audits and ensure that PRASA close all findings in the said audits within the stipulated timeframes.
- 11.1.7 The VoIP telephone system and trunk radio systems should be coupled to the backup power supplies of train control centres across all regions belonging to PRASA.
- 11.1.8 A system or process should be implemented by PRASA whereby the contact numbers for train drivers and train control officers on duty are updated on a daily basis. This will eradicate the system used by PRASA where details of the drivers and train control officers on duty are updated and captured by Section Managers manually by way of drafting a rooster.

- 11.1.9 The weekly and monthly inspections involving all departments should continue with the results or reports from these inspections communicated more sufficiently and the feedback communicated to the responsible disciplines.
- 11.1.10 Capital funding should be made available for the replacement of searchlight signals with the 3-aspect signals in critical areas where regular problems with visibility of signals occur.
- 11.1.11 The filling of vacancies within the Telecommunication Department of PRASA should be prioritised to enable new employees to gain the necessary knowledge and experience with the implementation of all new communication systems.
- 11.1.12 EAP should be ongoing and proactive, but not reactive in reaching out to employees who are exposed to stress-related activities.
- 11.1.13 Substance abuse tests should be taken by every employee at the beginning and at the end of every shift.
- 11.1.14 PRASA should undertake the driver behaviour study identified in the previous incident investigations to identify causal factors and human error rates associated with train driving in general and SPADS, in particular.
- 11.1.15 PRASA should compare the braking performance of all operational vehicle types to the permanent way related signalling scheme layout for the whole railway to determine whether there are any compromised overlaps on the system and to implement controls and mitigation such as speed restrictions, should any compromised overlaps be identified.
- 11.1.16 PRASA should undertake a risk assessment to demonstrate that the operation of its fleet of vehicles is safe and that the risks associated with operation are tolerable. The risk assessment should be presented to the Regulator.
- 11.1.17 PRASA must lift the moratorium on filling safety critical vacant posts.

- 11.1.18 It is recommended that a database be implemented to log the details of signalling related failures to enable management to keep record of signalling failures to determine amongst others, trend analysis, MTTR, MTBF and to also enable them to identify critical areas to address specific problems relating to signal visibility. These will, however, be a temporary solution until the re-signalling project of the Gauteng Region has been implemented to fully address this shortcoming.
- 11.1.19 PRASA must prioritise maintenance of the current infrastructure and allocate more funds, specifically for maintenance costs.
- 11.1.20 The EAP and Human Resource Departments need to review the consultation approach for accident victims and not wait for the victims to request the service. Sessions should be compulsory to all employees who are exposed to these unfortunate incidents in the workplace.
- 11.1.21 PRASA must implement a financial management assistance programme to assist employees to manage their personal budgets better to prevent or limit their dependence on overtime payments.

MEDIUM TERM CORRECTIVE MEASURES (6 – 12 MONTHS)

- 11.1.22 The implementation of the trunk radio system as a critical medium of communication between train drivers and train control personnel should be prioritised. Additional funds should be made available to purchase the required equipment to implement this successfully. Possible harsh penalties should be considered should the operator not comply.
- 11.1.23 Finalise the negotiations with Transnet to resolve the interface between the implementation of the Global System for Mobile Communication Railway and the trunk radio system.
- 11.1.24 It is recommended that PRASA must review the train driver and train control officers' training material and also the assessment of competency to ensure that it meets their current operational challenges. PRASA should ensure that training is updated based on any identified gaps.

11.2 LONG TERM CORRECTIVE MEASURES (12 MONTHS ONWARDS)

- 11.2.1 PRASA should fast track the movement of all CTC operations to the new Gauteng Nerve Center (GNC).
- 11.2.2 PRASA must fast track the replacement of all the searchlight signals.
- 11.2.3 PRASA must install speed limiting devices on railways to cater for the current rolling stock.
- 11.2.4 PRASA should conduct a study or research to determine the feasibility of introducing a collision avoidance system in their current fleet. This should be prioritised in order to prevent human factors from playing such a crucial role in the protection of assets, infrastructure and human lives.
- 11.2.5 PRASA should consider installing voice and video recording systems in the driver's cab of all future rolling stock acquisitions. This will not only assist during occurrence investigations, but can be used as an effective monitoring tool.

12. PART J: THE NAMES AND SIGNATURES OF THE BOARD OF INQUIRY

MEMBERS

RSR BOARD OF INQUIRY MEMBERS

	Name	Role	Company	Signature
	MRS BAITSENG RANGATA LLM, LLB, B Proc., Cert. Fin. Accounting	Chairperson of the Board of Inquiry	Maponya Incorporated	
	MRS SUSAN OOSTHUIZEN	Chairperson Administrator	Maponya Incorporated	
	MR KGABO MAPONYA LLB	Legal Practitioner / Secretary of the Board	Maponya Incorporated	
	MR MUZIWANDILE MASANGO Btech (Mechanical Engineering)	RSR Coordinator	Railway Safety Regulator	
	MR GIVEN MABASO Sc (Mechanical Engineering), University of Cape Town Pr. Registered Engineer, ECSA Master of Business Administration and Management (MBA), University of Stellenbosch Business School	Rolling Stock Engineer	MJT Consulting	

	RCAT Analysis (Cum Laude)			
	MR LEROY KOEN BSc Engineering (Electrical & Electronics)	Signalling Engineer:	R & H Rail (Pty) Ltd	
	MR MIKE GALLIE-JAMES Bachelor of Engineering, (B Eng) Brunel University, Middlesex, UK.	Mechanical Engineer	Interfleet Technology	
	MR SIPHIWE HLONOGWANE CA (SA)	Financial Accountant	Ntumba Incorporated	

13. PART K: ANNEXURES

13.1. Signals Report – Signalling Engineer

13.2. Rolling Stock Report – Rolling Stock Engineer

13.3. Human Factors Reports – Human Factors Expert

13.4. Financial Analysis Report – Financial Experts