OTSI Office of Transport Safety Investigations

LEVEL CROSSING COLLISION REPORT

PRIVATE LEVEL CROSSING at 594.680KMS

WEE WAA

1 SEPTEMBER 2010

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THE OFFICE OF TRANSPORT SAFETY INVESTIGATIONS

The Office of Transport Safety Investigations (OTSI) is an independent NSW agency whose purpose is to improve transport safety through the investigation of collisions and incidents in the rail, bus and ferry industries. OTSI investigations are independent of regulatory, operator or other external entities.

Established on 1 January 2004 by the Transport Administration Act 1988, and confirmed by amending legislation as an independent statutory office on 1 July 2005, OTSI is responsible for determining the causes and contributing factors of collisions and to make recommendations for the implementation of remedial safety action to prevent recurrence. Importantly, however, OTSI does not confine itself to the consideration of just those matters that caused or contributed to a particular collision; it also seeks to identify any transport safety matters which, if left unaddressed, might contribute to other collisions.

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ACRONYMS AND ABBREVIATIONS

ARR .....Australian Road Rules

ARTC .....Australian Rail Track Corporation

AS .....Australian Standard

DIP .....Directly Involved Party

ITSR.....Independent Transport Safety Regulator

NCCN.....Network Control Centre North, Broadmeadow

OTSI.....Office of Transport Safety Investigations

PN .....Pacific National Limited

RMV .....Road Motor Vehicle

CIRCUMSTANCES OF THE COLLISION

Synopsis

1.1 At approximately 7:40am on 1 September 2010, two Pacific National (PN) locomotives, operating as train D551, struck a road motor vehicle (RMV) on a private level crossing located in the Narrabri West to Wee Waa section approximately four kilometres East of the township of Wee Waa (see *Figure 1*). As a result, the driver of the RMV, a 32 year old resident from Wee Waa, suffered fatal injuries. No crew members of D551 were injured but they were treated for shock.

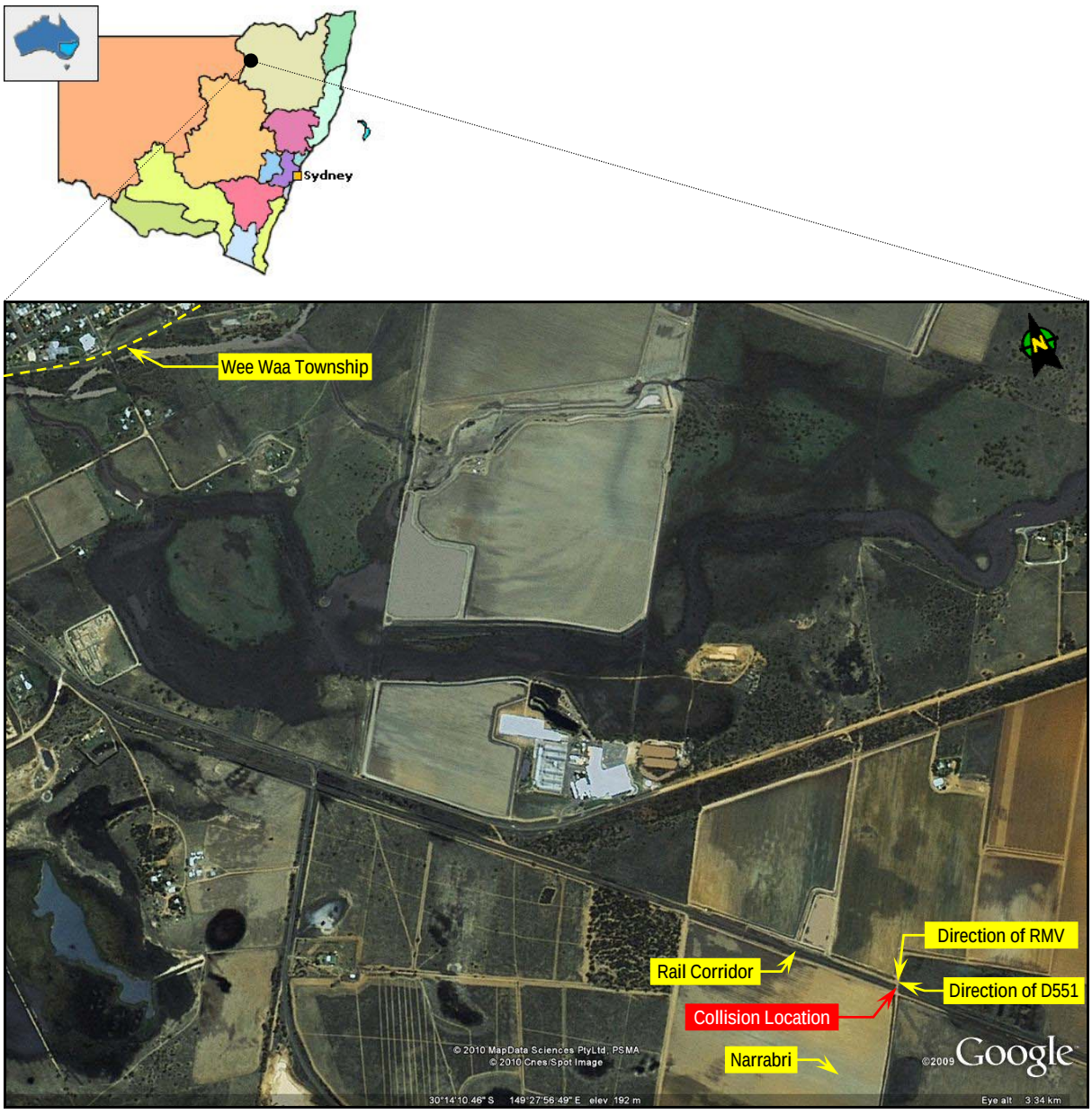


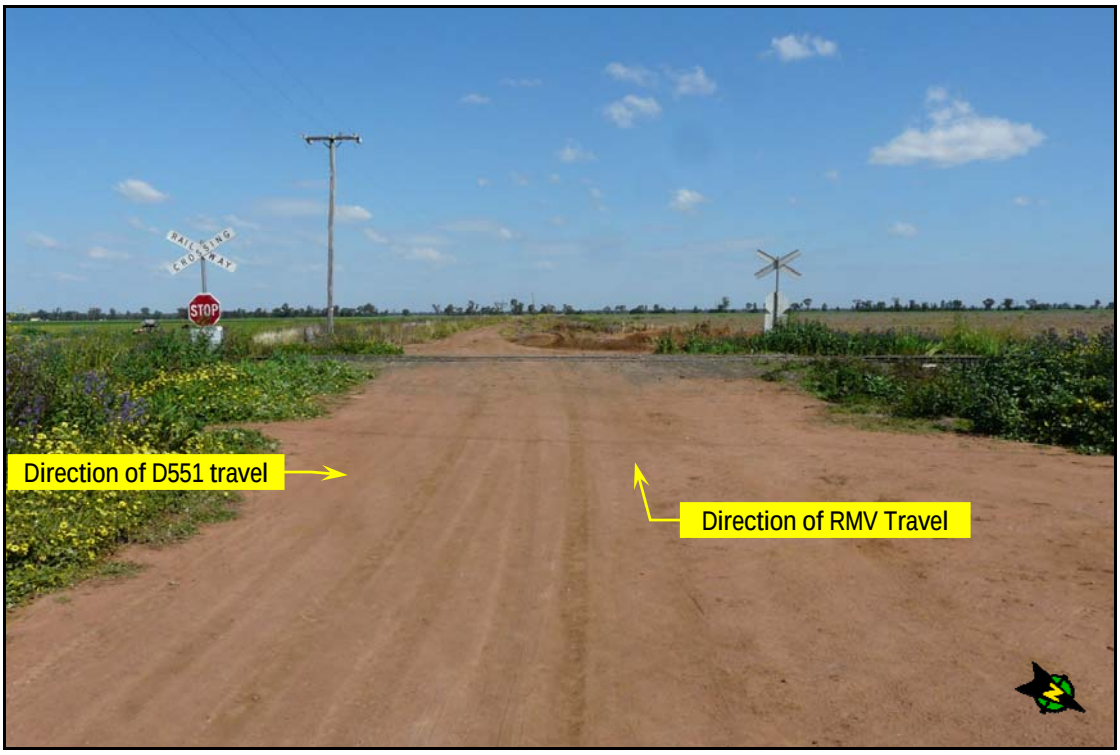
Figure 1: Collision location

1.2 Wee Waa is located on the branch freight line that runs from Narrabri Junction to Walgett in the North Western Plains Region of NSW. The level crossing is located at 594.680kms, the distance by rail as measured from Central Station in Sydney.

The Crossing

General

1.3 The level crossing is designated by the Australian Rail Track Corporation (ARTC) as a "*private accommodation crossing*" and is located on a straight section of the single line rail corridor[1] which divides a farming property. It is part of a private road system that provides the property owner with access from the main portion of the property to paddocks and farming infrastructure located on its Southern side (see *Photograph 1*). Historical records indicate that the crossing has been at the location since the line was built and, as the establishment of the crossing was a statutory requirement, there is no interface agreement between the track owner and property owner.



Photograph 1: Approach to the crossing

[1] The area between fence lines or, if there are no fences, everywhere within 15m of the outermost rails.

1.4 The crossing is one of eight private crossings marked on the current track diagram for the immediate section between Culgoora (583.441kms) and Wee Waa (598.959kms). It is also listed in the current ARTC Local Appendix: North – Volume 4 as Rhoden's (private) crossing, although at 594.130kms instead of 594.680kms.[2]

1.5 In the direction the RMV was travelling, the approach road runs from generally North-East to South-West at an angle of approximately 110° to the track but then bends close to the crossing so as to intersect the rail line at 90°. Immediately after the crossing on the Southern side, the road branches in three directions (see *Figure 2*).

1.6 It is believed that the driver of the RMV was intending to turn right immediately after the crossing to take the route to a silo which he had been cleaning out over previous days.

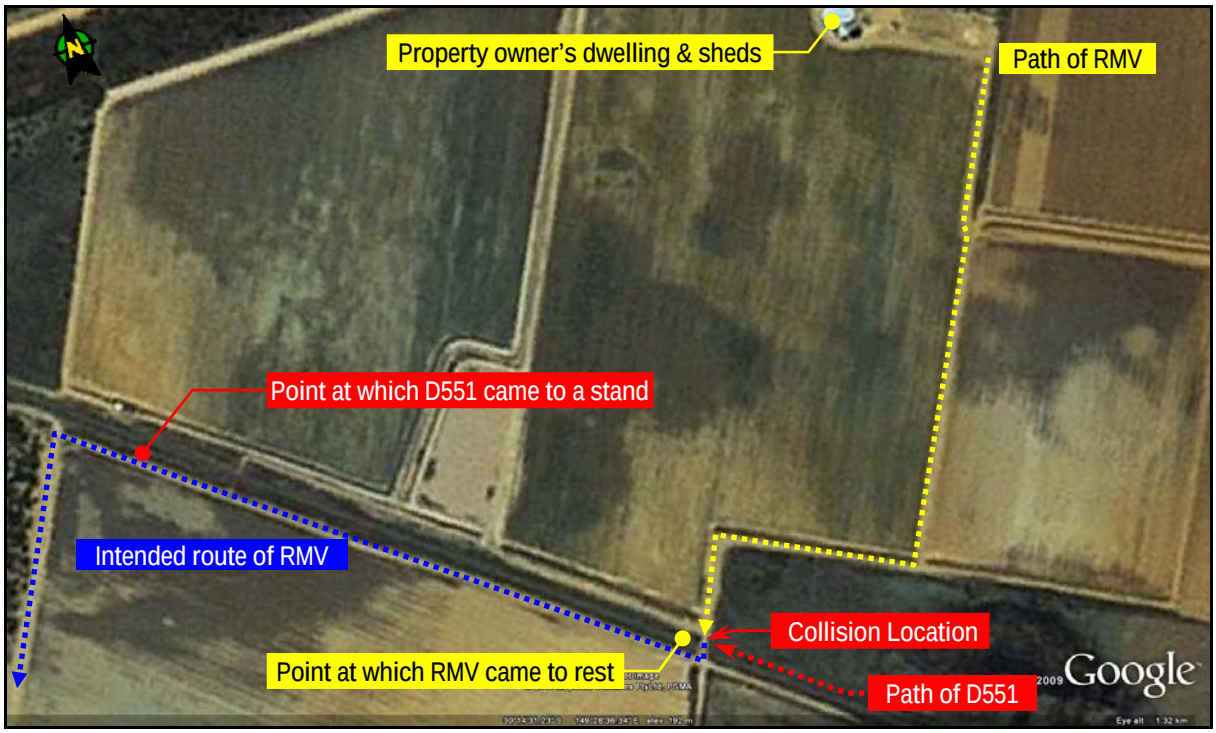


Figure 2: Overview of crossing and path of RMV

Construction and Warning Signage

1.7 The crossing measures approximately eight metres in width and is constructed of compacted gravel.

[2] Local Appendices are publications which prescribe special Safeworking arrangements for a location or area.

1.8 Due to its classification, the crossing is exempt from the requirements to have warning signage erected and road markings.[3] Nevertheless, Type D passive protection[4], consisting of RX2 type warning sign assemblies (see *Photograph 2*), was erected on both sides of the crossing by the Rail Infrastructure Corporation prior to 2004.[5] The assembly facing the driver of the RMV was situated on the left hand (Eastern) side of the crossing 5.1m from the nearest rail.

Photograph 2: RX2 type warning sign assembly

1.9 When inspected, both assemblies were in a clean and legible condition although both "*LOOK FOR TRAINS*" signs were partially obstructed by low

3 Australian Standard AS 1742.7-2007 *Manual of uniform traffic control devices Part 7: Railway crossings*, p. 6. The Standard also notes that private level crossings are sometimes referred to as "occupation" crossings.

4 Control of the movement of vehicular or pedestrian traffic across a railway level crossing by signs or devices, none of which are activated during the approach or passage of a train but, instead, rely on the road user detecting the approach or presence of a train by direct observation.

5 This protection also conforms to the requirements of ARTC Network Rule ANGE 216 *Level Crossings.*

growing vegetation and did not meet the minimum height requirement of 1.5m from the ground to the underside of the lowest sign in the assembly.[6] These shortcomings were not considered as causal or contributing factors in the collision. There was no other form of warning signage on the approaches to the crossing.

Approach speeds to crossing

1.10 The maximum track speed for rail traffic at the crossing is 80km/h.

1.11 There were no speed advisory signs for road traffic as the roadway is on private property.

Visibility at crossing

1.12 The corridor is straight with the track elevated approximately 500mm above ground level. A 19m gap exists between the boundary fence and the track on the North-Eastern side of approach to the crossing. On the left side of the RMV approach, the corridor was clear of shrubs and trees for approximately 1.7kms (see *Photograph 3*). On the RMV's right side, the corridor was clear of shrubs and trees for approximately one kilometre. The paddocks adjoining the corridor were also clear of any vegetation that might obstruct the view.

Photograph 3: View of rail corridor in the direction of the approaching train

6 Australian Standard AS 1742.7-2007, op. cit., p. 54, 55.

1.13 Although clear of taller vegetation, there was heavy weed growth, e.g., oats, Patterson's Curse and canola, in the corridor and on the Eastern side of the road approach to the crossing. The height of this vegetation ranged up to approximately 900mm. However, none of this vegetation completely obstructed the view of an approaching train from a RMV which had stopped in accordance with the warning signage prior to traversing the crossing (see *Photograph 4*).

Photograph 4: View of rail corridor from a RMV approaching the crossing

The Train and Crew

1.14 D551 departed Narrabri West at 06:55am and was en route to shunt and load a grain train at Burren Junction. The train was crewed by two employees of PN based out of its Narrabri West Depot who had signed on for duty at the Depot at 6:00am. The crew had the appropriate authorities for the journey.

1.15 The Driver had five years driving experience while the Assistant Driver had two years rail experience. Both crew members were within their respective

medical and competency assessment periods. Both were also familiar with, and qualified for, the route they were operating over.

1.16 D551 consisted of two 48 Class locomotives (4886 leading and 48110) coupled together measuring a total of 29.6m in length and weighing 156 tonnes.

The RMV and Driver

1.17 The RMV was a NSW registered 1992 model Daihatsu "*Rocky*" 4X4 flat tray utility owned by the deceased (see *Photograph 5*). It was carrying a variety of hand tools and equipment associated with the cleanout of the silo.

Photograph 5: Daihatsu "*Rocky*" 4X4

Australian Road Rules

1.18 The deceased held a current NSW driver licence.

1.19 The actions required of a licensed RMV driver at a level crossing are stipulated in Australian Road Rules (ARR) 121 *Stopping and giving way at a stop sign at a level crossing* and 123 *Entering a level crossing when a train or tram is approaching etc*.

1.20 ARR 121 requires that a driver of a RMV approaching a level crossing with a stop sign: "*must: stop at the stop line; or, if there is no stop line, at the stop sign and give way to any train approaching or entering the crossing*". ARR 123 (d) requires that a driver of a RMV must not enter a level crossing "*if a train or tram approaching the crossing can be seen from the crossing, or is sounding a warning, and there would be a danger of a collision with the train or tram if the driver entered the crossing"*.

The Collision

1.21 The crew stated that D551 was travelling at the maximum permitted track speed of 80km/h on approach to the level crossing, and this was verified in the analysis of the event recorder tape from the leading locomotive. At a point approximately 400m prior to the crossing, they sounded the train whistle (horn) in accordance with ARTC Network Rule ANTR 408 *Using Train Whistles*.

1.22 At a point approximately 100 metres from the crossing the Driver again sounded the whistle observing that, at this time, the crossing was clear. However, almost immediately after, the Assistant Driver observed a white RMV appear "*travelling from right to left at moderate speed*" and alerted the Driver. The Driver immediately made an emergency brake application. They then felt and heard the locomotive strike the RMV. D551 came to a stand some 632m beyond the crossing.

1.23 D551 impacted the RMV on the passenger side in the area of the rear pillar of the cabin and tray section (see *Photograph 6*). The RMV was then propelled in an arc-like trajectory from the crossing and spun approximately 180°. It came to rest on the parallel access road at a point some 32m from the crossing and 14.4m from the track.

Photograph 6: Damage to RMV

1.24 The crew's statements are supported by the recorded telephone conversations between the Assistant Driver and the Network Controller[7] at the ARTC's Network Control Centre North at Broadmeadow (NCCN). The Assistant Driver told the Network Controller that he had not sighted the RMV until immediately before it was struck and that he did not believe that the RMV had stopped before entering the crossing.

Emergency Response and Notification

1.25 Immediately after the collision, the train crew called for emergency services assistance by ringing 000. The Driver then went back to the RMV to ascertain the condition of its driver and render assistance. Meanwhile, the Assistant Driver reported the collision to the Network Controller at the NCCN before shutting down and securing the locomotives.

1.26 Units from the NSW Ambulance, Police and Fire Brigades arrived together on site at 8:35am after having initial difficulties in pinpointing the nearest public road to the location of the crossing.

1.27 OTSI was notified of the collision by the Train Transit Manager from the NCCN at 8:16am and an investigator was deployed to the site.

1.28 After the site inspection was completed, it was released at 4:30pm for the recovery and return of the locomotives to Narrabri. Another site inspection was conducted the next morning to ascertain the position of the sun relative to the crossing at the time the RMV was struck.

Post Collision Inspection and Analysis

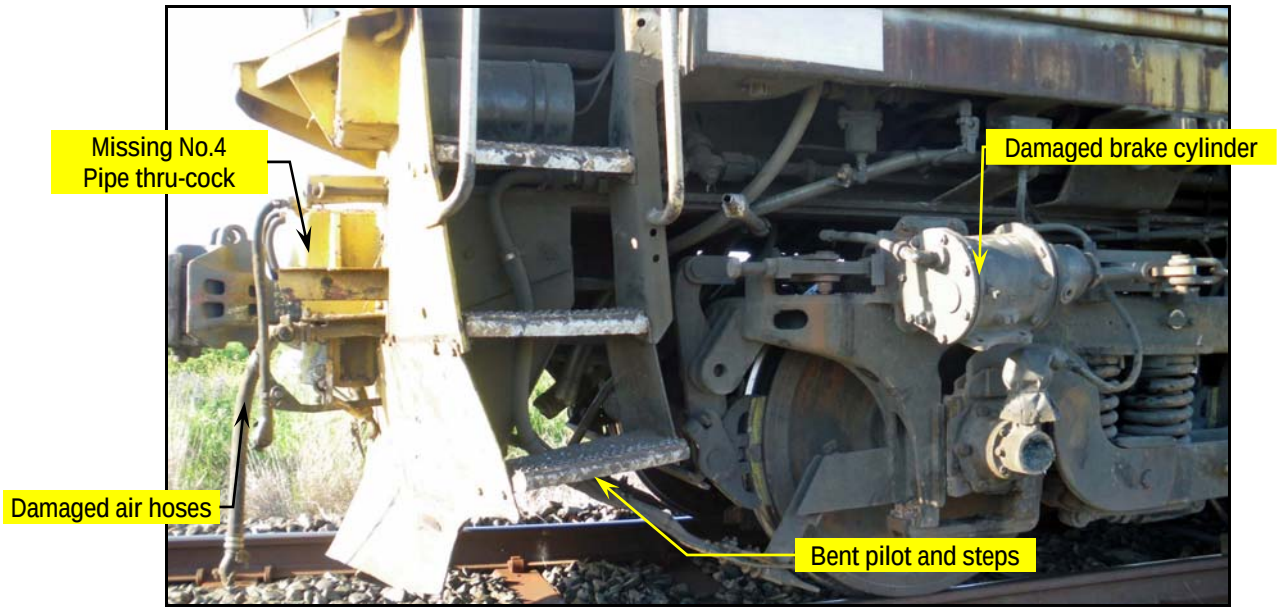
1.29 The following was determined from post collision inspections and analyses:

D551

- Neither locomotive had derailed after striking the RMV.
- Both locomotives were in a serviceable condition with no apparent defects with any safety critical components, i.e., wheels, axles, brake rigging or other bogie components. There were no outstanding defect entries in the locomotive log books.

[7] A qualified worker who monitors and controls train movements from a Control Centre.

- The brakes on both locomotives were correctly regulated and within travel limits. The thickness of all brake blocks exceeded the allowable minimum of 16mm.
- Various impact marks and damage were apparent on the front coupling region, front left hand side of the headstock, and leading left hand side of the leading locomotive (4886). The damage included bent steps, a bent pilot, damaged thru-cocks and hoses on the air lines for the main reservoir, brake pipe and the No.3 pipe of the independent brake, a missing thru-cock and hose on the No.4 pipe of the independent brake, and a damaged brake cylinder casing on the left side of the leading bogie (see *Photograph 7*). The location of the damage was consistent with the RMV being struck as it exited the crossing.

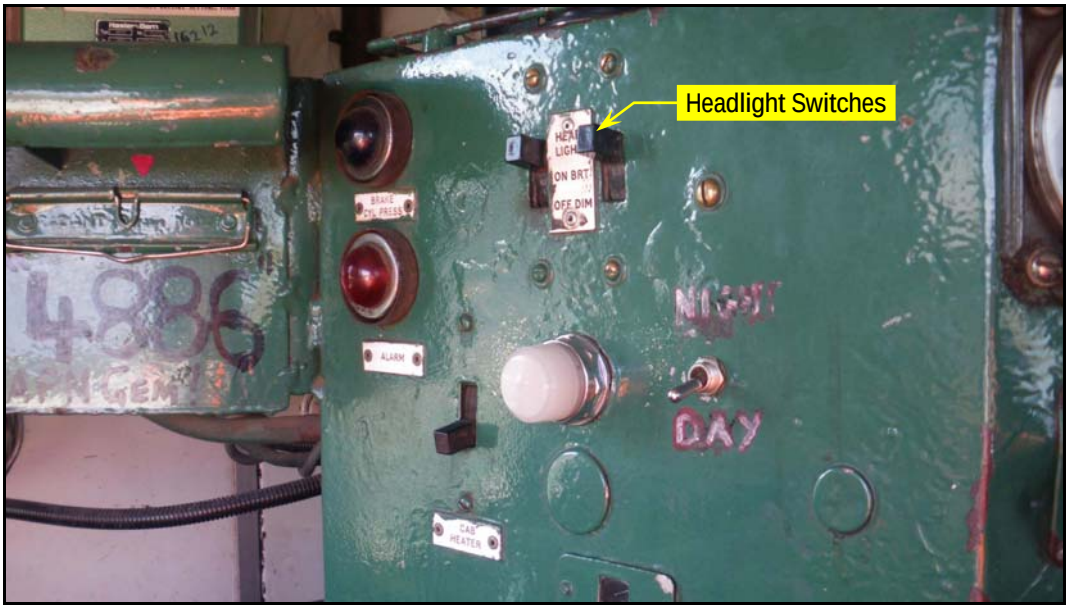


Photograph 7: Damage to leading locomotive

- The independent brake valve handle on 4886 was in the fully applied position while the automatic brake valve handle was in the “release and running” position. This indicated that the driver had used the independent brake system when making an emergency brake application. However, the damage to the brake cylinder casing and the missing No.4 thru-cock on the independent brake system would have caused a loss of air pressure within the system and reduced the braking effort of the train.

This would explain why it took an excessively long distance of 632m to stop the train after it struck the RMV.

- The whistle on 4886 was operable.
- The headlight switches on 4886 were in the "on" and "bright" positions (see *Photograph 8*) with both headlight globes illuminating when battery power was restored to the locomotives.[8] This indicated the headlights were being operated in accordance with ARTC Network Rule ANTR 406 *Using Train Lights* at the time of the collision.



Photograph 8: Headlight switches in "On" and "Bright" position

- The marker light and number box light switches on 4886 were in the "on" position with the respective globes illuminating when battery power was restored to the locomotives. The marker lights were set to white, indicating the front of the train.
- Due to the configuration of the cab of 48 Class locomotives, the driver had no view of the approach to the crossing by the RMV (see *Photograph 9*).
- The Assistant Driver's view of the approach to the crossing by the RMV was partially obscured by the cabin wall and entry door, and a scratched windscreen (see *Photograph 10*). However, 4886 was operating short end leading which provides the least restricted view for the crew.

[8] The battery power had been switched off by the crew of D551 when the train was stabled to ensure sufficient power remained to restart the locomotive at the completion of recovery operations.

Photograph 9: Driver's cross cab view to the RMV approach direction

Photograph 10: Assistant Driver's view of approach to crossing through scratched windscreen

RMV

- The RMV appeared to have been in a roadworthy condition prior to being struck.
- The driver's side seat belt was fully retracted and jammed against the rear pillar by the seat back indicating that the belt was not being worn at the time the RMV was struck (see *Photograph 11*). Further, the belt was not damaged; nor was there any damage on the buckle or clip to indicate that the buckle had disengaged during or after the impact (see *Photograph 12*).

Photograph 11: Seat belt retracted and jammed behind seat back

Photograph 12: Condition of seatbelt clip

- The ignition switch was in the "on" position with the keys still in the switch barrel.
- The handbrake was not applied.
- The gear that the RMV was travelling in at the time could not be established as the gear shift lever was jammed under the centre console/dash assembly. Its position indicated that it may have been jammed when the deceased was propelled in the cabin or when the transmission became dislodged from its mounts.
- Noise in the cabin was discounted as a causal or contributing factor as the driver's side cabin window was open, the car radio switch was in the "off"

position and the power supply to a “CB” type radio set was disconnected. The status of the passenger side window was not determined as its glass was shattered in the impact.

- The use of a mobile phone has been discounted as NSW Police advised that they had found the deceased’s mobile phone in the top pocket of his shirt. They also advised that telephone records had shown that calls were not being made or received at the time of the collision.

Crossing

- The surface of the crossing was in a serviceable condition with minor tyre rutting evident from previous muddy conditions.
- There were no skid marks caused by the tyres of the RMV on the approach to or on the crossing to indicate that the deceased had braked at any time prior to being struck (see *Photograph 13*). The only marks that were found were gouge marks between the rails at the point where the RMV was struck.

Photograph 13: Approach to crossing
(Note no evidence of skid marks)

Environmental conditions

- The RMV was struck during clear, dry weather conditions. There was no fog or rain in the region at the time.
- The position of the sun was discounted as a causal or contributing factor as its position at the time of the collision was behind the RMV over the driver's left hand shoulder.
- Visibility through the windscreen and passenger side door could not be determined due to damage sustained in the collision.
- Dust was eliminated as a contributing factor as the soil had not dried sufficiently from previous rains to become airborne in winds. There were also a number of puddles and mud holes along the approach road to the crossing.

Vegetation Control

- To control vegetation at level crossings between Narrabri and Wee Waa, ARTC conducts either weed spraying or weed spraying and slashing on a six monthly basis.
- Maintenance records for the corridor showed that all level crossings between Narrabri Junction and Burren Junction had been brush cut and sprayed in April 2010. The records also showed that the program had been adjusted due to recent heavy rains and increased vegetation growth in the region with the schedule for spraying at level crossings in the section brought forward by a month to 1, 2 and 3 September 2010.
- ARTC reported that the adjusted spraying program had commenced at Narrabri Junction on the day of the accident and had continued along successive crossings in the corridor. The crossing at 594.680kms was sprayed on 3 September 2010.

Event Recorder

- Both locomotives were fitted with Hasler type event recorders which record basic data about the operation of the train on wax covered tapes. The tapes from both locomotives were retrieved but the tape from 48110

(trailing unit) could not be analysed as it had run out before D551 departed Narrabri West.

- The tape from 4886 was sent by PN for independent analysis. In summary, the analysis concluded, that:
  - All recording functions of the event recorder were operating correctly at the time of the collision but, as locomotive 4886 was fitted with an older style of machine, it did not record the operation of the headlight or whistle.
  - At different points along the tape, the clock had not been wound or set but, when the RMV was struck, the clock was set near to the correct time.
  - D551 had stopped twice in the Narrabri West to Wee Waa section prior to the collision. The crew explained that these stops were related to a sticking brake problem with the trailing locomotive 48110.
  - D551 was travelling at 80km/hr on approach to the crossing and at the time of the collision.
  - D551 came to a stand at 7:32am[9] shortly after events, consistent with the locomotives colliding with the RMV, are recorded on the tape.
  - D551 then remained stationary until the tape was removed from the recorder at 9:43am.

Conclusions

1.30 On the basis of the available evidence, OTSI has determined that:

- The primary cause of the collision was the driver of the RMV not stopping and giving way to the approaching train as is required by Australian Road Rules 121 and 123. OTSI has not been able to establish why the driver of the RMV failed to stop.
- Contributing to the consequences of the collision was evidence that the driver of the RMV was not wearing a seat belt at the time of the collision.
- There were no obvious factors which would have prevented the driver of the RMV from seeing or hearing the approaching train.

[9] Recorded time on the tape.

- Although not required by AS 1742.7-2007, appropriate warning signage had been erected at the crossing.
- Although there was heavy weed vegetation around the crossing which partially obstructed the warning signage, there was adequate visibility of approaching trains at the crossing. Further, the risks associated with the growth of this vegetation were both recognised and being managed.
- There were no issues with the condition of D551 or the manner in which it was being operated when the RMV was struck.
- The crew of D551 had complied with the relevant ARTC Network Rules and Procedures for the use of train whistles and headlights when approaching the crossing and had acted diligently in notifying the Emergency Services and NCCN immediately after the RMV was struck.
- Although not a contributing or causal factor, the windscreens on 4886 were scratched and dirty and provided less than optimal visibility.

APPENDIX : Sources, Submissions and Acknowledgements

Sources of Information

- ARTC Network Controller and Train Transit Manager (NCCN Broadmeadow)
- ARTC Risk and Compliance Senior Investigator, Tamworth
- Bureau of Meteorology
- Pacific National
- Crew members of train D551
- NSW Police (Narrabri Detectives)
- WorkCover NSW

References

- Australian Standards
- Australian Road Rules
- ARTC Network Rules and Procedures
- Glossary for the National Codes of Practice and Dictionary of Railway Terminology
- Passenger Transport Act 1990 (NSW)
- Rail Safety Act 2008 (NSW)

Submissions

The Chief investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIPs) to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIPs were invited to make submissions on the Draft Report:

- Pacific National
- Australian Rail Track Corporation
- Independent Transport Safety Regulator

Responses were received from all three of the DIPs.

The Chief Investigator considered all representations made by DIPs and responded to the author of each of the submissions advising which of their recommended amendments would be incorporated in the Final Report, and those that would not. Where any recommended amendment was excluded, the reasons for doing so were explained.

Acknowledgements

Figures 1 and 2 were sourced from *Google*.

Photographs 1, 2, 4 and 10 are reproduced with the permission of *ARTC*.

Photograph 5 was sourced from www.Carbuddy.com.au