Australian Government
Australian Transport Safety Bureau

Office of Transport Safety Investigations

Defective axle bearing leading to fire on passenger train SN68

Yerrinbool, New South Wales, on 13 October 2020

ATSB Transport Safety Report
Rail Occurrence Investigation (Defined)
RO-2020-017
Final – 20 January 2022

Cover photo: Collapsed axle bearing with end cap removed on swing arm assembly
Source: Office of Transport Safety Investigations (OTSI)

This investigation was conducted under the Transport Safety Investigation Act 2003 (Commonwealth) by the **Office of Transport Safety Investigations (NSW)** on behalf of the Australian Transport Safety Bureau in accordance with the Collaboration Agreement.

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Addendum

Page	Change	Date

Safety summary

What happened

On 13 October 2020, TrainLink passenger service SN68, was operating from Moss Vale to Campbelltown, New South Wales with approximately 20 passengers on board.

The train driver stopped the train at Yerrinbool Station after being alerted to a small fire at the rear of the train. The fire was identified as coming from the vicinity of an axle bearing on the rear wheelset of the train. The passengers were evacuated onto the platform and the driver attempted to extinguish the fire using an on-board fire extinguisher.

The fire was subsequently extinguished by Fire and Rescue NSW. As a result of the fire, parts of the axle box were heat affected and sustained significant damage to the speed sensor and rubber suspension components. There were no reported injuries.

What the ATSB found

The investigation determined that the fire was the result of a collapsed axle bearing on wheel 8 on the trailing bogie on car 2811, the end of the train. The axle bearing failed when the axle end cap bolts loosened and one fractured which caused the collapse of the bearing and frictional heat to be generated. The resulting fire was fuelled by grease, oil and rubber suspension components in the immediate vicinity of the axle box.

It is likely that during the last overhaul of bogie NJA31, the locking plate tabs retaining the axle end cap bolts were not fitted correctly against the sides of the bolts. The axle bearing installation process was not sufficient to ensure the tabs on the locking plate were installed correctly during a refurbishment three months before the incident.

A wayside monitoring system at Burradoo on the Down Main line detected an elevated temperature on one bearing, but the temperature recorded was below the threshold for an alarm to be sent to network control.

What has been done as a result

Following the occurrence Sydney Trains, which is the maintenance provider for NSW Trains, initiated an inspection of similar axle boxes in the fleet and undertook an audit of the contracted maintainer's practices.

Sydney Trains have advised the following actions have taken place to prevent a recurrence:

- Improvements have been made to the contracted maintainer's quality assurance processes to ensure that bolts and locking tabs are correctly installed.
- An improved process was implemented to review and retain the contracted maintainer's certificate of completion checklists.

Safety message

Bearing failures continue to occur within the Australian rail network. This occurrence emphasises the significance of having adequate bearing installation processes and ensuring that axle bearings are correctly maintained and monitored throughout their operational life.

Contents

The occurrence

On Tuesday 13 October 2020, TrainLink passenger service SN68, operated by NSW Trains,[1] departed Moss Vale at 1757.[2] The two-car Endeavour train was crewed by a driver in the front cab and a guard in the rear cab. There were approximately 20 passengers on board the train as it departed Moss Vale (Figure 1). The train was to make 11 stops before being scheduled to arrive at Campbelltown at approximately 1900.

The train stopped at Burradoo and Bowral before departing Mittagong at approximately 1809. The train crew said they had experienced no problems with the train before Yerrinbool.

At 1820, as the train was slowing to stop at Yerrinbool Station, the guard, from inside the cab at the rear of the train, heard a loud noise and noticed smoke outside the window. The guard used the train's bell system to ask the driver to stop. The driver brought the train to a stand at Yerrinbool Station.

Figure 1: Incident location and path of SN68

Source: Geoscience Australia, annotated by OTSI

Once the train stopped at Yerrinbool Station, the guard used the trains' public address system to ask the passengers to move to the front of the train. The guard made a second announcement shortly afterwards, requesting passengers disembark onto the platform. The driver walked along the platform to the rear of the train and observed a flame and dark smoke coming from the last wheelset of the train, wheel 8 on axle 4 under the bogie of car 2811.

The driver spoke to an Australian Rail Track Corporation (ARTC) network controller at Junee requesting permission to go down onto the track to attempt to extinguish the fire. The network controller applied signal blocking to prevent rail traffic in both directions and then gave permission

[1] NSW Trains is an operating agency of Transport for New South Wales, it is responsible for the operations of TrainLink services.

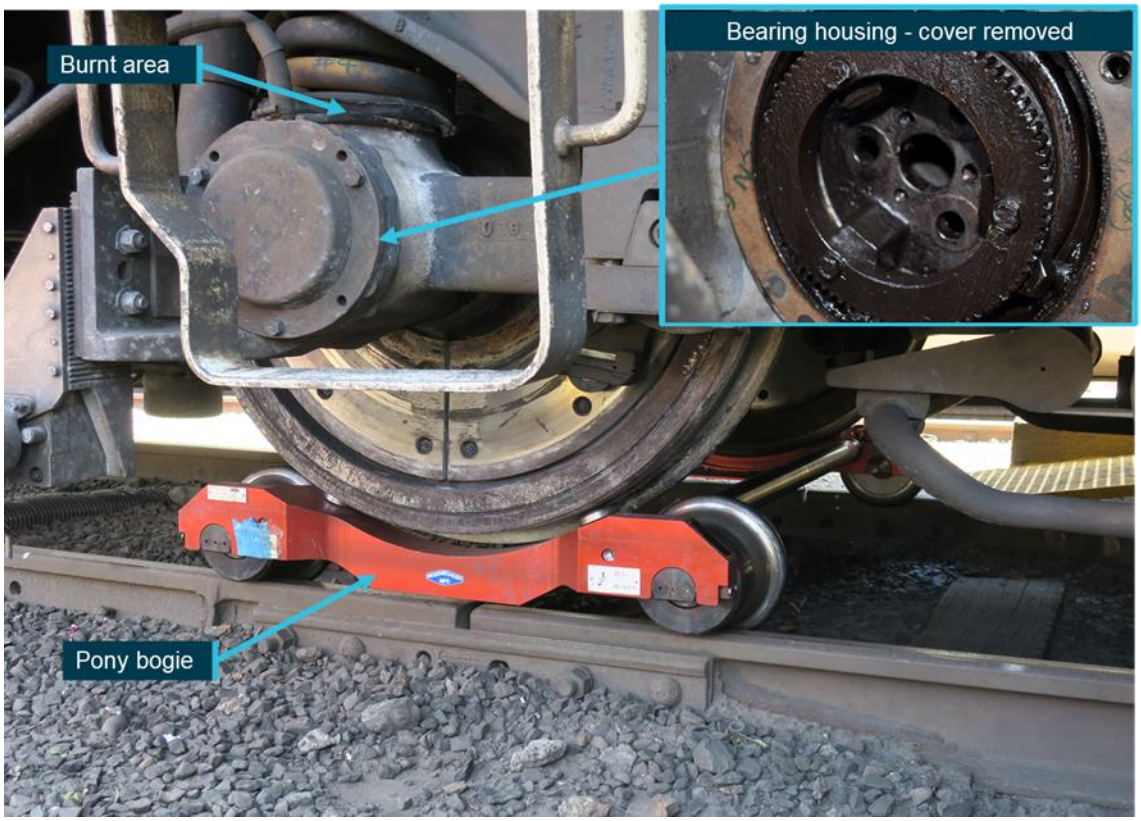
[2] Times shown in 24-hour time as Australian Eastern Daylight Time (AEDT).

for the driver to access the track. Another passenger service, SN61, was stopped by the signaller at a signal before the platform at Yerrinbool. This provided protection on the adjacent line so the driver could go onto the track. The driver went onto the track and used the on-board fire extinguisher to attempt to put out the fire. The fire continued to smoulder/burn as the heat source remained.

Fire and Rescue NSW arrived on site at approximately 1828 and ensured the fire was extinguished before departing at 1850. Train passengers were transferred to buses which replaced train services between Campbelltown and Moss Vale in both directions. There were no reported injuries as a result of this incident.

The maintenance shift manager at Eveleigh Maintenance Centre organised for the Rail Emergency Recovery Unit to arrange pony bogies (Figure 2) to be fitted under all wheels of bogie NJA31 and the train was worked back to Eveleigh over the next two nights. Under the supervision of Office of Transport Safety Investigations (OTSI) investigators, Office of the National Rail Safety Regulator representatives and Sydney Trains engineering staff a partial disassembly of the axle end cap and removal of bolts from the affected bearing was undertaken. A further strip down inspection of the axle bearing assembly was conducted at bogie maintainer United Group Limited Unipart (UGLU) at Auburn, also under the supervision of OTSI investigators and Sydney Trains engineering staff.

Figure 2: Heat affected area and pony bogie fitted under NJA31



The inset image shows the axle cover removed. Two bolts were found to be missing from the end cap and one bolt was broken. All three bolts remained within the axle housing.
Source: OTSI

The damage was contained to this localised area around the trailing axle of the rear bogie. Parts of the axle box were heat affected and the speed sensor and rubber suspension components were significantly damaged.

Context

Environment

The Bureau of Meteorology (BOM) automatic weather station at Moss Vale, recorded the temperature as 24.4 °C at 1500 on 13 October 2020. Yerrinbool is approximately 30 km north-east of Moss Vale. Weather conditions were fine and clear.

Location

Yerrinbool Station is on the Main South line in the Southern Highlands of New South Wales (Figure 3). Yerrinbool is located at 116.310 km.[3]

Figure 3: South-bound Endeavour two-carriage set at Yerrinbool Station

The figure shows south-bound (Down) Endeavour set at Yerrinbool Station. Image of car 2811 inset
Source: railgallery.wongm.com, annotated by OTSI

Train crew

The train was crewed by a driver, operating the train in the front driver's compartment, and a guard located in the rear drivers' compartment. The train crew were appropriately qualified and held the required route qualifications.

Train information

Train SN68

The passenger train involved in the incident, SN68, was an Endeavour railcar two-carriage set. This diesel-powered multiple unit train was operated by TrainLInk and built by ABB Transportation in Dandenong, Victoria. There were 14 Endeavour sets in service at the time of the incident and

[3] The kilometre distance is measured from Platform 1, Central Station, Sydney, New South Wales.

they first entered service in March 1994. Twenty-three Xplorer cars which have the same bogie types and axle bearings were also in service at the time of the incident.

The leading car of SN68 was LE2861, with TE2811 being the trailing car. The LE carriages feature a dedicated luggage space and can seat 95 passengers. The TE carriages feature a wheelchair accessible toilet and can seat 82 passengers.

The drivers' cab, positioned at each end of the train, is a full width driving compartment with the driver's seat offset to the left-hand side. Passengers enter and exit through power activated doors operated and controlled by the driver or the guard. Dry chemical fire extinguishers are fitted in the drivers' compartment.

Bogies

The bogies fitted to the Endeavour and Xplorer sets are NJA and PJA bogies. The bearing collapse occurred on an NJA bogie, the rear trailing bogie on car 2811. The NJA bogie is the trailer bogie (Figure 4), as opposed to the PJA powered bogie. Built for the State Rail Authority in 1994, the bogie involved in this incident was designated as NJA31. This bogie was installed on car 2811 on 7 July 2020 and had travelled approximately 66,087 km since installation.

Figure 4: NJA31 bogie

Source: OTSI

Axle bearing installation

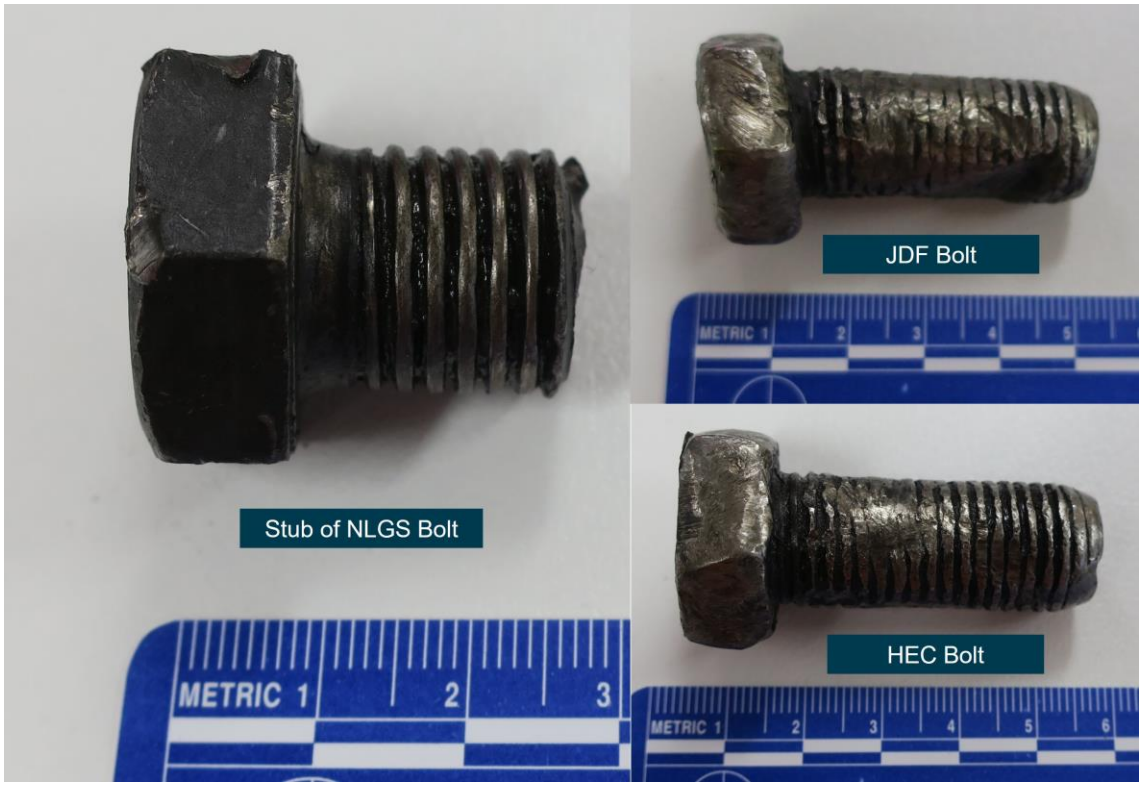
The maintenance and installation processes for critical components holding the axle bearing were examined as part of the investigation.

Each bogie has two wheelsets which have an axle bearing at each end of the axle (four bearings per bogie). The axle bearings were Timken SP130 type bearings. Securing the axle end cap were three different brands of bolts with the head markings showing: NLGS, JDF and HEC (Figure 5 and Figure 6). The axle end cap bolts were hexagonal head, metric 16 mm diameter (M16), 40 mm length (fully threaded), 2 mm pitch, and class 8.8. There are two types of end caps used, a standard or combined end cap suitable for mounting a phonic wheel. The phonic wheel is used as part of the train's on-board system for recording speed and detecting wheel slide during braking, this end cap was the phonic wheel type.

Figure 5: Three types of axle end cap bolts removed from hub following incident

Source: OTSI

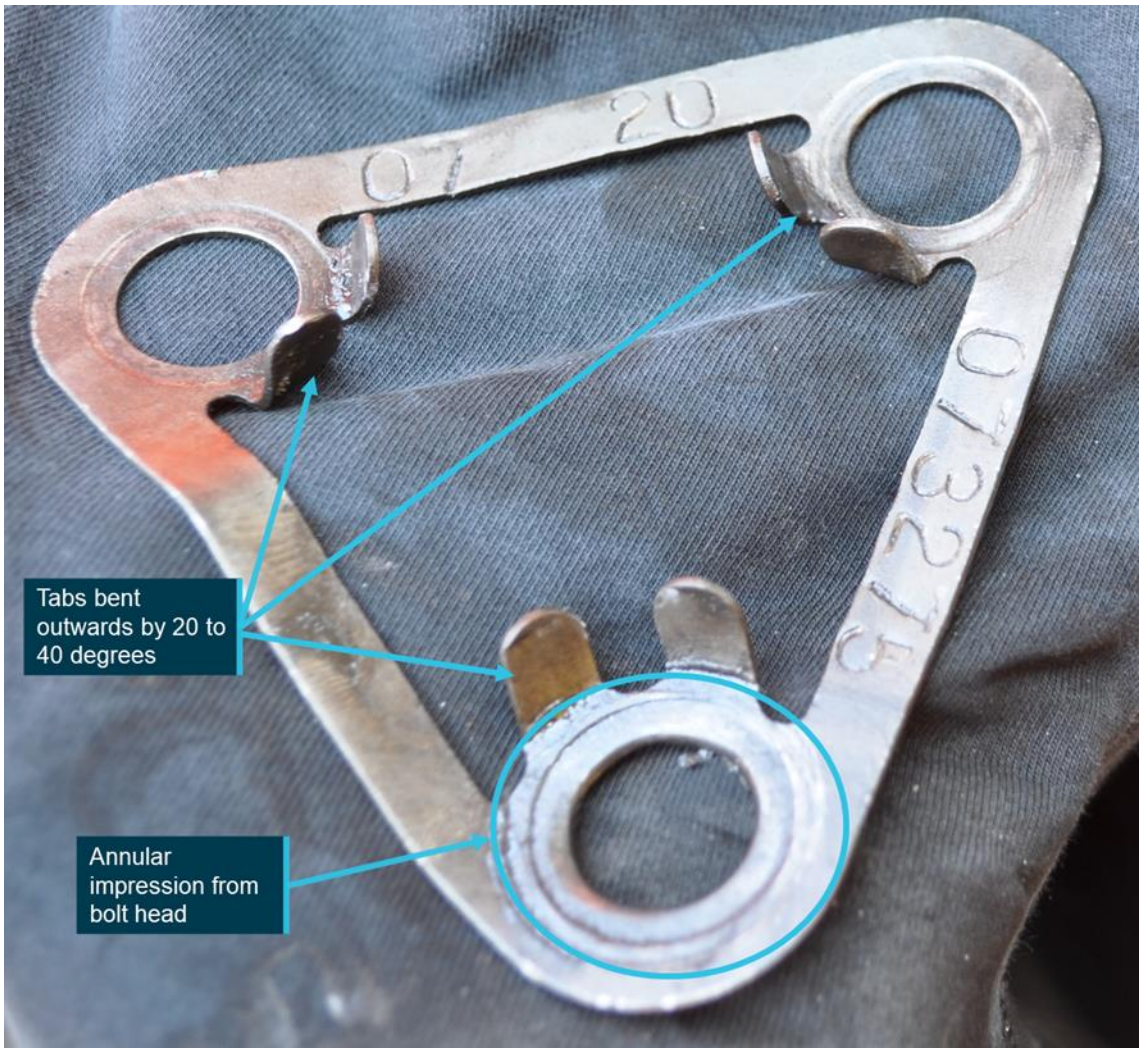
Figure 6: Side view of three axle end cap bolts, including broken NGLS bolt



Source: OTSI

The locking plate was a Timken brand K-422091 R.S 120-130. Stamped on the plate was the axle number (073275) and installation date (07 20 – July 2020) (Figure 7).

Figure 7: Locking plate



Source: OTSI

The requirements for installing the SP130 bearings onto the axles is documented in a Sydney Trains Standard Instruction.[4] This instruction provided maintenance workers with the details for installing the end cap, torque requirements for bolts and installing the locking tabs. There was a wheelset certificate of completion used by the maintenance workers to show that bogie NJA31 was refurbished. This work was completed on 1 July 2020. There are check boxes on a form that the maintenance workers complete when each task is done. These were all checked as completed and the installation tolerances for the bearing were correct at the time of installation.

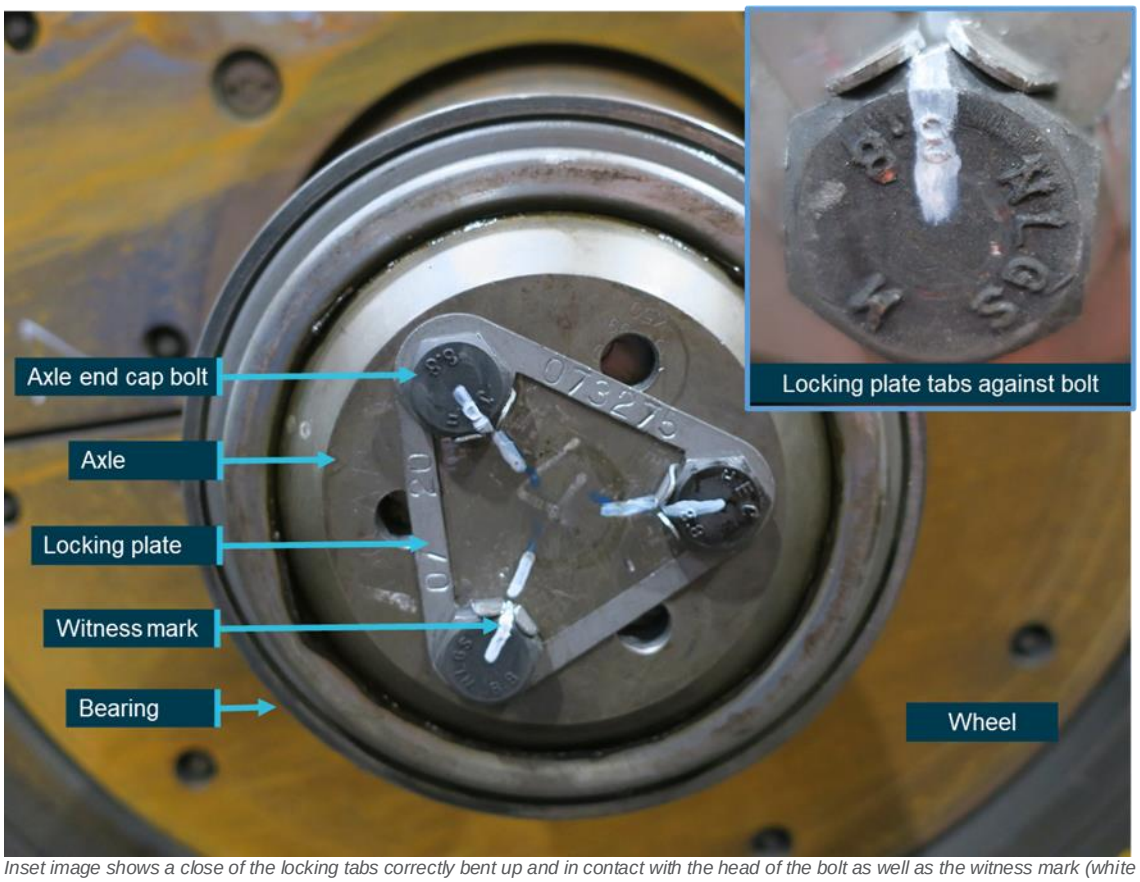
The axle bearing installation process commences with the bearing being pressed onto the axle journal before being retained on the journal by an end cap. The end cap is secured by three M16 bolts with a new locking plate positioned underneath the bolt heads. The bolts are screwed in threaded holes and using a calibrated torque wrench are finally torqued to 80 – 100 Nm.

The bolts are torqued in sequence until there is no further movement of the bolt resulting from the application of the specified torque. It may be necessary to further tighten the bolt to align the head with the locking plate tabs. The tabs on the locking plate are then bent up to engage with the sides of the bolt head to form a tight fit. After the process is complete a witness mark is applied to the

[4] Sydney Trains Standard Instruction, Installation of Metric SP type Package Unit Bearings, TRS1516.00, Vol 3, Section G, 8. Applying the end cap.

bolt head and adjacent area to show the original position of the bolts (Figure 8). Movement can be visibly determined during any subsequent inspections.

Figure 8: Correct bolt and locking tab installation bolt



Inset image shows a close of the locking tabs correctly bent up and in contact with the head of the bolt as well as the witness mark (white paint pen).
Source: OTSI

Involved parties

The Australian Rail Track Corporation (ARTC) is the rail infrastructure manager that manages the Main South Line from Macarthur on the outskirts of Sydney to Melbourne, including wayside monitoring devices and train control.

NSW TrainLink provides rail services in NSW and also operates some interstate services to Victoria and Brisbane.

Sydney Trains is responsible for maintenance activities on the trains operated by Sydney Trains and NSW TrainLink.

United Group Limited Unipart (UGLU) are contracted maintenance providers to Sydney Trains and serviced the bogies of the Endeavour and Xplorer fleet. UGLU is a joint venture between United Group Limited and Unipart.

Track and infrastructure information

The section of track at Yerrinbool was standard gauge (1435 mm). It consisted of an Up Main line and a Down Main line. At the time of the incident SN68 was travelling towards Sydney on the Up Main line.

ARTC maintains operational control for this area from Network Control Centre South at Junee.

Wayside detectors

The ARTC, operates and maintains the wayside monitoring systems in the vicinity where this incident occurred. There are different types of wayside devices including but not limited to detectors for hot bearings, wheel impact loads, acoustic wheel monitoring, and dragging equipment (Figure 10).

At Burradoo, 138.000 km, on the Down Main line, an operational wayside device detected an elevated bearing temperature as SN68 as it passed, in the Down direction, on the way to Moss Vale. This occurred at 1703 when the elevated temperature was recorded on car 2811 (wheel 8 on axle 4), the location of the subsequent collapsed bearing. The temperature was recorded as 84°C, below the threshold to trigger an alarm. The temperature of the other bearings on the bogie were recorded as 73°C, 65°C and 69°C.

The ARTC has two threshold categories for hot bearing detector alarms.[5] When a threshold temperature is exceeded an alarm is sent to the network controller who must ensure the category of alarm condition is understood by the driver and is responded to according to the required action outlined below (Figure 9).

Figure 9: Wayside Device Alarm Categories

Temperature Alarm	Required Action
Hot Alarm 100°C	The temperature has passed the critical level and there is a possibility of bearing damage. Trains to be stopped immediately and vehicle inspected. Rail operator notified and Train Control Report (TCR) is raised.
Warm Alarm 90°C at 20°C ambient varied by 80% for the actual threshold.	The temperature is higher than normal and the bearing may need attention. Train to be stopped immediately and vehicle inspected. Rail operator to be notified and TCR raised.

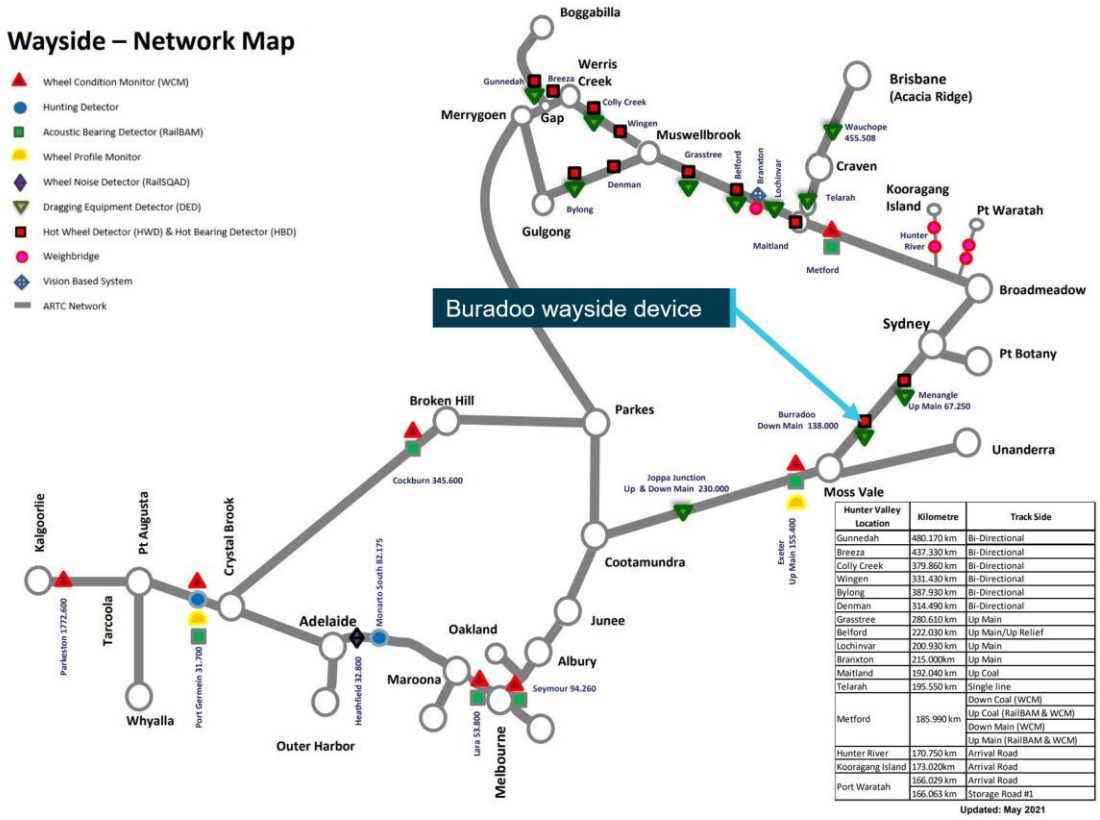
Source: ARTC

The other wayside monitoring system between Campbelltown and Moss Vale was located at Menangle on the Up Main at 67.25 km. It is likely that the hot bearing would have been detected here, 50 km past Yerrinbool.

Sydney Trains also checked previous passes by car 2811 over wayside monitoring systems and did not identify any other warm bearing temperature for this wheelset for the period 5 July 2020 to the incident date on 13 October 2020.

[5] ARTC, Response & Management of Wayside Monitoring Device Alarms – Wayside Device Alarm Categories.

Figure 10: ARTC Network wayside detectors



Source: ARTC, annotated by OTSI

Related occurrence

On 1 December 2020, less than two months after the incident at Yerrinbool, a related incident occurred when a hot bearing on an Xplorer train was detected by a Sydney Trains wayside detector on the Up Main at Wyee, NSW. TrainLink passenger service, NP24, travelling from Armidale to Sydney was stopped at Wyee after the driver was notified of a hot bearing. After inspection, the train proceeded at a low speed (under 25 km/h) to Wyong where the passengers were disembarked. There was no injury or damage.

The Xplorer was subsequently examined at Eveleigh Maintenance Centre where it was found that two axle end cap bolts on car 2508 (wheel 8) had moved from their original position. It was also found that the locking plate tabs were incorrectly bent up. The last refurbishment of the wheelset was 22 months before the incident on 1 March 2019.

Safety analysis

Mechanism of bearing collapse

The investigation determined that the fire in the wheel area of SN68 at Yerrinbool was caused by a collapsed bearing on wheel 8 on the trailing bogie on car 2811. This led to frictional heat to be generated and a fire started. The fire was fuelled by grease, oil, and rubber suspension components in the immediate vicinity of the axle box. The fire did not spread to other parts of the train.

The likely precipitating events to the bearing collapse was the loosening of two of the three axle end cap bolts which placed higher loading on the remaining bolt which then started to fracture. During every cycle of the bearing there are micro movements within the system. The locking plate tabs, if positioned correctly against the face of the bolts, assist in retaining the bolts in position. The two bolts, inadequately restrained by the locking plate, continued to loosen and fell out and the remaining bolt then fractured completely (Figure 11). With the end cap unsecured the outer cone of the bearing was able to move on the axle. Wayside data indicated that once the bolt fractured it took approximately 15-20 minutes for the failure to be identified.

Figure 11: Axle end with protruding failed bolt

Insert image showing the inside collapsed axle box and failed bolt protruding.
Source: OTSI

An initial inspection of the axle bearing and components was conducted following the incident at Eveleigh Maintenance Centre. All three bolts and the locking plate were recovered and, although damaged, were able to be examined. There were three different brands of bolts used and the failed bolt was identified as a NLGS bolt. A further inspection at UGLU Auburn Maintenance Centre was conducted when the bogie was disassembled. Present at these inspections were representatives from OTSI, Sydney Trains and UGLU. Measurements were taken and recorded for critical items, such as bearing end float, end cap installation torque and axle diameters on the other three undamaged bearings. These measurements were all were consistent and within specification.

Torque values were also measured on the other three undamaged bearing axle end cap bolts. Four out of the nine torqued bolts remaining on the bogie exceeded the 80-100 Nm torque range and two bolts were recorded at 180 Nm and 200 Nm. The differing torque amounts was attributed to bolts being tightened further to achieve the alignment with the locking tabs. This torque was the breaking torque, not the original application torque.

An independent metallurgical examination was also conducted on the bolts and the locking plate, as well as a sample of other similar bolts. The scope of this analysis included: examination and fractography, hardness testing on all bolts, microscopy analysis of the grain structure, tensile testing and compliance to applicable standards. A report was produced following this examination.[6]

The metallurgical examination showed that the bolts had no material or surface defects and complied with the requirements of the Australian Standard.[7] The use of differing bolt brands was initially identified as a concern but was later ruled out as an issue as all brands complied with the requirements of the standard. The metallurgical examination also showed the locking plate to be without issue. Other results from the metallurgical examination were:

- Damage was most severe on the first two bolts which loosened and fell out. These bolts were damaged after being tumbled around inside the case.
- The third bolt had the least damage as it had fractured after the first two bolt had fallen out.
- The third bolt had partially unscrewed about 4-5 mm before failure.
- The third bolt failure occurred progressively over a period of approximately one to two hours.
- The locking plates were made of low hardness steel which provided less resistance to loosening if the stresses in the system were sufficient to unscrew the bolts.
- The locking plate showed heavy damage and bent arms at the hole where the third bolt fractured.

The metallurgical report stated: ‘A potential factor in the failures was insufficient tensioning of the bolts on installation, however, annular impressions around the locking plate holes were mostly similar, which is a rough indication that torqueing of the bolts had been similar. This observation is very subjective, and the conclusion of similar torqueing may be erroneous.’ The investigation could not verify what torque level was applied to the axle end cap bolts that came loose.

Bearing installation process

An inspection of the processes undertaken at UGLU Auburn Maintenance Centre demonstrated that standard processes were in place, marked components were used, and calibrated torque wrenches available to be used by appropriately qualified personnel. Despite this, the physical evidence shows that it is likely that during the last refurbishment of the wheelset, on 1 July 2020, just over three months before the incident, the locking tabs were not sufficiently bent up against the face of the bolts.

There was completed documentation showing the processes had been checked off by a qualified maintenance person. The relevant checkboxes for all items were completed, this included:

- checking the bolt torque (new bolts used)
- tabs locked flat on the screw head face
- torque marking of screws.

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6 MetallTech, Metallurgical investigation Endeavour bolt failure – axle box bolt, Report M2020/09-1, 23 November 2020.

7 Australian Standard AS 4291.1 / ISO 898.1 Mechanical properties of fasteners made of carbon steel and alloy steel.

However, at the time of the refurbishment there was no additional quality assurance check once this process was completed.

The subsequent Sydney Trains investigation report into this incident at Wyee on 1 December 2020 showed strong similarities with the incident at Yerrinbool. The detection of the locking plate tabs not being bent up supports the same findings for Yerrinbool.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition 'other findings' may be included to provide important information about topics other than safety factors.

Safety issues are highlighted in bold to emphasise their importance. A safety issue is a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the collapsed bearing on passenger train SN68 at Yerrinbool, New South Wales on 13 October 2020.

Contributing factors

- The fire that occurred on SN68 was the result of excessive heat generated from a collapsed bearing on the trailing bogie of locomotive TE2811.
- The bearing collapse was the result of two axle end cap bolts becoming loose and the remaining bolt fracturing due to the increased load. Once the three bolts were no longer holding the end cap in position the bearing rapidly collapsed.
- It is likely that during the last NJA31 bogie overhaul the tabs on the locking plate were not installed correctly. This enabled the two axle end cap bolts to loosen.
- **The axle bearing installation process was not sufficient to ensure the tabs on the locking plate were installed correctly.** (Safety Issue)

Other (key) finding

- The brake and bearing temperature alarm detected an elevated temperature on an axle bearing at Burradoo as SN68 passed over it approximately 60 minutes before the fire was noticed at Yerrinbool. The temperature recorded was below the threshold for an alarm to be sent to network control.

Safety issues and actions

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues. The ATSB expects relevant organisations will address all safety issues an investigation identifies.

Depending on the level of risk of a safety issue, the extent of corrective action taken by the relevant organisation(s), or the desirability of directing a broad safety message to the [aviation, marine, rail] industry, the ATSB may issue a formal safety recommendation or safety advisory notice as part of the final report.

All of the directly involved parties were provided with a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

The initial public version of these safety issues and actions are provided separately on the ATSB website, to facilitate monitoring by interested parties. Where relevant, the safety issues and actions will be updated on the ATSB website as further information about safety action comes to hand.

Axle bearing installation process

Safety issue description

The axle bearing installation process was not sufficient to ensure the tabs on the locking plate were installed correctly (Safety Issue).

Issue Number:	RO-2020-017-SI-01
Issue Owner:	Sydney Trains
Transport function:	Rail: Passenger – regional
Current issue status:	Closed-Adequately addressed
Issue status justification:	The ATSB notes that the actions taken to address the installation and maintenance of bearings should address the safety issue.
Issue finalisation date:	29 September 2021

Proactive safety action taken by Sydney Trains

Action Number:	RO-2020-017-PSA-02
Action organisation:	Sydney Trains

Sydney Trains issued a Special Action notice to their Fleet Maintenance Division to check all axle end cap bolts on SP-type bearing on the XPT, Xplorer and Endeavour fleet. This included 51 cars in the Endeavour and Xplorer fleet and 74 XPT cars. Following a fleet wide check of SP130 bearings three other bearings were identified with incorrect bolt or locking tab configuration.

Other actions to prevent recurrence included the development of documented process to review and retain new UGLU Certificate of Completion checklists. In response to a Sydney Trains' request, UGLU updated their procedure so that photographs of every end cap showing the lock tabs bent up against the flats of the end cap screws are submitted as part of the wheelset build documentation. There is now a requirement for a second worker to inspect the photograph and the checklist to be forwarded to internal UGLU stakeholders, Sydney Trains Manager Heavy Fleet.

ULGU also updated their end cap installation process to replace any end cap screw that, when torqued between 80 and 100 Nm, does not align with the lock tabs to allow the tabs to be bent up correctly. This process sometimes requires half a dozen end cap screws to be rejected before one aligns correctly to allow the lock tabs to be bent up.

General details

Occurrence details

Date and time:	13 October 2020 – 1805 AEDT	
Occurrence category:	Incident	
Primary occurrence type:	Rolling stock irregularity – Defective Bearing	
Location:	Yerrinbool, New South Wales	
	Latitude: 34º 24.304' S	Longitude: 150º 32.606' E

Train details

Track operator:	ARTC	
Train operator:	NSW TrainLink	
Train number:	SN68	
Type of operation:	Passenger	
Consist:	2 carriages – 2811 and 2861	
Departure:	Moss Vale, New South Wales	
Destination:	Campbelltown, New South Wales	
Persons on board:	Crew – 2	Passengers – 20
Injuries:	Crew – nil	Passengers – nil
Damage:	Minor	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- Australian Rail Track Corporation
- NSW Trains
- Sydney Trains
- United Group Limited Unipart.

References

Australian Standard AS 4291.1 / ISO 898.1 Mechanical properties of fasteners made of carbon steel and alloy steel.

MetallTech (2020), *Endeavour Bolt Failure – Axlebox Bolt – Metallurgical Investigation,* 23 November 2020

Rail Industry Safety and Standards Board (2021), *Glossary of Terms.*

Sydney Trains (2020), Systemic Safety Investigation Report *Collapsed bearing on car 2811 at Yerrinbool on 13 October 2020.*

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- Australian Rail Track Corporation
- NSW Trains
- Office of the National Rail Safety Regulator
- Sydney Trains
- Transport for NSW

Submissions were received from:

- Office of the National Rail Safety Regulator

The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, international agreements.

Rail safety investigations in New South Wales and Victoria

Most transport safety investigations into rail accidents and incidents in New South Wales (NSW) and Victoria are conducted in accordance with the Collaboration Agreement for Rail Safety Investigations and Other Matters between the Commonwealth Government of Australia, the State Government of NSW and the State Government of Victoria. Under the Collaboration Agreement, rail safety investigations are conducted and resourced in NSW by the Office of Transport Safety Investigations (OTSI) and in Victoria by the Chief Investigator, Transport Safety (CITS), on behalf of the ATSB, under the provisions of the *Transport Safety Investigation Act 2003*.

- **Office of Transport Safety Investigations (OTSI)** is an independent statutory body which contributes to improvements in the safety of bus, ferry and rail passenger and rail freight services in NSW by investigating safety incidents and accidents, identifying system-wide safety issues and sharing lessons with transport operators, regulators and other key stakeholders. Visit www.otsi.nsw.gov.au for more information.

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.