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- fostering safety awareness, knowledge and action.

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ATSB TRANSPORT SAFETY REPORT
Rail Occurrence Investigation RO-2010-015
Preliminary

Derailment of train 1MP5 at Goddards Siding, Western Australia

28 December 2010



Figure 1: Train 1MP5 – Central section of the derailment site

Abstract

At about 1603¹ on Tuesday 28 December 2010, freight train 1MP5 derailed on the Trans Australian Railway Line approximately 240 km east of Kalgoorlie in Western Australia. There were no injuries as a result of the derailment but there was significant damage to rolling stock and track. The investigation to date indicates that the most probable initiator of the derailment was a track misalignment due to a heat related track buckle. The investigation is examining a number of other factors that contributed to the magnitude of the derailment.

FACTUAL INFORMATION

The information contained in this preliminary report is derived from the initial investigation of the occurrence. Readers are cautioned that it is possible that new evidence may become available that alters the circumstances as depicted in the report.

Location and track structure

The derailment occurred east of Kalgoorlie, Western Australia on a straight, level section of track near the 1544.410 km² point on the Trans Australian Railway Line. The track near the derailment site is constructed on a formation comprising red sand/clay based soil beneath a

1 The 24-hour clock is used in this report. Australian Western Standard Time (WST), UTC + 8 hours.

2 Distance in kilometres from a track reference point located at Coonamia in SA.

minimum 250 mm ballast bed that supports concrete sleepers and continuously welded 47 kg/m rail. The sleeper spacing is nominally set at 667 mm centres with the rails fastened to the sleepers using resilient clips.

However, the crossing loop at Goddards Siding is relatively new, having been commissioned on 25 January 2010. At Goddards Siding the main line comprises 60 kg/m rail and the crossing loop 47 kg/m rail. The track near the derailment site was straight and level and the track was elevated about 0.5 m above the natural ground surface. The maximum speed of trains through Goddards Siding is 110 km/h.

The Australian Rail Track Corporation (ARTC) is responsible for access to, and the maintenance of the section of the track at this location. Transfield Services (Australia) Pty Ltd perform track maintenance under contract to the ARTC.

Freight train 1MP5

Freight train 1MP5 was an intermodal freight service owned and operated by Pacific National. It consisted of two locomotives (NR111 leading and NR43 trailing), two crew accommodation carriages and 49 freight wagons (eight of which were multiple platform vehicles³). Train 1MP5 was loaded with a combination single and double stacked containers, car carriers with new and second-hand motor vehicles and flat wagons with prime mover trucks and buses. The train was 1615.9 m long with a trailing gross mass of 3667.8 t.

The train crew consisted of two sets of two drivers. The two crews worked rotating shifts with one crew driving while the other rested. The resting crew were accommodated in a fully equipped crew van marshalled immediately behind the locomotives. The driver at the time of the derailment had about 8 years train driving

experience. Both train drivers were appropriately qualified, assessed as competent and medically fit for duty.

Environmental conditions

The Bureau of Meteorology (BoM) has automatic weather observation stations at various locations across the Nullarbor Plain. The closest weather stations to the derailment site were at Kalgoorlie, approximately 240 km to the west and Balgair, approximately 170 km to the east.

The temperature recorded at 1500 at Balgair on 28 December 2010 was 39.5 degrees Celsius approximately one hour before the derailment. No rain was recorded on the day.

Occurrence

At 0645 on the morning of the derailment, the drivers of train 1MP5 signed on for duty at Cook, South Australia. At 0652 hrs train 1MP5 departed Cook.

At 1105, train 1MP5 arrived at Loongana, Western Australia where a crew change was made with the two resting drivers from the crew van. The train departed Loongana at 1116 after crossing train 2PM5.

At Bonderoo, Western Australia the train crossed Melbourne bound train 2PM5 where the co-driver and driver of 1MP5 swapped train operating duties. The train departed Bonderoo at 1511 after a stop of 43 minutes and continued its journey towards Perth.

On approach to Goddards Siding the train was travelling at about 75 km/h when the driver said he cross-checked the signal and points indicator with the co-driver. At the beginning of the crossing loop, the driver estimated that around 100 m past the facing points, he observed about 100 m further ahead that a track buckle deviated abruptly towards the crossing loop in the shape of a 'horse-shoe' and it spanned a distance of about six sleeper spaces. The driver immediately reduced power intending to coast over the buckle and then on further approach observed two more sleepers on the western end move in a southerly direction towards the crossing loop. As the train passed over the buckled track it encountered a rapid change in direction and both drivers feared that the locomotives could derail. After the locomotives had negotiated the buckled track

3 Multiple platform vehicles on train 1MP5 included 5 pack and 2 pack freight wagons. 5-pack – An articulated wagon comprising five platforms, the adjacent ends of individual units being supported on a common bogie and permanently connected by a device which permits free rotation in all planes. Note, these do not always consist of five units; they could be 2-packs, 3-packs etc. Source: ARA Glossary for the National Codes of Practice and Dictionary of Railway Terminology.

without derailing, the drivers observed the trailing portion of the train through the rear view mirrors and saw dust start to rise from the track indicating that a number of trailing wagons had derailed. The driver continued to slow the train with lead locomotive NR 111 stopping about 785 m past the point of derailment.

The train driver immediately contacted train control to advise them of the derailment. The co-driver, assisted by a resting driver from the crew van, walked back along the train to assess the extent of the derailment and damage.

Post occurrence

An investigator from the Australian Transport Safety Bureau (ATSB) was dispatched from Adelaide early on 29 December 2010, flying to Zanthus WA then travelling by road vehicle and arriving on site at about 0730. Once on site, the position of rolling stock, containers and track were examined and photographed. Train 1MP5 departed Goddards Siding at 1600 on 29 December 2010 with the undamaged front portion of the train. The recovery of derailed and damaged rolling stock and freight and the reinstatement of track began on the 29 December 2010. At 1224 on Saturday 1 January 2011, as repairs continued on the mainline, the passing loop track was re-opened for traffic with a 30 km/h temporary speed restriction.

Damage and Recovery

A total of 23 freight wagons were derailed with 14 sustaining significant damage. Six double deck and four triple deck loaded car carrier wagons and four container flat wagons sustained the majority of vehicle damage. About 550 m of mainline and 200 m of the crossing loop track was damaged in the derailment.

Site information

Examination of the derailment site focused on container flat wagon RQSY 34487-M, the 11th vehicle in the consist. This vehicle was loaded with a single-stacked container and a tank-tainer and was considered the first wagon to leave the track, derailing the leading bogie.

The eight wagons trailing RQSY 34487M were container and flat wagons loaded with containerised freight and road vehicles. Wagons

in positions 12 and 14 did not derail however trailing wagons at positions 13 and 15 to 23 had derailed.

All container flat wagons in the front portion of the train remained upright and coupled. Vehicles located 20 to 30 in the consist were loaded car carriers, consisting of seven double deck and four triple decks, that derailed in a concertina configuration spreading about 30 m each side of the mainline track alignment. The leading part of train 1MP5 separated between vehicles 20 and 21 leaving a gap of about 137 m between the front and second portion of the train. The gap between the second and rear portions of the train was about 12 m. Derailed vehicles at positions 31 to 34 were loaded container flat wagons with the last derailed vehicle (position 35) being a single stacked articulated 5 pack wagon.

Figure 2: Wheel contact marks across the southern rail head near the point of derailment



An examination of the track to establish the point of derailment (POD) located evidence of a track buckle about 530 m to the east of RQSY 34487M, the first wagon to derail.

Key on-site observations:

- A single diagonal wheel contact mark, about 5 m in length, (Figure 2) was found on the head of the southern rail about 410 m west of the 1544 km post⁴ and the Goddards Siding east end.
- The mark extended from the inside to the outside of the rail head and indicated that a wheel had ridden up and over the rail at this point. It then dropped off towards the field side of the southern rail with wheel contact marks visible on resilient rail fasteners and on the top surface of the concrete sleepers.
- The wheels of trailing wagons had impacted and disengaged resilient clips, breaking sleeper ends that released the southern rail from the sleeper, causing a loss of correct track gauge.
- The ballast was gouged and compacted into the sub-grade as wheels and bogie side frames of derailed wagons dragged along the track.
- About 100 m after the POD, car carrier wagons had slowed abruptly, concertinaing to the southern and northern sides of the mainline track with numerous motor vehicles being dislodged.

The investigation is continuing and will include examination of the following:

- Further examination of track condition.
- The project works for the installation and commissioning of Goddards Siding crossing loop.
- Track maintenance inspections, reports of irregularities and rectification works carried out through the derailment location.
- Examination of the train loading, configuration and handling.
- Bureau of Meteorology weather information including ambient temperatures, wind and the implications these conditions had on rail operations.

4 This location was considered to be the likely POD.