



Investigation of the safety of rail operations on the interstate rail line between Sydney and Melbourne

Figure 1: Map of rail corridor between Melbourne and Sydney



Abstract

On 16 August 2011, the Hon Anthony Albanese MP, Minister for Infrastructure and Transport, requested that the Australian Transport Safety Bureau (ATSB) undertake a systemic investigation of rail operations on the interstate rail line between Sydney and Melbourne. In accordance with the Minister's request the ATSB commenced a safety issue investigation which will consider:

- The condition of the interstate rail track and measures that have been put in place to maintain the safety of rail operations where track quality is below acceptable operational standards;
- Actions taken by the Australian Rail Track Corporation (ARTC) to remediate the track and address the safety of operations;
- Safeworking practices in relation to the track;
- A systemic review of safety systems, including signalling and the quality assurance of work undertaken on the track; and,

- Any other matters considered relevant by the ATSB.

The investigation is continuing.

FACTUAL INFORMATION

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

Background

The condition of the track on sections of the Melbourne to Sydney line has been subject to significant adverse comment, largely in relation to the existence and remediation of 'mud-holes'. There have also been a number of recent incidents on the corridor, including the parting of an interstate passenger train near Broadmeadows, Victoria on 11 August 2011, which is currently under investigation by the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory Agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in:

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

The ATSB does not investigate for the purpose of apportioning blame or to provide a means for determining liability.

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

When the ATSB issues a safety recommendation, the person, organisation or agency must provide a written response within 90 days. That response must indicate whether the person, organisation or agency accepts the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

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(Reference RO-2011-012), and the routing of a train onto the wrong railway track near Seymour, Victoria on 25 July 2011, currently under investigation by the Chief Investigator, Transport Safety Victoria.

ARTC management of the Melbourne to Sydney rail line

The ARTC took control of the Melbourne to Albury line in 1998 and the Albury to Sydney line in 2004 under long term lease arrangements.

From 1998, the ARTC implemented a number of infrastructure improvement strategies, aimed at increasing axle load and train speed over the Melbourne to Albury line.

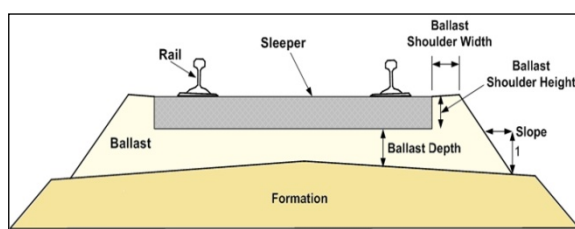
From 2004, the ARTC included additional infrastructure improvement strategies aimed at improving the transit times and network capacity over the Albury to Sydney line in New South Wales.

In 2007, after the release of the North South Corridor Strategy, the ARTC embarked on a major investment programme to further upgrade the track between Melbourne and Sydney. The investment program was largely funded by the Commonwealth and included the replacement of the existing timber and steel sleepers in the line with new concrete sleepers.

Mud-hole formation

Tracks are designed to be free draining to keep water away from the ballast and underlying track formation. One of the primary functions of ballast is to evenly distribute the load to the underlying formation to prevent localised formation failure. If efficient drainage of the ballast and formation is not maintained, the heavy concrete sleepers will tend to sink in the ballast and create mud-holes and track instability (Figure 2).

Figure 2: Cross section of typical track structure on the Melbourne–Sydney corridor.



Rail head faults such as peaked and dipped welds or joints and wheelburns cause additional impact loading to the track structure. These impacts exacerbate the pumping action of the sleepers caused by passing rail traffic and can accelerate the formation of mud-holes. Similarly insufficient ballast under the sleepers does not allow adequate drainage and limits the capacity to spread the loads transmitted by the passage of rail traffic. Damage to the track formation, caused by trapped water, can also accelerate the formation of mud-holes.

Mud-holes are usually identified by pumping sleepers, evidenced by small mud geysers that form under the track structure and can allow the track to settle unevenly. These conditions produce a weakened track structure that requires regular maintenance and increases the risk of derailment, train partings and broken rails.

After the completion of the concrete re-sleepering programme on the Melbourne to Sydney line in 2009, the region experienced widespread heavy rainfall. Information from the Bureau of Meteorology indicates that both Victoria and New South Wales experienced one of the wettest years on record during 2010. For example, Seymour (Vic) recorded its highest total annual rainfall for over 30 years. Wagga Wagga (NSW) recorded its highest in over 50 years. Other areas in Victoria and New South Wales have experienced similar rainfall.

It appears that this unusually heavy rainfall in combination with a range of track factors have contributed to the degradation of the track condition and the widespread development of mud-holes on the Melbourne to Sydney rail line. This has led to frequent zones of speed restrictions, additional maintenance activity and concerns by train drivers and train operators.

Identification of track issues

Track geometry defects, including those resulting from mud-holes, are identified through periodic inspections and/or measurements undertaken by track maintenance staff. Defects may also be identified by train drivers reporting rough riding which results in an assessment by area maintenance personnel. When a defect reaches defined limits, a Temporary Speed Restriction (TSR) is applied to limit train speed over the

defect until remedial work can be undertaken to repair it.

Work on track

Safeworking rules and procedures are used to facilitate safe track maintenance activities and train operations on the Melbourne to Sydney line. Sections of the line are temporarily closed to rail traffic using procedures which allow track maintenance crews to carry out repairs to the line. Typically this involves controlling rail traffic access to the section of line under repair for defined periods of time using Track Occupancy Authorities (TOA), the signalling system and other measures, such as flagmen and detonators, to alert train drivers to the presence of track maintenance crews on the line ahead. The object of the procedures is to ensure that the risk to track workers and rail traffic at work sites is as low as reasonably practicable.

The significant increase in maintenance activities and TSRs on the Melbourne to Sydney line has resulted in extended train running times along the corridor. Train crews see the mud-holes each time that they travel along the track and the effect on train ride has led them to express ongoing concern regarding the condition of the track. In some cases train operators have also imposed their own additional speed restrictions on specific sections of track to address their concerns regarding ride quality and safety.

The investigation

The *Transport Safety Investigation Act 2003* contains broad provisions which allow the ATSB to investigate a considerable range of transport safety matters. This includes investigation of single occurrences such as accidents but also a pattern of comparatively minor issues that may point to a broader problem, i.e. a safety issue investigation. The ATSB's primary focus is on ensuring the safety of rail operations on the line, in particular for passengers and rail workers.

The ATSB uses a systemic risk-based investigation methodology which looks holistically at the safety systems applicable to rail transport. In this case, the initial focus of the investigation is on ensuring that current rail operations are being safely managed on the Melbourne to Sydney rail line.

The investigation will include a detailed analysis of the safety systems and standards applicable to the ARTC's management of the Melbourne to Sydney rail line and the interaction of the ARTC with rail operators and maintenance contractors who are using or performing work on the line. The ATSB will also closely examine the design, maintenance and management of past project works on the track and the management of the safety risks associated with these activities.

While most track condition information is communicated to the ARTC for action, occasionally information may be known by individuals or organisations but not communicated. A function of the investigation is to examine the dissemination of information between organisations in relation to track condition and maintenance. In addition, the actions planned or taken and communication of these actions between organisations will be reviewed.

The investigation team is currently gathering information from a range of organisations and individuals including; the ARTC, train operators, train drivers, track and rolling stock maintainers, the rail safety regulators and independent investigation agencies in NSW and Victoria. It is evident that a number of organisations have expressed concerns regarding track condition. The ATSB will consider and collate information, and verify it against documented evidence to identify opportunities to improve the safety of operations on the Melbourne to Sydney line.

The investigation will include a detailed examination of the following:

- The condition and management of the rail track between Melbourne and Sydney.
- The track maintenance standards, procedures and practices applied to the Melbourne to Sydney corridor.
- Contemporary rail track maintenance standards and practice outside Australia.
- A review of recent rail safety incidents and reports on the Melbourne to Sydney line.
- The safeworking rules, procedures and practices applicable to works on the track.

Any other issues considered relevant to the investigation.