

The Paddington Rail Disaster

Date: October 5th, 1999

Who was involved?

There was a high speed diesel commuter train travelling from Stroud to Paddington. There were 422 people on the eight carriage train. The train driver had over 30 years' experience as a train driver.

At London Paddington a newly qualified driver was driving the Thames Turbo service to Bedwin (Wiltshire). There were 147 passengers on board the three carriage train.

Trains were being signalled in and out of Paddington by the signallers at Slough signal box.

Background information

The accident occurred during peak time, there were roughly 50 trains per hour being signalled through London Paddington. There were six bi-directional lines in and out of Paddington.

What happened?

The high speed train was nearing its destination at London Paddington travelling at roughly 120km/hr.

The Thames Turbo service was at the beginning of its journey. The driver of the train acknowledged the AWS indication at signal SN87. The signal displayed a single yellow, which indicates that you should be prepared to stop at the next signal. However, the driver not only failed to stop at signal SN109 but in fact increased his speed as he passed the signal. The signallers were not alarmed by the signal passed at danger (SPAD) as it happens occasionally and drivers usually realise their mistake and stop their trains. The driver of the Thames Turbo service failed to recognise that a SPAD had occurred. The signallers sent an emergency broadcast but there was a head on collision between the Thames Turbo train and the high speed train. The Thames Turbo train was travelling at 65 km/hr so at the time of collision there was a combined speed of about 200 km/hr between the trains. The crash caused two fireballs, and a fire broke out which was larger than any fire ever seen in a railway accident.

There were 31 fatalities (including the drivers of both trains involved) and over 400 casualties. The Thames Turbo train was a lot lighter in weight so took most of the impact of the crash.

Why did the driver of the Thames Turbo service pass signal SN109 at danger?

There was no failure with the on-train equipment, the AWS was working correctly and was acknowledged by the driver on the approach to signal SN109. Signal SN109 was at Ladbroke Grove. The signal was located shortly after a bridge that obstructs the sighting of the signal. Other obstructions of the signal include Overhead Line Equipment (OHLE), gantry and signage. There had been multiple SPADs at this signal since its introduction in 1993

(eight before this accident). The signal was an unconventional shape (the shape of a backwards L as opposed to the conventional shape (depicted in figure 1).

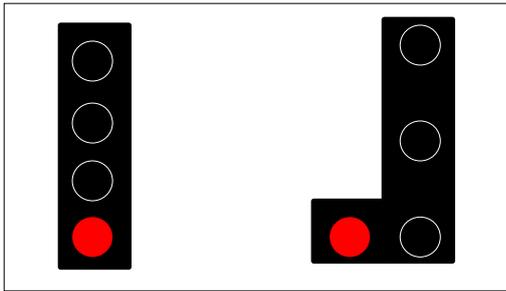


Figure 1: Conventional signal formation (left) and signal SN109 (right)

The weather on the day of the accident was clear and the sun was low in the sky. A phenomenon known as a phantom signal occurs when the sun light hits a signal and gives the impression that the signal is a different colour to what it actually is. This is a possibility but cannot be determined as the Thames Turbo driver lost his life in the accident.

The driving data of the driver of the Thames Turbo train suggested that he was unaware of passing signal SN109 at danger. This could potentially be due to the visual clutter in the area (lineside equipment obscuring the view of the signal), the unconventional shape of the signal, the location of the sun or he could have read the incorrect signal (there were six bi-directional lines in the area). All these factors meant that the driver believed that he had a proceed aspect.

In addition to this the investigation revealed a failure by Thames Turbo in their training of their driver and their methods of route learning in and out of Paddington are described as '*very informal*'. Thames Turbo failed to:

1. Instruct their driver about the risks of SPADs at high risk/multi-SPAD areas (like at signal SN109)
2. Arrange for him to attend a SPAD awareness day
3. Ensure his route learning assessment questions specifically covered the area between Paddington and Ladbroke Grove.

The signallers at Slough signal box

The signallers did not immediately react to signal SN109 being passed at danger. The emergency broadcast was sent too late for the collision to be avoided. The signallers lacked experience using the equipment to broadcast emergency broadcasts and it is unknown if the Thames Turbo driver received their broadcast.

As well as sending the emergency broadcast to the Thames Turbo driver there was also an opportunity for the signallers (if they reacted quickly enough) to warn the high speed train by setting signal SN120 to danger. It may not have been possible for the high speed train to stop in time but it would have slowed, reducing the speed of impact. However, the signallers waited 18 seconds to send the message and by this time it was too late.

The events following the Paddington rail crash

The investigation revealed that there was no fault apportioned to the Thames Turbo driver. Thames Trains were prosecuted for not providing adequate training on signal SN109. Network Rail was prosecuted for the poor signal sighting at signal SN109.

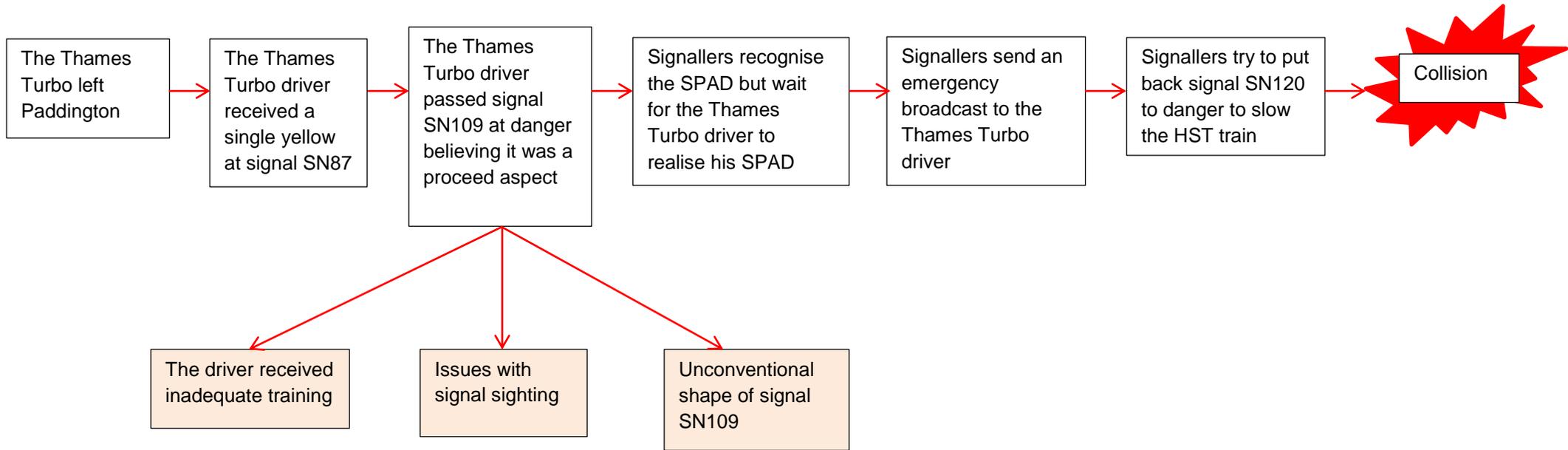
Actions taken since

The signal has been changed to the conventional shape and is easier to see. Trains in the area are fitted with Train Protection Warning Systems (TPWS). This system stops trains when they have passed a signal at danger regardless if a driver has not recognised their error.

Information sources

Information in this document has been sourced from the National Geographic 'seconds from disaster' television series, but further information is available from the incident report (by Lord Cullen, published by the Health and Safety Commission).

What happened?



 = background issues

What NTS contributed to the accident?

STAGE		SUB-SKILL	WHO DISPLAYED THE NTS	NOTES
OBSERVE	1.1	Attention to detail	Thames Turbo driver	Failed to observe the red signal (SN109).
	1.2	Overall awareness	Thames Turbo driver	Should have been aware that signal SN87 was a yellow aspect and that he was approaching signal SN109.
	1.3	Maintain concentration	Thames Turbo driver	It does not appear that he maintained concentration as he went past the signal (assumption).
	2.1	Systematic & thorough approach		
	2.2	Checking	Thames Turbo driver /Signallers	Signal indication should have been checked (assumption). Signallers should have checked Simon Hodder was aware of his SPAD.
	3.1	Listening		
UNDERSTAND (KNOWLEDGE)	1.2	Overall awareness		
	1.4	Retain information		
	1.5	Anticipation of risk	Signallers	Saw SPAD on their boards but waited for Simon Hodder to realise he had SPAD'd signal SN109.
	4.1	Effective decisions		
	4.2	Timely decisions		
	4.3	Diagnosing & solving problems	Signallers	Saw SPAD on their boards but waited for Simon Hodder to realise he had SPAD'd signal SN109 rather than immediately sending an NRN.
DECIDE	4.1	Effective decisions	Signallers/ Thames Turbo driver	Signallers waited to put back signal SN120 for the HST and send Simon Hodder an emergency broadcast. Simon Hodder decided (based on an incorrect understanding) to pass and accelerate past signal SN109 at danger.
	4.2	Timely decisions	Signallers	Signallers waited to put back signal SN120 for the HST and send Simon Hodder an emergency broadcast.
	4.3	Diagnosing and solving problems	Signallers	Signallers waited to put back signal SN120 for the HST and send Simon Hodder an emergency broadcast.
	2.3	Positive attitude to rules & procedures		

	3.4	Sharing information	Signallers	NRN emergency broadcast should have been made immediately to make Simon Hodder away he had passed signal SN109 at danger.
	5.1	Considering others' needs		
	5.2	Supporting others		
ACT	4.1	Effective decisions	Signallers/ Thames Turbo driver	Signallers waited to put back signal SN120 for the HST and send Simon Hodder an emergency broadcast. Simon Hodder (based on an incorrect understanding) passed and accelerated past signal SN109 at danger.
	4.2	Timely decisions	Signallers	Signallers put back signal SN120 for the HST and sent Simon Hodder an emergency broadcast. They waited for 18 seconds to do this though, and by that time it was too late.
	4.3	Diagnosing & solving problems	Signallers	Signallers put back signal SN120 for the HST and sent Simon Hodder an emergency broadcast but it was too late.
	2.1	Systematic & thorough approach		Cannot determine.
	2.2	Checking	Thames Turbo driver /signallers	Simon Hodder may not have checked the signal aspect of SN109 (assumption). Signallers should have checked Simon Hodder was aware of his SPAD.
	3	Communication (all)	Signallers	Should have shared the information (SPAD) with Simon Hodder immediately.
	5.2	Supporting others		
	5.3	Treating others with respect		
	5.4	Dealing with conflict / aggressive behaviour		
ALL STAGES	6	Workload management	Signallers	6.2 – emergency broadcast should have been the priority as soon as signal SN109 was passed at danger.

	7	Self-management		
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Description of the Paddington Rail Accident

Thames Turbo driver

Situational awareness					Conscientiousness			Communication				Decision making & action			Cooperation and working with others				Workload management			Self-management			
1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	5.3	5.4	6.1	6.2	6.3	7.1	7.2	7.3	7.4

Slough Signal box

Situational awareness					Conscientiousness			Communication				Decision making & action			Cooperation and working with others				Workload management			Self-management			
1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	3.1	3.2	3.3	3.4	4.1	4.2	4.3	5.1	5.2	5.3	5.4	6.1	6.2	6.3	7.1	7.2	7.3	7.4