Rail Accident Investigation Branch

RAIB Bulletin 04/2010

Collision between part of a freight train and a passenger train at Carluke, Scotland 18 August 2009

Description of the incident

1. At approximately 20:40 hrs on 18 August 2009, the driver of a passenger train running from Lanark to Partick reported that his train had been struck by an object protruding from a freight train passing on the adjacent up line at Carluke, Scotland.

2. The driver of the passenger train stopped at Wishaw and found evidence of scrape marks on the side of his train. He contacted Network Rail's control office, who made an emergency call to the driver of the freight train. The freight train, operated by DB Schenker (DBS) and travelling from Mossend (Glasgow) to Trafford Park (Manchester), stopped on the approach to the up platform at Carstairs station and the driver was asked to examine the train.

3. The driver reported that he had discovered a large piece of aluminium cladding hanging off the side of a tank[1] on the right-hand side[2] of the train. The driver did not examine the left-hand side of the train because the adjacent line on that side remained open to traffic. DBS made arrangements for a Rolling Stock Technician (RST) to be deployed to site to assess the damage and determine if the tank was fit to continue its journey. When the RST arrived on site, a Mobile Operations Manager (MOM) showed him the area of damage (by this time, a section of loose aluminium cladding had already been removed from the right-hand side of the tank (figure 1).

4. The RST was not familiar with the design of this particular type of tank and had no opportunity, without an isolation of the overhead line equipment, to examine the securing arrangements for the panel on the top. He also did not examine the tank on the opposite side. At no time was a request made to stop trains on the adjacent line to enable the left-hand side of the tank to be examined.

5. The train driver reported there were no leakages or spills from the tank and authority was given by the RST for the train to continue forward at normal speed. The train departed from Carstairs. It is likely that the cladding panel on the left-hand side of the tank was already either insecure or hanging from the tank (figure 2).

[1] The rail vehicle involved in this incident was a tank containing ethanol fixed within the framework of a container, conveyed on a flatbed wagon. The tank and the container are permanently attached. In this bulletin, reference to the tank should be taken to include its framework container as well.

[2] In this bulletin, references to right-hand side' and 'left-hand side' should be taken as referring to the orientation of a train running south at the time of the incident. The right-hand side of the train will normally be adjacent to trains running on the northbound track and the left-hand side of the train adjacent to the cess.

Figure 1: Image of the right-hand side of the tank after the 'H' panel cladding section had been cut off at Carstairs (direction of travel indicated with yellow line)

6. DBS had intended to examine the train again at Carlisle station but this did not take place because no member of staff qualified to undertake examination of freight vehicles was available. The train continued its journey and arrived at Trafford Park without any reported incident. The tank was examined again on its arrival at Trafford Park and the insecure cladding panel that had not been identified at Carstairs was found hanging over the side frame and out of gauge. This piece was also cut off from the tank.

Figure 2: Image of the 'A' panel of the tank (located on the side opposite to that from which the panel was removed at Carstairs) passing through Manchester Piccadilly station platform after the train had been authorised to proceed without restriction. Direction of travel indicated by the orange arrow. By this time, the train had reversed direction at Crewe

7. Cladding panels should be retained by a strap at each end, but the front strap (in the direction of travel at Carluke), which should have retained the loose panel, was missing (figure 3). The route followed by the train on departure from Mossend was later searched, but the strap was not found.

8. DBS took photographs of the damage at Trafford Park, with a representative of the owner of the container, Huktra, also present. One of the two retaining screws (Figure 4b) which secure the strap to the top of the tank was missing, but this part of the tank was not photographed. The other retaining screw was present, but not examined to establish how securely it was fastened.

9. The tank was secured in a safe state using fabric banding and ratchets to hold the adjoining panels and later transferred by road to Purfleet and on to Huktra in Belgium.

Figure 3: Image of the tank taken at Trafford Park, Manchester (direction of travel at the time of the incident at Carluke indicated with yellow line).

Findings of the Rail Accident Investigation Branch

Tank Design and Maintenance

10. The design of tanks must comply with standards mandated by the International Union of Railways (normally abbreviated to 'UIC'). The carriage of dangerous goods by rail is covered by international regulations, normally referred to as the 'RID' regulations. The security of the cladding and strapping is not specifically referred to in the UIC standards, their main focus being on the integrity of the tank in preventing leakage or explosion.

11. Each cladding panel covers the circumference of the tank unless it is interrupted by a manifold door on the top of the tank (figure 4a). The strap is secured by two retaining screws (paragraph 8) on either side of the tank (figure 4b) and on the underside by two rivets (figure 4c).

Figures left to right: 4a: top door of tank; 4b: securing screw for one side of the retaining straps; 4c: strap on underside of the tank secured by two rivets

12. Rubber insulation is provided on the underside of the strap and between the underside of the cladding and the main body of the tank.

13. The screw which secures the strap to the body of the tank does not pass through the cladding panels, which have no hole drilled in them. The panels are held in place by the pressure exerted on them by the strap, and therefore dependent on the force exerted by the screw used to secure the strap to the body of the tank.

14. The wagon owner's documented maintenance processes and associated checklists for the tank involved in the incident included checks on the integrity of the strapping and cladding. The last maintenance check undertaken on the tank resulted in a number of defects being identified, although no problems were identified with either the strapping or the cladding. The repairs were completed on 11 June 2009 in Brugge, Belgium.

Transportation history of the tank

15. The tank was filled with ethanol in northern France on 8 August 2009. Depot staff and road haulage drivers are required to complete a report if damage is seen during the tank inspection before departure. No such report was completed.
16. The tank was conveyed by road on 10 August 2009 to the port of Zeebrugge for a sea crossing to Rosyth, Scotland. Staff from the shipping company indicated that they had inspected the tank and completed a damage report before departure. The report identified 'old damage' to the framework at the rear of the tank.
17. The tank arrived at Rosyth on 11 August 2009 and was off-loaded at the port. It was again inspected before being taken by road to Cameron Bridge distillery on 14 August 2009. Another checklist was completed by Rosyth port authority staff and the lorry driver. The old damage to the framework was again recorded.
18. The distillery rejected the contents of the tank and it was parked, fully laden, within the depot pending despatch to Mossend rail depot on 18 August 2009 for onward transit by rail to Trafford Park and road to Purfleet. There was a security regime in place at the distillery and there were no recorded incidents of vandalism while the tank was parked at the depot.
19. When the tank returned to Mossend, it was again checked for damage; this time none was recorded. The tank was then taken from the lorry for transfer onto the southbound train to Trafford Park. No incidents were reported during this process, and the train departed normally.

Evidence from Closed Circuit Television (CCTV)

20. CCTV was not available at the port of Zeebrugge or on the ship which conveyed the tank to Rosyth. CCTV records were available at Rosyth and Cameron Bridge distillery, but not of sufficient quality to determine if all the straps were present.
21. CCTV images at Mossend rail depot were available. They show the tank arriving at the depot and during some of the shunting movements that took place as the train was prepared for departure. The images appear to show one of the two straps which secured one of the cladding panels to the body of the tank as missing (figures 5 and 6). There are two features which suggest that this may have been the case:

    - The lettering on the side of the panels is normally applied over the straps. There is a distinct line through the letter 'R', which would not be there if the strap with associated paintwork was in place.
    - The line running through the letter 'R' appears not to reflect the light in the same way that would be expected of a metal strap. This suggests that the line is actually the discoloured surface that had originally been hidden by the strap

Figure 5: Image of tank arriving by road at Mossend Rail depot on 18 August 2009. Image shows red painted surface on livery of letter 'R' (inset image) missing. The image also shows a distinct difference in the reflective properties of the area compared to an area where straps are present

Figure 6: CCTV image taken showing the tank being shunted within Mossend Yard on 18 August 2009

Previous occurrences of a similar nature

22. The Rail Safety and Standards Board's Safety Management Information System (SMIS) was reviewed to establish if other incidents of a similar nature had occurred. Eight other incidents relating to loose or missing straps on tanks were identified between December 1999 and July 2009. It has not been possible to identify if the tanks involved in those incidents were of an identical design to the tank involved in the incident at Carluke, but there was sufficient detail in some cases to confirm that strapping on tank wagons had become loose.

Actions taken following the incident

23. The tank was returned to Huktra's maintenance depot where a maintenance report was completed and the missing parts were replaced. Photographs were taken, but no investigation was undertaken to determine why the strap was missing as Huktra assumed the strap had been removed at the same time as the loose cladding.

24. DBS undertook an investigation and has issued a bulletin to ground staff who prepare the trains. The bulletin makes staff aware of the details of the incident and is aimed at raising their awareness of the need to identify and report damaged and missing straps, which might affect the safety of train operation. On November 3, 2009, DBS staff at Grangemouth prevented a tank from travelling because the strapping was loose.

25. The Maritime and Coastguard Agency has issued a bulletin to shipping companies aimed at ensuring that staff are made aware of the importance of checking and identifying damage which might affect the safe operation of train or road vehicles.

26. Huktra reports that it has reminded all staff involved in operating and maintaining this type of tank of the requirement to check for the presence of straps and to report missing straps.

27. Huktra, in conjunction with the tank supplier, also intends to review the construction of the tanks, to improve the method of retaining the panels. The review will include consideration of the integrity of the straps

Conclusion

28. The cladding panel came loose as a result of the absence of the retaining strap. The strap was the key securing mechanism for the cladding panel. CCTV evidence shows that it is likely that the strap was missing when the tank arrived at Mossend. Its absence was not identified by staff responsible for checking the condition of the tank to ensure that it was fit to travel. As a minimum, it was overlooked by the driver who brought the tank by road from the distillery to Mossend and by the ground staff at Mossend.

29. The cladding panel worked loose on the right-hand side of the tank by the time the train reached Carluke, and possibly on the left-hand side as well. It is possible that the airflow generated between the cladding and the main body of the tank after the train left Mossend caused the cladding to become loose and out of gauge.

30. It has not been possible to establish why the strap was missing. There are three possibilities:

    - it failed suddenly because of mechanical shock, e.g. through rough handling at port or depot;
    - it worked loose because of a failure of the securing arrangements; or
    - it was not replaced after maintenance activity which involved its removal.

31. The examination of only one side of the tank at Carstairs when the train was stopped may have resulted in a loose panel on the other side not being identified. It did not occur to the staff involved that there could be a loose panel on the left-hand side of the train as well.

32. The RAIB has conducted a preliminary examination of the circumstances and key evidence associated with this incident. On the basis of this examination, the RAIB has concluded that, in this case, further investigation by the RAIB would be unlikely to result in recommendations for the improvement of safety[3]. Nevertheless, the preliminary examination has highlighted a number of learning points. These are described at paragraph 33.

Learning points

33. The learning points from this incident are the need for:

- Owners and maintainers of this type of tank to review their current system of maintenance and inspection to ensure retaining straps are secure and that cladding panels are held firmly in place.
- Owners to review whether the method of securing the straps to the tank is robust enough to prevent the strap from moving or the retaining screw from becoming loose. Consideration to be given to marking the retaining screws to indicate if movement has taken place.
- Sea, port and road haulage companies involved in the movement and transportation of this type of tank to ensure that all staff undertaking tank examinations are made aware of the importance of the straps in retaining the panels and that the absence of any strap justifies preventing a tank from travelling until it has been replaced.
- Any railway operator whose staff may be called to examine a train on which a panel has come loose to brief those staff about the cladding panel retention arrangements and the need to examine the wagon from both sides before deciding whether it is fit to continue.

[3] It should be noted that this does not affect the industry's obligation to comply with health and safety legislation by conducting its own investigation into the accident / incident and implementing appropriate measures to address the risk.

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