Case Study – First ScotRail Risk Management of Legionella

Background

This case study describes the review First ScotRail carried out to their control arrangements for legionella bacteria exposure at their main diesel maintenance facilities and their fleet of trains.

In addition these controls were considered in response to the separate legionella outbreak that occurred in the City of Edinburgh in the summer of 2012. This outbreak resulted in the death of 3 local residents of the South West of the city and over 100 confirmed or suspected cases of Legionnaires disease. The source of this outbreak remains unclear however, it is likely to have been caused by some of the industrial cooling towers in the area and ORR/HSE does not believe the railway depot was the source of the outbreak.

First ScotRail is the largest regional train operating company in the UK covering the widest geographical area. First ScotRail holds the franchise to operate 95% of passenger rail service within Scotland as well as the Caledonian Sleeper services between Scotland and London. First ScotRail operates a variety of EMU and DMU rolling stock which are serviced and maintained in various locations in central and northern Scotland.

Legionnaires' disease is a potentially fatal form of pneumonia which can affect anybody but which principally affects those who are susceptible because of age, illness, immunosuppression, smoking etc. It is caused by the bacterium *Legionella pneumophila* and related bacteria. On average there are approximately 300 reported cases of Legionnaires' disease each year in the United Kingdom (UK). Clusters of cases occur and outbreaks are associated with cooling tower systems and hot and cold water systems in factories, hotels, hospitals and other establishments. It is normally contracted by inhaling legionella bacteria, either in tiny droplets of water (aerosols), or in droplet nuclei (the particles left after the water has evaporated) contaminated with legionella, deep into the lungs.

Legionella bacteria are common and can be found naturally in environmental water sources such as rivers, lakes and reservoirs, usually in low numbers. Legionella bacteria can survive under a wide variety of environmental conditions and have been found in water at temperatures between 6°C and 60°C. The presence of sediment, sludge, scale and other material within the system, together with biofilms, are also thought to play an important role in harbouring bacteria and providing favourable conditions in which legionella may grow. As legionella bacteria are commonly encountered in environmental sources they may eventually colonise manufactured water systems and be found in cooling tower systems, hot and cold water systems and other plant which use or store water.

First ScotRail, in common with most other Train Operating Companies, operates trains and maintenance depots where precautions are required to control the risk of exposure to legionella bacteria and implement suitable control measures.

HSE Guidance - *Legionnaires' disease: the control of legionella bacteria in water systems Approved Code of Practice and guidance (L8)* is the primary source of standards to control legionella and actions to be taken in event of the detection of bacteria or of an outbreak.

What was done?

Following poor standards of control in another TOC in respect of COSHH Regulations and the exposure to the risks of legionella, ORR highlighted these issues to FSR who used this information to review their control arrangements in respect of their underframe washing arrangements.

In addition, as a result of National Incident Report (NIR) 2693 in 2011 from another TOC where, during routine sampling, confirmed positive detection for legionella bacteria within the on-board water system, First ScotRail commissioned an investigation and assessment into the possible causes of legionella contamination within onboard train toilet water tanks and instigated a risk management plan to mitigate against the development, growth and occupational health risks of legionella bacteria across fleet and facilities.

FSR undertook cleaning and disinfecting of the on-train water tanks as well as some other precautions to prevent aerosols being generated by this water system and ATOC undertook research to help quantify the risks of legionella exposure to passengers and staff and a draft Guidance Note for the rail industry for non-potable water quality.

In May 2012 a legionella outbreak within the City of Edinburgh occurred. Legionella is a reportable disease in Scotland and due to the seriousness of the outbreak the Scottish Government created an Incident Management Team reporting to the Scottish Resilience Group (the equivalent of COBRA in Westminster). L8 describes the role of an Outbreak Committee and the powers of enforcing authorities in response to an outbreak.

FSR carried out a review of their risk assessment and risk management arrangements to manage identified sources of risk of legionella bacteria associated with all areas of the business. A 'Legionella Risk Management Steering Group' was set up to include all key stakeholders in the development of an action plan and report on progress of agreed actions.

Water systems were assessed using *L8* (including the equipment associated with the system such as pumps, heat exchangers, showers etc) to identify all aspects likely to present a risk. This was determined using the following criteria:

- What hot & cold water systems does First ScotRail operate?
- Are conditions present which will encourage bacteria to multiply? For example, is the water temperature between 20-45°C?
- Is it possible that water droplets will be produced and, if so, could they be dispersed over a wide area? For example, consider showers and aerosols from underframe or carriage wash facilities.
- Is it likely that anyone particularly susceptible will come into contact with the contaminated water droplets?
- The source of system supply water, for example, whether from a mains supply or not;
- Possible sources of contamination of the supply water within the premises before it reaches the cold water storage cistern, calorifier, carriage cleaning plant or any other system using water that may present a risk of exposure to legionella bacteria;
- The normal plant operating characteristics; and
- Unusual, but reasonably foreseeable operating conditions, for example breakdowns or stagnant water conditions (eg carriage wash plants with long lengths of pipework between wash and rinse plants).

First ScotRail defined the risk of legionella bacteria as follows:

Hazard: Legionella bacteria present in water systems leading to a potential outbreak of legionnaires' disease from:

- Train underframe wash.
- Train 'drive through' carriage wash facilities.
- Depot Hot and cold water systems
- Train toilet tanks and related on-train pipework/system.
- Toilet tank water storage tanks and associated hoses (depot, station, outstation).
- Legionella bacteria present in train system water-related systems such as windscreen wiper wash, engine coolant.

Risks were assessed in line with Company Risk Assessment Methodology and classified in terms of risk severity and likelihood.

The Steering Group agreed that good practice was already in place in many areas of the business to identify and manage the risk but that improvements could be made to ensure existing risk management procedures were visible/accessible to all and better integration across departments. ORR/HSE provided help and guidance throughout the improvement process.

Formal policies were developed to manage risks of legionnaires' disease within our Company Safety Manual.

Some of the key improvements that were made included:-

- Review of recommendations from RSSB Project T985 and subsequent ATOC Guidance Note GN013 Control of Risk Posed by the Presence of Legionella Bacteria in On-Train Non-potable Water Systems.
- Provision of 'ACoP L8' training for key staff.
- Installation of automated underframe wash systems in our vehicle maintenance depots to reduce the risk of exposure to legionella bacteria from jet washing activities.
- Renewal of all track and station located train tanking hoses to 'food grade' with detachable hose ends.
- Development of a tanking hose and train water tank cleaning programme for disinfection.
- Good housekeeping arrangements for the storage of all tanking hoses
- Further development of existing monitoring regimes for buildings, facilities and on-board systems to continually assess and detect risks. Ongoing review and development of these processes.
- Review of PPE/RPE for all maintenance activities relating to water systems, particularly underframe wash, train toilet tanking and high pressure washing in compliance with COSHH regulations.
- For underframe washing the introduction of air-fed hoods as respiratory protection providing an APF of 20 which was recommended as good practice by HSE/ORR.
- Introduction of examination and record keeping for RPE in accordance with Regulation 9 of the COSHH requirements.
- Review and update of risks assessments to include risk management of legionella.
- Working in partnership with ORR/HSE and with Network Rail (particularly regarding landlord managed facilities including carriage washplant).
- Clarity on the role of the Responsible Person (required by L8) to be properly trained and in managing the control of legionella.
- Sampling for microbiological counts is described in L8. As a result of the Edinburgh Legionella outbreak, the IMT requested that all businesses with medium risk plant cleaned and disinfected the facilities and undertake sampling for legionella and

microbiological bacteria. FSR's Haymarket Depot carriage wash plant was subject to weekly dipslides for microbiological counts until levels were below 10^4 and monthly thereafter – legionella sampling was done on quarterly basis. HSE/ORR consider the precautionary sampling regime at Haymarket to be good practice and encouraged the Responsible person to monitor count trends over a protracted period.

What were the Barriers/ Challenges?

At the time, there was no railway specific guidance for the management, protocol or monitoring for legionella or any aspect of water quality relating to 'non-potable' onboard train toilet water systems from either historical British Rail, First ScotRail or ATOC. From a railway perspective, the only guidance related to this was GM/TC 0018 Potable Water Supplies on Railway Vehicles (detailing requirements for drinking water supplies to minimise bacteriological contamination) and HSE Approved Code of Practice (ACoP) L8, the Control of Legionella Bacteria in Water Systems.

Processes and risk assessments were revised to ensure compliance with COSHH regulations. First ScotRail undertook a complete review of underframe wash and spot washing procedures and associated risks to establish:

- Business Case for automated underframe wash systems.
- Review of specification to ensure appropriate PPE/RPE.
- Training for relevant staff in face-fit mask testing and RPE use.
- Maintenance records for monitoring of condition of RPE equipment.

Risk management for train tanking activities managed by suppliers at station and outbase locations requires review of 3rd party safety management systems and, in some cases, revisions to contracts and audit/governance programmes.

Progress to Date

Management of the risk of legionella for our operations is an ongoing activity. First ScotRail continue to review outcomes of proactive testing/sampling regimes and take remedial action when required to mitigate risks of legionella bacteria on on-board and facilities water systems. We continue to support and review industry guidance and work with our suppliers/3rd party servicing and maintenance companies to ensure risk management procedures are in place.

Summary

First ScotRail remains committed to identifying and reducing risks associated with legionella or any aspect of water quality for our on-train and buildings/facility systems. Through the successful implementation of key actions, monitoring and control of legionella risks ensure proactive and remedial action is taken where necessary to reduce the risk.

ORR & HSE have worked closely with First ScotRail in respect of their hierarchy of control arrangements at Haymarket Depot and believe that their introduction of automatic wash plant and their policy on PPE for underframe wash describes good practice in the rail industry.