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Target Audience:  
FOD Inspectors  
Specialist Group Inspectors (Occ Hyg)

## **DEODORISING SPRAY SYSTEMS USED AT SEWAGE TREATMENT WORKS RISK OF LEGIONELLA**

This SIM provides information on the sampling carried out for legionella bacteria in deodoriser systems used at sewage treatment works. It also advises on the precautions to further lessen the possible risk of legionnaires' disease.

### INTRODUCTION

1 During an outbreak of legionnaires' disease a variety of sources were investigated including the deodorisers used at a local sewage treatment works. It was concluded that the most likely source was a water cooling tower at a plastics factory. The deodorisers were not considered to be involved due to the low velocity of the spray and the low risk that legionella bacteria might proliferate within the system. Also no cases of the disease involving sewage treatment workers have been reported. However it was agreed with the water company that they would carry out further biological monitoring to properly assess the risk.

2 Water deodoriser systems are intended to absorb airborne odours. They consist of a water supply which may be piped or from a water tank/bowser. Various odour treatment chemicals may then be added using a mixing tank or drawn off directly from a chemical storage drum. The water now flows down a branching series of pipes each terminating in a metal lance positioned over the source of the odour such as a settling tank. At the end of each lance is a nozzle which produces a fine water spray. The number and position of the lances per tank can be altered to ensure a uniform spread of water mist. Water pressure is usually provided by a dedicated pump.

### LEVELS OF BACTERIA FOUND DURING SAMPLING

3 Sewage odours are normally produced by bacteria which increase in numbers during warmer weather hence deodorisers are mainly used in the summer. Monitoring was therefore carried by the water company from the end of June through to mid September when water temperatures above 20°C. were found.

4 Two series of tests were carried out. The first involved mobile plant in the form of five 1000 litre black plastic tanks connected to 30 metres of black plastic hose. The tanks were cleaned and disinfected. Next they were filled with water and left closed in various positions around the site to monitor thermal gain. Different deodorising chemicals were also added to individual tanks. Also various cleaning regimes were used. Regular water sampling was

done to monitor bacterial growth.

5 The second series involved sampling deodorisers in use at various stagnant water systems including one mobile system and 8 fixed deodorisers.

6 One day (37°C) and three day (22°C) plate counts were carried out on water samples and were appropriate smear samples. Also samples were analysed for legionella bacteria.

7 The highest bacterial levels of 10<sup>7</sup>/ml were found after 10 days of sampling the closed tanks in the first series of tests. It was also found that some deodorising chemical appeared to promote the growth of bacteria. No legionella bacteria were found in any of the samples.

8 Samples from various operational sites produced a range of results from 10<sup>2</sup>/ml to 10<sup>7</sup>/ml. Again no legionella bacteria were found. The sampling was done in September when temperatures would be lower and bacterial growth slower. However the use of the systems would be intermittent allowing the build up of bacteria. Due to these variables the information can only be taken as indicating a trend.

9 The mobile tanks in the first series were also subjected to a variety of cleaning regimes. At first this led to control of bacterial levels but after a few cleans the rate of bacterial growth actual increased. The systems in use in the second series of tests were not being regularly cleaned.

10 The levels of bacteria are those which would be expected for a stagnant water system. Whilst no legionella bacteria were found this may simply be due to the known difficulties of sampling and analysing. However if significant concentrations of legionella bacteria had been present the analysis should have identified them. It is therefore unlikely that a properly maintained and regularly used deodorising system would be responsible for an outbreak.

## RISK ASSESSMENT

11 Companies need to carry out a COSHH risk assessment on all deodorisers to confirm that:

- (1) the plant is being operated in accordance with the manufacturer's instructions;
- (2) that the materials of construction of all component parts comply with normal water standards, eg close lidded, correct hose material;
- (3) that any modifications have not caused increased bacterial growth, eg changing from direct dosing to mixing new chemicals in an unclean mixing tank and as a result reseeding bacteria into the system;
- (4) there are no dead legs/blind ends which would allow water stagnation and subsequent reseeding; and
- (5) that measures have been taken to minimise thermal gain by materials of construction and location of plant.

12 Regular cleaning is inadvisable as this will lead to rapid proliferation of opportunistic bacteria as they are not in competition with an established bacteria population. The

potential risk does not merit continuous water dosing with biocides. Rather the system should be managed using suitable operational procedures to prevent the build up of high concentrations of bacteria.

13 Operational procedures should therefore be in place to ensure that:

(1) at the beginning of the season when the deodorisers are to be used all component parts of the system are thoroughly disinfected;

(2) once in use the deodorisers should be used at least once per week to flush away any static/stagnant water in the system. This may be done manually or automatically using a timer. If a timer is used, periodic checks should be made to ensure that the timer and flushing arrangements are working properly. In either case a written record should be maintained; and

(3) at the end of the season the equipment should be thoroughly dried. Disinfection is not necessary and could even increase the risk by providing a readily available environment for bacterial growth if any moisture was present.

#### ACTION BY INSPECTORS

14 The information contained in this SIM has been circulated to the water industry by their trade body, Water UK. Water companies should be required to carry out a suitable and sufficient risk assessment in compliance with COSHH 1999 reg.6. They may not need to carry out water sampling as part of the assessment for the basic systems described above.

15 It should be borne in mind that no legionella bacteria were identified during the trials and to date no cases of legionnaires' disease have involved sewage treatment works employees. Whilst a maximum bacteria count of  $10^7$ /ml was found it is thought that rapid proliferation above this figure is unlikely due to low water temperatures and reduced nutrient. Also the spray system would not widely distribute any aerosol. However if unused during warm weather deodoriser systems could produce bacteria which may cause other infections. The simple precautions suggested in the SIM to reduce bacterial levels are being monitored by the industry during the summer (2000) to confirm if they have been effective.

16 Inspectors are therefore requested to raise the control of deodorisers during visits to sewage treatment works and advise on appropriate precautions. Given the low risk inspectors are advised not to carry out enforcement action on lack of appropriate measures unless there are significant local factors. If enforcement action is being considered inspectors are advised to contact the National Utilities Group at Nottingham.

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