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PREFACE

Customer: Marina Developments Limited

**Customer Address: Outlook House
Hamble Point Marina
School Lane
Hamble
Southampton
Hampshire SO31 4NB**

**Customer Contact: Alan Tribbeck
Telephone: 02380 457155**

**Site: Brixham Marina
Berry Head Road
Brixham
Devon TQ5 9BW**

**Site Contact: Shaw Smith
Site Telephone: 01803 882929**

**Freeston Water Treatment Address:
Unit 1, Lulworth Business Centre
Nutwood Way
Calmore Industrial Estate
Totton
SouthamptonSO40 3WW**

**Telephone: 02380 669713
Fax: 02380 663825**

Risk Assessment Consultant: Mr Chris Wilson MWM Society

Date of Review: 30th January 2013

Date of next Review: January 2015

INTRODUCTION

This report relates to the Second Legionella Risk Assessment Review carried out by Mr Chris Wilson of Freeston Water Treatment Ltd on the 30th January 2013 on behalf of Marina Developments Ltd.

The First Risk Assessment Review was carried out by Mr Chris Wilson of Freeston Water Treatment Ltd on the 28th October 2010 on behalf of Marina Developments Ltd.

This Risk Assessment Review survey was carried out by Mr Chris Wilson at Brixham Marina, Berry Head Road, Brixham, Devon TQ5 9BW.

During the course of the survey water systems within the properties were risk assessed. These sources were chosen as being fully representative of the overall domestic water systems and outlets within the buildings.

The Review of Recommendations highlighted in the previous Risk Assessment were undertaken in order to comply with the Health and Safety Executive requirements on the control and prevention of Legionellosis. This Review has been carried out in accordance with ACoP L8 'The control of Legionella bacteria in water systems' (APPROVED CODE OF PRACTICE & GUIDANCE) and BS 8580 (RISK ASSESSMENTS FOR LEGIONELLA CONTROL-CODE OF PRACTICE).

The Review has been limited to the terms of reference agreed between Marina Developments Limited and Freeston Water Treatment Ltd. Observations relating to system conditions and other factors applicable to the requirements of L8 have been recorded during the survey and specific references are made to compliance with the ACoP in the Observations section of the report.

A recommendations section concludes the report. ACoP L8 places responsibility on employers and others to prepare a scheme for preventing or controlling the risk from Legionellosis. Adoption of a monitoring scheme in conjunction with a regime of preventative maintenance and associated record keeping will meet these requirements.

BACKGROUND TO LEGIONELLA

Legionella is the bacterium that causes Legionnaires disease. Of this bacterium, Legionella pneumophila is the species most commonly associated with disease outbreaks. Legionnaire's disease is identified as a pneumonia type of infection of the lower respiratory tract. The infection is most commonly acquired by the inhalation of airborne droplets or particles containing viable Legionella. Exposure to Legionella can also cause a short feverish illness without pneumonia, known as Pontiac Fever.

Research and investigations indicate that the occurrence of Legionella contamination is greatest in water cooling towers, evaporative condensers, hot and cold water services, water spray humidifiers, air washers, spa baths and pools where water is agitated and recirculated. The contamination from a cooling water tower will cover a far larger area than any other likely source.

Sediment, scale, and organic materials present in water systems can provide nutrients and give protection for Legionella. Legionella has been shown to colonise certain types of water fittings, pipework and materials used in the construction of water systems. The presence of these materials may provide nutrients for Legionella and make eradication difficult. Other organisms in water systems such as bacteria, amoeba and algae can provide a suitable habitat and nutrients in which Legionella can survive and multiply.

The formation of biofilms within water systems is undesirable and may also provide harbourage and favourable conditions for Legionella growth. The presence of Legionella in biofilms and in enclosures within protozoa may protect the organisms from any remedial measure employed to eradicate the bacterium.

Legionella is most likely to proliferate in water systems that have a temperature between 20°C and 50°C. Human blood temperature of approximately 37°C is the most ideal temperature for proliferation. Stagnant water within the above temperature range appears to provide the ideal conditions for proliferation of Legionella.

Legionella will survive at temperatures below 20°C but is considered to be in a dormant state with no growth activity. The bacterium does not survive temperatures maintained consistently at 60°C or above.

For water samples collected and returned to the laboratory, Legionella pneumophila is recovered by propagation of the organism on a specially supplemented nutrient growth medium. Such samples are normally then incubated at around 37°C. It may take up to 7 days for colonies of Legionella to appear. Legionella can be recognised by visual examination of the colonies followed by a number of laboratory techniques to identify species and serogroup.

ASSESSMENT OF RISK

Rationale

Legionnaire's disease is most commonly caused by the inhalation of water droplets contaminated with the Legionella bacteria. It is therefore important that systems susceptible to colonisation by Legionella and which incorporate a potential means for creating and disseminating water droplets should be identified and the risk they present assessed. ACoP L8 requires this identification and assessment.

The assessment must be completed for routine system operation and also for circumstances such as breakdown, abnormal operation, commissioning or other unusual circumstances.

Once the assessment has been completed, a strategy can be prepared for preventing or controlling the risk. The strategy will be based on a sound knowledge of the varying levels of attention required by the differing risk sources within the building.

The assessment takes account of:

- A) The potential for formation of droplets.
- B) The condition of the water.
- C) Water temperature.
- D) The water turnover rate.
- E) The susceptibility of persons exposed to droplets.
- F) The population density exposed to droplets.

Water droplets are normally created in various ways such as by spraying, bubbling and following impact onto hard surfaces. Large drops may be reduced to irrespirable size by further impact or evaporation. Smaller particles can remain airborne for long periods and will be carried on air currents.

In undertaking the Risk Assessment and drawing up precautions, particular attention must be paid to situations where:

- 1) The population exposed contains a relatively high number of people susceptible to Legionella, for example in Hospitals and Nursing Homes.
- 2) The density of population is high and therefore the number of people at potential risk is high.

The Risk Assessment should be reviewed whenever there is reason to believe that the original assessment may no longer be valid and ideally an annual review of all sources should be undertaken. The original assessment may be compromised if:

- 1) Changes are made to plant or water systems or its use.
- 2) Changes are made to building use in which the water system is installed.
- 3) New information about risks or control measures becomes available.
- 4) Results of checks indicate that control measures are no longer effective.

Once a risk has been identified and assessed, a scheme should be prepared for preventing or controlling it. The risk is heightened when conditions are not monitored and control of the system is lost, thereby allowing Legionella to proliferate. The scheme should be implemented together with a planned preventative maintenance schedule in line with that contained within the general recommendations section of this report. This will meet the requirements of the ACoP.

REVIEW OF RISK ASSESSMENT AND OBSERVATIONS

The Review was commissioned in order to identify and assess the risk of Legionellosis from the water sources on the premises using the previous Risk Assessment. General and specific observations on the systems made during the course of the survey are also recorded and the more general requirements of L8 are also commented on where applicable.

The specific observations made in this Review, together with the most recent Risk Assessment should be read in conjunction with the practices and procedures detailed in the recommendations section and also with ACoP L8.

Compliance with ACoP L8 may be classified into two distinct categories:

- a) Management Procedures - The management procedures which have been implemented to ensure that all control measures, record keeping and monitoring are adequate and effective.
- b) Systems Conditions - The physical conditions of the water systems in the building must be considered when assessing the risk from Legionellosis.

This report therefore addresses the above categories. A general overview of existing Management Procedures is included and followed by comprehensive observations of the Systems Conditions as seen during the course of the survey.

General Management Compliance

ACoP L8 para 23 - Identify Sources of Risk

Observations

The survey was commissioned in order to identify and assess sources of risk from the water storage and distribution systems in the premises and this Review highlights the remedial works and recommendations from that Report.

Further Action

Following receipt of the Review, all recommendations and remedial work should be carried out at the earliest opportunity.

General Management Compliance

ACoP L8 para's 39, 53 and 66 - Prepare a Scheme for Preventing or Controlling the Risk - Implement and Manage Precautions - Maintain Records

Observations

A regime of repair and breakdown maintenance should be operational on the site for all of the water services and systems. Direct labour and contract staff should undertake the work. Procedures and records for the various maintenance activities must be documented and the particular procedures relative to the control of Legionellosis are documented within an operational logbook.

Further Action Required

A written scheme for preventing or controlling the risks from Legionellosis identified in the Risk Assessment must be drawn up to maintain and provide a monitoring function for the relevant equipment and water systems.

A control and record-keeping logbook document should be prepared for the premises and the scheme contained within the logbook must be implemented and monitored in order to meet the requirements of ACoP L8.

A logbook system will meet the requirement for maintaining records of precautions implemented. The logbook documentation should include:

- Definition of Management responsibilities.
- Description of systems and inclusion of available system schematic drawings and plans.
- A record of Risk Assessment.
- Details of system operation relevant to controlling the risk.
- The precautions to be implemented.
- System inspection and check procedures.
- All details of precautions carried out including checks, inspections, cleaning and disinfection.

The logbook documentation and operation should be audited on a periodic basis in order to ensure that the system conditions and precautionary procedures are being carried out satisfactorily.

The logbook should contain simple schematic diagrams of the domestic hot and cold water systems indicating the areas of storage and areas of distribution. This information may already be available in the building record drawing systems but for ease of reference simple line diagrams should be considered for the logbook.

The precise procedures relating to the precautionary measures i.e. cleaning of water cistern systems and calorifiers, together with start up and shut down procedures for calorifiers should be maintained within the log book system and updated as required. The details of persons who are trained and competent to undertake the works should also be recorded in the log with details of the training undertaken. This also applies to specialist contractors who may undertake part of these duties.

The operating logbook document should state the details of the persons appointed as being responsible for the operational policy and management of precautions regarding control of Legionellosis on the site. The responsibilities should be clearly set out and lines of communication defined. Any specialist water treatment company providing a service on site and persons responsible for any auditing of the system operation and documentation should also be defined within the structure.

The present precautionary measures and maintenance activities should continue and the measures should be reviewed on an ongoing basis dependant on feedback on systems conditions and updated knowledge on the control of Legionella bacteria.

Consideration should be given to the inclusion of periodic water quality tests in order to monitor and record changes in local water conditions i.e. cold water from storage cisterns, calorifiers and associated outlets.

This Review relates to observations made and information supplied from the existing Risk Assessment together with information supplied by others.

The following observations and recommendation were made in the 2010 Risk Assessment Review.

Purge hot water storage calorifiers to drain at least six monthly and record when carried out.

This is not being carried out and I therefore reiterate the recommendation.

Inspect calorifiers internally on an annual basis and descale and disinfect if required.

This is not being carried out and I therefore reiterate the recommendation.

Fit temperature gauges to the common return pipe work on the calorifiers for monthly temperature monitoring.

This has not been carried out and I therefore reiterate the recommendation.

Weekly flushing of all low use infrequently used facilities showers, disabled toilet outlets, pontoon wash down hose reels, cleaners taps etc and record when carried out especially in winter months when facilities are not used as frequently.

This is being carried out and recorded within the logbook.

Bacteriological and Legionella water samples to be taken if temperatures fall outside the required limits.

No samples have been taken.

Descale and disinfect all showerheads quarterly. Record when carried out.

This is being carried out and recorded within the logbook.

Ensure all domestic hot and cold water pipes are adequately insulated.

This has not been carried out and I therefore reiterate the recommendation.

Ensure water heater is adjusted to achieve 50.0°C at the outlet within one minute.

This has not been carried out and I therefore reiterate the recommendation.

Remove all dead legs or put on a weekly flushing regime and record in the logbook.

This has not been carried out and I therefore reiterate the recommendation.

Flush pontoon hoses as often as necessary to keep the cold water temperature to below the maximum temperature of 20°C as outlined in L8.

I reiterate the recommendation although the hoses are flushed on a weekly basis and recorded within the logbook. I was informed that it is likely that the pontoon hoses will be fully insulated by the summer.

Updating the schematic drawings to show the changes to the domestic water system.

This has not been carried out and I therefore reiterate the recommendation.

Investigate as to the cause of the low hot water temperatures in the facilities block gents toilets wash basin hot outlets.

This no longer appears to be a problem.

System Reference	Brixham Marina
Location	MDL Buildings
Method	Visual Assessment and Temperature Profiling

HOT WATER STORAGE

Hot water storage within Brixham Marina is by two directly heated, gas fired water heaters located in the Plant Room.

The calorifiers are linked by a secondary return pipe and hot flow pipe. I was informed that the calorifiers supply all the hot water outlets on site except those on site that are heated by electric water heaters. They are both Lochinvar water heaters and a temperature gauge has been fitted to the right side calorifier on the flow pipe but not on the left side calorifier or on the common return pipe work and I would recommend that this be fitted for monthly temperature monitoring to be carried out.

The calorifiers had insulation under the factory fitted metal casings. There is a shunt pump on each calorifier to eliminate stratification. Shunt pumps should be on a timer and run for 1 hour before first demand each morning.

Both pumps are on 24 hours a day and I would consider this satisfactory.

Both calorifiers are supplied by the mains cold water system via a pressure reducer.

I was informed that it was not known when drain water samples were taken from the calorifiers or when they were last inspected internally for scale and sludge.

ACoP L8 recommends that this is carried out annually, this should be scheduled in for as soon as is practicable and cleaned and disinfected if needed.

The temperature of the stored water within the hot water calorifiers at the time of the survey was:

Left Side Calorifier - Storage	66.0°C	Satisfactory
Left Side Calorifier – Return	64.5°C	Satisfactory
Right Side Calorifier - Storage	73.1°C	Satisfactory
Right Side Calorifier - Return	64.5°C	Satisfactory

ACoP L8 recommends hot water should be stored at a minimum of 60°C at all times and the return hot water should be a minimum of 50°C at all times.

COLD WATER STORAGE

There is no longer any cold water within Brixham Marina. The cold water storage cistern along with all the associated pipework has been removed and the system converted to run on the mains cold water supply.

DOMESTIC WATER DISTRIBUTION

Domestic water services should operate at temperatures that prevent the proliferation of Legionella. L8 specifies that hot water should be stored at no less than 60°C and distributed at no less than 50°C, obtainable at user outlets within one minute of opening. Cold water should be stored and distributed at no more than 20°C.

Domestic hot water within Brixham Marina distributes from the calorifiers in the Plant Room and supplies all the hot water outlets on site except the marina office kitchen which has a local electric water heater.

Cold water services within Brixham Marina distributes from the underground mains water supply and serves all the cold water outlets and appliances on site.

In all areas of distribution and use, inspection, test and measurement was undertaken at representative positions in order to evaluate conditions and areas of potential risk.

At the time of the survey (within one minute) these hot water outlets within the buildings were recorded as follows:-

Brixham Marina	
Facilities Block Ladies Toilets Hand Basin	50.3°C Satisfactory
Facilities Block Gents Toilets Hand Basin	50.1°C Satisfactory
Marina Office Staff Kitchen Sink	Water Heater 45.4°C Not Satisfactory

The hot water supplying the TMV's should be 50°C at the TMV inlet as recommended in L8.

ACoP L8 recommends that the hot water should achieve 50°C, obtainable at user outlets within one minute of opening.

At the time of the survey (within two minutes) the cold water outlets within the building were as follows:

Brixham Marina	
Facilities Block Ladies Toilets Hand Basin	8.4°C Satisfactory
Facilities Block Gents Toilets Hand Basin	8.2°C Satisfactory
Marina Office Staff Kitchen Sink	9.1°C Satisfactory

ACoP L8 recommends cold water should be stored and distributed at no more than 20°C.

GENERAL

- The Pontoon hose reels are supplied by blue UPVC type plastic water hoses that run along the side of the pontoons. These are un-insulated and I would expect the water temperature in the summer to exceed the recommend maximum of 20.0°C, as outlined in L8. I would recommend that temperature monitoring and flushing of the hoses are carried out as regularly as needed to keep the water temperature to below 20.0°C or the pipework be adequately insulated.
- I was informed that it is unknown when legionella and bacteriological water samples were last taken. I would recommend that this is carried out if temperatures fall outside the required limits.
- The facilities block has been completely altered and a Laundry Room has also been built. The cold water storage cistern has been removed and the calorifiers are now mains cold water fed. Because of these changes to the water system the schematic drawings need updating.
- There is insulation missing on pipe work and I would recommend that the pipes are adequately insulated to prevent heat loss / gain.
- Dead leg pipe work is an ideal area for the proliferation of bacteria including legionella and should be either removed as soon as is practicable or put on a weekly flushing regime (without creating an aerosol) and recorded in the logbook. Dead legs were found in the following areas:-
 - Plant Room - On the mains cold water pipe to the right of the right side calorifier.
 - Plant Room - On the Chemical WC mains cold water supply pipe.
 - Plant Room - On the end of the hot water return pipe to the right of the right side calorifier.

RECORDS

The logbook should contain a full management structure and written scheme detailing all of those involved with regard to control and prevention of Legionellosis from management through to the engineers carrying out the work.

Details of the responsibilities they hold should be included together with items listed as follows:

- Maintenance carried out on water systems.
- Monthly temperature monitoring.
- Flushing of infrequently used outlets (weekly).
- Annual inspections of calorifiers.
- Purging of calorifiers.
- Changing/cleaning of inline filters.
- Faults and defects to be recorded.
- Audit sheet for inspections of the logbook and dated when completed.

All of the above should be included in the water systems logbook and signed for when completed.

ADDITIONAL PHOTOGRAPHS

Plant Room

Dead leg on the mains cold water pipe.



Plant Room

Dead leg on the hot return pipe.



Plant Room

Dead leg on the chemical toilet WC mains supply pipe.



Pontoon

Uninsulated mains cold water pipe.



SUMMARY OF RECOMMENDATIONS

For ease of reference the actions and recommendations made throughout this report are summarised in this section. They should read in conjunction with the preceding observations section.

LEGIONELLA RISK CATEGORY KEY

1 = Insignificant risk.

2 = Controlled risk.

3 = Risk is controlled, but deteriorating conditions could increase risk.

4 = Potential hazards identified, but uncertain about risk.

5 = Risk Uncontrolled

Site Reference/ Address	Remedial/Recommendations	Priority	Date Actioned	Signature
<u>Hot Water Storage</u> Brixham Marina	Purge hot water storage calorifiers to drain on an annual basis and record when carried out.	4		
	Inspect calorifiers internally on annual basis and descale and disinfect if required.	4		
	Fit temperature gauges to the common return pipe work and the left side calorifier flow pipe on the calorifiers for monthly temperature monitoring.	3		

Site Reference/ Address	Remedial/Recommendations	Priority	Date Actioned	Signature
Distribution Brixham Marina	Bacteriological and Legionella water samples to be taken if temperatures fall outside the required limits.	5		
	Ensure all domestic hot and cold water pipes are adequately insulated.	3		
	Ensure local water heater is adjusted to achieve 50.0°C at the outlet within one minute.	3		
	Remove all dead legs or put on a weekly flushing regime and record in the logbook.	5		
	Flush pontoon hoses as often as necessary to keep the cold water temperature to below the maximum temperature of 20°C as outlined in ACoP L8 or adequately insulate the pipework.	5		
	Updating the schematic drawings to show any changes to the domestic water system.	2		
	Ensure that all on-site personnel who carry out Legionella management are competent and adequately trained in Legionella management.	5		
	A full written scheme should be produced to show the procedures and timescale that the recommendations within this report will be carried out to.	5		
	Flush pontoon hoses as often as necessary to keep the cold water temperature to below the maximum temperature of 20°C as outlined in ACoP L8 or adequately insulate the pipework.	5		