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INTRODUCTION

This report relates to a cooling tower risk assessment carried out by Mr Peter Smith of Freeston Water Treatment on the 15th December 2008. The risk assessment was carried out at H&S Aviation Ltd, Airport Service Rd, Portsmouth Hampshire PO3 5PJ on one induced draught counter flow cooling tower located at the rear of the EAB workshop.

The survey and risk assessment were undertaken in order to comply with the Health and Safety Executive requirements on the control and prevention of Legionellosis. The risk assessment has been carried out in accordance with L8 Legionnaires' disease – The control of Legionella bacteria in water systems (APPROVED CODE OF PRACTICE & GUIDANCE).

The survey has been limited to the terms of reference agreed between Freeston Water Treatment and H&S Aviation Limited. 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 L8 in the Observations section of the report.

A Summary of Recommendations concludes the report. This gives priority levels to allow scheduling of work and targeting of budgets.

SITE RISK ASSESSMENT

Rationale

In a typical air conditioning system, heat from the refrigeration cycle is removed by the condenser, which may be cooled by air or more commonly by water from a cooling tower. Such water is typically heated to temperatures in the region of 30°C and may become heavily contaminated by airborne dust, biological slime, scale and sludge. It provides an ideal environment for the growth of aquatic organisms including Legionella.

Cooling towers have caused a number of outbreaks of Legionnaires' disease. The risk is posed not only to the building inhabitants where the tower is sited, but also to passers by and people a considerable distance away. For this reason we have assumed that all cooling towers pose a high risk, which is controlled by the combination of water treatment and good management practice. Should one or both of these control measures fail, then conditions will arise where water quality will be affected resulting in possible contamination by waterborne micro-organisms including Legionella.

The risk assessment therefore audits the management practices; water treatment and physical conditions to assess where possible improvements may be made or remedial measures are required. Non-compliances are highlighted in the site assessment.

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 should be undertaken. The original assessment may be compromised if:

- 1) Changes are made to plant or water systems or their 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.

| SECTION 1 | | COOLING TOWER SYSTEM DESIGN & CONDITION SYSTEM 1 | |
|-----------|--|--|--|
| 1 | MANUFACTURER TYPE | VISTECH EWK 225/09 | |
| 2 | LOCATION | To the rear of EAB workshop in the car parking area. | |
| 3 | LOCAL AUTHORITY | | COMMENTS |
| | a) Is the tower registered with the local authority Environmental Health dept? | | It should be ensured this cooling tower has been registered with the local authority and certification filed in the cooling tower logbook. |
| | b) Name of local authority | | Portsmouth City Council. |
| 4 | Is the tower discharge located near air conditioning intakes/open windows? | | The tower is located by possible air intakes and roller doors. |
| 5 | Is the population density of the exposed persons high, medium or low? | | High (Residential and Industrial Estate close by). |
| 6 | Is the tower make up from the mains? | | Yes |
| 7 | Is a softener attached to the system? | | Yes |
| 8 | Are all materials in contact with the water WRC approved? | | Visible components yes. |
| 9 | Is corrosion present internally? | | Unable to inspect due to tower running. |
| 10 | Is scale present within the tower? | | Some scale was evident on the side louvers. |
| 11 | Is bio fouling evident? | | No |
| 12 | Is sediment present in the pond? | | Unable to inspect due to tower running. |

| | | |
|----|--|---|
| 13 | Are internal components accessible for cleaning & maintenance? | Only one access area to the pond by removal of side louver. |
| 14 | Are high efficiency drift eliminators fitted? | Assumed Yes |
| 15 | Are the eliminators closely fitting & secure? | Unable to inspect due to tower running. |
| 16 | Does the drain discharge via a screen and air gap to the main drainage system? | Drain pipe work disappears below shingle unable to trace. |

| SECTION 2 | | WATER TREATMENT COOLING TOWERS |
|-----------|--|---|
| 17 | Biocide A | BC 60 |
| 18 | Biocide B | BC 70 |
| 19 | Inhibitor | SC 320 |
| 20 | Inhibitor | N/A |
| 21 | Are biocides automatically dosed? | Yes automatic dosing pumps fitted to system. |
| 22 | Is there an automatic bleed to control dissolved solids (TDS)? | There is an automatic bleed control. |
| 23 | Are monthly monitoring routines carried out and by whom? | There is monthly monitoring being carried out on this cooling tower water system by Freeston Water Treatment. |
| 24 | Are weekly checks carried out on the condition of the tower? | Yes weekly checks are being carried out by Freeston Water Treatment. |
| 25 | Is the tower cleaned & disinfected twice yearly? | The cooling tower is being cleaned and disinfected twice annually. Last clean and disinfection was carried out in October 2008. |

| SECTION 3 | | MANAGEMENT & OPERATION COOLING TOWERS |
|-----------|---|--|
| 26 | Are the names & positions of all employees, contractors and others with responsibilities listed? | Yes in logbook documentation |
| 27 | Is the exact nature of their responsibilities given, including full details of how these responsibilities are to be discharged and frequency? | No |
| 28 | Are the lines of communication clear? | Yes |
| 29 | Is sufficient information, training & instruction given to personnel involved in the maintenance of the plant? | Yes training has just been carried out in November 2008. |
| 30 | Are the contact names & telephone numbers of the local Environmental Health Officers given? | No name or phone number found. No Logbook |
| 31 | Are adequate design details provided to enable the safe operation of the system? | Yes |
| 32 | Is a description of the plant including a schematic of the plant & water treatment equipment provided? | Yes: schematic produced at time of survey. |
| 33 | Are full details of how to operate the plant & water treatment system provided, including adequate start up/shut down procedures? | No |
| 34 | Are site specific cleaning & disinfection procedures given? | No |

| | | |
|----|--|---|
| 35 | <p>Do cleaning & disinfection procedures detail: Cleaning & disinfection prior to use following a period out of use? Routine cleaning & disinfection? Cleaning & disinfection when sampling indicates high microbiological activity, Legionella, or the tower is implicated in an outbreak of Legionellosis? Extra cleaning & disinfection should testing or inspection indicate the need?</p> | <p>No No No No These are obtainable from Freeston Water Treatment</p> |
|----|--|---|

| SECTION 4 | RECORD KEEPING COOLING TOWERS | |
|-----------|--|-------------------------------------|
| 36 | Are test records by the water treatment contractor up to date, signed & dated? | Yes found in logbook documentation. |
| 37 | Are chlorination certificates present & up to date? | Yes found in logbook documentation. |
| 38 | Are analysis results of legionella and dip slides recorded? | Yes found in logbook documentation. |
| 39 | Are the control parameters required to maintain the safe & hygienic operation of the tower listed? | Yes |
| 40 | Are adequate descriptions of tests, inspections, maintenance & other control measures present? | Yes |
| 41 | Are all remedial maintenance records present, including communications of defects? | No Remedial records found. . |

OBSERVATIONS

Cooling Tower Systems

Cooling tower systems are devices that use the evaporation of water to cool processes down. As a result of evaporation, the resulting salts become concentrated in the water, and due to the operation temperature, which is often in the range of 18°C to 35°C, bacteria can become established and proliferate within these systems.

Factors contributing to problems in cooling tower systems are scale, corrosion, bacterial proliferation and fouling. These four main problems are interrelated and it is for this reason that cooling tower systems of this nature should be operated and maintained carefully and correctly. These systems and main components must be maintained in a clean and sound condition, the water quality must also be controlled and the precautions must be carefully monitored.

At the time of the survey the cooling tower system was running.

COOLING TOWER SYSTEM

Section 1: System Design & Condition

Numbers and Susceptibility of Persons Exposed

The cooling tower is located at the rear of the engine accessory workshop in the car parking area. H&S Aviation Ltd Airport Service Road is located on an industrial area on the outskirts of Portsmouth and close to residential areas.

The susceptibility of the persons exposed to these aerosols is variable and unknown. It must therefore be assumed that at any given time there will be susceptible people present.

Location of Discharge

Climatic disturbances and wind patterns will direct the discharge of aerosols from the cooling tower over a considerable distance in this area as well as the local residential areas. Although the cooling tower water system is being treated, other factors may cause loss of microbiological control very quickly e.g. building works, road works and other cooling towers within close proximity. With this in mind, strict monitoring of the cooling tower water system and maintenance regimes must be undertaken continuously when the cooling tower is in full operation.

Design and Conditions of the Towers

The cooling tower is a forced induced draught type manufactured by Vistech.

System

At the time of the survey the cooling tower water system was running therefore internal inspection of the tower was not possible. There was seen to be some scale deposits on the side louvers; this could also mean there could be some scale build up on the internal packing although the flow through the packing was seen to be good. The cooling tower water is made up from a water softener located within the workshop area; I would recommend the capacity of this water softener be checked to determine if this water softener is large enough to cope with the demand from the cooling water system. I would consider replacing with a larger capacity water softener this will also help in the removal of scale.

The cooling tower water system is being treated with a chemical scale inhibitor SC 320 and biocide treatments BC 60 and BC 70 all chemicals are automatically dosed with dosing pumps sited close at hand. I would recommend that the safety data sheets for these chemicals be replaced as the current ones hanging above the chemical containers have faded. At present the chemicals are being housed in plastic bunds but do appear to be inadequate as they are breaking up. I would recommend that the chemical bunds be replaced with a more suitable container. The system is fitted with an automatic bleed to control levels and build up of TDS this bleeds into the drain pipe work.

The cooling tower water system serves eight test rigs within the EAB workshop area; the cooling tower water system was last cleaned and disinfected in October 2008 certification was found within the logbook documentation.

It must be understood that having a good chemical treatment and monitoring regime in place is of paramount importance. I would recommend that the current procedures continue.

At the time of the survey the cooling tower system was running, if the system is shut down for a week or more the tower should be run for a minimum of one hour at least once a week.

Materials in Contact with the Water

It is recommended that when maintenance work is carried out on the cooling tower all materials used are WRC approved. This also applies to other items of equipment, e.g. drift eliminators, fill pack and flexible flange connections on the water systems etc.

SECTION 2: Control Systems & Equipment**Method of Water Treatment**

The water treatment for the cooling tower water system consists of automatic dosing equipment for the dosing of BC60 and BC70 and also for the scale and corrosion inhibitor SC320. All chemicals are being dosed into the cooling tower pond enabling it to be mixed with the returning water.

As previously mentioned the cooling tower water system is fitted with an automatic bleed control, regarding TDS (total dissolved solids).

At present the chemicals are being housed in plastic bunds but do appear to be inadequate as they are breaking up. I would recommend that the chemical bunds be replaced with a more suitable container and new safety data sheets obtained.

SECTION 3: Management & Operation

Management & Supervisory Systems

A regime of repair and breakdown maintenance should be operational on the site for the building services, plant and systems. Procedures and records for the various maintenance activities should be documented and kept in a maintenance book. The procedures relative to the control of Legionellosis for the cooling tower system should be documented and filed within the cooling tower logbook. There were no remedial records found at the time of the survey.

Nominated Persons and Precise Responsibilities

There is a cooling tower logbook in place this has the nominated persons recorded within it although the precise responsibilities was not seen.

Lines of Communication

It must be ensured that at all times there are deputies available when the named nominated responsible persons are not available due to annual leave, sickness etc. These deputies should have all contact details in the cooling tower log book.

Staff Training

All staff associated with the operation, maintenance and testing of the cooling tower systems must have adequate experience and be properly trained.

It is understood that legionella awareness has just been carried out to staff in November 2008. Copies of all training certificates and an up-to-date chart of personnel training status should be maintained within a cooling tower logbook. Refresher training should be carried out on a minimal annual basis.

Written Descriptions for Safe Operation and Precautions to be taken

There is no written description for safe operation and precaution regarding the cooling tower water system. This should be prepared and filed within the logbook.

Description of System and Operational Parameters

A technical description for the cooling tower system, with all operational parameters and system capacities, was found within the cooling tower logbook although this was not completed.

At the time of the survey there was no schematic drawing of the cooling tower water system located. **This was produced at the time of the survey.**

Control Parameters and Standards of Cleanliness

The control parameters for the cooling tower water system are to be kept within the logbook and periodic tests and measurements, which are undertaken, should make a comparison against these base control parameters. It must be ensured the control parameters are updated inline with current technical guidance and manufacturers' recommendations.

Start-Up/Shut-Down Procedures

The start-up and shut-down procedure specific to the cooling tower water system should be filed within the logbook.

Cleaning and Disinfection Procedures

All relevant site-specific cleaning and chlorination procedures and method statements should be present within the logbook documentation.

These are the cleaning and chlorination procedures which should be available and filed in a cooling tower logbook:-

- Clean and disinfection prior to use following a period of out of use.
- Routine clean and disinfection.
- Clean and disinfection when sampling indicates high microbiological activity, Legionella, or the towers indicated in an outbreak of Legionellosis.
- Extra cleaning and disinfection should the testing or inspections indicate the need.

These disinfection procedures should be filed within the cooling tower log book.

**These procedures should be obtained from your water treatment service provider
Freeston Water Treatment.**

SECTION 4: Record Keeping

Descriptions of Tests, Inspections and Maintenance Procedures

It was noticed during the survey that dipslides are being taken on a weekly basis. All results are monitored and recorded within the cooling tower logbook. All weekly tests are being carried out by contractor Freeston Water Treatment and were found to be up to date and satisfactory.

The following tests are being carried out on a weekly basis:-

- Total Dissolved Solids (TDS)
- Water pH
- Oxidising Biocide Levels
- TVC Dipslide
- Visual inspection of the cooling tower.

It was noted that the monthly visits and test carried out by Freeston Water Treatment were up to date and report sheets filed in the logbook documentation.

It is imperative that the cooling tower water system be sampled for the Legionella bacterium on a minimum three monthly basis. These samples should be sent to a UKAS accredited Laboratory and a suitable certificate should be produced and placed within the cooling tower logbook.

Legionella sampling is being carried out by Freeston Water Treatment Ltd on a quarterly basis. The last sample taken was November 2008 all test results are found within the logbook documentation and have proved satisfactory. An L8 compliant control parameter regarding the Legionella bacterium should also be placed within the cooling tower logbook, and appropriate actions to be undertaken regarding sample levels.

Cleaning and Disinfection Records

The cooling tower should be cleaned and disinfected in accordance with the L8 requirement on a minimum twice-yearly basis. As previously mentioned the cooling tower water system was last cleaned and disinfected in October 2008 and the certificate was found in the logbook documentation.

Recording of Defects

It is recommended that all major defects should be formally recorded and passed on to the responsible person with all details being formally logged within the cooling tower logbook.

Records of Supervisory Inspections and Reviews

It is important to maintain the logbook documentation in good order and fully up-to-date. All written procedures must be adhered to and the documentation completed.

This should be confirmed through regular inspection by supervisory/management staff and recorded, with the date on which they are carried out. These must be maintained within the cooling tower logbook documentation.

The accuracy of the record documentation and management of the operational systems should ideally be confirmed by periodic external audit. Annual external audit would be appropriate.

SUMMARY OF RECOMMENDATIONS

For ease of reference, the actions and recommendations made throughout this report are summarised in this section. They should be read in conjunction with the preceding Observations section and Further Action Required section.

| Site Reference/ Address | Remedial/Recommendations | Priority |
|--|--|----------|
| <u>H&S Aviation</u> <u>EAB</u> <u>Cooling Tower System</u> | Ensure the cooling tower is registered with the local authority and ensure a copy of the registration is filed within the logbook. | 5 |
| | Continue to treat, monitor and test the cooling tower water system weekly and monthly. | 3 |
| | Continue to carry out legionella water sampling of cooling tower water system on a quarterly basis. | 3 |
| | Continue to train and refresher train all staff on an annual basis. | 3 |
| | Continue to clean and disinfect cooling tower water system on a six monthly basis. (Twice Annually) | 3 |
| | Consider upgrading the water softener to a larger capacity. | 3 |
| | Replace existing chemical bunds for a more adequate bund and replace fading safety data sheets. | 3 |

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.