

Policy:

In the event of detection of legionella bacteria in the hospital water systems, hot water or cooling tower water, guidelines are in place to ensure that corrective action is taken.

Prevailing Codes and Standards:

TJC EC 02.05.01(5)

Procedure:

I. POTABLE HOT WATER

- A. Cause - Bacteria survive and grow particularly well in manmade environments, especially if water is at a temperature of 77 - 108 F (25 - 42 C). Current standards require hot water temperatures not to exceed 120F (49C).
- B. Corrective action - when a diagnosed case has been identified, the following procedures will be followed.
 - 1. Notification of Hospital Administration and the Safety office.
 - 2. Hospital Administration will notify all patient care areas and departments to discontinue the use of hot water immediately.
 - 3. The Physical Plant will increase the water temperature to 170F (77C). This will be accomplished by adjusting the hot water temperature controls and safety circuits on the Aerco hot water generators located in the hospital power plant, on the first floor of the K-Wing tower and on the eleventh floor (K-wing penthouse).
 - 4. Physical Plant employees will then progress through each floor of the hospital and draw hot water at each faucet and shower. A temperature of 140F (60C) must be achieved. This will be accomplished by placing a thermometer in a container and running the hot water until the desired temperature is reached.
 - 5. After purging the plumbing distribution system, Physical Plant employees will reset the temperature control and safety circuit to 120F (49C), then open the main drains on the hot water generators and drain down the system until 120F (49C) is reached.
 - 6. Notify Hospital Administration and the Safety office that the purging process has been accomplished. Caution should be taken to advise patient floors and

other departments that residual water may be at an elevated temperature.

II. WATER IN COOLING TOWERS

- A. Cause - Aerosolization of cooling tower water which may contain the organism is frequently associated with community outbreaks and in some instances, nosocomial cases.
- B. Corrective action - when a diagnosed case has been identified, procedures for shut down of the cooling tower will be coordinated with Hospital Administration and the Safety office.

1. Before Chemical Disinfecting and Mechanical Cleaning

- a. Provide protective equipment to workers who perform the disinfection, to prevent their exposure to a.) Chemicals used for disinfection and b.) Aerosolized water containing Legionella sp. Protective equipment may include full-length protective clothing, booths, gloves, goggles, and full or half-face mask that combines a HEPA filter and chemical cartridges to protect against airborne chlorine levels of up to 10 mg/L.
- b. Shut off cooling tower.
 - 1. If possible, shut off the heat source.
 - 2. Shut off fans, if present, and the cooling tower/evaporative condenser (CT/EC).
 - 3. Shut off the system blow-down (i.e., purge) valve. Shut off the automated blow down controller, if present, and set the system controller to manual.
 - 4. Keep make-up water valves open.
 - 5. Close building air-intake vents within at least 27.2 m. Of the CT/EC until after the cleaning procedure is complete.
 - 6. Continue operating pumps for water circulation through the CT/EC.

2. Chemical Disinfection

- a. Add fast-release chlorine-containing disinfectant in pellet, granular, or liquid form, and follow safety instruction on the product label. Examples of disinfectant includes sodium hypochlorite (NaOCl) or calcium hypochlorite (CA{OCl}2), calculated to achieve initial free residual chlorine (FRC) of 50 mg/L (i.e., 30 lbs

{1.4 kg} industrial grade NaOCl {12% - 15% available Cl} per 1,000 gal of CT/EC water; 10.5 lbs {4.8 kg} domestic grade NaOCl {3% - 5% available Cl} per 1,000 gal of CT/EC water or 0.6 lb. {0.3 kg} Ca {OCl} 2 per 1,000 gal of CT/EC water. If significant bio-deposits are present, additional chlorine may be required. If the volume of water in CT/EC is unknown, it can be estimated (in gallons) by multiplying either the recirculation rate in gallons per minute by 10 or the refrigeration capacity in tons by 30. Other appropriate compounds may be suggested by a water-treatment specialist.

- b. Record the type and quality of all chemicals used for disinfection, the exact time the chemicals were added to the system, and the time and results of FRC and pH measurements.
- c. Add dispersant simultaneously with or within 15 minutes of adding disinfectant. The dispersant is best added by first dissolving it in water and adding the solution to a turbulent zone in the water system. Automatic-dishwasher compounds are examples of low or non-foaming silicate-based dispersants. Dispersants are added at 10-25 lbs. (4.5 - 11.25 kg) per 1,000 gallons of CT/EC water.
- d. After adding disinfectant and dispersant, continue circulating the water through the system. Monitor the FRC by using an FRC-measuring device (e.g., a swimming pool test kit), and measure the pH with a pH meter every 15 minutes for 2 hours. Add chlorine as needed to maintain the FRC at greater than or equal to 10 mg/L. Because the biocidal effect of chlorine is reduced at a higher pH, adjust the pH to 7.5-8.0. The pH may be lowered by using any acid (e.g., muriatic acid or sulfuric acid used for maintenance of swimming pools) that is compatible with the treatment chemicals.
- e. Two hours after adding disinfectant or after the FRC level is stable at greater than or equal to 10 mg/L, monitor at 2-hour intervals and maintain the FRC at greater than or equal to 10 mg/L for 24 hours.
- f. After the FRC level has been maintained at greater than or equal to 10 mg/L for 24 hours,

drain the system. CT/EC water may be drained safely into the sanitary sewer. Municipal water and sewerage authorities should be contacted regarding local regulations. If a sanitary sewer is not available, consult local or state authorities (e.g, Department of Natural Resources) regarding disposal of water. If necessary, the drain-off may be dechlorinated by dissipation or chemical neutralization with sodium bisulfite.

- g. Refill the system with water and repeat the procedure outlined in steps 2-6 in II.A.2.b-f above.

3. Mechanical Cleaning

- a. After water from the second chemical disinfection has been drained, shut down the CT/EC.
- b. Inspect all water-contact areas for sediment sludge, and scale. Using brushes and/or a low pressure hose, thoroughly clean all CT/EC water-contact areas, including the basin, sump fill, spray nozzles, and fittings. Replace components as needed.
- c. If possible, clean CT/EC water-contact areas within chillers.

4. After Mechanical Cleaning

- a. Fill the system with water and add chlorine to achieve FRC level of 10 mg/L.
- b. Circulate the water for 1-hour, then open the blow-down valve and flush the entire system until the water is free of turbidity.
- c. Drain the system.
- d. Open any air-intake vents that were closed before cleaning.
- e. Fill the system with water. CT/EC may be put back into service using an effective water-treatment program.

5. Notify Hospital Administration and the Safety office that the disinfecting process is complete and that cooling tower operation will resume.

Note:

Similar plans would be put into effect for the medical school and off site facilities.