



DEPARTMENT OF ENVIRONMENTAL HEALTH County of Riverside

INFORMATIONAL BULLETIN NO. 118-16-DES

DISTRICT ENVIRONMENTAL SERVICES DIVISION

Disinfection of Hot Tubs Contaminated with *Legionella*

Riverside County Environmental Health Department conducts routine inspections of over 7,500 recreational water facilities and investigates complaints to prevent waterborne illness. This guide is to help you in the event that you have a Legionnaires case at your facility. If you have any questions or concerns please contact your local environmental health office to discuss with one of our inspectors. Providing a safe and fun recreational water experience is everyone's goal and responsibility.

The following is the most current information from the Center for Disease Control:

Hot tubs that are not properly operated and maintained can provide an ideal environment for spreading *Legionella*, the bacterium that causes [Legionnaires' disease and Pontiac fever](#). The phrase "hot tubs" in this document includes hot tubs, whirlpool spas, and hydrotherapy spas.



[Outbreaks of Legionnaires' disease and Pontiac fever have been linked to hot tubs contaminated with *Legionella*](#). Failing to regularly scrub hot tub surfaces to remove biofilm, the slime layer that protects *Legionella* from disinfectants, and failing to maintain adequate disinfectant levels promotes *Legionella* growth. Hot tub users can be infected with *Legionella* when they breathe in tiny water droplets that contain *Legionella*. Children, smokers, those over 50 years of age, and individuals with lung disease are at particular risk. The CDC has not made any recommendations regarding routine laboratory testing for *Legionella*, because [proper hot tub maintenance and operation](#) should prevent the growth of *Legionella*. However, if cases of Legionnaires' disease or Pontiac fever are linked to a hot tub, it is important to take samples for laboratory testing and then disinfect the hot tub to prevent others from being infected.

You may want to consider hiring a consultant with expertise in *Legionella* elimination to safely conduct the testing and disinfection process. The CDC recommends these best practices based on the scientific information that is currently available to disinfect a hot tub contaminated with *Legionella*:

1. Close the hot tub to bathers immediately, and shut down the hydrotherapy jets and circulation pumps, but do not drain the water.

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2. Contact your [local environmental health office](#) for information about laboratory testing for *Legionella*. If the health department determines that laboratory testing is needed, water and biofilm samples should be taken from the tub, hydrotherapy jets, drain, and filters/filter media to test for *Legionella* by culture before taking the steps below. [Sampling](#) and laboratory testing are complicated and should always be done in collaboration with your state or local public health agency, environmental health office and a laboratory with *Legionella* testing expertise. A list of CDC-certified *Legionella*-testing laboratories can be found at <https://wwwn.cdc.gov/elite/Public/MemberList.aspx>.
3. Proceed as directed below **after samples have been taken**; it is not necessary to wait for laboratory test results. However, the hot tub should not be re-opened to bathers until all test results are negative for *Legionella*.
4. **Drain** all water from the hot tub. Dispose of the water to waste or as directed by the environmental health department.
5. **Scrub VIGOROUSLY** all hot tub surfaces, skimming devices, and circulation components with free chlorine at a minimum concentration of 5 parts per million (ppm) to remove any biofilm or slime. After scrubbing, rinse the tub with clean water and flush.
6. **Replace** filters (for cartridge or diatomaceous earth filters) or filter media (for sand filters). Bag these and dispose as normal solid waste.
7. **Inspect** the hot tub thoroughly for any broken or poorly functioning components such as valves, sensors, tubing, or disinfectant feeders. Make any needed repairs.
8. **Refill** the hot tub with clean water.
9. **Hyperchlorinate** using 20 ppm free chlorine.
 - a. Keep the hydrotherapy jets off and let the hyperchlorinated water circulate for 1 hour in all of the components of the hot tub including the compensation/surge tank, filter housing, and piping.
 - b. Turn on the hydrotherapy jets to circulate the hyperchlorinated water for 9 additional hours. Ensure that 20 ppm of free chlorine is maintained in the system for the **entire 10 hours**.
10. **Flush** the entire system to remove the hyperchlorinated water from all equipment prior to repeat sampling.
11. **Take repeat samples** for culture-based laboratory testing to confirm that *Legionella* has been eliminated. Water and biofilm samples should be taken from the tub, hydrotherapy jets, drain, filters/filter media, and any part of the hot tub that originally tested positive for *Legionella*.
12. Keep the hot tub closed to bathers until this repeat testing has confirmed the elimination of *Legionella*. If laboratory testing is positive for *Legionella*, repeat steps 4–11 until all testing is negative for *Legionella*. When all tests are negative, the hot tub can be re-opened to bathers.



This image is of a typical pool/spa water chemistry test kit for measuring chlorine, bromine, and pH.

13. Ensure that chlorine (3.0ppm-10ppm) and pH levels (7.2-7.8) meet proper standards before re-opening the hot tub to bathers. **Maintain water quality standards.** Continued *Legionella* testing may be considered on a case-by-case basis to ensure complete elimination of *Legionella*.
14. If the hot tub is associated with an outbreak, the following **continued laboratory testing schedule** may be considered: conduct culture-based testing every 2 weeks for 3 months, then every month for 3 months to ensure complete elimination of *Legionella*. If at any time during this laboratory testing schedule *Legionella* is found, report this to your local environmental health office, disinfect again and start the testing schedule over. For hot tubs that continue to grow *Legionella*, consider hiring a consultant with expertise in *Legionella* elimination.

Note: There are no data to suggest that personal protective equipment is required for disinfecting a hot tub, but N95 respirator masks may be worn during the disinfection process. Respirators must be used in accordance with a comprehensive respiratory protection program, which includes fit testing, training, and medical clearance (see OSHA standard [29 CFR 1910.134](#)). For more information about N95 respirators, visit the National Institute for Occupational Safety and Health (NIOSH) [website](#).

References:

1. Fields BS, Benson RF, Besser RE. *Legionella* and Legionnaires' disease: 25 years of investigation. Clin Microbiol Rev 2002;15:506-526.
2. CDC. [Legionnaires Disease Associated with a Whirlpool Spa Display – Virginia, September, October, 1996](#). MMWR 1997; 46(04):83-86.
3. Donlan RM. [Biofilms: microbial life on surfaces](#). Emerg Infect Dis 2002;8:881--890.
4. American Society of Heating, Refrigerating and Air-Conditioning Engineers. Minimizing the Risk of Legionellosis Associated with Building Water Systems. ASHRAE Guideline 12-2000.
5. CDC. [Vessel Sanitation Program 2011 Operations Manual](#). U.S. Public Health Service Centers for Disease Control and Prevention, National Center for Environmental Health. 2011.
6. CDC. Facts About *Legionella* and Hot Tubs. <http://www.cdc.gov/healthywater/pdf/swimming/resources/legionella-factsheet.pdf>
7. CDC. Operating Public Hot Tubs. <http://www.cdc.gov/healthywater/pdf/swimming/resources/operating-public-hot-tubs-factsheet.pdf>
8. Dupuy M, Mazoua S, Berne F, Bodet C, Garrec N, Herbelin P, Menard-Szczebara F, Oberti S, Rodier M-H, Soreau S, Wallet F, Hechard Y. Efficiency of water disinfectants against *Legionella pneumophila* and *Acanthamoeba*. Water Research 2011; 45:1097-1094.
9. Cooper IR, Hanlon GW. Resistance of *Legionella pneumophila* serotype 1 biofilms to chlorine-based disinfection. Journal of Hospital Infection 2010; 74:152-159.

*Document available in an alternate format upon request