

Temporary Closures of Pools, Spas, and other Aquatic Venues: Prevention of Biofilm and Legionellae Establishment

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Human pathogens that cause Legionnaires' disease, swimmer's ear, and common skin infections have an opportunity to establish in public/semi-public aquatic venues, flourishing when temporarily closed for use. Spas and hot tubs are at the greatest risk for transmitting legionella although attention to pools, interactive fountains, and other venues is critical while operation is idle. When neglected, water chemistry allows the establishment of biofilms and drastically increase the risk of opportunistic pathogens.

A community of microorganisms called "biofilm" can permanently establish when water circulation systems are turned off and disinfectant, such as Chlorine or Bromine, concentrations drop to near zero. Human pathogens hiding in already established biofilm can make people very sick who simply breathe the air *near* the affected spa. Deaths have been reported from the operation of unsafe systems.

Biofilm can be practically impossible to remove completely once allowed to establish, threatening swimmers long after reopening the venue. Maintaining basic water chemistry and circulation during a closure is critical, unless a pool owner/operator takes more serious steps to completely drain and dry the venue, its filter, and circulation piping.

Operators should never turn off circulation pumps and stop maintaining chemistry, simply because it's closed to patrons.

The Problem

Many bacteria, including some that infect humans, protect themselves by hiding in a living layer of slime called "biofilm". Biofilm is an entire ecosystem of living microorganisms that establishes when Chlorine or Bromine levels disappear. Swimmer's ear and other bacterial skin infections result from Pseudomonas bacteria, living in biofilm, just like Legionellae.

Once biofilm has been established, it can take over 100 times the normal levels of Chlorine/Bromine to begin to destroying the organisms imbedded in the layers of film, stuck inside the piping and equipment network of the pool system. *It is simply not possible to "shock" or super chlorinate water after reopening a pool or spa to 'kill' biofilm.*

Biofilm can be manually scrubbed off some accessible areas, but impossible to reach colonies established in the pipes and filter. Long after a venue reopens, pathogens such as Legionellae and Pseudomonas can be hiding in the pipes, the filter, and other features.

The Solution

Public/semi-public pools, interactive fountains, and especially spas/hot tubs should be maintained while temporarily closed for public use. The only way to prevent the establishment of dangerous biofilm is to maintain water circulation, appropriate Chlorine/Bromine levels, and pH.

Maintaining water circulation and chemistry is an essential building maintenance activity necessary to ensure the safety of building occupants, regardless of whether the pool/spa is in active use or idled.

The only alternative would be to drain the spa or other aquatic venue, while taking the following recommended steps:

1. Clean accessible surfaces, scrubbing away any slime and biofilm that might already exist, prior to draining.
2. Apply a disinfectant shock treatment using label directions to the pool.
3. Drain and remove as much of the water from the system as possible AFTER ensuring that hydrostatic pressure will not damage the venue.*
4. Disconnect the filters and any connecting piping that aids in draining.
5. Clean and dry cartridge filter media. Replace filter media such as sand if the sand cannot be effectively dried. Be sure to dry or replace the filter media as recommended by the manufacturer.
6. Keep the spa or aquatic venue as dry as possible, protecting it from external sources of water (for example, rainfall, sprinklers, hoses, etc.).

**** Hydrostatic pressure can crack and otherwise destroy pools/spas installed below ground level in areas that have a high ground water table. In such areas, the only option is to maintain circulation and water chemistry. Never rely on a hydrostatic pressure relief valve alone to ensure the venue will not be damaged.***

Additional Resources and Information

For more information on preventing illness at public/semi-public aquatic facilities, visit:

- The CDC's Model Aquatic Health Code and Annex:
<https://www.cdc.gov/mahc/index.html>.
- The Indiana State Department of Health's Public/Semi-public pool website:
<https://www.in.gov/isdh/23281.htm>
- The Pool and Hot Tub Alliance (formerly National Swimming Pool Foundation) website:
<https://www.phta.org/>
- The CDC's Healthy and Safe Swimming website:
<https://www.cdc.gov/features/healthyswimming/index.html>