WATER QUALITY & HEALTH COUNCIL
PERSPECTIVES

Legionella Bacteria Concerns Grow as Schools Reopen

By the Water Quality & Health Council
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In a nutshell…

COVID-19, building closures, and stagnant water can form an unfortunate "trifecta" when it comes to *Legionella* bacteria and other microorganism growth in building water systems. This article highlights recent reports of *Legionella* detections in school water systems and steps to safely reopen school buildings to protect students, faculty, staff, and visitors.

We recently wrote about risks of exposure to *Legionella* bacteria growing in the building water systems of fully or partially closed workplaces as a result of coronavirus (COVID-19). Before the pandemic, these bacteria sickened and killed more people in the United States than any other reported drinking water-related illness. Thousands of school buildings across the nation, ranging from elementary school classrooms to college dorms, have also been shuttered for many months. And with Labor Day just behind us, millions of students have already started returning to school.

Building closures and reduced occupancy conditions will affect all building environmental systems. These must be maintained to protect building occupants. Extended property closures can lead to unsafe building water system conditions, such as recently reported findings of *Legionella* in several schools in Pennsylvania and Ohio. There is concern that school and public health officials lack plans or effective guidance for addressing the effects of prolonged shutdowns generally, or specifically regarding *Legionella* risk.

Legionella, Stagnant Water, and School Buildings

Legionella bacteria are common in warm, freshwater environments like lakes and streams. They are also known to grow readily and can be commonly found in building water systems, particularly in the microbial growth on pipe walls called biofilms. When a school's water system is not in use, stagnant water fills the pipes, tanks, and other water features. *Legionella* along with other pathogenic microorganisms like mycobacterium can thrive in stagnant water, particularly in hot water heaters and pipes that have cooled to temperatures in the *Legionella* growth range of 77–108°F (25–42°C). This is because the chlorine or chloramine disinfectant residual, typically provided in treated water from a local drinking water utility, has decayed due to reaction with organic and inorganic compounds or disappeared entirely. The extent of stagnation and risk of *Legionella* can vary between school buildings, even on the same campus.

Legionella and Legionnaires' Disease

Inhaling, but not drinking, water droplets (aerosols) containing *Legionella* bacteria can cause Legionnaires' disease, which is a serious and potentially deadly form of pneumonia. Most healthy students and other persons exposed to *Legionella* from school building water systems will not get sick. Those who do are likely to get Pontiac fever, a flu-like illness that is usually self-limiting. Students, teachers, and faculty at increased risk of Legionnaires' disease include those with compromised immune systems or a chronic lung disease. As we noted in our May 15, 2020, article, "The threat from Legionnaires' disease may be compounded because its victims tend to share similar symptoms as coronavirus patients, including cough, chills, and fever, making misdiagnosis a possibility."

Legionella Testing in School Buildings

There are no national regulations or requirements for *Legionella* testing in public schools. Similar to lead testing in school drinking water, *Legionella* testing and reporting programs are largely voluntary or tied to specific school systems. Although health authorities are required to report cases of illness caused by *Legionella* to the U.S. Centers for Disease Control and Prevention (CDC), there are no requirements to test and report the presence of the bacteria. A recent *New York Times* article on this topic reported that some preventive steps schools may take to limit coronavirus infection risk could inadvertently add to *Legionella* concerns. For example, many schools are turning off drinking fountains and some bathroom sinks to ensure social distancing. However, that practice can create reservoirs for bacteria and can contribute to lead levels in drinking water fountains. Shower heads like those found in closed locker rooms are common places to find *Legionella* and other microbes and where inhalation of aerosols is most likely.

Of course, many school systems do not have the budget to test for *Legionella*. But even those schools that have tested recently and had positive test results may have also been positive for *Legionella* (and not know it) before the pandemic and closures, so the *Legionella* risk may not have changed. Moreover, school systems that do test often lack the knowledge and authoritative guidance on how to respond.

Guidance and Steps for Reopening School Buildings

Utilities are responsible for delivering disinfected drinking water to school buildings,[1] but school systems must ensure the safety of water within their buildings. CDC has issued Guidance for Reopening Buildings After Prolonged Shutdown or Reduced Operation, including schools. It outlines eight steps to take before and during reopening a building to reduce risk from *Legionella* and mold. These steps include ensuring water heaters are properly maintained and the temperature set to at least 140 °F (60 °C); flushing the water system through *all* points of use (e.g., taps, showers); and regularly checking residual disinfectant levels. CDC recommends wearing a half-face air-purifying respirator equipped with an N95 filter or an N95 filtering mask in enclosed spaces where aerosol generation is likely. CDC also warns that people at increased risk of developing Legionnaires' disease should consult with a medical provider before participating in activities that may generate aerosols.

A newly released paper, "Preparing for COVID-19's Effect on *Legionella* and Building Water Systems," in the *Journal of the American Water Works Association* also offers guidance on starting a building water system after a prolonged closure. That 11-step guidance includes recommendations to test for *Legionella* to evaluate the effectiveness of building start-up procedures. It emphasizes waiting 48 hours *after* final flushing to collect

[1] Unless the school provides its own treated and disinfected drinking water as a U.S. Environmental Protection Agency-regulated "non-transient, non-community" drinking water system.

samples for testing; testing immediately after flushing will likely just result in a negative test. If appropriate testing reveals widespread or high levels of *Legionella* in the water system, corrective actions may be needed. In addition to system flushing, two widely recommended measures are “shock chlorination” and “thermal shock” disinfection of the building water system. Some of the affected Pennsylvania school officials opted for thermal shock and flushing while at least one Ohio school sent a high level of chlorine solution through their building water system in addition to flushing. Because confirmation of tests for *Legionella* can take weeks, many of those schools in Ohio and Pennsylvania had to rely solely on operational risk-reduction precautions only prior to opening their doors to students.

Final Thoughts

As our students and teachers head back to school, we must be mindful of more than masking with social distancing and COVID-19; we must also remain vigilant about the risk of *Legionella* in under-used school building water systems. By thinking through and implementing procedures to address stagnant water conditions *now*, school officials and building operators can help protect students, teachers, staff, and parents as formerly closed or partially closed school buildings continue to reopen into the fall. School and public health officials should consider CDC’s guidance and at the very least flush the entire building water system (hot and cold) before opening a school building after any prolonged shutdown.