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Consumer Protection, Technology and Utilities Committee

Public Hearing – Water Systems and Legionella: Closing the Regulatory and Statutory Gap

July 20, 2026

Philadelphia City Hall – Council Chambers

11am to 1pm

Call to Order (Chair Burgos)

Opening Remarks (Chair Burgos, Republican Chair Metzgar)

Panel #1

Dr. Charles N. Haas – PhD, NAE, F AAAS, Dist. F IWA, F. AEESP, F SRA, BCEEM, F ASCE, F AAM – Drexel University.

Dr. Jung Chueng, MD, MPH, FACOEM –Medical and Environmental Health Scientist, Cogency

Ms. Kristina Zwolenik – Epidemiology Research Associate, PA Department of Health

Member Q and A

Panel #2

Ms. Charlotte Katzemyoer – Chief Executive Officer, Capital Region Water

Mr. Bill Murray – Reading Area Water Authority

Dr. Chris Crockett – PhD, P.E., Chief Environmental, Safety, and Sustainability Officer - Essential Utilities

Benjamin C. Jewell, Commissioner – Philadelphia Water Department

Mr. Steve Chintaman – PA Apartment Association – Vice President of Governmental Affairs

PA Department of Environmental Protection – Regulatory Expert

Member Q and A

Panel #3

Mr. Bill McQuade – Immediate Past President ASHRAE, Board Member – APLD, Global VP and Head of Government Affairs and Sustainability, Baltimore AirCoil Company

Rep. Smith-Wade-el – Lancaster County, Prime Sponsor - HB 2085

Ms. Rebeca Medvedev, Lancaster County Resident

Steve Hvozdovich – Clean Water Action, PA Campaigns Director

Member Q and A

Closing Remarks

Chair Burgos

Chair Metzgar

Adjournment

Alliance to Prevent Legionnaires' Disease

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Chairman Burgos and members of the Consumer Protection, Technology and Utilities Committee, thank you for the opportunity to testify at this public hearing regarding *Water Management Systems and the Prevention of Legionnaires' Disease.* I will focus my testimony on support for House Bill 2085, which will help address our ongoing issues with Legionella bacteria and Legionnaires' Disease in Pennsylvania. My name is Bill McQuade and I am a Pennsylvania resident and the immediate past president of ASHRAE, which is a nonprofit professional and technical society of more than 54,000 members who focus on building systems, energy efficiency, indoor air quality, water system safety, refrigeration, and resiliency within the built environment. Through research, standards development, publishing, certification and continuing education, ASHRAE shapes tomorrow's global built environment today.

Managing building water systems to reduce waterborne disease risk is essential to comprehensive water safety. Multiple ASHRAE standards and guidelines directly address Legionnaires' disease risk.

I am also a proud board member of the Alliance to Prevent Legionnaires' Disease (APLD), a nonprofit public health advocacy group dedicated to reducing the occurrence of Legionnaires' disease by promoting public research, education, best practices for water management, and advocating for comprehensive policies to combat and investigate this preventable disease.

First, I would like to recognize the sponsors of this legislation, Representative Smith-Wade-El and Representative Ed Neilson, and other cosponsors, for their leadership and work put into this bill. We know there has been a considerable amount of time spent reviewing this issue and meeting with stakeholders. We thank everyone for the efforts to protect public health.

I respectfully urge the Committee to advance this legislation because it creates the comprehensive, source-to-tap framework Pennsylvania needs to reduce *Legionella* bacteria in the water systems that serve our residents. Pennsylvania is my home. It is where my family lives, and like everyone else in Pennsylvania, I expect clean water free of Legionella bacteria. Prevention requires a comprehensive approach that begins with the source of the water flowing into our homes, buildings and facilities and continues through proper management of distribution and premise plumbing systems and water-using equipment. New Jersey has enacted a comprehensive source-to-tap framework, while states such as Illinois and Louisiana have adopted stronger residual disinfectant requirements and other water quality standards. Now it is time for Pennsylvania to follow suit.

Pennsylvania has a unique place in the history of Legionnaires' disease. The disease was first recognized after the 1976 outbreak in Philadelphia, yet 50 years later, too many public policies and approaches are reactive, going into effect only after a multiple victim outbreak. HB 2085 moves the Commonwealth toward prevention. It recognizes that Legionella is a water quality issue, not only a building maintenance problem or an outbreak-response problem. The water that enters a building matters. The condition of the public distribution system matters. The way water

is managed inside buildings matters. The public health response after a case is reported matters. HB 2085 connects each of these responsibilities into one practical framework.

The key aspect of Legionnaires' disease prevention is straightforward. Legionella does not spontaneously appear at the showerhead, our faucets, in cooling equipment or at other points of exposure in our homes and buildings. They are exposure points, but they are downstream from the source. The bacteria must first be introduced into an environment where it can survive, multiply in biofilm and eventually become aerosolized or aspirated (when water goes down the wrong pipe). Aging infrastructure, disruptions in treatment, changes in source water, heavy rain and flooding, water age, low flow, stagnation, and inadequate residual disinfectant can all create conditions that allow waterborne pathogens to persist and move through the distribution system into buildings.

That is why a building-only approach is incomplete. It is also why an outbreak-only approach is inadequate. The overwhelming majority of Legionnaires' disease cases (96%) are sporadic (individual), not formally linked to a recognized outbreak of two or more cases. Those individual cases often never receive the level of investigation needed to identify shared water quality conditions or systemwide warning signs. HB 2085 corrects that blind spot by requiring a better understanding of both distribution system conditions and building-level risks.

In 2016, the Centers for Disease Control and Prevention (CDC) declared that Legionnaires' disease is preventable through proper water management. The CDC released a toolkit, *Developing a Water Management Program to Reduce Legionella Growth and Spread,* which is based on the leading global building ANSI-standard, ASHRAE 188 for reducing Legionellosis risk which was first published in 2016 and updated most recently in 2021. Standard 188 and a related Guideline 12-2020 provide detailed guidance on creating building water management programs for managing legionella bacteria risk focused on the types of buildings and facilities, water-using equipment and populations that may utilize or be served by a building. ASHRAE Standard 188 and ASHRAE Guideline 12 are written to be usable and implemented by a broad range of building owners. The standards are the result extensive input from technical experts, academia, and healthcare stakeholders and from city, state, and national public health departments and regulatory authorities including the CDC.

Importantly HB 2085 would codify these standards requiring the owners and operators of covered buildings to create a building water management plan consistent with ASHRAE 188 and Guideline 12. Specifically, a team would develop and implement the plan, ensuring good water quality, removing stagnant pipe sections, monitoring water-using equipment, flushing systems regularly, and having a response plan for potential cases.

In 2016, a CDC study also found that over a third of outbreaks were the result of a disruption in the public water distribution system. Disruptions include planned and unplanned construction and issues in distribution systems like treatment changes and water main breaks. In two-thirds of outbreak investigations there were inadequate water disinfectant levels. These system upsets like construction, water main breaks, water treatment changes, heavy rainfall and others can disrupt *legionella* bacteria stored in the biofilm of public water distribution system piping and send the bacteria downstream into homes and buildings.

Given these factors, HB 2085 appropriately creates additional standards for public water systems because effective prevention must start before water reaches our buildings. For these systems, the bill requires a minimum disinfectant residual of at least 0.5 mg/L of free chlorine, or at least 1.0 mg/L of monochloramine, in all active parts of the public water system at all times. This is not an arbitrary standard. It is a protective floor that helps ensure the last customer on the line receives meaningful pathogen protection, not merely the first customer closest to the treatment plant.

The words 'at all times' are essential. A standard that allows a system to miss the requirement in a percentage of samples may look administratively convenient, but it is not protective for the family at the end of the line, the cancer patient at home, the nursing home resident, the dialysis patient, the hospital patient or the person with chronic lung disease. Legionella risk is not averaged across a spreadsheet; exposure occurs at a specific tap, in a specific building, at a specific time. If residual disinfectant is allowed to disappear in portions of the active distribution system, the public health purpose of the legislation is weakened.

But this legislation importantly recognizes that disinfectant residual alone is not enough. HB 2085 requires best management practices and distribution system maintenance planning; documentation of public water system disruptions; customer notification when disruptions may affect water quality; environmental rules and regulations by our state agencies; and annual reporting so the Governor and General Assembly can evaluate cases, sampling results, violations and whether future legislative action is needed. These provisions are important because disruptions and source changes can loosen biofilm, increase water age, change chemistry and move pathogens or nutrients into homes and buildings.

While the Committee may hear concerns about taste, odor or disinfectant byproducts related to these provisions, they should not be used to avoid reasonable protection. Chlorine and chloramine have been used for decades to protect drinking water from disease-causing organisms. Federal guidance recognizes chlorine and chloramine levels up to 4.0 mg/L as safe in drinking water. HB 2085's residuals are well below that level. Other states have adopted residual requirements at or above levels proposed in this bill, including 0.5 mg/L free chlorine requirements, without evidence of the broad public health or consumer impacts sometimes predicted by opponents. The better policy is not to choose between microbial safety and chemical compliance, but to require competent water quality management that achieves both.

HB 2085 is also cost-effective when compared with the human and financial cost of preventable disease. Legionnaires' disease can mean hospitalization, intensive care, long recovery, permanent health consequences and death. Every case also triggers public health work, medical expense, building response costs and loss of public confidence. Preventing risk before an outbreak is more effective than waiting to test water systems after people are sick.

HB 2085's public awareness provisions are particularly important for vulnerable residents, many of whom live at home or spend time in facilities with complex water systems. They deserve notice when disruptions may affect water quality and practical information to reduce exposure. The dashboard and annual reports will help communities, health care providers and policymakers identify patterns earlier and evaluate whether the program is working.

We must recognize that every water system is different. That is precisely why Pennsylvania needs a framework that combines clear minimum standards with a source to tap approach that manages both the water source and distribution system, as well as the buildings and homes that use it.

I was encouraged by New Jersey's 2024 law, which raises disinfectant levels throughout water systems, requires notifications for at-risk populations, mandates thorough investigations of cases, and ensures buildings fully follow ASHRAE Standard 188 and Guideline 12. A comprehensive source-to-tap approach is the only way to effectively protect vulnerable people.

For nearly five decades, public health policy has too often chased Legionella after it has already reached the end of the system and after people have already become sick. Pennsylvania can lead by rejecting that reactive model. HB 2085 follows the water, follows the science and focuses on prevention. It will help protect seniors, patients, immune-compromised residents, workers, students and families across the Commonwealth. For these reasons, I respectfully urges the Committee to report House Bill 2085 favorably and move Pennsylvania toward a comprehensive source-to-tap strategy to prevent Legionnaires' disease.

House Bill 2085 and Legionnaires' Disease

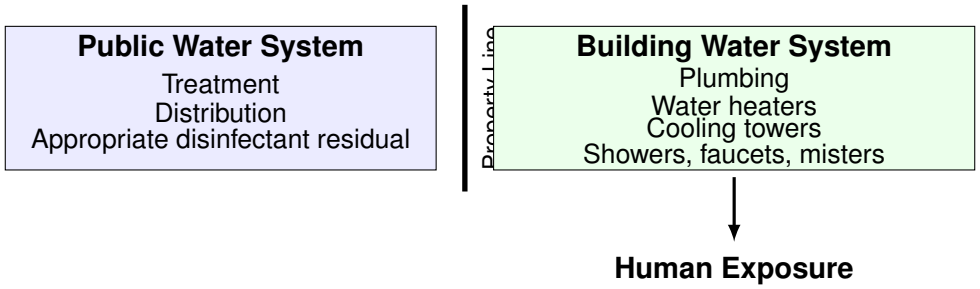
Scientific Considerations for the Pennsylvania House Consumer Protection, Technology & Utilities Committee

Charles N. Haas, Ph.D., NAE
Betz Chair Professor of Environmental Engineering
Distinguished Professor, Drexel University

Why This Matters

- Reported U.S. cases of Legionnaires' disease have increased more than six-fold since 2000.
- Approximately **96%** of reported cases are sporadic, with no environmental source ever identified.
- Prevention therefore requires controlling the conditions that allow *Legionella* to multiply before disease occurs.

Shared Responsibility for Prevention



Public Water Suppliers

- Deliver biologically stable drinking water
- Maintain distribution-system integrity
- Maintain appropriate disinfectant residuals

Building Owners and Operators

- Reduce stagnation and water age
- Maintain appropriate temperatures
- Implement ASHRAE 188 water management programs
- Control aerosol-generating systems

What Current Scientific Evidence Indicates

- Maintaining an adequate disinfectant residual throughout the public distribution system is essential.
- Building conditions—not the disinfectant residual entering the building—are usually the dominant determinants of *Legionella* amplification.
- Water management programs provide the strongest evidence-based approach for reducing building-associated Legionnaires' disease.

Scientific Considerations Regarding HB 2085

The bill appropriately emphasizes building water management.
Current evidence also suggests that increasing distribution-system disinfectant residuals alone is unlikely to substantially reduce *Legionella* occurrence inside buildings while potentially increasing

- regulated disinfection by-products,
- corrosion of aging infrastructure,
- utility operating costs, and
- operational complexity.

Recommendations

1. Continue emphasizing proactive prevention.
2. Maintain a multi-barrier approach to risk management.
3. Encourage building-level engineering controls.
4. Strengthen implementation of water management programs.
5. Enhance surveillance, diagnostics, and environmental investigations.

Bottom Line

House Bill 2085 addresses an important public health problem.

The strongest scientific evidence supports a shared-responsibility framework:

Public water systems deliver biologically stable water.
Building owners manage the conditions that permit *Legionella* growth.
Effective prevention requires both.

Written Testimony on House Bill 2085
Pennsylvania House of Representatives
Consumer Protection, Technology & Utilities Committee

Charles N. Haas, Ph.D., NAE
Betz Chair Professor of Environmental Engineering
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July 20, 2026

Executive Summary

Legionnaires' disease remains one of the most significant waterborne public health challenges facing the United States and the Commonwealth of Pennsylvania. Although first recognized following the 1976 Philadelphia outbreak, the disease has continued to increase in incidence, with reported cases rising more than six-fold over the past two decades [21, 10]. Most importantly, approximately 96% of reported cases in the United States are sporadic, community-acquired infections for which no specific environmental source is ever identified [21, 22]. This pattern indicates that preventing disease requires controlling the conditions that allow *Legionella* to proliferate in engineered water systems rather than responding only after recognized outbreaks occur.

The proposed legislation represents an important and commendable effort by the General Assembly to address this continuing public health challenge. It appropriately recognizes the need for systematic management of risks associated with *Legionella* and reflects growing awareness that prevention requires more than ensuring the microbiological quality of water delivered by public water systems. Effective prevention must also address conditions that promote pathogen amplification within building plumbing and other engineered water systems.

The principal scientific question raised by the bill is whether increasing secondary disinfectant residuals throughout public water distribution systems will, by itself, meaningfully reduce the risk of Legionnaires' disease. The current scientific evidence indicates that this relationship is considerably more complex. Once water enters premise plumbing, cooling towers, and other engineered water systems, disinfectant residuals decline because of water age, stagnation, temperature, corrosion, and biofilm development. These local conditions—rather than the disinfectant concentration entering a building—largely determine whether *Legionella* amplifies to levels that present a public health concern [8, 21, 17].

Maintaining an adequate disinfectant residual throughout the public distribution system remains an essential component of safe drinking water and should continue to be required. The available scientific evidence, however, indicates that increasing utility-level disinfectant residuals alone is unlikely to provide substantial additional protection against building-associated Legionnaires' disease while increasing the potential for undesirable consequences, including greater formation of regulated disinfection by-products, accelerated corrosion of aging infrastructure, and additional operational challenges associated with maintaining higher disinfectant concentrations [8, 21].

The current scientific evidence instead supports a shared-responsibility framework. Public water suppliers are responsible for delivering biologically stable water to the building connection. Building owners and operators are responsible for maintaining their internal engineered water systems in a manner that minimizes the amplification and dissemination of *Legionella*. Effective legislation should recognize these distinct responsibilities and establish a regulatory framework that addresses both [21, 24].

Accordingly, I respectfully offer the following recommendations to the Committee:

1. **Emphasize proactive, systems-level prevention.** Recognize that *Legionella* is a ubiquitous environmental organism for which "zero" colonization is neither an achievable nor a verifiable regulatory target, and establish proactive, process-based risk management, rather than reactive response to identified cases, as the state standard [21, 11].

2. **Base regulatory requirements on multi-barrier evidence rather than a single distribution-system parameter.** Continue to require public water systems to maintain a stable secondary disinfectant residual for overall distribution-system stability, while recognizing that this residual is not, by itself, a reliable predictor of building-level *Legionella* occurrence [8, 11].

3. **Reform the consecutive-system classification that discourages on-site engineering controls.** Pursue available federal flexibility (e.g., 40 C.F.R. §141.29) to relieve high-risk facilities that install supplemental on-site disinfection from the full regulatory burden of a public water system [21].

4. **Build on House Bill 2085's existing water management program requirement.** The bill already directs covered buildings to implement water management programs consistent with ASHRAE Standard 188 (§6707). I recommend that the Committee confirm the adequacy of this provision's scope and add numeric, risk-based action levels and thermal-control targets consistent with the National Academies' consensus recommendations [21].

5. **Strengthen surveillance and diagnostic capacity.** Encourage the use of respiratory culture, quantitative PCR, whole-genome sequencing, and related laboratory methods that improve environmental source attribution and support timely public health interventions [21, 11].

In summary, the proposed legislation addresses an important public health issue and provides the Commonwealth with an opportunity to strengthen the prevention of Legionnaires' disease.

The available scientific evidence supports a comprehensive, multi-barrier approach that combines sound operation of public water systems with effective management of building plumbing and other engineered water systems. Aligning the legislation with this evidence will provide a stronger scientific foundation for reducing the burden of Legionnaires' disease in Pennsylvania while avoiding unintended consequences associated with relying primarily on increased distribution-system disinfectant residuals.

1 Introduction

1.1 Purpose of this Testimony

I appreciate the invitation to testify on how best to reduce the occurrence of Legionnaire's disease in the context of HB 2085. My testimony will provide the scientific context to the problem, and outline what steps could be taken to reduce the risk to people from this disease, and the important roles and responsibilities of various entities in such responses.

I am appearing here in my personal, individual capacity, and not on behalf of my university or any agency, association, or corporation.

1.2 Biography and Qualifications

I am the L. D. Betz Professor of Environmental Engineering and Distinguished Professor in the Department of Civil, Architectural, and Environmental Engineering at Drexel University, where I have served since 1991. I have been engaged in teaching and research in environmental engineering since 1978. For more than 45 years, my professional and academic career has specialized in the assessment of risk from and control of human exposure to waterborne pathogenic microorganisms, specifically focusing on the treatment of water and wastewater to minimize public health risks. Throughout my research, I have developed pivotal risk assessment, occurrence, and disinfection models for *Legionella* in engineered water systems, and I co-directed the Center for Advancing Microbial Risk Assessment (CAMRA), a cooperative center of excellence funded by the U.S. Environmental Protection Agency and the U.S. Department of Homeland Security.

Among my over 250 publications are two editions of the book, *Quantitative Microbial Risk Assessment* and a forthcoming book (to be published in September), *Environmental Engineering for Pathogen Control*.

My advisory and public service contributions include serving on numerous committees of the National Academies of Sciences, Engineering, and Medicine, and I am a past member of both the Water Science and Technology Board and the U.S. EPA Board of Scientific Counselors. Notably, I served as a member of the National Academies Committee on the Management of *Legionella* in Water Systems, which produced the landmark 2020 consensus study report on this pathogen. I also served as vice chair of a 2006 National Academies Committee on Public Water Supply Distribution Systems: Assessing and Reducing Risks, which is relevant to the issues under discussion here. I am an elected Fellow of the American Academy of Microbiology, the American Association for the Advancement of Science, the American Society of Civil Engineers, the Association of Environmental Engineering and Science Professors, and the Society for Risk Analysis. I am a Distinguished Fellow of the International Water Association.I hold a B.S. in biology and an M.S. in environmental engineering from the Illinois Institute of Technology, and a Ph.D. in environmental engineering from the University of Illinois at Urbana-Champaign.

I am an elected member of the National Academy of Engineering, and have received the A.P. Black and the John Leal Awards from the American Water Works Association, and the Clarke Water

Prize from the National Water Research Institute. I am the current President-elect of the American Academy of Environmental Engineers and Scientists.

2 Legionnaires' Disease as a Continuing Public Health Problem

2.1 Burden of Disease

It is critical to recognize that infections caused by *Legionella pneumophila* present a severe and escalating public health threat in the United States and globally [21]. Estimates from the Centers for Disease Control and Prevention (CDC) indicate that Legionnaires' disease accounts for approximately 12% of all directly attributable waterborne disease healthcare costs associated with emergency department visits and hospitalizations in the United States [7]. While overall waterborne infections impose an annual financial burden of $3.3 to $3.8 billion on the U.S. healthcare system, water-based (saprozoic) pathogens alone account for over $2.39 billion of these costs, reflecting the disproportionately high expense of treating severe respiratory infections compared to self-limiting gastrointestinal illnesses [7].

The burden is equally severe in Europe, where legionellosis ranks as the fifth most significant contributor to disability-adjusted life years (DALYs) among 31 selected infectious diseases, following only influenza, tuberculosis, HIV, and invasive pneumococcal disease [5]. This disease burden is further exacerbated by an aging population and a growing cohort of immunocompromised individuals who are highly susceptible to opportunistic pathogens [21, 11].

Active surveillance continues to document a relentless rise in the incidence of legionellosis. In the United States, reported cases increased more than six-fold between 2000 and 2018, rising from 0.42 to over 3.0 cases per 100,000 population [21, 10]. Pennsylvania holds a historically significant place in this public health timeline, as the disease was first identified following the landmark 1976 outbreak at the Bellevue-Stratford Hotel in Philadelphia, which infected 182 individuals and resulted in 29 fatalities [21]. Despite decades of clinical and engineering interventions, national and global notification rates have continued their upward trajectory, as detailed in recent collaborative assessments of global research needs [11].

A central challenge in managing this disease is that the vast majority of cases—approximately 96% in the United States and 70% in Europe—are sporadic, community-acquired infections for which no environmental source is ever definitively identified [21, 22]. While dramatic, high-profile outbreaks associated with cooling towers, hotels, or decorative fountains capture public attention, they represent only a fraction of the overall disease burden; the silent majority of cases are sporadic and likely trace back to colonization within complex, unmonitored building plumbing networks, or from other sources where only small numbers of persons may have been exposed [21, 10].

2.2 The Unique Ecology of *Legionella*

Unlike enteric pathogens that enter water systems via fecal contamination, *Legionella* species are naturally occurring, saprozoic organisms ubiquitous in natural aquatic and soil environments [21]. They have evolved to colonize human-made water systems, which provide highly favorable physical and chemical conditions for their survival and amplification [21].

The life cycle and environmental resilience of *Legionella* are fundamentally tied to its interactions with free-living protozoans (such as *Acanthamoeba* and *Naegleria*) and biofilms [21]. These biofilms can be in natural bodies of water, or in man-made (engineered) systems. In engineered systems, *Legionella* cells colonize the complex matrices of biofilms on pipes, cooling tower surfaces, surfaces of fountains etc., which shield the bacteria from shear stress and chemical disinfectants [21, 14]. More importantly, *Legionella* acts as an intracellular parasite, replicating inside host amoebae trophozoites [21]. This parasitic relationship offers several survival advantages:

- **Disinfection Resistance:** Intracellular growth within amoebic vacuoles or highly resilient protozoan cysts protects *Legionella* from extreme temperatures and standard municipal disinfectants like free chlorine or monochloramine [21].
- **Respirable Vesicles:** Upon lysing host cells, *Legionella* can be expelled into the water column within protozoan-derived vesicles. These lipid-bound vesicles can encapsulate hundreds of live bacteria, presenting a highly concentrated, infectious dose capable of deep inhalation into the human respiratory tract [21].
- **Phenotypic Adaptation and VBNC States:** Under environmental stress (e.g., biocide exposure or nutrient limitation), *Legionella* can transition into a viable but non-culturable (VBNC) state [21, 11]. While these cells cannot be detected using standard culture-based diagnostic media, they remain metabolically active and can resume replication and infectivity upon resuscitation inside a permissive protozoan host [21, 2].

Understanding this dual lifestyle—living both as free-floating cells in bulk water, as members of biofilm consortia, and as intracellular parasites within protective microeukaryotes—is essential to evaluating the limitations of municipal disinfectant residuals and designing effective building-level water management programs [11, 2].

3 Scientific Evidence Regarding Prevention

3.1 Potential Sources of Colonization

Engineered water systems do not exist in a sterile vacuum; they are constantly subjected to microbial seeding from various environmental reservoirs [17]. The primary sources of colonization which could result in subsequent amplification include:

- **Municipal Source Water:** Public water supplies are not intended to be sterile; low concentrations of *Legionella* cells can survive municipal treatment—often shielded inside free-living amoebae or biofilms—and continuously seed downstream plumbing networks [17].
- **Soil and Compost:** Soil, potting mixes, and garden compost are highly favorable growth media and have been found to harbor *Legionella pneumophila* as well as other pathogenic species [12].
- **Rainwater Harvesting:** Roof-runoff harvested in cisterns can be seeded with *Legionella* from environmental dust and bird droppings, presenting a notable colonization risk if used without downstream filtration and disinfection [9].
- **Construction and Plumbing Repairs:** Water-main breaks, physical repairs, and construction debris disrupt system pressure, dislodge protective pipe biofilms, introduce soil contaminants, and deplete local disinfectant residuals, frequently preceding community clusters [17].
- **Untreated Waters:** Untreated waters, including groundwater, have been found to contain viable *Legionella pneumophila* [6].

3.2 Amplification

Regardless of the source of *Legionella*, once the organism encounters a conducive environment, such as building plumbing, cooling towers, etc., multiplication can occur.

The amplification of *Legionella pneumophila* is widely documented across a diverse array of man-made and natural environments, with engineered water systems serving as the primary vectors for human exposure and subsequent infection [21]. These man-made reservoirs include building premise plumbing networks—such as showerheads, faucets, and thermostatic mixing valves—which provide the direct aerosolization mechanisms necessary for inhalation [14, 13], cooling towers and evaporative condensers [10, 26], recreational facilities like hot tubs, whirlpool spas, and public baths [18], and ornamental fountains [21]. Additionally, substantial colonization has been observed in the aeration ponds of municipal and industrial biological wastewater treatment plants, where the combination of high aeration and nutrient-rich waters creates an ideal growth environment [21, 23]. Outside of aquatic systems, non-water media such as commercial potting soils, natural soils, and garden compost piles also harbor high concentrations of both *L. pneumophila* and other pathogenic *Legionella* species (such as *L. longbeachae*), presenting a distinct, soil-associated pathway for community-acquired sporadic cases [4, 12].

This pathogen proliferation is primarily driven by three interacting environmental factors: warm water temperatures, hydraulic stagnation, and the development of complex biofilms. The optimal thermal window for *Legionella* replication is between 25°C and 45°C; water temperatures below 20°C inhibit growth as host protozoan digestion kinetics shift from parasitic replication to active predation [21, 14]. Extended water age and stagnation in dead-ends or oversized storage

tanks accelerate the decay of secondary disinfectant residuals, such as free chlorine or monochloramine, removing the primary chemical barrier to bacterial regrowth [8, 17]. Under these conditions, *Legionella* cells integrate into pipe-wall biofilms, which physically shield them from bulk-water disinfectants [21, 14]. Within the biofilm matrix, the pathogen multiplies intracellularly as an obligate parasite inside free-living protozoan hosts, such as *Acanthamoeba* and *Vermamoeba* trophozoites, which provide the essential nutrients and protection required for the bacteria to differentiate into highly infectious, transmissive forms [2, 21].

The specific chemical composition of water and the materials used in plumbing networks further dictate the rate of amplification. Dissolved iron acts as an essential nutrient that directly stimulates *Legionella* growth and virulence, meaning that unlined cast-iron pipes—which corrode rapidly, consume chlorine residuals, and form porous iron oxide scales—provide a highly favorable habitat [21]. Furthermore, modern synthetic plumbing materials, such as cross-linked polyethylene (PEX) or flexible polyvinyl chloride (PVC-P) hoses, can exacerbate colonization by leaching biodegradable organic carbon (BDOC) and assimilable organic carbon (AOC) into the water, which feeds the heterotrophic biofilm and indirectly stimulates protozoan host populations [21, 20]. Conversely, in chloraminated systems, monochloramine decay releases free ammonia, which can stimulate nitrifying biofilms under stagnant conditions, leading to rapid local disinfectant loss and accelerated pathogen proliferation [17, 20].

3.3 Exposure Pathways

Human exposure to *Legionella* species occurs almost exclusively through the inhalation or microaspiration of contaminated water droplets suspended in the air [21]. To initiate an infection in the lower respiratory tract, these aerosols must typically fall within the respirable size range of 1 to 10 μm, which allows them to bypass upper airway defenses and deposit directly within the lung alveoli [21].

Engineered water systems contain numerous proximate sources capable of generating these infectious aerosols. These include:

- **Premise Plumbing Fixtures:** Standard showerheads, particularly fine-mist models, and faucet aerators draw air into the water stream, generating high volumes of respirable aerosols [21].
- **Cooling Towers and Evaporative Condensers:** These large-scale heat-rejection systems utilize fan-induced drafts to cool circulating water, producing massive, high-velocity aerosol plumes that can disperse bacteria over several kilometers [21]. These types of equipment can be on individual buildings [19], in use by industries [15], or in use by electric power generation facilities [3]. With the dramatic growth in data centers, which frequently rely on wet cooling towers for thermal control, the potential for these additional sources merits further investigation [1].
- **Recreational and Architectural Features:** Hot tubs, whirlpool spas, and decorative fountains use water jets, air injection, or physical cascades that continuously generate fine mists directly in the breathing zone of users [18].

- **Misters and Humidifiers:** Ultrasonic and centrifugal humidifiers disperse cold, unheated water droplets, making them highly efficient dissemination vectors if their reservoir water is colonized [21].

Understanding these pathways demonstrates that public health risks are not uniform; they are heavily concentrated around specific aerosol-generating fixtures and systems, where vulnerable populations are housed, or nearby potential sources of aerosols such as cooling towers etc. [21].

3.4 Responsibilities Across the Engineered Water System

Effective prevention requires recognizing the distinct jurisdictional boundaries that govern our water infrastructure. In the United States, a public water utility's legal and operational responsibility typically ends at the property line or water meter [21]. Under the Safe Drinking Water Act (SDWA), municipal utilities are tasked with delivering biologically stable water to the building gate, but they have no control over the miles of complex plumbing inside the structure [21]. The significance of this was summarized in a 2006 National Academies Report, with relevant highlights noted in the box [24].

Water Age and Quality Degradation in Premise Plumbing

(summarized from [24])

The physical scale of drinking water infrastructure shifts dramatically past the property boundary, where the public distribution system's 1 million miles of municipal mains expand to over 6 million miles of private service lines and premise plumbing. Consequently, more than 80% of the wetted surface area of our nation's water infrastructure resides entirely within private buildings, beyond utility jurisdiction and regulatory oversight. This private network is characterized by an exceptionally high surface-area-to-volume ratio, estimated at 2.1 cm^2/mL for standard 1.9-cm home plumbing compared to just 0.26 cm^2/mL for a typical 15.2-cm public water main. This geometric reality maximizes chemical and biological reactions at the pipe-water interface.

Once municipal water enters this private network, the hydraulic regime shifts from continuous flow to prolonged stagnation, exponentially increasing water age . In contrast to the active flow maintained in looped public mains, water sits stagnant in building plumbing for hours, days, or even weeks depending on occupancy patterns. This stagnation, combined with wetted surface reactions and exposure to extreme indoor temperatures (which can range up to 100°C at the surface of water heater elements), accelerates the decay of secondary disinfectant residuals like free chlorine and chloramine.

As disinfectant residuals deplete, the high surface area and warm, stagnant conditions transform premise plumbing into highly favorable microclimates for microbial regrowth. Biofilms readily colonize wetted pipe walls and fixtures, utilizing assimilable organic carbon leached from synthetic plumbing materials (like PEX) and corrosion scales on legacy metal pipes. This environment facilitates the colonization and rapid intracellular amplification of opportunistic pathogens, most notably *Legionella pneumophila* and nontuberculous *Mycobacterium avium*, which replicate inside host amoebae and are subsequently aerosolized into the breathing zone of users at distal taps and showerheads.

An instructive analogy can be drawn to the electric utility industry:

> *An electric utility is responsible for generating power and delivering it safely to a building's service panel. However, the utility is not responsible for a fire caused by faulty, outdated, or overloaded wiring inside a private residence. Similarly, a water utility cannot be held solely responsible for the amplification of pathogens inside a complex building plumbing network, over which it has no control, that experiences high water age, thermal decay, and stagnation.*

This split-responsibility model highlights a significant regulatory gap. While municipal water systems generally maintain high-quality water, the chemical and biological quality can degrade rapidly once inside building premise plumbing [21]. Consequently, preventing legionellosis should be treated as a shared responsibility: municipal utilities should optimize distribution system stability, while

building owners and facility managers should actively maintain their internal networks [17].

3.5 Evidence Regarding Disinfectant Residuals

Under the SDWA Surface Water Treatment Rule (SWTR), utilities are required to maintain a detectable secondary disinfectant residual throughout the distribution network [21].

In a landmark study, LeChevallier [16] demonstrated that maintaining a free chlorine residual of at least 0.1 mg/L was highly effective at keeping *L. pneumophila* concentrations below 10 MPN/100 mL, particularly when bulk water temperatures exceeded 18°C.

However, relying on distribution system residuals as a single predictor for building-level safety has severe limitations. In a comprehensive 2026 study evaluating water quality across approximately 5,600 federally owned and leased buildings, Hagen et al. [8] found **no clear numeric distribution system residual threshold consistently linked to lower *Legionella* occurrence in buildings**. This decoupling occurs because several dominant building-specific variables dictate colonization:

- **Water Age and Stagnation:** Large buildings and green designs designed to conserve water significantly increase water residence times, allowing disinfectant residuals to decay completely.
- **Plumbing Materials:** Common pipe materials react differently with disinfectants; for example, legacy unlined iron pipes rapidly consume chlorine residuals through corrosion reactions, while plastic materials like PEX can leach organic carbon that stimulates biofilm growth.
- **Nitrification:** In chloraminated systems, the decay of monochloramine releases free ammonia, which can stimulate nitrifying biofilms under warm, stagnant conditions, completely depleting the disinfectant residual and leaving the plumbing vulnerable.

A similar decoupling between the water quality at the exit of a distribution system and the water in use (that could potentially be aerosolized) exists in the context of other uses, such as cooling towers, spas and hot tubs, fountains, misters, etc.

3.6 Control Measures Supported by the Strongest Evidence

Rather than relying on a single water quality parameter, the scientific consensus emphasizes a holistic, multi-barrier approach [11]. The strongest, evidence-based preventive measures include:

1. **Systematic Water Management Plans (WMPs):** Developing and implementing building-specific WMPs in accordance with ASHRAE Standard 188 represents the gold standard of care [21]. These programs identify critical control points, establish operational limits (e.g., temperature and biocide levels), and continuously validate their efficacy [21].
2. **Strict Temperature Control:** Maintaining hot water storage heaters at a minimum of 60°C (140°F) and circulating hot water to ensure temperatures exceed 55°C (131°F) at distal points remains the most effective physical barrier to restrict *Legionella* amplification [21, 25]

3. **Cooling Tower Management:** Mandatory registration, continuous oxidizing biocide dosing (e.g., maintaining 0.3 to 0.7 mg/L free chlorine), routine monthly servicing, and the installation of high-efficiency drift eliminators have been shown to drastically reduce community outbreaks and colonization rates [21].

4. **Targeted Healthcare Guidance:** Requiring hospitals and long-term care facilities to conduct routine environmental sampling for *Legionella* in high-risk units provides direct, actionable validation that engineering controls are successfully protecting vulnerable patients [21].

4 Scientific Assessment of House Bill 2085

A review of House Bill 2085 against the available scientific evidence indicates that while its focus on systematic water management is well founded, its proposed reliance on a fixed, elevated secondary disinfectant residual at the utility boundary lacks strong empirical support as a means of controlling *Legionella* within complex building plumbing systems.

4.1 Positive Elements

House Bill 2085 represents a highly commendable and much-needed legislative effort to address the leading cause of reportable waterborne disease outbreaks in the United States [21]. By drafting this legislation, the General Assembly of Pennsylvania is taking a proactive step to:

- **Recognize the Public Health Burden:** The bill directly acknowledges the severe morbidity, mortality, and financial costs associated with Legionnaires' disease, elevating it to a high-priority public health issue in the Commonwealth [21].

- **Increase Public and Institutional Awareness Beyond the Utility Boundary:** The water industry (utilities and their consultants) has long been aware of the need to control pathogens, including *Legionella*, through drinking water treatment, and water delivered to customers at the point of delivery is designed to be safe and wholesome under the requirements of the Safe Drinking Water Act. The proposed legislation's principal value lies in extending that awareness to those who take custody of the water after delivery and may not otherwise take care to minimize its degradation in quality, such as building owners, industries and facilities that operate cooling towers, and establishments using misters, fountains, or other architectural water features [21].

- **Mandate Systematic, Building-Level Water Management:** By requiring the owners and operators of buildings meeting the applicability criteria of ASHRAE Standard 188-2021 to implement a water management program consistent with that Standard and with ASHRAE Guideline 12-2023 (§6707), the bill already establishes the building-level management framework that the scientific literature identifies as the primary control point for *Legionella* amplification [21, 8, 11].

- **Promote Systematic Water Management:** By shifting the conversation toward accountability and oversight particularly via end users, the bill aligns with the scientific consensus that active, planned oversight of engineered water systems is required to protect vulnerable populations [8, 11].

4.2 Scientific Questions and Limitations Raised by the Bill

While the intent of House Bill 2085 is scientifically sound, several of its specific mandates raise critical engineering questions and run counter to the latest empirical evidence regarding pathogen behavior in distribution and building plumbing networks.

4.2.1 The Decoupling of Utility Residuals and Building-Level Proliferation

The disinfectant-residual provision in House Bill 2085 presupposes that mandating a specific, elevated secondary disinfectant residual throughout the municipal distribution system will translate into a corresponding reduction of *Legionella* occurrence inside buildings. This presupposition is not supported by the recent, highly detailed study by von Hagen [8], who found a decoupling between residual disinfectant entering the premises of a user and the actual occurrence of *Legionella* at the point of use.

This decoupling occurs because of the specific phenomena noted above, which principally govern the survival and growth of the pathogen [21, 8]:

- **Water Age and Stagnation:** Large buildings, particularly those designed for water conservation, experience extreme water residence times. This stagnation allows secondary disinfectants like free chlorine or monochloramine to decay to near-zero levels, regardless of the residual concentration delivered at the building's gate [8, 17].

- **Thermal Decay:** The warm ambient temperatures inside building plumbing networks (ranging from 25°C to 43°C) rapidly accelerate biocide decay while simultaneously providing the optimal thermal window for explosive *Legionella* replication within host amoebae [21, 17].

- **Biofilm Shielding:** *Legionella* predominantly replicates as an intracellular parasite inside free-living protozoans embedded in complex pipe biofilms [21]. This parasitic niche shields the bacteria from bulk-water disinfectants, rendering standard distribution residuals ineffective without localized thermal or physical control measures [21, 2].

4.2.2 Potential Unintended Consequences of Rigid Disinfectant Mandates

Mandating water utilities to maintain high numeric residuals (e.g., up to 0.5 mg/L free chlorine or 0.7 mg/L chloramines, as currently discussed in federal regulatory revisions) to solve building-level *Legionella* issues presents significant technical and public health trade-offs [8]:

- **Disinfection By-Product (DBP) Formation:** Under the Safe Drinking Water Act (SDWA), utilities must carefully balance pathogen inactivation with the formation of carcinogenic DBPs, such as trihalomethanes (TTHMs) and haloacetic acids (HAA5). Increasing chlorine residuals at the utility level to address a building-level problem would increase DBP exposure for the general public, potentially above federal water quality standards [8].

- **Corrosion and Iron Release:** Legacy distribution systems in Pennsylvania are heavily composed of unlined cast-iron mains [21]. Elevated free chlorine concentrations can accelerate pipe corrosion, which not only degrades infrastructure but also consumes disinfectant residuals through oxidation chemistry [21]. Crucially, dissolved iron serves as an essential nutrient that actively stimulates the growth of *Legionella* biofilms [21]. This same failure cascade—corrosive water depleting chlorine residuals while stimulating iron-rich *Legionella* growth—has been identified as a major contributing factor in the increase in Legionnaires' disease cases associated with the Flint, Michigan water crisis, although the full causal chain in that event was never conclusively established [21].

- **Pathogen Selection and Nitrification:** In chloraminated systems, the decay of monochloramine releases free ammonia, which can stimulate nitrifying biofilms under warm, stagnant conditions [17]. This process can deplete the disinfectant residual, leaving the building plumbing highly vulnerable to colonization [17].

4.2.3 Biological Risk Trade-offs: The Mycobacterium Problem

Engineering interventions targeting a single pathogen can inadvertently select for other dangerous waterborne pathogens [21]. For example, while monochloramine is highly effective at controlling *L. pneumophila* in plumbing networks [21, 17], long-term hospital studies have shown that its continuous application can lead to a significant increase in the colonization and positivity rates of *Mycobacterium avium* complex (MAC) [21, 17]. Like *Legionella*, MAC is a severe, opportunistic respiratory pathogen that infects vulnerable and immunocompromised populations through inhaled aerosols [17]. A regulatory framework that requires water systems to adopt specific chemical disinfection regimes without a multi-pathogen risk assessment risks replacing one respiratory pathogen risk with another [21, 17].

4.2.4 Unintended Regulatory Barriers: The "Consecutive System" Obstacle

Under current U.S. Environmental Protection Agency (EPA) interpretations of the Safe Drinking Water Act, if a high-risk building (such as a hospital or senior-care home) installs an on-site secondary disinfection system—such as chlorine dioxide, copper-silver ionization, or chloramine boosting—to protect its occupants, that building is legally classified as a consecutive public water system [21]. This designation instantly subjects the building owner to the full administrative, monitoring, and reporting burdens of a municipal water utility [21]. This regulatory consequence discourages facility

managers from implementing the very on-site engineering controls that the scientific literature demonstrates are the most effective at preventing *Legionella* growth and protecting human lives [21].

4.2.5 Feasibility and Yield of Universal Case Investigation

Section 6706 of House Bill 2085 directs the Department of Health or a local health officer to conduct an epidemiological investigation for every reported diagnosis of Legionnaires' disease in the Commonwealth. This provision merits consideration alongside the point discussed earlier in this testimony: approximately 96% of reported U.S. cases are sporadic, community-acquired infections for which no environmental source is ever identified [21, 22]. A universal, case-by-case investigation requirement will commit public health resources to investigations that, based on national experience, are unlikely to identify a specific environmental source in the large majority of instances. This is not, by itself, a reason to forgo investigation; surveillance data retain value independent of source attribution, and a meaningful subset of sporadic cases may prove traceable given sufficient investigative resources. The Committee may nonetheless wish to consider whether the Department of Health should be given discretion to prioritize investigative intensity toward clusters, outbreaks, and cases involving vulnerable populations, or whether a risk-based tiering of investigative effort would better match the epidemiology of this disease while preserving the surveillance value of universal case reporting [21].

5 Recommendations

A comprehensive regulatory strategy for the Commonwealth should look beyond utility-level disinfectant residuals to address the complex premise plumbing dynamics where *Legionella pneumophila* actually amplifies. Based on the scientific evidence, municipal residuals are substantially decoupled from building-level colonization due to water age, thermal decay, and the protective niche of biofilms. Therefore, Pennsylvania's policy should transition toward a shared-responsibility model that pairs utility-level stability with the building-level water management programs already required in part by §6707, strengthened with numeric action levels and thermal-control standards.

Based on the scientific evidence and the critical assessment of House Bill 2085, I offer the following five key recommendations to the Committee to establish a scientifically defensible and public-health-protective regulatory framework for the Commonwealth:

5.1 Emphasize Proactive, Systems-Level Prevention Over Reactive Measures

Legislation should recognize that *Legionella* species are ubiquitous, naturally occurring aquatic organisms, meaning that "zero" colonization is neither an achievable nor a verifiable target in engineered water systems [21]. Instead of reacting only after disease cases are clinically identified—a method that leaves the silent majority of sporadic, community-acquired cases unaddressed—the

Commonwealth should establish proactive, process-based risk management as the state standard [11]. A system of checks, including routine flushing, biological monitoring, and physical barriers, should be applied systematically to prevent rapid intracellular amplification of *Legionella* inside protozoan hosts before it can reach water users [2]. More importantly, while water utilities are already highly regulated, increased emphasis on educating and overseeing what happens to water after it leaves utility control is most needed.

5.2 Base Regulatory Requirements on Rigorous, Multi-Barrier Scientific Evidence

While water utilities should continue to maintain a stable secondary disinfectant residual to ensure overall biological stability in the public distribution system, the General Assembly should not treat utility-level residuals as a single predictor of building-level safety [8, 11]. The 2026 GSA-based study of approximately 5,600 buildings demonstrated that building-specific variables—such as water age, plumbing materials, and local stagnation—substantially decouple municipal residuals from building colonization [8]. Rather than mandating elevated residuals that risk increasing public exposure to carcinogenic disinfection by-products (DBPs) and stimulating corrosive iron release, which can in turn stimulate *Legionella* biofilm growth, regulations should focus on building-level controls [21].

5.3 Reform the Consecutive System Rule to Empower Localized Engineering Controls

A significant regulatory barrier currently exists under the Safe Drinking Water Act: if a high-risk facility, such as a hospital or long-term care home, installs an on-site secondary disinfection booster system to protect its vulnerable residents, it is legally classified as a "consecutive public water system" [21]. This designation penalizes proactive facility managers by subjecting them to the administrative, monitoring, and financial burdens of a municipal water utility [21]. The Commonwealth should utilize federal provisions (such as 40 CFR §141.29) to combine or exempt consecutive systems, streamlining the regulatory pathway for high-risk buildings to safely implement on-site engineering controls without administrative penalties [21]. Because this classification arises under federal Safe Drinking Water Act regulations rather than state law, the Commonwealth's ability to act on this recommendation runs through the Department of Environmental Protection's exercise of its primacy authority to apply 40 C.F.R. §141.29, or through engagement with the U.S. Environmental Protection Agency, rather than through amendment of Title 27 alone. I raise it here because it bears directly on the scientific case for enabling building-level engineering controls, even though its resolution may lie partly outside this Committee's direct statutory authority.

5.4 Codify Comprehensive Water Management Plans, Thermal Barriers, and Risk-Based Action Levels

Rather than relying on chemical residuals alone, Pennsylvania should build on the water management program requirement already established in §6707 by adding the following enforceable components:

- **Confirm and, if Necessary, Broaden WMP Scope:** House Bill 2085 ties its water management program requirement to the applicability criteria specified within ASHRAE Standard 188-2021 itself. The Committee should confirm that this scope reaches the full range of public and commercial buildings (excluding single-family homes) where sporadic, community-acquired cases are believed to originate, and specify minimum plan content—control points, validation frequency, and documentation—beyond a general reference to the Standard [21].

- **Strict Thermal Barriers:** Mandate that hot water heaters and storage reservoirs be maintained at a minimum of 60°C (140°F) and circulated to ensure temperatures exceed 55°C (131°F) at distal outlets, which represents the single most effective physical control against pathogen amplification [21].

- **Risk-Based Numeric Action Levels:** Replace the historically controversial and unvalidated "30% site positivity" rule with a strict numeric action level [21]. Following the NASEM scientific consensus, the Commonwealth should establish a concentration of **50,000 CFU/L (50 CFU/mL)** of culturable *L. pneumophila* **at the point of end use where aerosolization could occur** as the legal action level that immediately triggers system review, intensive flushing, and localized disinfection [21, 17].

5.5 Support Enhanced Surveillance, Diagnostic Culturing, and Applied Research

To successfully trace and interrupt community-acquired infections, the Commonwealth should expand clinical and environmental diagnostic capacity [21]. Sole reliance on the clinical urinary antigen test (UAT) is highly problematic; it is highly specific to *L. pneumophila* serogroup 1, thereby failing to detect up to 20–40% of cases caused by other serogroups and species, and it does not yield the bacterial isolates required for epidemiological traceback investigations [21]. The Commonwealth should incentivize clinicians to perform lower respiratory sputum cultures and equip public health laboratories with the resources to perform whole-genome sequencing (WGS) and quantitative PCR (qPCR) to match clinical isolates directly with environmental reservoirs [21, 11].

6 Conclusions

In conclusion, controlling *Legionella pneumophila* requires a fundamental shift from treating water safety as a localized, utility-boundary issue to managing the entire engineered water system [8, 11]. House Bill 2085 represents an important step toward addressing the public health burden of Legionnaires' disease in Pennsylvania [21]. However, mandating specific, elevated secondary disinfectant residuals at the utility level lacks scientific support as a standalone solution for buildings [8]. To protect public health effectively, the Commonwealth should adopt a comprehensive, multi-barrier framework that combines stable municipal delivery with adequately specified building water management plans, thermal controls, reformed consecutive-system regulations, and advanced diagnostic surveillance [21, 11].

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Testimony before the Pennsylvania House Consumer Protection, Technology and Utilities Committee Hearing on Water Management Systems and the Prevention of Legionnaires' Disease.
July 20, 2026

Chairman Burgos and Members of the Committee, thank you for the opportunity to provide testimony at this important hearing regarding water management systems and the prevention of Legionnaires' disease. My name is Dr. Hung Cheung. I am a board-certified physician in preventative and internal medicine, professor at the University of Pennsylvania Pearlman School of Medicine and faculty at The Johns Hopkins Bloomberg School of Public Health. I am a former Medical Director for the State of Maryland and the owner of Cogency, an organization which specializes in investigation and response to waterborne disease cases and environmental outbreaks.

I also serve on the Board of the Alliance to Prevent Legionnaires' Disease, a national non-profit public health advocacy group dedicated to reducing the occurrence of Legionnaires' disease by promoting public research, education, best practices for water management, and advocating for comprehensive policies to combat and investigate this preventable disease.

I am very pleased to testify before the Committee regarding this important public health matter and I am in strong support of House Bill 2085 which provides a comprehensive framework to prevent Legionnaires' disease in Pennsylvania through a source to tap approach focused on the quality of water throughout our public water systems and in building plumbing systems as well as greater transparency and public awareness.

Legionnaires' disease is a severe form of pneumonia caused by a naturally occurring waterborne bacteria known as *legionella*. On average there are 400-600 cases of Legionnaires' diseases reported in Pennsylvania each year and it has a fatality rate of 10% which means 40-60 residents on average die from Legionnaires' annually. The fatality rate is higher among those who are more susceptible including those over age 50, smokers, those with impaired lung function or who are immune compromised such a patient who may be undergoing cancer treatment. Legionnaires' cases are known to be underreported due to misdiagnoses, lack of distinct clinical features and other factors so in actuality its impact is even greater.

Legionnaires' disease is the leading cause of waterborne illness and death in our country and *legionella* is readily found in plumbing systems and in equipment in homes, facilities and buildings, which are seeded with the bacteria from the public water distribution system. This month marks the 50th Anniversary from when Legionnaires' disease first emerged in July 1976 during an American Legion convention, here in Philadelphia. While our knowledge and understanding of this serious disease has progressed in the last five decades, unfortunately we also continue to see year over year increases in disease rates across the country. In fact, cases have increased five-fold since 2000. If we are going to effectively turn the tide on

disease rates, it is urgent that we take a new and comprehensive approach focused on Legionnaires' prevention as provided by House bill 2085.

House Bill 2085 Provisions

The key provisions of House Bill 2085 include:

- **Improved monitoring, management and treatment of water throughout public water distribution systems** including a provision to prevent the growth and proliferation of *legionella* bacteria by requiring most water suppliers to maintain a minimum disinfectant residual of free chlorine of 0.5 mg/L or 1.0 mg/L of chloramine in all active parts of the system. This ensures the water is of the same quality at the start of the system leaving the treatment plant as when it enters all homes, facilities and public places for human use. Importantly, these levels are in agreement with the 2023 National Drinking Water Advisory Council's Microbial Disinfectant Byproduct Rule Revisions working group's recommendations, and are well below the EPA maximum level of 4.0 mg/L and builds on a Pennsylvania Department of Environmental Protection policy that became effective in 2019 establishing a disinfectant residual of 0.2mg/L.
- **A provision to require water utilities to notify water users when there may be elevated risks in their communities** due to planned and unplanned water system events or disruptions which can release legionella from the biofilm in the piping of the distribution system and push it downstream in the water entering our homes and buildings. Included would be information on actions for building owners and individuals to take if there is elevated risk of exposure. Such disruption events would be reported and tracked by state agencies to be used for case and outbreak investigations.
- **A requirement for buildings of a certain size, occupancy or those containing particular equipment to have a water management plan**, following ASHRAE Standard 188-2021, the leading global standard for *legionella* risk management in buildings.
- **Strengthened investigations** to thoroughly review all reported Legionnaires' cases to determine the source to help prevent further incidences. The bill also calls for greater transparency notifying the community when there are single cases and outbreaks through a state dashboard of Legionnaires' cases.
- **Increased public education** around Legionnaires' disease so residents are more aware of increased risks, signs and symptoms and when to seek treatment, as well as steps that can be taken to reduce one's risks.

Ecology of *Legionella* Bacteria

To understand the focus of this legislation, it is important to establish an understanding of Legionnaires' disease. It is a waterborne illness caused by *legionella* bacteria which is commonly found in our environment in water and soil. The bacteria are present in our water sources and is introduced into our public water system. As drinking water travels from reservoirs and other water sources to treatment plants and into what can be miles of piping in water distribution systems before reaching our homes, facilities and workplaces for human use, *legionella* bacteria can survive and thrive in this system. In fact, there are many factors that can cause the bacteria to proliferate in the public water distribution system including biofilm which houses the bacteria and serves as its food source, water temperature, stagnation, depleted disinfectant, water treatment changes and others. Disruptive events, such as source water changes, water main breaks, service interruptions, construction, and heavy rainfall can cause *legionella* bacteria to become dislodged and enter premise plumbing in facilities, buildings and homes.

Legionella thrive in water between 77-122 degrees Fahrenheit and can be inhaled through water droplets in mist released from water-using equipment like showers, sinks, hot tubs, fountains, pools, misters, HVAC equipment and others. Humans can also be exposed to the bacteria when drinking water if they aspirate (when water goes down the wrong pipe). Given the ecology of *legionella* and the potential points for human exposure, proper monitoring, management and treatment throughout the system are required for effective prevention.

96% of Legionnaires' Disease Cases are Sporadic
According to the Centers for Disease Control and Prevention (CDC), 96% of Legionnaires' disease cases are sporadic and isolated from larger outbreaks. US Environmental Protection Agency (EPA) studies and one recently completed in the state of New Jersey by the Department of Health have found that approximately 50% of all household taps tested positive for *legionella*.

A review of available literature of sporadic cases identified "definite" and "probable" sources of sporadic cases as including potable water from single family homes and apartment buildings, potable water used in humidifiers, home spas, and potable water from other sites (i.e. dental office, etc.) Environmental sources of community-acquired legionnaires' disease: A review (2018 Orkis et al.)

Upstream Management
Given the fact that *legionella* exists in the source water and public water distribution system, it is important to properly manage, treat and monitor water in the public distribution system to kill and starve the pathogen to try to prevent infection of the plumbing systems of homes and buildings.

In a letter to the US Environmental Protection Agency sent in 2016, R. Ellingboe, Supervisor of the Drinking Water Protections Section of the Environmental Health Division at Minnesota Department of Health warned, *"Nationally, we continue to see an increase in Legionella disease outbreaks… from exposures within premise plumbing. Are water systems providing a continual "seeding" of Legionella bacteria and the bacteria getting into premise plumbing…?"*

Further, in 2016 a CDC Morbidity and Mortality (MMWR) Weekly Report found that *35%* of the outbreaks they investigated were attributed to unmanaged external changes including nearby construction and problems with water mains and 70% of investigations reported inadequate water disinfectant levels. Such external changes or system upsets like construction, water main breaks, water treatment changes, heavy rainfall and others can disrupt *legionella* bacteria stored in the biofilm of public water distribution system piping and send the bacteria downstream into homes and public places. It is important for such disruption events to be better monitored and for notification given to surrounding communities, so they are aware of increased risks. This is particularly important for those most at-risk of contracting the disease.

When increasing its minimal residual disinfectant level in regulations that became effective in 2019, the Pennsylvania Environmental Review Board stated, *"Maintenance of an adequate disinfectant residual (treatment) throughout the water distribution system plays a key role in controlling the growth of pathogens and biofilms and is a treatment technique that serves as one of the final barriers to protect public health. Lack of an adequate residual may increase the likelihood that disease-causing organisms such as E. Coli and Legionella are present."* Disinfection Requirements Rule, 2/20/16

Efforts to date have proven ineffective as cases continue to increase. This requires a holistic approach that includes improved water quality management "upstream" as discussed above, as well as risk mitigation efforts in complex buildings, premise plumbing systems and with water-using equipment.

Legionella Found in the Water in Philadelphia through Prior Testing
It is with irony that this hearing is being held in City Hall. Not only because of the 50-year Anniversary, but eight years ago, as part of a public water testing program in Philadelphia, I took many drinking water samples in this very location that were positive for Legionella Pneumophila Serogroup 1. This is the serogroup responsible for more than 80% of LD cases, and associated deaths. Found right here in City Hall at a level that would require immediate remediation. Overall, we took 155 samples in 35 locations across the city including City Hall, 31 samples were positive for Legionella, 4 samples were positive for Legionella Pneumophila Serogroup 1 and 27 samples positive for other Legionella species. And these samples were taken during late Fall, when Legionella activity tends to slow down. Obviously, the importance of this legislation is paramount to ensure that Philadelphia does not experience a repeat of 1976.

Building Management
This legislation would require building owners and operators to follow the ASHRAE 188 standard for *legionella* risk mitigation which calls for a water management plan for their building, premise plumbing system and water using equipment. This ensures that buildings are closely monitored and managed to address issues that can increase *legionella* growth including water stagnation, dead legs, ensuring proper treatment of water using equipment where indicated and other measures. ASHRAE Standard 188, *Legionellosis: Risk Management for Building Water Systems*, launched in 2015 and updated in 2021 is the leading, national standard developed over 15 years via the ANSI standard development processes and involved all stakeholders – from the CDC to public health officials, microbiologists, chemists, engineers, water treatment professionals, and water management experts.

Case Investigations and Public Education
While outbreaks often receive the attention, single and sporadic cases often go uninvestigated despite comprising the overwhelming majority of cases. When health officials only take action when there are 2 or more cases in a common location or time period, we are missing the opportunity to intervene early and prevent future incidence. Thorough investigations of all cases which look at all potential sources, exposure points and the potential impact of public water system disruptions that may have preceded cases are critical to better understand the source of disease, mitigate risks and prevent future cases.

Increased public education and awareness is also critical for disease prevention and reducing mortality and morbidity caused by this waterborne illness. Having residents better informed about Legionnaires' disease, what makes individuals more susceptible, and its signs and symptoms, will enable those who may have been exposed to seek early treatment, and to enable individuals to take steps to reduce their risks where possible. For instance, experts recommend that hot water heaters be set to a minimum of 130 degree Fahrenheit and systems should distribute water at a minimum of 122-124 degrees. And cold water systems should be maintained below 68-77 degrees Fahrenheit. More education is needed to help home and building owners to reduce risks.

National Recommendations
In November 2023, after an 18 month process with a working group of experts and stakeholders, the US EPA issued a final report on Microbial and Disinfection Byproducts Rule Revisions recommendations. This report recommended improvements in water treatment by establishing a minimum residual disinfectant treatment (chlorine or chloramine), better public water system monitoring/ management and building water management programs, which this bill includes. And in 2024, the CDC released a report on drinking water outbreaks and found that *legionella* was a leading cause of public water system and biofilm-related

outbreaks. The report calls for the need for water source-to-tap prevention strategies, consistent with this legislation.

In sum, House bill 2085 takes a comprehensive approach to preventing Legionnaires' disease, modeled after national recommendations, a 2024 law passed by New Jersey and effective policies in other states like Illinois and Louisiana while also codifying the ASHRAE 188 Standard to mitigate *legionella* risks in buildings. Together, this approach follows the latest science and data around the need to properly monitor and manage water to mitigate risks posed by *legionella* bacteria throughout the enter water system. Of note, there are also similar bills pending in New York and Maryland.

I applaud the committee for taking a leadership role in holding this hearing and commend Representatives Smith-Wade-El, Neilson and all cosponsors for championing state legislation to effectively reduce cases associated with this serious waterborne disease through improved water quality management throughout water systems. I look forward to continuing to work with you to achieve its enactment.

CLEAN WATER ACTION
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Good afternoon, Chairman Burgos, Chairman Walker-Metzgar, and other members of the House Consumer Protection, Technology and Utilities Committee. Thank you for holding this hearing. I appreciate the opportunity to testify today on the important topic of fighting Legionnaires' Disease.

My name is Steve Hvozdovich and I'm the Pennsylvania Campaigns Director for Clean Water Action. Clean Water Action is a national non-profit environmental organization with a little over 95,000 members across Pennsylvania. Since our founding during the campaign to pass the landmark Clean Water Act in 1972, we've worked to enact strong protections for our health and environment by bringing issue expertise, solution-oriented thinking and people power to the table.

Legionella bacteria, especially Legionella pneumophila, are naturally occurring worldwide, usually in warm freshwater environments. Legionella tends to proliferate in water temperatures between 77 and 113°F but can survive at temperatures as low as 68°F and grow in temperatures up to 120°F.

Climate change is fueling the greater proliferation of these conditions. A 2025 Penn State University study found that heat waves in water are increasing between two to four times as rapidly as heat waves in air. Heat waves in water also persist longer and have a greater intensity. The study highlights a 2025 heat wave that occurred across much of Pennsylvania where daily high temperatures in southeastern Pennsylvania ranged from 86 to 101 degrees for thirteen days between June 18th and June 26th. Near the end of the heat wave, the water temperature of the Schuylkill River, measured at the United States Geological Survey gauge at Norristown, reached 85°F on June 26, and for five days, water temperatures remained above 80 degrees, which is right in that desirable threshold for Legionella to proliferate. A typical June temperature at this gauge under normal summer conditions would be in the low to mid-70s. But let's be clear, what we considered normal summer conditions are a thing of the past, just see the recent we experienced which mirrored our same experience last year.

In Pennsylvania, over 8 million people receive drinking water from public water systems that rely at least in part on surface water sources.

While Legionella occurs naturally in our environment, Legionella growth can also occur in water systems. Let's touch upon several key factors known to affect this.

Water stagnation in closed units, including but not limited to water towers and storage tanks, can contribute to the potential proliferation of pathogens.

Biofilms and sediments in drinking water systems provide habitats that can support the proliferation and survival of opportunistic pathogens like Legionella. Older infrastructure

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carries a greater risk because biofilms accumulate more readily on pipes with greater wetted surfaces and low flow conditions. In other words, iron or copper infrastructure that has deteriorated due to oxidation. Free-living amoebae within the biofilms are their preferred environmental host. Legionella have demonstrated their ability to survive and multiply within different amoebae and thus may resist disinfection.

Conditions that exert a demand on disinfectants limit the system's ability to maintain a disinfectant residual. For example: biofilms and sediments in piping and tank surfaces can harbor microorganisms that consume the disinfectant. Corrosion products and other compounds present in finished water can also react with disinfectants.

The United States Environmental Protection Agency regulates Legionella in public water systems under the Surface Water Treatment Rule via a treatment technique with a maximum contaminant level goal of zero organisms per liter. While there are no monitoring requirements, the Surface Water Treatment Rule does contain a provision for maintenance of a disinfectant residual in distribution systems, which may provide some control of Legionella. Public water systems supplied by or under the direct influence of surface water that disinfect with chlorine must maintain a minimum free chlorine residual of 0.2 mg/L at the entry point and a free chloring residual for water that is delivered to customers through a distribution system. Disinfectant residuals serve three main purposes: to protect against microbial contaminants, to act as an indicator of distribution system upset, and to limit growth of heterotrophic bacteria and Legionella within the distribution system.

In addition, the Revised Total Coliform Rule emphasizes preventive action by requiring water systems to investigate and correct contamination sources rather than solely report maximum contamination level exceedances that include baseline and follow up testing for Legionella.

Between a growth in Legionnaires Disease cases and federal rules for drinking water and water systems remaining static, states are left to decide if the floor set by the federal government is sufficient to ensure the safety and health of its residents.

Pennsylvania has previously decided that they don't go far enough. Currently, Pennsylvania follows the United States Environmental Protection Agency's numerical value of 0.2 mg/L, but Pennsylvania applies it more broadly to all community water systems using chlorine, instead of just surface water systems.

New Jersey decided to go even further. While New Jersey raised the free chlorine standard to 0.3 mg/L free chlorine, the standard is applied at all times to all active parts of chlorine-disinfected systems. The higher requirement means the New Jersey systems must maintain a greater residual to meet the state's minimum. New Jersey also requires regular

testing and investigation of repeated violations. The impenitence for the 2024 adoption of New Jersey's gold standards was confirmed cases as reported by the Center for Disease Control rising to 318 in 2019 or 3.6% of the national total.

Pennsylvania's confirmed cases according to the most recent Center for Disease Control's Surveillance Report were 351 or 5.6% of the national total in 2020 and 454 or 5.4% of the national total in 2021. Only three states had more alarming numbers.

Given what we now know, the question before us today is how will Pennsylvania respond? Will it be with the same urgency and equal fervor as New Jersey?

HB 2085 is the response that says Pennsylvania will!

While Section 6703 (a) (1) of HB 2085 moves the mg/L to .5, it would also adjust the standard to being applied AT ALL TIMES and to ALL ACTIVE PARTS of chlorine-disinfected systems. Like New Jersey, the higher requirement would mean Pennsylvania's systems must maintain a greater residual to meet the state's minimum. The move also remains within the practice of most municipal water systems, according to the World Health Organization, maintaining chlorine residuals between 0.2 and 1.0 mg/L in finished water.

In addition to modifying the application of the standard, there are a series of best management maintenance practices a water system can take to help ensure Legionella doesn't develop. Given disinfections importance in addressing pathogens' growth, mapping disinfectant residuals in the distribution system can be a valuable tool to direct resources to areas that may be dropping below these residuals. Best management maintenance practices should also include:

- conducting an evaluation of their asset inventory to identify old components, dead ends, or pipe materials conducive to Legionella growth.
- cleaning and then installing liners on their water mains to help prevent biofilm adhesion.
- maintaining pre-established flushing schedules to ensure a sufficient disinfectant residual is present throughout the system. Many public community water systems use a combination of conventional, unidirectional, and continuous/blow off flushing for routine flushing activities.
- cleaning storage towers and tanks once every 3-5 years, or whenever an evaluation, sampling, or indication event suggests that pathogens are present in a system that may be impacting a storage tank or tower.

HB 2085 addresses these other areas through the provisions of Section 6703(b).

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Legionnaires disease may have a history that's connected to Pennsylvania, but it doesn't have to have a future that does. Pennsylvania can fight back against Legionnaires Disease and the tools to do so are at our fingertips.

That's why Clean Water Action recommends that the General Assembly pursue policies, like HB 2085, that improve standards for our water systems and other pathways in order to better prevent, detect, and control cases of Legionnaires' Disease.

Thank you for your time today!

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Committee on Consumer Protection, Technology and Utilities
July 20, 2026

Testimony Provided By:
Steven Chintaman, Vice President of
Government Affairs
Pennsylvania Apartment Association

Committee on Consumer Protection, Technology and Utilities
HB 2085
July 20, 2026

Good morning, Chairman Burgos, Sponsor Representative Izzy, and members of the Committee on Consumer Protection, Technology and Utilities. My name is Steven Chintaman, and I am the Vice President of Government Affairs for the Pennsylvania Apartment Association (PAA) representing over 310,000 units and 316 property management companies across the Commonwealth. I'd like to thank you for the opportunity to testify today on HB 2085.

Protecting the health and safety of Pennsylvania residents remains a top priority for the Pennsylvania Apartment Association (PAA) and the multifamily housing industry. PAA supports reasonable, science-based measures that reduce the risk of Legionella exposure and recognizes the importance of responsible water management practices. We also appreciate that House Bill 2085 incorporates nationally recognized industry standards, including ASHRAE Standard 188 and ASHRAE Guideline 12, rather than creating entirely new Pennsylvania-specific engineering requirements. Likewise, the educational resources and public awareness initiatives assigned to the Department of Environmental Protection (DEP) and Department of Health (DOH) have the potential to strengthen water safety efforts for both public water systems and building owners.

PAA supports the bill's public health objectives and appreciates the sponsor's commitment to preventing Legionella-related illness. At the same time, we believe several targeted amendments would improve the legislation by ensuring compliance requirements are practical, risk-based, and appropriately allocate responsibilities among all parties involved.

One of PAA's primary concerns is that the bill takes a broad, one-size-fits-all approach to water management. By applying its requirements to all buildings meeting the criteria outlined in ASHRAE Standard 188, the legislation could encompass apartment communities, senior housing, student housing, mixed-use developments, and other residential properties regardless of their actual risk profile. Legionella risk varies considerably depending on factors such as building age, plumbing design, water temperatures, occupancy patterns, the presence of cooling towers, and whether a facility provides healthcare services. We respectfully suggest that compliance requirements be tailored to demonstrated risk rather than based solely on building classification or size.

The legislation would also establish significant new compliance obligations for housing providers, including developing comprehensive water management programs, conducting ongoing sampling and testing, maintaining extensive documentation, updating management plans, responding to inspections, and satisfying new reporting requirements. For many owners, particularly those providing affordable and workforce housing, these responsibilities will require the assistance of environmental engineers, industrial hygienists, water consultants, and certified laboratories, resulting in substantial recurring operational costs. We encourage consideration of implementation approaches that achieve the bill's objectives while recognizing the operational realities facing housing providers.

PAA is also concerned that the legislation requires Legionella testing without establishing clear regulatory standards governing implementation. Important questions remain regarding testing frequency, sampling locations, approved laboratory methodologies, action thresholds, remediation requirements, and what constitutes compliance. Providing these standards before implementation would promote consistent statewide enforcement, reduce uncertainty, and help ensure owners understand their obligations.

Additionally, mandatory testing raises important liability considerations. Because Legionella bacteria naturally occur in many water systems, a positive test result alone does not necessarily indicate unsafe conditions or negligence. Without appropriate legal safeguards, testing results could be used in litigation even where no illness or outbreak has occurred. PAA believes the legislation should recognize that owners who implement and maintain industry-accepted water management programs have exercised reasonable care and should receive appropriate legal protections for acting in good faith.

The bill also authorizes inspections and enforcement by multiple agencies while many of the implementing regulations remain undeveloped. Housing providers would benefit from greater clarity regarding inspection procedures, corrective action timelines, appeal rights, and compliance expectations. We respectfully encourage an implementation framework that emphasizes technical assistance, education, and compliance support before penalties are imposed.

In addition, portions of the legislation address issues affecting public water systems, including disinfectant residuals, source water quality, and municipal distribution infrastructure. Apartment owners generally do not control municipal treatment facilities, water mains, or the quality of water entering their properties. Clarifying the respective responsibilities of public water utilities and property owners would help ensure accountability is appropriately assigned.

Finally, as with any new regulatory requirement, implementation costs ultimately affect the cost of providing rental housing. Increased compliance expenses place additional pressure on operating budgets, capital planning, reserve accounts, and long-term housing affordability. These impacts are especially significant for affordable housing providers, workforce housing communities, and owners of older multifamily properties with substantial existing capital needs.

To strengthen the legislation while preserving its important public health goals, PAA respectfully recommends consideration of the following amendments:

- Establish a statutory safe harbor providing that housing providers who adopt and maintain an ASHRAE-compliant water management program are presumed to have exercised reasonable care.

- Limit mandatory water management program requirements to facilities presenting a higher risk of Legionella exposure, such as hospitals, nursing homes, assisted living facilities, buildings with cooling towers, or buildings with centralized hot water systems above specified thresholds, rather than applying identical requirements across all multifamily housing.

- Allow owners a reasonable opportunity to cure identified deficiencies before penalties may be assessed.

- Require DEP and DOH to publish model water management plans, compliance templates, technical guidance, and implementation resources before enforcement begins.

- Clearly establish statewide testing standards, including sampling frequency, approved laboratory methods, action thresholds, reporting requirements, and remediation protocols.

- Clarify that the presence of Legionella bacteria alone does not establish negligence and that compliance with the Act and accepted industry standards may be considered evidence of reasonable care.

- Consider grants, tax incentives, or other financial assistance to help affordable housing providers, workforce housing communities, and older multifamily properties implement these new requirements.

PAA appreciates the opportunity to work collaboratively with the bill sponsor, legislators, and stakeholders to strengthen this legislation. We believe these amendments will better balance the shared goal of protecting public health with practical, effective implementation that supports both residents and the housing providers who serve them.

Testimony of Dr. Christopher S. Crockett, PE
Vice President, Chief Environmental, Safety & Sustainability Officer
Essential Utilities / Aqua
Regarding House Bill No. 2085: Legionnaires' Disease Risk Management

Submitted for State Committee Hearing

Chair, Members of the Committee, and staff, thank you for the opportunity to provide testimony on House Bill No. 2085, concerning Legionnaires' disease risk management. My name is Dr. Christopher S. Crockett, and I serve as Vice President and Chief Environmental, Safety and Sustainability Officer for Essential Utilities, including Aqua water utilities.

Essential's highest priority is the delivery of safe, reliable drinking water and the protection of public health. Our teams operate every day of the year through storms, droughts, emergencies, and other challenging conditions to maintain resilient water service for the communities we serve. We appreciate the Committee's attention to Legionnaires' disease and share the goal of reducing public health risk.

Essential supports the portions of House Bill No. 2085 that focus on building water management, premise plumbing, cooling towers, healthcare facilities, and other building systems where *Legionella* risk is most directly controlled. However, Essential cannot support the bill in its current form because the provisions directed at public water suppliers are overly prescriptive, scientifically unsupported in key respects, potentially conflicting with existing Pennsylvania Department of Environmental Protection drinking water regulations, and unlikely to produce measurable reductions in Legionnaires' disease risk.

Summary of Essential's Position

Essential respectfully recommends that the Committee amend House Bill No. 2085 to focus on the most effective risk-reduction measures: building water management plans, premise plumbing controls, cooling tower management, healthcare facility water safety planning, and coordinated review by the Pennsylvania Department of Health and PADEP. The bill should not impose new public water system mandates unless those requirements are supported by current science, aligned with Chapter 109, and developed through Pennsylvania's established regulatory review process.

As drafted, the bill would bypass the Commonwealth's established Environmental Quality Board and Independent Regulatory Review Commission process for PADEP drinking water requirements. That process is important because it allows technical review, public comment, cost analysis, stakeholder input, and consistency with existing state and federal drinking water obligations.

Why Building Water Systems Are the Primary Control Point

The available public health evidence indicates that Legionnaires' disease risk is most often associated with building water systems, not the public water distribution system. In Pennsylvania, reported sources and risk settings have included healthcare facility plumbing, building hot water systems, cooling towers and HVAC systems, and stagnant or low-use building water systems. This is consistent with Pennsylvania Department of Health information and with Centers for Disease Control and Prevention guidance indicating that building water systems are the primary point of control for *Legionella* risk.

Recent national research also supports this conclusion. A study of 8,250 General Services Administration buildings found substantial *Legionella* occurrence in building systems and did not identify a clear numeric distribution system disinfectant residual threshold consistently linked to lower building occurrence. This reinforces the need to focus legislation on building-level controls, where temperature, stagnation, premise plumbing configuration, cooling towers, hot water systems, and maintenance practices can directly influence risk.

The Role of Public Water Suppliers

Public water suppliers play an important role in protecting public health by maintaining resilient treatment and distribution systems, stable disinfectant residuals, appropriate water age management, nitrification control, pressure integrity, emergency response capability, and compliance with PADEP drinking water requirements. Essential supports strong distribution system management and already operates under extensive Chapter 109 requirements including.

- Maintaining minimum and stable disinfectant residuals under PADEP's Disinfection Residual Rule.
- Managing water age through routine system operation, flushing, storage management, and hydraulic controls.
- Implementing nitrification control where chloramine is used.
- Responding to pressure loss, treatment interruptions, and emergency conditions under Chapter 109.
- Coordinating with regulators and public health agencies when conditions warrant additional response.

Those responsibilities are important. But the scientific evidence does not support the conclusion that imposing higher, fixed numerical residual requirements on public water suppliers will meaningfully reduce Legionnaires' disease outcomes, particularly when

Legionella growth and amplification frequently occur inside buildings after water has entered premise plumbing.

Scientific Concerns With Prescriptive Residual Requirements

Essential has participated in research with leading national experts to better understand how public water distribution systems can manage *Legionella* risk. Recent Water Research Foundation work by Bartrand and colleagues found that maintaining a disinfectant residual of 0.2 mg/L as total chlorine in chloramine systems provides comparable *L. pneumophila* control to 0.2 mg/L in free chlorine systems. The same research found that increasing residual from below 0.2 mg/L to 0.2 mg/L produced a large reduction in occurrence, while further increases beyond 0.2 mg/L produced progressively smaller benefits.

Those findings align with Pennsylvania's existing Chapter 109 Disinfection Residual Rule, which has been in place since 2018. A broader distribution system management approach—focused on water age, stable residuals, nitrification control, pressure integrity, and operational response—is more appropriate than legislating narrow residual thresholds that may not correspond to building-level disease risk.

Concerns With Definitions and Regulatory Conflicts

Several provisions in House Bill No. 2085 appear to duplicate or conflict with existing PADEP regulations and guidance. In particular, the bill's definition of "disruption" is broader and less precise than existing Chapter 109 concepts tied to treatment failure, loss of pressure, emergency conditions, contamination events, public notification, and emergency response obligations.

Under existing PADEP regulations and guidance, public water suppliers already have reporting and notification duties for events that adversely affect the quality or quantity of finished water and may present a significant potential for serious adverse health effects. These requirements include one-hour and 24-hour reporting obligations and emergency response planning requirements under Chapter 109.

The bill's treatment of routine operational changes and source changes as "disruptions" is also problematic. Water suppliers may lawfully adjust treatment operations or blend sources based on system conditions, water availability, seasonal demands, or approved operating plans. Significant source or treatment changes already require PADEP review where applicable. Recasting routine operational decisions as statutory disruptions would create confusion without a demonstrated *Legionella* risk-reduction benefit.

Recommended Amendments to House Bill No. 2085

Essential respectfully recommends that the Committee amend the bill to retain the provisions that address building water management, while striking or substantially revising the public water supplier provisions that are duplicative, conflicting, or unsupported by the current evidence.

- Retain provisions requiring building water management plans for high-risk facilities and building systems.
- Align any public water supplier requirements with PADEP Chapter 109 and existing public notification, emergency response, and disinfection residual regulations.
- Strike Sections 6703, 6704, and 6705 as currently drafted, or replace them with a science-based review process led by PADEP and the Pennsylvania Department of Health.
- Require PADEP and PADOH to review Pennsylvania Legionnaires' disease case data, distribution system residual performance, existing Chapter 109 requirements, and current scientific literature.
- Require any recommended changes to public water system requirements to proceed through the Environmental Quality Board and Independent Regulatory Review Commission process.

This approach would preserve the bill's public health intent while ensuring that any new drinking water requirements are science-based, technically feasible, cost-effective, and consistent with Pennsylvania's existing regulatory framework.

Conclusion

In closing, Essential shares the Committee's goal of reducing Legionnaires' disease risk and protecting public health. The strongest opportunity for measurable risk reduction is in building water systems, premise plumbing, cooling towers, healthcare facilities, and other building environments where *Legionella* can grow and amplify.

We respectfully urge the Committee to amend House Bill No. 2085 to focus on those building-level controls, remove duplicative or conflicting public water system mandates, and rely on PADEP and PADOH expertise through the Commonwealth's established regulatory review process.

Thank you for the opportunity to provide testimony. Essential looks forward to continuing to work with the Committee, PADEP, PADOH, and other stakeholders to advance practical, science-based measures that protect public health.

Testimony in Support of House Bill 2085

Prepared for the Public Hearing on Water Management Systems and the Prevention of Legionnaires' Disease

Good afternoon, Chairman and members of the committee. Thank you for the opportunity to speak today.

My name is Rebecca Medvedev, and I am a registered nurse of 10 years and a recent Psychiatric Mental Health Nurse Practitioner graduate. I am also a Lancaster County resident. To start, I'll clarify some background information about myself. I don't work in infectious disease. My primary clinical background is in psychiatry. But I've spent time studying the issue of Legionnaire's disease, and in 2023 I wrote an article for Lancaster Newspaper urging support for legislation to prevent Legionnaires' disease in Pennsylvania. I'm here today not as a disease expert, but as an advocate. I am someone who believes that protecting people from a preventable illness shouldn't require a specialty degree, just attention and will.

Legionella may sound like a cute baby name, but what it represents is anything but. It's a family of bacteria that causes Legionnaires' disease, a severe form of pneumonia. It can be fatal, and even people who survive it can be left with lasting lung damage.

Here's what makes this disease different from something like the flu or COVID-19: it isn't contagious from person to person. You cannot catch it from a coworker or a family member. You catch it from your infrastructure. Legionella grows in water systems including cooling towers, hot tubs, decorative fountains, showerheads. Legionella becomes dangerous when contaminated water turns into a fine mist that we breathe into our lungs.

Think about that for a moment. Getting sick from a shower in your own apartment building. Getting sick from a fountain in a hotel lobby. Getting sick from an air conditioning unit that hasn't been properly maintained. These aren't hypotheticals, they are patterns seen again and again in real cases, including right here in Pennsylvania.

And Pennsylvania has a real problem. According to the state's own Bureau of Epidemiology, the most recent statistics demonstrate that Pennsylvania averaged a bit over 400 Legionnaires' cases every year between 2021 and 2023, a rate that is higher than the national average. In prior years, Pennsylvania has ranked among the states with the highest incidence in the country. Furthermore, because so many mild or sporadic cases go undiagnosed, public health experts believe the true number is likely far higher than what gets reported.

This isn't an abstract statistic. It is grandparents, cancer patients, people with chronic lung disease, and psychiatric and long-term care residents, even prison inmates. These are the very populations I have cared for throughout my nursing career. Many of these people are the ones who are most vulnerable to this disease, and least able to survive it. In my own area of practice, behavioral health, patients often live in congregate settings for extended stays. They depend entirely on the safety of the building systems around them. They are not in a position to inspect

the plumbing or question the water quality. That responsibility falls on us. It falls on policy, on oversight, and on the people who own and manage these buildings.

The good news, and the reason I'm asking you to support House Bill 2085, is that Legionnaires' disease is preventable. We already know how to stop it: routine testing, proper disinfection, keeping water systems from running stagnant, and maintaining safe temperatures throughout a building's plumbing. Industry guidelines already exist. What we lack in Pennsylvania is a legal requirement that those guidelines actually be followed.

I understand the concern about cost. Testing and maintenance take resources, and I don't dismiss that. But consider the alternative. A single Legionnaires' outbreak can cost a building owner far more in legal settlements, hospital bills, and reputational damage than a basic water management plan ever would. Google the average legal settlement for Legionnaires' disease and you'll get a range of $225,000 to $5.2 million. Chlorine is much cheaper. Prevention is not just the compassionate choice: it is the financially responsible one.

Pennsylvania is where this disease got its name, after the tragic 1976 outbreak in Philadelphia. Fifty years later, we still don't have a law on the books requiring water systems to manage this risk. House Bill 2085 would change that. It would establish real accountability for public water systems and building owners.

You don't have to be an infectious disease specialist to understand that this is common sense. You just have to believe that a disease we know how to prevent shouldn't keep taking lives and/or damaging lungs because we failed to require the basic steps that stop it.

I respectfully urge this committee to advance House Bill 2085. Thank you for your time and for your attention to this issue.

CAPITAL REGION™

WATER

Written Testimony of

Charlotte Katzenmoyer, CEO
in Opposition to House Bill 2085

Before the

Pennsylvania House Consumer Protection,
Technology and Utilities Committee

Public Hearing on Water Management Systems
and the Prevention of Legionnaires' Disease

July 20, 2025

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capitalregionwater.com

Written Testimony of Charlotte Katzenmoyer, CEO, Capital Region Water, in Opposition to House Bill 2085

Chairman Burgos, Chairman Metzgar, and members of the House Consumer Protection, Technology and Utilities Committee, thank you for the opportunity to provide testimony regarding House Bill 2085 and the important public health goal of preventing Legionnaires' disease. My name is Charlotte Katzenmoyer, and I serve as Chief Executive Officer of Capital Region Water, the municipal water, wastewater, and stormwater utility serving Pennsylvania's capital city and surrounding communities.

Capital Region Water shares the Committee's commitment to protecting public health. Every day, public water systems across the Commonwealth treat, monitor, and deliver safe drinking water under extensive federal and state regulatory requirements. We also recognize the seriousness of Legionnaires' disease and the need for sound, effective risk-management strategies. However, for the reasons outlined below, I respectfully oppose House Bill 2085 as currently drafted.

Legionella Risk Is Primarily a Building Water System Issue

Legionella is an opportunistic premise-plumbing pathogen. While it may be present in low levels in natural and engineered water environments, the conditions that allow Legionella pneumophila to grow to levels of public health concern are most commonly found inside buildings: warm water temperatures, stagnation, low flow, complex plumbing configurations, dead legs, sediment, biofilm, distal fixtures, cooling towers, humidifiers, and other aerosol-generating devices.

Public water systems do not own, operate, maintain, or control private plumbing systems, hot-water systems, cooling towers, or closed-loop mechanical systems. We also do not have routine legal authority to enter private buildings, inspect premise plumbing, adjust building temperatures, remediate biofilm, replace fixtures, manage cooling towers, or implement facility-specific water management plans. A mandate that places responsibility on utilities for risks created inside privately owned facilities creates liability without control and blurs accountability for the actions that actually reduce risk.

House Bill 2085 Would Misalign Legal Responsibility and Public Health Accountability

Public water systems are already responsible for treating and distributing drinking water in compliance with the federal Safe Drinking Water Act, the Pennsylvania Safe Drinking Water Act, and DEP regulations. Those requirements focus on water quality within the public system up to the service connection. By contrast, building owners and operators control the internal plumbing and equipment where building-specific water quality conditions develop.

House Bill 2085 would shift responsibility toward public water systems even when the relevant risk is caused by private plumbing design, lack of use, water age inside the building, inadequate flushing, poor temperature control, fixture condition, or failure to maintain cooling towers and closed-loop systems. That approach would make it harder, not easier, to assign responsibility to the party best positioned to prevent exposure.

The Proposed Disinfectant Residual Mandates Are Not the Right Tool

House Bill 2085 would establish minimum detectable disinfectant residuals of 0.5 milligrams per liter of free chlorine and 1.0 milligrams per liter of monochloramine in all active parts of covered public water systems at all times. Those figures should not be set by statute. Drinking water disinfectant requirements involve complex scientific and engineering judgments that must balance microbial control, water age, source water characteristics, corrosion control, distribution system hydraulics, taste and odor concerns, and compliance with disinfection byproduct limits.

Pennsylvania's existing disinfectant residual standards were developed through a regulatory process that included technical review, public comment, and consideration of system operations and compliance impacts. If the Commonwealth believes those standards should be revised, that evaluation should occur through the scientific and regulatory process, not through a fixed statutory mandate that applies broadly across systems with different source waters, treatment strategies, infrastructure conditions, and customer bases.

Setting these technical requirements in statute would also make future adjustments more difficult. As science evolves, new contaminants emerge, public health concerns change, and best practices are refined, the Commonwealth should be able to update disinfectant requirements through an expert regulatory process. Legislating fixed residual levels could unnecessarily encumber future decision-making and risk politicizing technical public health judgments that should remain grounded in science, engineering, and regulatory expertise.

Increasing disinfectant residuals is not risk-free. Higher chlorine levels can increase the potential formation of regulated disinfection byproducts, affect corrosion control, create taste and odor concerns, and increase operational costs. These tradeoffs are precisely why disinfectant standards should remain grounded in federal and state regulatory expertise and should be evaluated in relation to the full drinking water compliance framework.

This is not merely an operational concern; it is also a public health concern. When chlorine reacts with naturally occurring organic matter in source water, it can form disinfection byproducts such as trihalomethanes and haloacetic acids, which are regulated because long-term exposure above established limits has been associated with increased health risks, including potential cancer and reproductive or developmental effects. Public water systems must therefore carefully balance the need to maintain an effective disinfectant residual with the equally important obligation to minimize the formation of disinfection byproducts. A statutory mandate to increase chlorine residuals across all systems could unintentionally increase exposure to these regulated compounds without providing a commensurate, science-based reduction in Legionella risk.

The Bill Would Create Costly and Duplicative Requirements

House Bill 2085 would require covered public water systems to develop, certify, and implement separate Legionella-focused distribution system maintenance plans and report broadly defined "disruptions" within 72 hours. Public water systems already operate under extensive monitoring, reporting, sanitary survey, treatment, distribution, and operational requirements. DEP sanitary surveys and existing regulatory oversight already examine distribution system operations, maintenance, storage, disinfection, and compliance practices.

Creating a separate statutory plan and annual certification process would add administrative burden without necessarily improving public health outcomes. The bill's broad definition of "disruption" is also problematic because it could capture routine operational events without a demonstrated relationship to increased Legionella risk. Reporting, notification, and enforcement requirements should be tied to scientifically supported risk conditions and clear public health triggers, not undefined or overly broad categories that may generate confusion, unnecessary alarm, and paperwork without meaningful risk reduction.

New Requirements Would Ultimately Fall on Ratepayers

New testing, monitoring, planning, reporting, notification, laboratory analysis, staffing, legal, and recordkeeping obligations would impose real costs on public water systems. For municipal utilities,

those costs are ultimately borne by ratepayers. In communities already facing affordability challenges and major infrastructure investment needs, as we face in the city of Harrisburg, new state-imposed requirements must be carefully evaluated to ensure they deliver measurable public health benefits.

A utility-centered mandate would shift costs and responsibility away from the building owners and facility operators who own and control the systems where the highest risk for Legionella pneumophila amplification and exposure occurs. Public funds and ratepayer dollars should be directed toward proven water system investments—such as treatment reliability, corrosion control, distribution system maintenance, lead service line replacement, storage tank management, and infrastructure renewal. To effectively reduce the risk of Legionella transmission, building owners and facility operators must also do their part to improve, monitor, repair, and maintain the private systems under their control so the safe, treated water delivered by public water systems is not compromised after it enters the building.

A Better Policy Framework

The Commonwealth can strengthen Legionnaires' disease prevention without misplacing responsibility. A more effective framework should recognize the distinct roles of public water systems, building owners, healthcare and long-term care facilities, schools, public health agencies, and regulators.

- Maintain public water system accountability for treatment, distribution system integrity, compliance monitoring, disinfectant residual management, and cooperation with public health investigations.
- Require or incentivize building water management programs for high-risk facilities to use recognized standards and guidance, including ANSI/ASHRAE Standard 188, as the basis for building-level risk management, maintenance, monitoring, flushing, temperature control, corrective action, and documentation. High-risk facilities include hospitals, nursing homes, large institutional buildings, schools, and facilities with complex plumbing, cooling towers, or closed-loop systems.
- Provide technical assistance, training, and funding opportunities for building owners and operators to improve, monitor, repair, and maintain premise plumbing and related building water systems.
- Strengthen coordination among DEP, the Department of Health, public water systems, and facility operators during public health investigations, with data sharing focused on actionable risk conditions.
- Support public education that helps consumers, facility managers, and building owners understand how Legionella grows, where exposures occur, and what practical steps reduce risk.

Conclusion

Legionnaires' disease prevention deserves serious, science-based attention. Capital Region Water supports policies that improve public health, strengthen coordination, and help building owners and facility operators manage the premise plumbing, hot-water systems, cooling towers, closed-loop systems, and other building water systems where Legionella amplification and exposure risks most commonly occur. However, House Bill 2085 would impose broad new statutory duties on public water systems—including prescribed disinfectant residual levels, distribution system maintenance plans, disruption reporting, customer notification requirements, and penalties—that are not aligned with

the best available science, existing drinking water regulatory frameworks, or the practical realities of Legionella risk management.

For these reasons, I respectfully urge the Committee to oppose House Bill 2085 as currently drafted and instead pursue a targeted framework that aligns responsibility with control, protects ratepayers from unnecessary costs, and focuses resources where they will most effectively reduce risk.

Thank you for the opportunity to provide testimony. I would be pleased to answer any questions and to work with the Committee, DEP, the Department of Health, public water systems, and building-sector stakeholders on a more effective approach to Legionnaires' disease prevention.

Testimony of Benjamin C. Jewell, Commissioner, City of Philadelphia Water Department

Before the Pennsylvania House Consumer Protection, Technology, & Utilities Committee

Regarding House Bill 2085 – Legionnaires Disease Risk Management

Monday, July 20, 2026

Good morning, Chairmen Burgos and Metzgar, and members of the House Consumer Protection, Technology, and Utilities Committee. I am Ben Jewell, Commissioner of the City of Philadelphia Water Department (PWD). Thank you, Chairman Burgos, for inviting PWD to speak today. I appreciate the opportunity to provide comment on House Bill 2085 regarding Legionnaires Disease Risk Management.

I recognize the serious health impacts *Legionella* can have, and nothing in this testimony should be interpreted to minimize those impacts on individuals and families. However, transferring protective obligations from building owners/operators to the commonwealth's drinking water systems will have significant detrimental impacts, several of which are outlined below.

First, some background. PWD is the largest municipal water utility in the Commonwealth of Pennsylvania, providing 1.6 million residents with safe drinking water and more than 2.2 million people with reliable wastewater and stormwater collection and treatment services. PWD uses free chlorine as the primary disinfectant and monochloramine as the secondary disinfectant, through the distribution system, and at all three of our water treatment plants. PWD began chloramination in the late 1960s and 1970s. PWD staff members work steadfastly, 24/7/365, to ensure that water leaving our treatment plants and throughout our distribution system maintains adequate monochloramine residual to prevent bacteria growth and ensure that the water delivered to residents, businesses, and visitors is safe.

Despite its purported goals, PWD **opposes House Bill 2085** and the proposed requirements for public water systems. The bill would establish numerous requirements for public water systems that PWD believes would result in significant costs to Philadelphians (and all Pennsylvanians for that matter), establish poor precedent, be ineffective at achieving its stated purpose, and result in negative impacts on PWD's ability to provide safe drinking water. While PWD supports efforts to improve the management of *Legionella* in building water systems, primarily through establishing individual building water management plans and training, PWD does not believe that the requirements set forth in House Bill 2085 related to public water systems would achieve any significant risk reductions relative to Legionnaires Disease and could have the unintended consequence of increasing public health risk associated with increased disinfection by-products.

In my written submittal, PWD presents several key considerations for why **we respectfully request that H.B. 2085 not advance out of committee.** These include concerns about:

1. Water quality standards, such as treatment techniques, being mandated in legislation rather than following the formal regulatory process.
2. The effectiveness of the proposed requirements on public water systems to provide any additional risk reduction from *Legionella* growth compared to existing requirements from the Pennsylvania Department of Environmental Protection. In fact, a recent study by highly regarded water system associations investigating *Legionella* detections in federal buildings showed that establishing minimum disinfectant residuals has no statistically significant impact on reducing *Legionella* detections. Rather, the more effective prevention method is the establishment of building management plans for individual properties.
3. Significant costs expected to implement required drinking water infrastructure updates to meet the proposed requirements.
4. Operational and safety concerns for successfully operating and maintaining required drinking water infrastructure.
5. The unintended consequences of the proposed minimum disinfectant residual and the likelihood that this will result in Maximum Contaminant Level (MCL) exceedances for other regulated compounds with known adverse health effects.
6. The feasibility of planning, designing, constructing, and commissioning the required drinking water infrastructure in the timeframe set forth in House Bill 2085 in addition to the ongoing capital improvement work that is required to meet competing regulatory requirements as well as ensuring that PWD's drinking water system remains operational.

PWD takes significant pride in providing Philadelphia residents, businesses, and visitors with safe drinking water. **The requirements for public water systems proposed in House Bill 2085 will result in harmful water quality side effects while not effectively providing any additional risk reduction for *Legionella* in premise plumbing and would increase the financial burden on Philadelphians.** Due to these reasons, we again respectfully request that House Bill 2085 not advance containing the additional, ineffective burdens on public water systems, including in Philadelphia.

This concludes my testimony. Again, thank you, and I am happy to answer any questions.

1. **Drinking water regulations should not be established without following the established regulatory process that ensures adequate research and justification for the rulemaking along with a thorough cost benefit analysis and opportunity for public comment.**

   The PA Safe Drinking Water Act, enacted by the General Assembly of the Commonwealth of Pennsylvania, does not establish maximum contaminant levels (MCL) or treatment techniques. Rather, it empowers the Environmental Quality Board (EQB) to establish standards, rules, and regulations. This includes MCLs and Treatment Techniques. **Setting a numerical minimum for residual disinfectant in House Bill 2085 amounts to establishing a treatment technique outside of the regulatory process.**

   The EQB is comprised of 20 members, providing input to rules and regulations from perspectives of environmental protection, health, community and economic development, transportation, agriculture, labor and industry, and public utility.

   There are standard processes and procedures for establishing environmental regulations in PA[1,2].

   These rulemaking processes allow for the review of current scientific and engineering data by EQB and requires DEP to provide justifications and cost-benefit analysis to support the proposed rules. Additionally, public participation in the regulatory process allows for comments on the proposed rules and published responses.

2. **Current science indicates that requiring water systems to maintain a numeric minimum disinfectant residual greater than 0.2 mg/L, the current PA standard, would have no clear benefit on *Legionella* control.**

   Legionella is a premise plumbing issue that must be addressed by individual building managers. Through the establishment of individual building water management plans, building managers can effectively minimize risks from *Legionella*. According to the CDC's 2024 report on the surveillance of waterborne disease outbreaks[3], premise plumbing and point-of-use are the most commonly cited contributing factors for *Legionella* associated outbreaks. Efforts to reduce Legionnaires' Disease should be focused on premise plumbing system where this issue arises. The Philadelphia Water Department does not have any authority over building managers to require the establishment of these building management plans.

   Further, Pennsylvania's Department of Environmental Protection (DEP) has already established a numeric minimum disinfectant residual of 0.2 mg/L for free or total chlorine. This disinfection level was promulgated in the Disinfection Requirements Rule (DRR) that went through Pennsylvania's

formal regulatory process. This rulemaking included a rigorous research and development process that included scientific review, cost-benefit analysis, and feedback from stakeholders. During this process, it was determined that 0.2 mg/L was an effective minimum disinfectant residual.

Recent research indicates that further increases to the minimum disinfectant residual above 0.2 mg/L would not have a significant impact on reducing *Legionella sp.* occurrence. Water Research Foundation (WRF) project 5156[4] demonstrated that there was no clear benefit to *Legionella* control from a minimum disinfectant level above 0.2 mg/L. In addition, a recent study by the American Water Works Association (AWWA) and American Metropolitan Water Association (AMWA) investigating *Legionella sp.* detections in federal buildings showed that establishing minimum disinfectant residuals has no statistically significant impact on reducing *Legionella* detections[5]. Rather, the more effective prevention method is the establishment of building management plans for individual properties.

In addition, this bill would require the DEP to establish best management practices for water systems to reduce *Legionella* risks. Many of the required elements of this guidance are redundant to existing requirements in place by the DEP. Rather than improving the management of water systems, this bill would require water systems to develop and certify a redundant system maintenance plan and divert resources away from other critical operations.

3. **It would cost PWD a significant amount of money to make the drinking water infrastructure changes, such as water treatment plant upgrades and/or distribution system booster chloramination, required to meet the minimum disinfectant residual requirements established by House Bill 2085. This cost would ultimately be borne by PWD's ratepayers.**

   Implementation of House Bill 2085 would be costly to PWD's customers, and it is uncertain if compliance with the bill is feasible in PWD's large and complex drinking water system. To meet the minimum disinfectant residuals outlined in the draft bill, PWD would be required to make significant changes to the drinking water infrastructure serving the City of Philadelphia.

   It could cost PWD tens of millions of dollars, or more, to design, build, operate, and maintain this infrastructure.

   Extensive and costly engineering studies at PWD's three drinking water treatment plants, and throughout the drinking water distribution system, would be required to determine the full extent of infrastructure and operational changes required, and to determine if those changes would be adequate to meet compliance to the bill.

4. **There will likely be significant public opposition, and operational and safety challenges, associated with the additional infrastructure needed to achieve the proposed minimum disinfectant residual level.**

   It is anticipated that along with infrastructure upgrades at the existing drinking water treatment plants, the creation of numerous chloramination booster stations will be needed throughout the distribution system, including within residential neighborhoods, where **public opposition is expected**.

   The creation and operation of these additional chemical receiving, storage, and dosing assets increase the opportunity (e.g. open gates during chemical deliveries) and attack surface for physical and cybersecurity threats, as outlined under Department of Homeland Security and CISA cybersecurity requirements and guidelines for water sector critical infrastructure.

   PWD is committed to continue to maintain secondary disinfection in the distribution system through chloramination, for the clear benefits that chloramination presents, such as better chlorine odor control, reduced disinfection byproducts and better control of *Legionella* in PWD's system. However, relative to chlorination, chloramination has more water quality and operational complexity, and those challenges would be amplified at the new chloramination booster stations required to meet the proposed increase in minimum disinfectant residual. Restated, the proposed rule is more difficult to implement in PWD's existing drinking water system than within other systems. The required changes are counter to predictable and resilient drinking water operations.

5. **The proposed increase in minimum chlorine residual would very likely cause PWD to exceed maximum contaminant levels (MCLs) under the federal disinfectant/disinfection byproduct (D/DBP) Rule and may result in other unintended water quality consequences.**

   Disinfection Byproducts (DBPs) – The formation of disinfection byproducts is directly proportional to the amount of disinfectant added. Increasing the disinfectant residual in the distribution system increases the potential formation of regulated disinfection byproducts. Exposure to DBPs in drinking water above the MCL are associated with carcinogenic risks – aligned to increased risk of bladder, liver, kidney, and other cancers. While PWD has successfully maintained DBPs below the MCLs established by EPA and DEP, the significant increase in minimum disinfectant residual, a 400% increase from the current minimum, would require PWD to raise or boost disinfectant throughout the system. This will put PWD at increased risk of exceeding the established DBP MCLs with known

health effects and would be putting Philadelphians at increased risk.

Aesthetic Concerns – The aesthetics of drinking water (e.g. smell, taste, etc.) play a major role in customer's perception of the safety of their drinking water. While many aesthetic issues do not have direct safety impacts, they can lead to distrust among consumers. Increasing disinfectant residuals to meet the proposed minimum disinfectant residual will likely result in increased complaints and concerns caused by the chlorinous taste and odor of the drinking water. Customers often equate this taste and odor with chemicals in their water and wrongly believe that means their water is not safe. In PWD's 2025 Annual Comprehensive Customer Survey, 68.6% of respondents expressed concerns with drinking water. Of those with concerns about drinking water, the most common concern was aesthetic issues. This is a common concern that PWD customers have expressed in previous annual customer surveys. If PWD is required to further increase its secondary disinfectant level, there is likely to be further damage to customer trust in PWD.

6. **House Bill 2085 would require public water systems to meet the proposed requirements, including the minimum disinfectant residual levels, within two and a half years. This proposed timeline for implementation is not feasible for many public water systems.**

   PWD is facing numerous challenges involving aging infrastructure, and existing and new regulatory requirements, such as compliance with the Per- and Polyfluoroalkyl Substances (PFAS) MCLs and customer lead service line removal. We would need to integrate drinking water infrastructure upgrades required to meet the requirements of House Bill 2085 into existing planning, design, and construction projects required to keep the drinking water system operating for our > 1.6 million residents and visitors. In light of these competing priorities, PWD would not be able to plan, design, construct and commission the required infrastructure in the required timeframe proposed by House Bill 2085.

References

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5. von Hagen, E., Mathews, C., Samson, C., & Seidel, C. (2026). Legionella Occurrence in Buildings: Implications of Public Water System Disinfectant and Residual. *AWWA Water Science*, *8*(3), e70055.

Pennsylvania House Consumer Protection, Technology and Utilities Committee
Public Hearing on Legionella Tracking and Public Reporting and HB 2085
Written Statement Pa Department of Health
July 20, 2026

Good morning/afternoon, Chairman Cruz and members of the Consumer Protection, Technology and Utilities committee. Thank you for the opportunity to testify today regarding House Bill 2085. My name is Kristina Zwolenik, and I am a Waterborne Epidemiology Research Associate at the Pennsylvania Department of Health (PA DOH). My role centers on tracking, analyzing, and investigating pathogens that compromise public health through water exposure, including *Legionella*.

My goal today is to inform the legislative discussion using the latest epidemiological data from the Pennsylvania Department of Health's Legionella 2021-2023 Report and to walk through how PA DOH's work protects the public from Legionella.

How Legionella Spreads:

Before diving into the data, it helps to understand how *Legionella* behaves as a public health threat. In nature, this bacteria lives harmlessly at low levels in freshwater lakes and streams. However, man-made water systems can accidentally act as incubators that allow the bacteria to grow *Legionella* thrives in warm, stagnant water, growing within the protective slime or biofilms that coat complex pipe networks. People contract the infection by breathing in fine mists or vapors containing the bacteria, such as those from showers, hot tubs, decorative water fountains, or cooling towers. Infection can also occur through aspiration, which happens when a person accidentally chokes on water, sending it directly into the lungs instead of the stomach. It is important to note; the infection is not contagious and cannot be transmitted from person to person.

There are two primary forms of this infection. The mild form, Pontiac fever, a brief, flu-like illness that resolves on its own without causing pneumonia. The severe form and the one we track most closely is Legionnaires' disease, which presents as a serious type of pneumonia. Its main symptoms include a cough, shortness of breath, fever, headache, and muscle aches. Because these symptoms are similar to other types of pneumonia, confirming a diagnosis requires specific laboratory testing. This means that some cases can go undetected if health care providers do not properly recognize and test for the bacteria.

Those most vulnerable to the disease include older adults, individuals with chronic lung conditions, and people with weakened immune systems.

The Data:

Data from our recent multi-year report show that *Legionella* remains a significant and persistent public health burden in Pennsylvania. Between 2021 and 2023, Pennsylvania recorded 1,231 confirmed or probable cases of *Legionella* infection. Annually, this broke down to 417 cases in 2021, 416 cases in 2022, and 398 cases in 2023, averaging 410 cases per year.

To put these numbers into perspective, Pennsylvania's annual infection rate consistently hovers at nearly double the national average reported by the CDC. This disproportionate burden is part of a well-documented regional trend, as many of the Mid-Atlantic states consistently report some of the highest counts of Legionnaires' disease in the entire country. While not included in this report, more recent provisional state data continue to support the disease burden with 337 cases in 2024 and 450 cases in 2025.

Looking closer at the clinical outcomes of these cases, the severity of the illness is obvious. Of those 1,231 cases that occurred from 2021 to 2023, an average of 86% required hospitalization, meaning roughly 353 Pennsylvanians were hospitalized each year for a *Legionella* infection. Furthermore, the disease carries an almost 5% mortality rate within the Commonwealth, resulting in an average of 19 deaths annually over this three-year period.

When we look closer at the data, a few distinct demographic and geographic trends emerge:

- Age and Sex: While the highest total number of infections occurred in individuals aged 55 to 64, the trend shifts when adjusted for population. Older adults aged 75 to 84 experience the highest incidence rate. Additionally, males accounted for approximately 63% of all tracked cases.
- Geography: While cases occurred statewide, regional distribution varies. The highest annual volumes were concentrated in the Southeast and Southwest regions. However, when adjusted for population size, the Northeast region actually experienced the highest incidence rate in the state.
- Healthcare Exposure: A significant portion of these infections are linked to health care settings. Over this three-year period, an average of 11% of all tracked cases were classified as healthcare-associated, meaning the individual spent time at a health care facility during their incubation period. This trend is concerning for two reasons. First, patients in hospitals and long-term care facilities often have underlying health conditions that put them at higher risk. Second, these facilities are typically large buildings with complex water systems, creating the exact environment where *Legionella* can easily grow and hide.

How Pennsylvania Investigates Legionella Cases:

Now that we have discussed the numbers, let's look at how we investigate each reported case.

Case Detection and Reporting

Diagnosing a *Legionella* infection requires specific laboratory testing, typically completed via a urinary antigen test or a respiratory culture. Once a laboratory confirms a positive result, the case is reportable to the Pennsylvania Department of Health by law, which immediately initiates our official public health response.

Epidemiologic Interview and Exposure History

As soon as a report comes in, our priority shifts to finding out where the exposure occurred. Our investigators interview the patient to map out their exposure history over the previous 14 days, which is the incubation period for *Legionella* infection. The incubation period is the time from when a person is first exposed to the bacteria to when they develop their first symptom. During this two-week window, we ask about:

- Workplace settings and occupational exposures
- Travel and day trips, both within and outside of Pennsylvania
- Exposure to high-risk water features, such as hot tubs, decorative fountains, and misting systems
- Exposure to respiratory equipment, including CPAP (continuous positive airway pressure) machines or nebulizers
- Recent visits to dental offices, hospitals, or long-term care facilities
- Home water details, including their residential water source and the specific name of their public water utility provider

Routine Tracking and Facility Investigation

Once we gather individual histories, our focus shifts to detecting patterns. Each week, we analyze the data and use a spatial program called SaTScan to identify cases clustering close together in time and place. This can help us determine if cases share a common exposure. If cases overlap geographically but lack an obvious common exposure, we complete a specialized cluster interview to probe deeper into specific activities and exposures.

Importantly, we do not always wait for a cluster to form. If a single case is identified that spent 10 or more continuous days during their incubation period in a high-risk setting, such as a hospital or long-term care facility, that triggers an immediate investigation, regardless of whether other cases are linked to the facility.

When the data or our routine tracking identifies a specific building as a potential area of concern, we recommend that a qualified water consultant conduct a comprehensive environmental sampling protocol to help identify the source. Rather than testing a single tap, this protocol requires evaluating the entire building. That is because the bacteria can live in areas of the building that are infrequently used and a thorough building assessment is needed. The consultant samples foundational hot- and cold-water systems, storage tanks, and incoming lines, before moving to room endpoints,

low-use piping loops, and cooling towers. After sampling, we conduct enhanced case research to look for more cases tied to the same water system, recommend system remediation, and advise on follow-up testing.

Coordination with DEP

If the building we are investigating receives water from a public water supplier, we immediately engage the Pennsylvania Department of Environmental Protection (DEP)for awareness. DEP then works directly with the public water supplier to check treatment performance, evaluate distribution lines, and address any issues on the utility side.

This collaboration allows us to look at all potential sources, both inside the building and within the public water system.

This brings us directly to the specific framework proposed in House Bill 2085.

Epidemiological Considerations for House Bill 2085:

We share the committee's goal of protecting Pennsylvanians from *Legionella*, and we hope that our investigation history offers useful context on how *Legionella* behaves inside building water systems. In the majority of outbreaks where we have successfully identified the source of exposure, the root cause has been poor maintenance inside the building itself. We routinely trace cases back to poor, irregular, or non-existent maintenance of hot tubs, ice machines, and cooling towers, as well as building renovations that leave water stagnant in unused spaces, just to name a few. Public health data consistently show that *Legionella* growth is primarily driven by conditions inside a building's own plumbing network. Specifically, when water stagnates and enters an optimal temperature range, it creates the ideal environment for biofilm to form and the bacteria to multiply.

House Bill 2085 places a significant emphasis on monitoring public water before it hits these facilities. However, while public utilities safely deliver treated, cold water to a property line, water chemistry inevitably changes once it enters a building. The disinfectants used to treat our water naturally break down when they sit stagnant in internal plumbing networks or pass through a facility's boilers. Because these disinfectants dissipate over time, simply increasing chemical treatment at a municipal water plant will not prevent bacterial growth occurring deep within a complex building's internal plumbing.

As a result, while the proposed bill sets strict metrics for public water distribution networks, public health data show that the primary risk factors are found after the property line, within the plumbing of the buildings themselves.

House Bill 2085 also places new operational expectations on the Department. As such, the volume of work proposed by this legislation exceeds our current capacity and would require the department to increase staffing dedicated to this program. To successfully implement these

mandates, a stable, ongoing funding source would be required to support the necessary investigations, education, and tracking infrastructure.

Conclusion:

In closing, the Department appreciates the committee's proactive focus on this issue. As you move forward with your deliberations, we hope these insights into the behavior of *Legionella* within buildings, alongside the operational needs of our team, help inform your work. Successfully managing this public health risk requires balancing the scope of the bill with the long-term, stable resources needed to sustain it.

The Department is ready to assist the Committee with any additional data or technical feedback you may need. Thank you for your time and dedication to public health, and I would be glad to answer any questions you might have.

MEMORANDUM

TO: Sean W. Gatten
Pennsylvania House Consumer Protection, Technology & Utilities Committee

FROM: Jules Zacher Esquire
On behalf of the Kopsi Foundation for the Elimination of Legionnaires' Disease Inc. (Kopsi Foundation)

DATE: March 6, 2026

RE: HB 2085 – Critical Deficiency Regarding Victim Access to Department of Health Investigation Records; Legal Basis, Resulting Injustice, and Victim-Centered Legislative Fix

I. Purpose of This Memorandum

This memorandum is submitted to assist Committee staff as HB 2085 is considered and refined. While the bill represents a significant effort to improve Legionnaires' disease prevention and investigation in Pennsylvania, it fails to address a fundamental injustice currently embedded in Pennsylvania law and Department of Health practice:

Individuals who contract Legionnaires' disease are not permitted to obtain records of the Department of Health's investigation into their own illness.

This outcome is legally sanctioned under existing law and appellate precedent. However, it is deeply harmful to victims, undermines trust in public health, and is inconsistent with a patient-centered prevention framework. HB 2085 presents a clear opportunity for the General Assembly to correct this problem in a narrow, responsible manner.

II. Existing Law and Practice: Why Victims Are Denied Their Own Records

A. Statutory and Regulatory Framework

Under Pennsylvania's Disease Prevention and Control Law (DPCL), reports of disease and records maintained as a result of communicable-disease investigations are deemed confidential. The Department of Health interprets this confidentiality broadly to prohibit disclosure of investigation records to anyone outside government, including the individual who contracted the disease.

As a result, Legionnaires' disease victims are routinely denied access to:

- epidemiological investigation summaries,
- assessments of potential exposure sites,
- environmental sampling decisions,
- and explanations of investigative conclusions or limitations.

Victims are treated, for disclosure purposes, no differently than members of the general public.

B. Appellate Authority: *Department of Health v. Capouillez*

The Department's position is supported by Pennsylvania appellate precedent.

In *Department of Health v. Capouillez*, 585 C.D. 2021 (Pa. Commw. Ct. Nov. 16, 2022), the Commonwealth Court upheld the Department's authority to withhold disease-related investigatory records as confidential under the DPCL and exempt from disclosure under the Right-to-Know Law.

Although *Capouillez* did not involve a Legionnaires' disease victim seeking records of their own illness, the decision is now relied upon to justify the Department's categorical refusal to provide investigation records to affected individuals.

The practical effect of Capouillez is clear:

- Absent legislative change, victims have no right to see the records of the investigation into how they became seriously ill.

III. Why This Is an Injustice to Legionnaires' Disease Victims

Legionnaires' disease is frequently severe and often life-altering. Victims experience:

- prolonged hospitalization,
- permanent respiratory or neurological effects,
- loss of income,
- and enduring uncertainty regarding exposure and preventability.

Yet under current law:

- victims cannot determine what was investigated,
- cannot know why certain locations were excluded,
- cannot understand whether investigations were constrained by time, data, or authority,
- and cannot obtain a plain-language explanation of findings or uncertainty.

This produces a system in which:

The Commonwealth investigates a person's life-threatening illness, but the person who suffered the illness is barred from seeing the results.

That outcome undermines public confidence, discourages cooperation with public health authorities, and leaves victims without answers, closure, or meaningful participation in prevention.

IV. HB 2085 Expands Investigations but Does Not Address Victim Exclusion

HB 2085:

- mandates investigations for each reported Legionnaires' disease case,
- expands data collection and reporting,
- and contemplates public dashboards and summaries.

However, the bill contains no provision granting victims access to investigation records concerning their own illness.

Without amendment, HB 2085 risks:

- increasing the volume and formality of investigations,
- while preserving a legal regime that excludes victims from the investigative record.

From a policy and implementation standpoint, this is a significant omission.

V. Victim-Centered Legislative Fix (Substance)

The Kopsi Foundation urges consideration of a narrow, carefully tailored amendment that would:

1. Grant a Legionnaires' disease victim (or their authorized representative) the right to obtain records related to the investigation of their own case;
2. Allow appropriate redactions to protect:
    a. unrelated patient information,
    b. third-party identities,
    c. and sensitive security or proprietary details;
3. Require a written explanation, in plain language, of:
    a. what was investigated,
    b. what was not,

    c. and why attribution may not have been possible;
4. Clarify that disclosure does not constitute a determination of fault or liability, preserving the Department's public-health role.

This approach would override DPCL confidentiality only as to the victim's own case, while leaving the broader public-health confidentiality framework intact.

VI. Role of the Kopsi Foundation and Willingness to Assist the Committee

The Kopsi Foundation represents victims of Legionnaires' disease. It does not represent building owners, utilities, insurers, or other regulated entities.

The Foundation is willing to:

- work with Committee staff and legislative counsel on amendment language,
- provide technical and victim-centered context regarding investigations and attribution,
- identify and support Legionnaires' disease victims willing to appear and testify at any Committee hearings, either publicly or in closed sessions, to explain the real-world impact of being denied access to their own investigation records.

Victim testimony can assist the Committee in understanding:

- how current law affects patients,
- why access to records matters for recovery and prevention,
- and how modest statutory changes can restore fairness without undermining public health.

VII. Conclusion

The current legal framework—validated by *Capouillez*—may be defensible as a matter of statutory interpretation, but it produces an outcome that is unjust, opaque, and harmful to victims.

HB 2085 is the appropriate vehicle for the General Assembly to correct this imbalance by:

- preserving necessary public-health confidentiality,
- while affirming that people who contract Legionnaires' disease have a right to understand what happened to them.

The Kopsi Foundation stands ready to assist the Committee and respectfully urges consideration of a victim-access amendment as HB 2085 moves forward.

MEMORANDUM

To: Representative Smith-Wade-El
From: Jules Zacher Esquire
On behalf of the Kopsi Foundation for the Elimination of Legionnaires' Disease Inc. (Kopsi Foundation)

Date: June 10, 2026

Re: Aligning HB 2085 with Scientific Evidence on Legionnaires' Disease Transmission

Legionnaires' disease is a severe and preventable form of pneumonia caused by *Legionella* bacteria. As the General Assembly considers House Bill 2085, it is essential that the statutory framework reflect the well-established scientific and epidemiological understanding of how this disease occurs. The weight of peer-reviewed literature, public health guidance, and outbreak investigations demonstrates a consistent and critical point: while *Legionella* may be present at low levels in municipal water systems, **human disease occurs only after the bacteria amplify within downstream building water systems or engineered devices**.

This distinction—between background presence and pathogenic amplification—should guide legislative design. As currently structured, HB 2085 risks imposing regulatory obligations on public water suppliers that are not supported by the scientific evidence as primary drivers of disease transmission. Refining the bill to focus on downstream amplification sites will both improve its effectiveness and enhance its prospects for passage.

The scientific consensus on this issue is clear. *Legionella* is ubiquitous in natural aquatic environments and can persist at low concentrations even in treated drinking water. However, infection requires inhalation of aerosolized water droplets containing sufficiently high concentrations of the bacteria. Those

concentrations arise under specific environmental conditions—warm temperatures, stagnation, biofilm formation, and reduced disinfectant residuals—that are characteristic of **premise plumbing systems and engineered water devices**, not properly operated municipal distribution systems.

The National Academy of Sciences, Engineering and Technology has stated in *Management of Legionella in Water Systems* (2020) "However, it is the unchecked growth of pathogenic legionellae in human-made water systems that typically leads to human exposures and causes disease." These findings are echoed in epidemiological investigations across the United States and internationally, where outbreak sources are consistently identified as cooling towers, healthcare facility plumbing, hotels, and similar downstream systems.

Public health authorities have adopted this scientific understanding in their guidance. The Centers for Disease Control and Prevention emphasizes that *Legionella* "grows best in building water systems" and recommends building-level water management programs as the primary prevention strategy. The World Health Organization similarly identifies "engineered water systems" as the locus of risk, where temperature control, stagnation, and biofilm formation allow bacterial amplification.

Engineering standards reinforce this same conclusion. ASHRAE Standard 188—the leading risk management framework adopted nationwide—focuses exclusively on building water systems and high-risk facilities. It does not impose requirements on municipal water suppliers, reflecting the consensus that amplification, not mere presence, is the operative risk factor.

Against this backdrop, it is important to consider the frequently cited exception of the Flint water crisis. In Flint, a change in water source without appropriate corrosion control altered water chemistry, reduced disinfectant effectiveness, and contributed to conditions that increased *Legionella* risk. However, Flint represents an extraordinary failure of water system management, not the norm for regulated public water suppliers. Even in that case, the mechanism of disease involved the creation of conditions that enabled downstream amplification. Flint does not support the imposition of broad, prospective

regulatory burdens on properly functioning municipal systems across Pennsylvania.

The policy implications for HB 2085 are significant. By directing regulatory attention toward public water suppliers, the bill risks misallocating resources and imposing compliance costs on entities that are not the proximate cause of Legionnaires' disease. Such an approach may also dilute focus on the environments where intervention is most effective—namely, building water systems and engineered devices where amplification occurs. Moreover, including public water suppliers within the bill's regulatory scope is likely to generate opposition from municipal stakeholders, potentially hindering passage without advancing public health outcomes.

A more effective and scientifically grounded approach would align HB 2085 with the established consensus: prevention of Legionnaires' disease depends on controlling conditions that allow *Legionella* to multiply within buildings and devices after water leaves the municipal system. Legislative focus should therefore be directed toward high-risk settings such as healthcare facilities, long-term care facilities, large residential and commercial buildings, and cooling towers. Encouraging or requiring water management programs consistent with ASHRAE 188 and CDC guidance would directly target the environments where disease originates.

Refining HB 2085 to remove or substantially narrow requirements imposed on public water suppliers would not weaken the bill. To the contrary, it would strengthen it—scientifically, practically, and politically. It would align the legislation with peer-reviewed research, established public health guidance, and real-world outbreak data. It would concentrate regulatory efforts where they can have the greatest impact. And it would reduce unnecessary opposition, improving the likelihood of enactment.

In sum, the evidence is clear and consistent: **Legionnaires' disease is a downstream amplification problem, not a source water problem**. Legislation that reflects this reality will be more effective in protecting public health and more likely to achieve passage. HB 2085 presents an important opportunity to do so, provided it is carefully aligned with the scientific record.

Curriculum Vitae

PAUL HERBERT EDELSTEIN, M.D.

July 10, 2026

EDUCATION:

1966-1969	San Jose State College, San Jose, California Chemistry major, no degree
1969-1973	UCLA Medical School, Los Angeles, California, (M.D.)

NON-MEDICAL EMPLOYMENT:

1967-1969	Research Assistant in Physical Chemistry at San Jose State College
1969	Research Chemist in Polymer Chemistry at TRW Systems, Redondo Beach, California

POSTGRADUATE TRAINING AND FELLOWSHIP APPOINTMENTS:

1973-1974	Intern in Internal Medicine, Wadsworth VA Medical Center, Los Angeles (UCLA School of Medicine)
1974-1976	Resident in Internal Medicine, Wadsworth VA Medical Center (UCLA School of Medicine)
1976-1978	Fellow in Infectious Diseases, Wadsworth VA Medical Center (UCLA School of Medicine)
1977-1978	Chief Medical Resident, Wadsworth VA Medical Center

MILITARY SERVICE: None

FACULTY APPOINTMENTS:

1978-1983	Assistant Professor of Medicine in Residence, UCLA
1983-1986	Associate Professor of Medicine, UCLA
1986-1994	Associate Professor of Pathology and Laboratory Medicine, University of Pennsylvania
1987- 2017	Secondary appointment in the Department of Medicine, University of Pennsylvania
1994- 2017	Professor of Pathology and Laboratory Medicine, University of Pennsylvania
2017-	Emeritus Professor of Pathology and Laboratory Medicine, University of Pennsylvania
9/95-6/96	Visiting Scholar, Department of Microbiology and Immunology, Stanford University School of Medicine (Laboratory of Stanley

	Falkow)
6/15 -	Honorary Senior Research Fellow, Department of Medicine, University of Cambridge (Laboratory of Lalita Ramakrishnan)
2/24-	Fellow, UK Medical Research Council Laboratory of Molecular Biology

HOSPITAL AND ADMINISTRATIVE APPOINTMENTS:

1978-1980	Associate Investigator, Wadsworth VA Medical Center
1980-1982	Research Associate, Wadsworth VA Medical Center
1983-1984	Director, Medical Intensive Care Unit, Wadsworth VA Medical Center
1978-1986	Director of Legionnaires' Disease Laboratory, Wadsworth VA Medical Center
1986- 2017	Director of Clinical Microbiology Laboratory, Hospital of the University of Pennsylvania

SPECIALTY CERTIFICATIONS:

1973	National Board of Medical Examiners #131761
1976	American Board of Internal Medicine #055675 in Internal Medicine
1978	American Board of Internal Medicine #055675 in Infectious Diseases
1985	Diplomat of American Board of Medical Microbiology in Public Health and Medical and Molecular Microbiology

LICENSURE: California (1974) G27347 (inactive)
Pennsylvania (1986) MD035963E (active-retired)

AWARDS, HONORS, AND MEMBERSHIP IN HONORARY SOCIETIES:

1967-1969	National Science Foundation Fellowship in Physical Chemistry Research
1969	Elected member of Phi Kappa Phi, National Scientific Fraternity
1981	Burroughs-Wellcome Traveling Fellowship to Great Britain
1982	Japan Society for the Promotion of Science Scholar Traveling Fellowship to Japan
1985	Lowbury Lecturer, Hospital Infection Society of Britain, London
1989	W. G. Smith Memorial Lecturer, University of Western Australia Medical School

MEMBERSHIPS IN PROFESSIONAL AND SCIENTIFIC SOCIETIES:

1967-1970	American Chemical Society
1977-2000	Member, American College of Physicians
1976- 2017	Member, American Society for Microbiology
2018-	Emeritus Member, American Society for Microbiology
1976-1984	Associate, American Thoracic Society

1984-2004	Member, American Thoracic Society
1979-1994	Member, American Federation for Clinical Research
1981-1984	Member, Infectious Diseases Society of America
1984- 2017	Fellow, Infectious Diseases Society of America
2018-	Emeritus Fellow, Infectious Diseases Society of America
1998-	Member, British Society for Antimicrobial Chemotherapy
2002-	Fellow, American Academy of Microbiology
2012-	Member, International Union Against Tuberculosis and Lung Disease
2018-	Associate Member, Clare Hall College, University of Cambridge, UK
2024-	Fellow, Medical Research Council Laboratory of Molecular Biology, Cambridge, UK

MEMBERSHIPS ON NATIONAL and INTERNATIONAL COMMITTEES

1983	Organizing committee of the 1983 International Conference on Legionella.
1991	Organizing committee of the 1992 International Conference on Legionella.
1991-1994	American Board of Medical Microbiology Part I examination committee.
1993-1994	Chair organizing committee Medical Microbiology Interdisciplinary Commission symposium on pneumonia, Prague 7/94
2000-2005	Organizing committee of the 2005 International Conference on Legionella
2005-2009	Scientific committee of the 2009 International Conference on Legionella
2011-2013	Scientific committee of the 2013 International Conference on Legionella
2022	Scientific committee of the 2022 International Conference on Legionella

EDITORIAL BOARDS:

1986-1994	Journal of Clinical Microbiology
1987-2000	Enfermedades Infecciosas y Microbiologia Clinica
1988-1991	Diagnostic Testing Alert
1992-1996	Clinical Microbiology Reports
1995-2000	Journal of Infection and Chemotherapy
2005-2008	Laboratory Errors and Patient Safety
2006-2009	Editorial Advisory Board Journal of Infectious Diseases

AD HOC REVIEWER FOR:

- Annals of Internal Medicine
- New England Journal of Medicine
- Antimicrobial Agents and Chemotherapy
- Journal of Clinical Microbiology
- European Journal of Clinical Microbiology
- Clinical Infectious Diseases
- Archives of Internal Medicine

- Journal of Antimicrobial Chemotherapy
- Infection Control and Hospital Epidemiology
- Journal of Medical Microbiology
-Science
-Infection and Immunity
-Clinical Microbiology and Infectious Diseases
-Clinical Microbiology Reviews
-Journal of Infectious Diseases
-Molecular Microbiology
-Applied and Environmental Microbiology
-Journal of Medical Microbiology
-PLOS One
-Scandinavian Journal of Infectious Diseases
-Diagnostic Microbiology and Infectious Diseases
-Infection and Immunity
-European Journal of Clinical Microbiology and Infectious Diseases
-Annals of Applied Statistics
-International Journal of Systematic and Evolutionary Microbiology
-Emerging Infectious Diseases
-American Journal of Respiratory and Critical Care Medicine
-Lancet Infectious Diseases
-Lancet
-Transplant Infectious Diseases
-Nature Medicine
-Water Research
-Proceedings of the National Academy of Science, USA
-Elife
-Journal of Clinical Investigation
-Emerging Infectious Diseases
-Infectious Diseases Clinical Practice
-Journal of Antimicrobial Chemotherapy
-Cell
-Epidemiology and Infection
-Infectious Diseases Clinical Practice
-Germs

CONSULTANCIES AND EXTERNAL COMMITTEE MEMBERSHIPS:

1989-1991	Special Consultant, US FDA Panel on Microbiologic Diagnostic Devices
1991-2000	Voting Member, US FDA Panel on Microbiologic Diagnostic Devices and the Medical Devices Advisory Committee
1994-1995	Chair, US FDA Panel on Microbiologic Diagnostic Devices and the Medical Devices Advisory Committee
1991-1994	Chair, Electric Power Research Institute Advisory Committee on a Prospective Study of Legionnaires' Disease in Ohio

1990	Technical consultant to NJ State Dept of Health and CDC in the investigation of an outbreak of Legionnaires' disease in an elementary school.
1991	Consultant to NJ State Dept of Health in the investigation of a suspected outbreak of Legionnaires' disease in the Lincoln Tunnel.
1992	Consultant to CDC and the Pennsylvania Dept of Health in the investigation of an industrial outbreak of Legionnaires' disease in suburban Philadelphia.
1989- 2012	Consultant to various hospitals and industrial concerns regarding suspected or actual outbreaks of Legionnaires' disease.
1993	Consultant to the Hospital Infections Branch of the Centers for Disease Control on the development of a national policy for the control of nosocomial Legionnaires' disease.
1993	Consultant to the Respiratory Diseases Branch of the Centers for Disease Control on the development of a national policy for the control of occupational Legionnaires' disease.
1993-1999	Consultant to CDC concerning outbreaks of Legionnaires’ disease
2004	Chair, NIH U01 Special Emphasis Panel, RFA AI03-28, Partnerships for Vaccine and Diagnostic Development (Feb 12th, 2004)
2005	Member, NIH U54 Special Panel, (RFA) AI-04-018: Regional Centers of Excellence for Biodefense and Emerging Infectious Diseases Research (January 2005)
2007	Reviewed Botswana National Microbiology and Tuberculosis Laboratories for Univ of Pennsylvania
2014-2020	Member, Clinical Laboratory Standards Institute Ad Hoc Working Group on Molecular Detection of Antimicrobial Resistance
2015	Member, British Medical Research Council Grant Review Panel, Antimicrobial Resistance Themes 2 and 3 (September 2015)
2015	Member, British Medical Research Council Meeting on Antimicrobial Resistance, Berlin (October 2015)
2018-2021	Member, Clinical Laboratory Standards Institute Ad Hoc Working Group on Epidemiologic Cut-off Values for Antimicrobial Susceptiblity Testing
2019-2021	Chair, Clinical Laboratory Standards Institute Ad Hoc Working Group on Aminopenicillin Breakpoints
2020-2021	Member, U.K. Royal Society DELVE (Data Evaluation and Learning for Viral Epidemics) Scientific Advisory Group on Covid-19

MAJOR TEACHING AND CLINICAL RESPONSIBILITIES FOR THE UNIVERSITY OF PENNSYLVANIA:

1. Supervision of Pathology Fellow training in Clinical Microbiology 1 day per week.

LECTURES BY INVITATION:

1. September 5-6, 1989. Visiting Lecturer, Victoria General Hospital, Dalhousie University Halifax, Nova Scotia, Canada. Legionnaires' disease - Medical Grand Rounds. "Virulence of L. pneumophila is modulated by growth temperature."

2. September 18-28, 1989. Visiting Lecturer (W.G. Smith Memorial Lecturer), Department of Microbiology, Queen Elizabeth II Medical Center, University of Western Australia Medical School, Perth, Australia.
   Pathogenesis of Legionnaires' disease
   Experimental models of Legionnaires' disease
   Clinical aspects of Legionnaires' disease
   Experimental therapy of Legionnaires' disease
   Pneumocystis carinii pneumonia
   Environmental aspects of Legionnaires' disease

3. March 8, 1990. "Legionnaires' disease." Claifornia Thoracic Society Meeting, Hawaii.

4. August 7, 1990. "Legionnaires' disease and water heaters." National Rural Electrification Cooperative Research Group. San Diego, California.

5. September 19, 1990. "Temperature-associated virulence of L. pneumophila." Department of Microbiology and Infectious Diseases Lecture Series, University of Calgary Medical School, Calgary.

6. February 20, 1991. "Infections caused by free-living amoebae." Infectious Diseases Grand Rounds, Cedars-Sinai Medical Center, Los Angeles, California.

7. January 8, 1992. "Interaction of L. pneumophila with complement system." Dalhousie University Department of Microbiology Lecture Series. Halifax.

8. January 8, 1992. "Infections caused by free-living amoebae." Dalhousie University Department of Medicine/Infectious Diseases Lecture Series. Halifax.

9. January 28, 1992. "Laboratory diagnosis of Legionnaires' disease." State of the art lecture for the International Conference on Legionella. Orlando, Florida.

10. September 4, 1992. "Prediction of antimicrobial efficacy for Legionnaires' disease using animal and cell culture studies." "An update on the laboratory diagnosis of Legionnaires' disease." Danish Society of Clinical Microbiologists, Copenhagen.

11. November 9, 1993. "An Update on Community Acquired Pneumonia." Medical Society of Delaware, Wilmington, Delaware.

12. March 31, 1994. "Legionnaires' Disease." Medical Grand Rounds, Asan Medical Center (Ulsan University Hospital), Seoul, Korea.

13. April 1, 1994. "Legionnaires' Disease." Korean Infectious Diseases Society. Seoul, Korea.

14. April 2, 1994. "Laboratory diagnosis of Legionnaires' disease, Epidemiology of Legionnaires' disease, and Ecology of Legionella." Korean Laboratory Workshop on Legionnaires' disease, sponsored by Korean Association of Quality Assurance for Clinical Pathology. Seoul, Korea.

15. April 5, 1994. "Legionnaires' Disease." Kinki University School of Medicine. Osaka, Japan.

16. April 6, 1994. "Legionnaires' Disease." Research Institute for Microbial Diseases, Osaka University. Osaka, Japan.

17. April 7, 1994. "Legionnaires' Disease." Ryuku University School of Medicine. Naha, Okinawa, Japan.

18. July 2, 1994. “Treatment of Legionnaires’ Disease.” Medical Microbiology Interdisciplinary Commission Meeting on Pneumonia, Prague, Czech Republic.

19. September 1, 1995. “Treatment of Legionnaires’ Disease.” Advanced Seminar in Infectious Diseases at the Royal Society of Medicine, London

20. September 2, 1995. Participant and lecturer in “Intracellular Infections”, West Sussex, England.

21. December 8th, 1995. Special Lecturer, Chemotherapy Society of Western Japan, Naha, Okinawa, Japan

22. February 19th, 1997. “Clinical Microbiology of Legionnaires’ Disease”. Fundacion de Ciencias de la Salud, Madrid, Spain.

23. January 24th, 1998. “ Antimicrobial Chemotherapy of Legionnaires’ Disease”. Japanese Legionnaires’ Disease Symposium, Tokyo, Japan.

24. June 1st, 1998. “ Antimicrobial Chemotherapy of Legionnaires’ Disease”.

European Working Group on Legionella Infections, Helsinki, Finland.

25. June 21st, 1998. " Antimicrobial Chemotherapy of Legionnaires' Disease". 10th International Meeting on Infections in the Immunocompromised Host. Davos, Switzerland.

26. September 29th, 1998. "Signature-tagged mutagenesis of *Legionella pneumophila*". Stanford University Department of Microbiology and Immunology.

27. September 28th, 2000. "Therapy of Legionnaires' disease with newer macrolides and fluoroquinolones. 5th International Conference on Legionella, Ulm, Germany.

28. January 25th, 2001. "Legionnaires' disease" Robert Wood Johnson Hospital, Division of Infectious Diseases. New Brunswick, New Jersey.

29. April 2002. "Treatment of Legionnaires' Disease" Toho University School of Medicine, Tokyo; Legionnaires' disease symposium, Osaka, Japan.

30. April 2002. "Anthrax" Ryukyu University School of Medicine, Okinawa, Japan; Toho University School of Medicine, Tokyo

31. April 2003. "Legionnaires' disease". Okayama University Medical School

32. April 2003. "Clinical Microbiology of Infections Associated with Organ Transplantation". Japanese Infectious Diseases Society Annual Meeting, Fukuoka.

33. June 2004. "Diagnosis and Treatment of Legionnaires' Disease". Japanese Society for Chemotherapy, 52nd annual meeting, Okinawa.

34. May 2005. "An update on Legionnaires' disease." European Working Group on Legionella Infections, Rome.

35. September 2005. "An update on the laboratory diagnosis of Legionnaires' disease." Scott Memorial Symposium, Wilmington, Delaware.

36. September 2005. "Clinical features of Legionnaires' disease." Opening lecture of 2005 International Conference on Legionella, Chicago.

37. June 2009. "Legionnaires' disease". Japanese Society for Chemotherapy Annual Meeting, Tokyo.

38. June 2009. "Swine influenza virus". Japanese Society for Chemotherapy Annual Meeting, Tokyo.

39. October 2009. "Treatment of Legionnaires' disease". 2009 International

Conference on Legionella, Paris.

40. March 2011. “Legionnaires’ disease”. University of Washington Infectious Diseases Board Review Lecture.

41. September 2011. “Tuberculosis and Efflux Pumps: Can Pump Inhibition Help Shorten TB Therapy, Even with MDR TB?” KwaZuluNatal Research Institute on Tuberculosis and HIV and Nelson Mandela School of Medicine, Durban, South Africa.

42. May 2013. "Clinical Microbiology Laboratory Organization and Regulation", Japanese Adhoc Committee on Clinical Microbiology, Yokohama, Japan.

43. June 2013. "Legionnaires' disease", International Congress of Chemotherapy, Yokohama, Japan.

44. October 2013. "Clinical aspects of Legionnaires' disease", 8th International Conference on Legionella, Melbourne, Australia.

45. February 2016. “Shortening TB treatment through the use of adjunctive efflux pump inhibitors. 14th Annual Christian Medical College Meeting on Tuberculosis Research, Vellore, India.

46. September 2017 “History of Legionnaires’ disease”, 2017 International Conference on Legionella, Rome, Italy.

47. September 2017, “Clinical aspects of Legionnaires’ disease”, 2017 International Conference on Legionella, Rome, Italy.

48. August 2018. “Laboratory diagnosis of Legionnaires’ disease”, 2018 International Conference on Emerging Infectious Diseases, Atlanta, GA.

49. September 2022. “History of Legionnaires’ disease”, 2022 International Conference on Legionella, Yokohama, Japan.

50. October 2023. “Latent tuberculosis concepts”. Special meeting on tuberculosis, Tokyo.

BIBLIOGRAPHY:

Original Papers

1. Bock BV, Kirby BD, Edelstein PH, George WL, Snyder KM, Owens ML, Hatayama CM, Haley CE, Lewis RP, Meyer RD, Finegold SM. Legionnaires'

disease in renal-transplant recipients. Lancet 1:410-413, 1978.

2. Goldstein EJC, Lewis RP, Martin WJ, Edelstein PH. Infections caused by Klebsiella ozaenae: a changing disease spectrum. J. Clin. Microbiol. 8:413, 1978.

3. Edelstein PH, Meyer RD, Finegold SM. Isolation of a new sero-type of Legionnaires' disease bacterium. Lancet 2:1172-1174, 1978.

4. Edelstein PH, Meyer RD. Netilmicin therapy of serious gram-negative infections. J. Antimicrob. Chemother. 4:495-502, 1978.

5. Edelstein PH, Finegold SM. Isolation of Legionella pneumophila from a transtracheal aspirate. J. Clin. Microbiol. 9:457-458, 1979.

6. Edelstein PH, Meyer RD, Finegold SM. Isolation of Legionella pneumophila from blood. Lancet 1:750-751, 1979.

7. McKinney RM, Thacker L, Harris PP, Lewallen KR, Hebert GA, Edelstein PH, Thomason BM. Four serogroups of Legionnaires' disease bacteria defined by direct immunofluorescence. Ann. Intern. Med. 90:621-624, 1979.

8. Faine S, Edelstein PH, Kirby BD, Finegold SM. Rapid presumptive bacteriological diagnosis of Legionnaires' disease. J. Clin. Microbiol. 10:104-105, 1979.

9. Lewin S, Brettman LR, Goldstein EJC, Holzman RS, Devila H, Taubman F, Sierra MF, Edelstein PH. Legionnaires' disease: A cause of severe abscess-forming pneumonia. Amer. J. Med. 67:339-342, 1979.

10. Edelstein PH, Finegold SM. Use of a semiselective medium to culture Legionella pneumophila from contaminated lung specimens. J. Clin. Microbiol. 10:141-143, 1979.

11. Hernandez FJ, Kirby BD, Stanley TM, Edelstein PH. Legionnaires' disease: Postmortem pathologic findings of 20 cases. Am. J. Clin. Pathol. 73:488-495, 1980.

12. Edelstein PH, Meyer RD, Finegold SM. Laboratory diagnosis of Legionnaires' disease. Am. Rev. Resp. Dis. 121:317-327, 1980.

13. Bock BV, Edelstein PH, Meyer RD. Prospective comparative study of efficacy and toxicity of netilmicin and amikacin. Antimicrob. Agents Chemother. 17:217-225, 1980.

14. Edelstein PH, McKinney RM, Meyer RD, Edelstein MAC, Krause CJ, Finegold SM. Immunologic diagnosis of Legionnaires' disease: Cross-reactions with

anaerobic and microaerophilic organisms and infections caused by them. J. Infect. Dis. 141:652-655, 1980.

15. Meyer RD, Edelstein PH, Kirby BD, Louie MH, Mulligan ME, Morgenstein AA, Finegold SM. Legionnaires' disease: Unusual clinical and laboratory features. Ann. Intern. Med. 93:240-243, 1980.

16. Edelstein PH, Meyer RD. Susceptibility of Legionella pneumophila to twenty antimicrobial agents. Antimicrob. Agents Chemother. 18:403-408, 1980.

17. Kohler RB, Zimmerman SE, Wilson E, Allen SD, Edelstein PH, Wheat LJ, White A. Rapid radioimmunoassay diagnosis of Legionnaires' disease: Detection and partial characterization of urinary antigen. Ann. Intern. Med. 94:601-605, 1981.

18. Serota AI, Meyer RD, Wilson SE, Edelstein PH, Finegold SM. Legionnaires' disease in the postoperative patient. J. Surg. Research. 30:417-427, 1981.

19. McKinney RM, Porschen RK, Edelstein PH, Bissett MC, Harris PP, Bondell SP, Steigerwalt AG, Weaver RE, Ein ME, Lindquist DS, Kops RS, Brenner DJ. Legionella longbeachae species nova: Another etiologic agent of human pneumonia. Ann. Intern. Med. 94:739-743, 1981.

20. Edelstein PH, Meyer RD, Finegold SM. Long-term follow-up of two patients with pulmonary cavitation caused by Legionella pneumophila. Am. Rev. Resp. Dis. 124:90-93, 1981.

21. Edelstein PH. Improved semiselective medium for isolation of Legionella pneumophila from contaminated clinical environmental specimens. J. Clin. Microbiol. 14:298-303, 1981.

22. Saito A, Rolfe RD, Edelstein PH, Finegold SM. Comparison of liquid growth media for Legionella pneumophila. J. Clin. Microbiol. 14:623-627, 1981.

23. Sathapatayavongs B, Kohler RB, Wheat LJ, White A, Winn WC Jr, Girod JC, Edelstein PH. Rapid diagnosis of Legionnaires' disease by urinary antigen detection: Comparison of ELISA and radioimmunoassay. Am.J. Med. 72:576-582, 1982.

24. Meyer RD, Pasiecznik KA, Yasui VK, Edelstein PH. Susceptibility of Legionella species and nosocomial respiratory tract isolates of Enterobacteriaceae to Sch-29482 and other beta-Lactam agents. J. Antimicrob. Chemother. (Supplement C) 199-202, 1982.

25. Edelstein PH, Snitzer JB, Finegold SM. Isolation of Legionella pneumophila from hospital potable water specimens: Comparison of direct plating with guinea pig inoculation. J. Clin. Microbiol. 15:1092-1096, 1982.

26. Edelstein PH, Pasiecznik KA, Yasui VK, Meyer RD. Susceptibility of Legionella spp. to mycinamicin I and II and other macrolide antibiotics: Effects of media composition and origin of organisms. Antimicrob. Agents Chemother. 22:90-93, 1982.

27. Edelstein PH. Comparative study of selective media for isolation of Legionella pneumophila from potable water. J. Clin. Microbiol. 16:697-699, 1982.

28. Edelstein PH, Whittaker RE, Kreiling RL, Howell CL. Efficacy of ozone in eradication of Legionella pneumophila from hospital fixtures. Appl. Environ. Microbiol. 44:1330-1333, 1982.

29. Edelstein PH, Brenner DJ, Moss CW, Steigerwalt AG, Francis EM, George WL. Legionella wadsworthii species nova: A cause of human pneumonia. Ann. Intern. Med. 97:809-813, 1982.

30. Edelstein PH, Snitzer JB, Bridge JA. Enhancement of recovery of Legionella pneumophila from contaminated respiratory tract specimens by heat. J. Clin. Microbiol. 16:1061-1065, 1982.

31. Bridge JA, Edelstein PH. Orpharyngeal colonization with Legionella pneumophila. J. Clin. Microbiol. 16:1108-1112, 1983.

32. Edelstein PH. Culture diagnosis of Legionella infections. Zbl. Bakt. Hyg., I. Abt. Orig. A. 255:96-101, 1983.

33. Edelstein PH, Bibb WF, Gorman GW, Thacker WL, Brenner DJ, Wilkinson HW, Moss CW, Buddington RS, Dunn CJ, Roos PJ, Meenhorst PL. Legionella pneumophila serogroup 9: a cause of human pneumonia. Ann. Intern. Med. 101:196-198, 1984.

34. Edelstein PH, Calarco K, Yasui VK. Antimicrobial therapy of experimentally induced Legionnaires' disease in guinea pigs. Am. Rev. Resp. Dis. 130:849-856, 1984.

35. Gorman GW, Feeley JC, Steigerwalt A, Edelstein PH, Moss CW, Brenner DJ. Legionella anisa: A new species of Legionella isolated from potable waters and a cooling tower. Appl. Environ. Microbiol. 49:305-309, 1985.

36. Edelstein, PH. Imipenem in Legionnaires' disease. [Letter] Lancet. 2:757, 1984.

37. Shands KN, Ho JL, Meyer RD, Gorman GW, Edelstein PH, Mallison GF, Finegold SM, Fraser DW. Potable water as a source of Legionnaires' disease. JAMA 253:1412-1416, 1985.

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PA bill 2085 comments

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1) Underemphasis of wet cooling tower regulation
    a. While it is true that Legionnaires' disease (LD) epidemics are rare, when they occur many people may be affected depending on the route of airborne dissemination. Cooling tower outbreaks can be explosive and cause disease in hundreds of people(1, 2), and demand specific language in the bill. The bill currently focuses on potable water as the cause of LD, deemphasizing the critical role of cooling tower management for the potential reduction of LD cases. Proper water treatment, disinfection and distribution cannot prevent cooling tower-caused LD, and in some cases non-potable water, such as river water, is used for cooling towers.
    b. The sources of sporadic LD (usually single unrelated cases) aren't established with certainty, but it is likely that a significant fraction, at least 20%, of these are caused by Legionella-colonized cooling towers(3-5).
    c. The claim that the source of LD is the drinking water supply, and that therefore water supply companies are responsible for LD cases downstream of the water treatment plant is misleading. Additional factors not under the control of the water supply company play a huge role in causing LD (ASHRAE 188-2021 states "The presence of Legionella bacteria in building water systems is not sufficient to cause LD"). These include improper wet cooling tower maintenance and siting, plumbing use and design in buildings and factories, water usage in buildings, use of devices that remove disinfectants from supplied water, improper maintenance of hot tubs, industrial processes that use water and other factors.
    d. Legislation regulating cooling towers comes at high regulatory costs, requiring sufficient public health infrastructure for cooling tower registration, review of periodic culture results and enforcement of infractions. It also comes at high costs to business and governmental bodies. Whether national, regional or local cooling tower regulation has reduced LD incidence is not established, although it is appealing. Regardless, the bill does not establish funding for state and local regulatory agencies and public health departments and must do so.
2) Role of public health agencies
    Any regulatory requirement concerning monitoring of water for the presence of Legionella bacteria in homes or other sites, determining the link between a case of LD and bacteriologic and epidemiologic findings, and enforcement of regulations

will increase the workload of state and local public health departments. Funding of public health departments including hiring additional personnel, and delineation of which regulatory authorities will oversee such a scheme needs to clarified.

3) LD case investigation

The proposed bill calls for epidemologic investigation of each reported case of LD, and as part of an investigation environmental inspection of homes and other locations of people with LD. This is likely to be unproductive for several reasons:

a) Linking a positive environmental water culture with a case of LD requires a bacterial isolate from the patient; this occurs in the minority of cases of LD, especially sporadic cases because most hospital laboratories lack the capabilities to isolate the bacterium from LD patients and even if they do culture yield is low. About 4% of reported US LD cases have a positive culture for the bacterium(6), meaning that more than 90% of home or business site surveys will be meaningless because of the inability to link a positive culture to a LD case bacterial isolate. Simply finding Legionella bacteria in the home environment does not establish that the bacterium caused the patient's disease because the bacteria are commonly found in homes of those without the disease. A recent study of New Jersey single family residences found that 12 to 53% of homes of people who had no history of LD contained Legionella bacteria by culture and DNA detection, respectively. The figures for homes of those with a history of LD were positive 19 and 63%, by culture and DNA detection, respectively(7). The futility of residential, workplace and visited location investigation of sporadic cases of LD is illustrated by the experience of Dutch public health officials; over a ten year period extensive environmental investions were conducted for the source of LD in1991 persons; 1.9% of cases implicated an environmental source and when confined to non-health care cases only 1.2% of investigations found a link between the investigated environment and the person's LD(8). Only 0.3% of home investigations found a link between environmental sources and a person's LD. During these investigations, Legionella spp. bacteria were found in about 25% of sampled environmental sites, indicating that the presence of the bacterium in the environment can not be used by itself to implicate the site as the source of the disease. Not only is home environmental investigation uninformative more than 99% of the time, so are environmental investigations of locations outside the home. Environmental investigations should be reserved for LD outbreaks where there is solid epidemiologic evidence of a common source outbreak. Only about 5% of US LD cases are linked to a common source outbreak. Investigating unlinked cases of LD is costly and unuseful.

b) Section 6706 of the bill requires an epidemiologic investigation of each reported case of LD, including determining the potential source of infection. This includes determination of disruption of residential water supplies and investigation of home water fixtures, as well as determining potential water exposures outside the home.

c) Section 6707 of the bill requires cultures for L. pneumophila as part of any water management plan. Water management plan requirements per ASHRAE 188-2021building water management plans and 12-203.
d) Unfunded regulatory overreach – requiring owners of all buildings in the state other than single dwelling homes to conduct a risk survey annually per 188-2021. In addition, each time a renovation, addition or modification is made to the building a new survey is required. Every free-standing coffee shop, every shoe repair shop, every gas station, every contractor building a duplex apartment building, every restaurant and bar, etc. Since the standard does not define renovation, addition or modification, it is unclear whether a coffee shop owner adding new countertops, or a car dealer replacing floor tiles would need to perform and certify compliance. How the state will determine the compliance with the code for all these types of buildings, including inspection, etc. is not stated nor funded in the bill.
e) Free-standing cooling towers are not covered by ASHRAE 188-2021, as they are not in human-occupied buildings. Such cooling towers at power plants, industrial facilities, paper processing plants and other places can be a significant cause of LD(9-11). If the intention of the bill is to reduce the risk of community LD then such sources must be included in the regulations.
f) ASHRAE 188-2021 does not mention displays of hot tubs at public events, as these are transient events in otherwise compliant buildings. Water spa exhibits at public events can cause large LD outbreaks and require regulation in a bill designed to control LD (12, 13).
g) Contrary to ASHRAE 188-2021, this bill requires routine environmental cultures to comply with a building water safety plan.

1. Garcia-Fulgueiras A, Navarro C, Fenoll D, Garcia J, Gonzales-Diego P, Jimenez-Bunuelas T, et al. Legionnaires' disease outbreak in Murcia, Spain. Emerg Infect Dis. 2003;9(8):915-21.
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6. Centers for Disease Control. Legionnaires' disease surveillance summary report, United States 2014-20152019 2/28/2020. Available from: https://www.cdc.gov/legionella/health-depts/surv-reporting/2014-15-surv-report-508.pdf.
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9. Blatny JM, Fossum H, Ho J, Tutkun M, Skogan G, Andreassen O, et al. Dispersion of *Legionella*-containing aerosols from a biological treatment plant, Norway. Front Biosci. 2011;3:1300-9.
10. Nygard K, Werner-Johansen O, Ronsen S, Caugant DA, Simonsen O, Kanestrom A, et al. An outbreak of legionnaires disease caused by long-distance spread from an industrial air scrubber in Sarpsborg, Norway. Clin Infect Dis. 2008;46(1):61-9.
11. Nguyen TM, Ilef D, Jarraud S, Rouil L, Campese C, Che D, et al. A community-wide outbreak of legionnaires disease linked to industrial cooling towers--how far can contaminated aerosols spread? J Infect Dis. 2006;193(1):102-11.
12. Donovan CV, MacFarquhar JK, Wilson E, Sredl M, Tanz LJ, Mullendore J, et al. Legionnaires' Disease Outbreak Associated With a Hot Tub Display at the North Carolina Mountain State Fair, September 2019. Public Health Rep. 2024;139(1):79-87.
13. den Boer JW, Yzerman EP, Schellekens J, Lettinga KD, Boshuizen HC, Van Steenbergen JE, et al. A large outbreak of Legionnaires' disease at a flower show, the Netherlands, 1999. Emerg Infect Dis. 2002;8(1):37-43.

PA bill 2085 comments

Paul H. Edelstein, M.D.

1) Underemphasis of wet cooling tower regulation
    a. While it is true that Legionnaires' disease (LD) epidemics are rare, when they occur many people may be affected depending on the route of airborne dissemination. Cooling tower outbreaks can be explosive and cause disease in hundreds of people(1, 2), and demand specific language in the bill. The bill currently focuses on potable water as the cause of LD, deemphasizing the critical role of cooling tower management for the potential reduction of LD cases. Proper water treatment, disinfection and distribution cannot prevent cooling tower-caused LD, and in some cases non-potable water, such as river water, is used for cooling towers.
    b. The sources of sporadic LD (usually single unrelated cases) aren't established with certainty, but it is likely that a significant fraction, at least 20%, of these are caused by Legionella-colonized cooling towers(3-5).
    c. The claim that the source of LD is the drinking water supply, and that therefore water supply companies are responsible for LD cases downstream of the water treatment plant is misleading. Additional factors not under the control of the water supply company play a huge role in causing LD (ASHRAE 188-2021 states "The presence of Legionella bacteria in building water systems is not sufficient to cause LD"). These include improper wet cooling tower maintenance and siting, plumbing use and design in buildings and factories, water usage in buildings, use of devices that remove disinfectants from supplied water, improper maintenance of hot tubs, industrial processes that use water and other factors.
    d. Legislation regulating cooling towers comes at high regulatory costs, requiring sufficient public health infrastructure for cooling tower registration, review of periodic culture results and enforcement of infractions. It also comes at high costs to business and governmental bodies. Whether national, regional or local cooling tower regulation has reduced LD incidence is not established, although it is appealing. Regardless, the bill does not establish funding for state and local regulatory agencies and public health departments and must do so.
2) Role of public health agencies
    Any regulatory requirement concerning monitoring of water for the presence of Legionella bacteria in homes or other sites, determining the link between a case of LD and bacteriologic and epidemiologic findings, and enforcement of regulations

will increase the workload of state and local public health departments. Funding of public health departments including hiring additional personnel, and delineation of which regulatory authorities will oversee such a scheme needs to clarified.

3) LD case investigation

The proposed bill calls for epidemologic investigation of each reported case of LD, and as part of an investigation environmental inspection of homes and other locations of people with LD. This is likely to be unproductive for several reasons:

a) Linking a positive environmental water culture with a case of LD requires a bacterial isolate from the patient; this occurs in the minority of cases of LD, especially sporadic cases because most hospital laboratories lack the capabilities to isolate the bacterium from LD patients and even if they do culture yield is low. About 4% of reported US LD cases have a positive culture for the bacterium(6), meaning that more than 90% of home or business site surveys will be meaningless because of the inability to link a positive culture to a LD case bacterial isolate. Simply finding Legionella bacteria in the home environment does not establish that the bacterium caused the patient's disease because the bacteria are commonly found in homes of those without the disease. A recent study of New Jersey single family residences found that 12 to 53% of homes of people who had no history of LD contained Legionella bacteria by culture and DNA detection, respectively. The figures for homes of those with a history of LD were positive 19 and 63%, by culture and DNA detection, respectively(7). The futility of residential, workplace and visited location investigation of sporadic cases of LD is illustrated by the experience of Dutch public health officials; over a ten year period extensive environmental investions were conducted for the source of LD in1991 persons; 1.9% of cases implicated an environmental source and when confined to non-health care cases only 1.2% of investigations found a link between the investigated environment and the person's LD(8). Only 0.3% of home investigations found a link between environmental sources and a person's LD. During these investigations, Legionella spp. bacteria were found in about 25% of sampled environmental sites, indicating that the presence of the bacterium in the environment can not be used by itself to implicate the site as the source of the disease. Not only is home environmental investigation uninformative more than 99% of the time, so are environmental investigations of locations outside the home. Environmental investigations should be reserved for LD outbreaks where there is solid epidemiologic evidence of a common source outbreak. Only about 5% of US LD cases are linked to a common source outbreak. Investigating unlinked cases of LD is costly and unuseful.

b) Section 6706 of the bill requires an epidemiologic investigation of each reported case of LD, including determining the potential source of infection. This includes determination of disruption of residential water supplies and investigation of home water fixtures, as well as determining potential water exposures outside the home.

c) Section 6707 of the bill requires cultures for L. pneumophila as part of any water management plan. Water management plan requirements per ASHRAE 188-2021building water management plans and 12-203.
d) Unfunded regulatory overreach – requiring owners of all buildings in the state other than single dwelling homes to conduct a risk survey annually per 188-2021. In addition, each time a renovation, addition or modification is made to the building a new survey is required. Every free-standing coffee shop, every shoe repair shop, every gas station, every contractor building a duplex apartment building, every restaurant and bar, etc. Since the standard does not define renovation, addition or modification, it is unclear whether a coffee shop owner adding new countertops, or a car dealer replacing floor tiles would need to perform and certify compliance. How the state will determine the compliance with the code for all these types of buildings, including inspection, etc. is not stated nor funded in the bill.
e) Free-standing cooling towers are not covered by ASHRAE 188-2021, as they are not in human-occupied buildings. Such cooling towers at power plants, industrial facilities, paper processing plants and other places can be a significant cause of LD(9-11). If the intention of the bill is to reduce the risk of community LD then such sources must be included in the regulations.
f) ASHRAE 188-2021 does not mention displays of hot tubs at public events, as these are transient events in otherwise compliant buildings. Water spa exhibits at public events can cause large LD outbreaks and require regulation in a bill designed to control LD (12, 13).
g) Contrary to ASHRAE 188-2021, this bill requires routine environmental cultures to comply with a building water safety plan.

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PENNSYLVANIA AMERICAN WATER

TESTIMONY ON PENNSYLVANIA HOUSE BILL 2085

July 20, 2026

Dear Chairman Burgos & Chairman Metzgar,

American Water appreciates the committee's focus and attention on the control and prevention of waterborne disease in drinking water and the opportunity to provide written feedback on HB2085. American Water provides drinking water and wastewater service to an estimated 14 million people in 14 states, including in Pennsylvania, where we provide homes and businesses with safe, clean, reliable drinking water.

The greatest opportunity to protect public health lies in the portions of this legislation that focus on building management plans and premise plumbing. These risks are recognized and well documented by the U.S. Environmental Protection Agency and the Centers for Disease Control and Prevention and should be the focal point of the final legislation.

However, the sections of the legislation that focus on drinking water systems are not based on sound science, were not developed through established processes, and will place undue burden on drinking water systems without clear improvement in drinking water quality or public health protection. In fact, regulations applicable to drinking water systems are already in place to address the issues raised in the legislation, and processes exist to revise these requirements when appropriate. As such, the final legislation should be amended to recognize the current situation and build upon the existing regulatory requirements and framework.

We believe the purpose of this bill is well-intended and look forward to working with you in the development of final legislation that will lead to improved public health protection in Pennsylvania.

Sincerely,

Matthew J. Corson

Matthew J. Corson, P.E.
Senior Principal, Environmental Policy and Planning

PENNSYLVANIA AMERICAN WATER
TESTIMONY ON PENNSYLVANIA BILL HB2085
July 20, 2026

Duties of Building Owners and Operators (Section 6707)

The greatest opportunity to protect public health lies in the portions of the legislation that focus on building management plans and premise plumbing. These risks are recognized and well documented by the U.S. Environmental Protection Agency (U.S, EPA) and the Centers for Disease Control and Prevention (CDC) and should be the focal point of the final legislation.

Specifically, both the U.S. EPA and CDC provide recommendations for building management plants that focus on:

- Managing hot and cold water temperatures
- Preventing water stagnation through regular use and flushing
- Maintaining plumbing fixtures and aerosol-producing devices
- Implementing building-appropriate water management practices

This underscores the importance of requiring building management plans as proposed in the legislation.

However, while the proposed legislation requires building owners to execute plans and make them available for review, it lacks a requirement for the PA Department of Health (PA DOH) to provide direct oversight of the execution of said plans. This is a necessary step for ensuring overall effectiveness of the process.

Investigating Legionella Cases (Section 6706)

The legislation should be revised to retain the requirement for PA DOH to investigate reported cases of Legionnaires Disease while providing them with the necessary flexibility to develop a process that is effective and implementable. The CDC web site *About Legionnaires' Disease Investigations* provides information to be considered when performing such an investigation (link provided below).

PA DOH needs to be very mindful when developing a dashboard on reported legionella cases to ensure that the public can clearly and easily understand the information. This includes what the data represents but also what it does not represent so as to avoid potential misinterpretation or misuse. Water systems and other interested parties should have the opportunity to review and provide feedback on the draft dashboard prior to finalization.

Minimum Numeric Disinfectant Residual Levels (Section 6703) and Response to Low Disinfectant Residuals and Customer Notification (Section 6705)

The Pennsylvania Department of Environmental Protection (PA DEP) currently requires water systems to maintain a minimum numeric disinfectant residual level of 0.2 mg/L. This level was developed through the established regulatory development process. Any changes to the required level should follow the same process which allows for key activities including review of existing science and public review and comment on the proposed rule.

Likewise, PA DEP also has established requirements for responding to low disinfectant residuals, any changes to these requirements should be through the established process to allow for appropriate development, review, and comment.

Any changes to the disinfectant residual requirement would need to consider the total impact of the change and specifically the need to address increases in disinfection byproducts (DBPs) as disinfectant residuals are increased. Costs associated with any changes would include both capital costs for construction as well as on-going operations and maintenance (O&M) costs.

These costs must also be viewed in terms of overall customer affordability. Water systems are working with limited resources and already have multiple priorities, including lead service line replacement and installing treatment to meet the new limits for perfluorinated (PFAS) compounds. Customer affordability remains a priority and key concern, so we must ensure that new requirements that come from this legislation are based on sound science and incorporate best practices. As a water utility regulated by the Pennsylvania Public Service Commission, new costs associated with additional compliance obligations would be included in the cost of service and recoverable in the water rates charged to our customers.

Further, to the extent that any new regulations create additional costs, all water utility providers, regardless of ownership, should have equal access to any and all state and federal funding that may be available to support compliance with new requirements. Customers in all types of systems should have the opportunity to benefit from available funding.

Any provisions related to Best Management Practices (BMPs) and Distribution System Maintenance Plans that are included in the final legislation should require development through existing regulatory processes. The legislation should include examples of what could be included in each (e.g. might or may) without being prescriptive (e.g., will or shall).

Environmental Rules and Regulations – Implementation of Minimum Disinfectant Residual (Section 6705) and Health Rules and Regulations (Section 6709)

The final legislation must include adequate time for water systems to understand the requirements, determine their current situation, make plans for any necessary improvements, and execute said plans (which may include design, permitting, funding, and construction).

The current legislation appears to require the development of regulations to implement the requirements in this bill within 24-month, but the bill is unclear on the amount of time that will be provided to water systems to comply with the new requirements once established in regulation. Although water systems will know the overarching requirements based on the final bill, water systems will not be able to initiate any necessary modifications or improvements until PA DEP finalizes the associated regulations to ensure that they meet the new regulatory requirements. Taking action prior to this risks not meeting the requirement. For proposed new requirements like those contemplated by the legislation, water systems typically need at least 3 years to determine actions needed, design, receive required permits, secure funding, and complete necessary construction. The final compliance deadline must be clearly articulated in the final bill to provide water systems with the time needed to prepare for compliance.

The final legislation must also clearly indicate roles and responsibilities for PA DEP and PA DOH in Sections 6705 and 6709, respectively. As currently written, there could be misinterpretation as to which deadlines apply to which sections.

Definition of *Disruption of Public Water System* (Section 6702) and Reporting Disruptions (Section 6704)

PA DEP has already established definitions for *Disruption of Public Water System* and requirements for reporting disruptions under 25 Pa Code Chapter 109. As such, the proposed definitions should be removed from the final legislation to avoid confusion and potential contradiction with those definitions. Further, PA DEP or PA DOH should use currently reported information to meet any data needs.

In addition to being duplicative to existing definitions, the proposed definitions are unclear and / or unnecessary:

- Paragraph (1) should be clarified to capture significant changes to, or more likely failures in, the water treatment process. This would include challenges related to providing required disinfection and is not intended to capture minor alterations in chemical feed rates or challenges with other chemical feeds, which could be interpreted as "changes in the water treatment process" under the current definition.
- Paragraph (3) is not necessary since changes to source water require review and approval by PA DEP.
- Paragraph (4) should be expanded to clarify that this is focused on risks in water quality related to legionella. This would avoid confusion and misapplication when considering risks from chronic contaminants or other factors that are not related to legionella.

Links

https://www.epa.gov/indoor-air-quality-iaq/legionella-indoor-environment

https://www.ashrae.org/technical-resources/bookstore/ansi-ashrae-standard-188-2021-legionellosis-risk-management-for-building-water-systems

https://www.cdc.gov/control-legionella/about/index.html

https://www.cdc.gov/legionella/causes/index.html

Testimony Attachment

Submitted by: Susan K. Emswiler

To: Representative Ismeal Smith-Wade-El

49th District

Regarding: Metabolic Encephalopathy Associated with Legionnaires' Disease

For: Pennsylvania House of Representatives

Date: July 11, 2026

METABOLIC ENCEPHALOPATHY ASSOCIATED WITH LEGIONNAIRES' DISEASE

OVERVIEW

Metabolic encephalopathy is a condition in which global brain function becomes impaired due to metabolic disturbances in the body, not from a structural brain injury such as a stroke or tumor. It is often reversible if the underlying cause is identified and treated promptly. Legionnaires' disease, a severe pneumonia caused by Legionella bacteria, is a documented infectious cause of metabolic encephalopathy.

CAUSES

Any systemic illness that disrupts brain metabolism can cause metabolic encephalopathy. In Legionnaires' disease, multiple mechanisms contribute:

Category: Severe infection / Sepsis

Legionnaires' Disease Mechanism: Legionella produces bacterial endotoxins and cytotoxins that can directly affect brain function. The systemic inflammatory response also contributes to cerebral dysfunction.

Category: Organ failure

Legionnaires' Disease Mechanism: Acute kidney injury and rhabdomyolysis occur in Legionnaires' disease and can lead to uremic encephalopathy secondarily.

Category: Electrolyte imbalances

Legionnaires' Disease Mechanism: Hyponatremia is a hallmark of Legionnaires' disease, with sodium levels <130 mEq/L commonly reported. Severe low sodium is a major driver of encephalopathy.

Category: Hypoxia

Legionnaires' Disease Mechanism: Pneumonia in Legionnaires' disease frequently causes hypoxia. Case reports document arterial pO2 as low as 58.2 mmHg, which impairs cerebral metabolism.

Category: Bacterial toxins

Legionnaires' Disease Mechanism: Legionella produces specific neurotoxins that have been linked to encephalopathy.

Category: Dehydration / Hypotension

Legionnaires' Disease Mechanism: High fever, vomiting, diarrhea, and poor oral intake are common in Legionnaires' disease, leading to volume depletion and low blood pressure.

SYMPTOMS

Symptoms reflect global cerebral dysfunction and related systemic stress. Up to 50% of patients with Legionnaires' disease develop neurologic symptoms during acute illness.

Neurologic symptoms include:

- Confusion and disorientation
- Slurred speech (dysarthria), often an early sign
- Poor balance and coordination (ataxia), which may cause stumbling or falls

- Sleepiness, lethargy, or stupor, progressing to coma in severe cases
- Agitation or personality changes
- Seizures, especially with severe hyponatremia
- Memory deficits, which may persist after recovery

Symptoms related to reduced cerebral blood flow or oxygen:

- Fainting (syncope) or near-fainting — Due to dehydration, sepsis, hyponatremia, or hypoxia. Fever, vomiting, and diarrhea in Legionnaires' disease can cause volume loss and hypotension when standing.
- Dizziness or "graying out," often preceding fainting
- Generalized weakness from infection, rhabdomyolysis, and electrolyte shifts

Other associated symptoms from Legionnaires' disease:

- High fever, chills, and cough
- Shortness of breath and low oxygen saturation
- Muscle aches and rhabdomyolysis, with creatine kinase levels >15,000 reported

BODY SYSTEMS AFFECTED

1. Neurologic system: Primary site of dysfunction, producing the symptoms listed above.
2. Cardiovascular system: Sepsis and dehydration from Legionnaires' disease cause hypotension and tachycardia, contributing to fainting and reduced cerebral perfusion.
3. Respiratory system: Hypoxia from pneumonia directly worsens encephalopathy.

4. Renal/electrolyte system: Acute kidney injury and hyponatremia are common and directly precipitate encephalopathy.
5. Musculoskeletal system: Rhabdomyolysis and generalized weakness add metabolic stress.

TREATMENT

Treatment targets the underlying cause. For metabolic encephalopathy due to Legionnaires' disease:

1. Treat the infection: Prompt antibiotic therapy with macrolides, quinolones, or tetracyclines. Duration is typically 7–14 days for uncomplicated cases.
2. Correct metabolic derangements: Carefully correct hyponatremia, manage acute kidney injury, and treat rhabdomyolysis. Sodium must be corrected slowly to avoid osmotic demyelination syndrome.
3. Support vital functions: Provide supplemental oxygen for hypoxia, intravenous fluids for dehydration and hypotension, and vasopressors for septic shock if indicated.
4. Prevent secondary brain injury: Control fever and seizures, avoid sedating agents that worsen confusion, and monitor for aspiration risk in patients with reduced consciousness.

PROGNOSIS

Encephalopathy and related symptoms, including fainting, typically resolve as the Legionnaires' disease is treated and metabolic abnormalities are corrected. Neurologic symptoms in Legionnaires' disease are not associated with increased mortality. Some patients report persistent memory deficits, but long-term susceptibility to encephalopathy has not been established in the absence of permanent organ damage.

PATIENT INFORMATION: WHEN TO SEEK URGENT MEDICAL EVALUATION

Seek urgent medical evaluation if you have Legionnaires' disease and experience:

Fainting or passing out — especially if it occurs more than once

Confusion, slurred speech, or behavior changes lasting more than a few minutes

Severe weakness or falling due to balance problems

Trouble breathing, chest pain, or bluish lips/fingertips

High fever over 103°F with vomiting or diarrhea and inability to keep fluids down

Seizure or shaking

Why this matters: Fainting or confusion may indicate dangerously low blood pressure, oxygen, or sodium levels, or that the infection is affecting brain function. These symptoms require prompt hospital evaluation.

CLINICAL INFORMATION: RED FLAGS FOR PROVIDERS

Urgent evaluation is indicated for patients with Legionnaires' disease plus any of the following:

Syncope/Presyncope — May reflect dehydration, sepsis, hyponatremia, hypoxia, or arrhythmia

Acute Altered Mental Status — Confusion, dysarthria, ataxia; consider metabolic encephalopathy

Persistent Neurologic Deficits Post-Syncope — Helps distinguish encephalopathy from simple vasovagal event

Vital Sign Instability — Systolic BP <90 mmHg, HR >120, RR >30, SpO2 <92% on room air, Temp >104°F

Critical Laboratory Findings — Sodium <130 mEq/L, pO2 <60 mmHg, elevated lactate, acute kidney injury, CK >10,000, procalcitonin >5

Clinical Note: Neurologic manifestations occur in approximately 50% of Legionnaires' disease cases and may precede respiratory decompensation. Hyponatremia and hypoxia are common drivers of both syncope and encephalopathy.

STATEMENT FOR THE RECORD

This document is submitted by Susan K. Emswiler as an attachment to formal testimony before the Pennsylvania House of Representatives. It outlines the medical basis for metabolic encephalopathy as a direct complication of Legionnaires' disease, based on peer-reviewed clinical literature.

The intent of this submission is to ensure that the neurologic and systemic impacts of Legionnaires' disease are accurately recognized in public health and legislative discussions.

Submitted by: Susan K. Emswiler

To: Representative Ismeal Smith-Wade-El, 49th District

Location: Lancaster, Pennsylvania

Date: July 11, 2026

Submitted to: Representative Ismail Smith-Wade-El, Pennsylvania House District 49
From: Susan K. Emswiler, Lancaster, PA
Date: July 10, 2026
Re: Patient Testimony in Support of Legionnaires' Disease Investigation and Prevention Legislation

My name is Susan K. Emswiler. I am a resident of Lancaster, Pennsylvania, and I am submitting this testimony as a patient diagnosed with Legionnaires' disease.

1. Displacement and Lodging
Due to heating system failures at my home in late 2025, I was displaced and required temporary lodging. I stayed at the Eden Resort and Suites, 222 Eden Road, Lancaster, PA on: November 22 to 26, 2025; November 30 to December 2, 2025; and December 8 to 9, 2025.

During each stay, I requested the same room due to my husband's disability. It is helpful for him to be familiar with his surroundings. Upon checking into our room, the vanity sink had standing water. I informed the Front Desk but nothing was done. There did not appear to be a drip but the possible cause was water coming up the drain.

2. Diagnosis and Hospitalization
On December 17, 2025, I was admitted to Penn Medicine - Lancaster General Hospital with symptoms of fever, muscle and body pain, headaches, chest pain, cough, weakness, and confusion. Upon admission I was so weak I could not get out of bed and was unable to walk. I was hallucinating and delirious. I had no comprehension of where I was or who I was with.

My family was told I may have been having a stroke because of my confusion. They were also told my infection was worsening and it was critical to find the correct antibiotic, because if sepsis set in, it would be very serious.

I remained hospitalized until December 21, 2025. My discharge diagnoses included Legionnaires Pneumonia, Right Lower Lobe Pneumonia, Acute Encephalopathy, seizure-like activity, and secondary diagnoses of diabetes mellitus, asthma, hypertension, and high cholesterol.

I personally question why both health facilities were not forthcoming about the fact that I had Legionnaires' disease and did not provide information on the physical and mental effects it can have. I only learned of my diagnosis when I read my discharge papers from both facilities. I asked my family if they were ever told my diagnosis or given any information about it, and they said no.

3. Attempts to Report
Following my diagnosis, I made multiple telephone calls to the Eden Resort and Suites to report my illness and my concern about a potential exposure source. I was told the matter would be investigated and that someone would get back to me. I never received any follow-up information, findings, or confirmation that any investigation or remediation was completed.

I also contacted the Pennsylvania Department of Health to report my case. I was told by staff that the Department does nothing with individual reports except forward them to the CDC, and that no contact information for follow up was available.

4. Identified Gap in Public Health Protection
My experience indicates a significant gap in Pennsylvania's public health response. Patients who report a potential commercial source receive no follow up. The Department of Health does not conduct source investigation at the state level. Without investigation, building water systems that may harbor *Legionella* bacteria can remain in operation.

5. Request for Legislative Action
I respectfully request that Representative Smith-Wade-El consider introducing legislation to:

a. Require the Pennsylvania Department of Health to investigate confirmed cases of Legionnaires' disease to attempt to identify potential sources of exposure;

b. Establish mandatory inspection, testing, and remediation protocols for facilities linked to confirmed cases;

c. Create a transparent notification process so that reporting patients and the public are informed that an investigation has occurred and what corrective actions were taken;

d. Ensure that information regarding Legionnaires' investigations, environmental test results, and remediation actions is accessible to the affected patient and to the public, and that Pennsylvania's Right-to-Know Law shall not be used to deny access to this public health information.

Legionnaires' disease is preventable. Transparency is essential to prevention. Patients and the public should not be blocked from learning whether a facility where they were exposed has been tested or cleaned.

In closing, the aftereffects of Legionnaires' disease remain with you for an indefinite time. It has been seven months for me and some of the side effects that I am suffering from are the following:

- Headaches
- Confusion
- Mood changes, being grouchy and depressed
- Fatigue/insomnia
- Muscle weakness, attended therapy
- Balance issues, attended therapy
- Problems with thinking and remembering
- Passing out with little or no warning

I am willing to provide medical documentation and a log of my communications upon request. Thank you for your consideration.

Respectfully submitted,
Susan K. Emswiler
Lancaster, PA
July 10, 2026