CORONAVIRUS, LEGIONELLA & RE-COMMISSIONING WATER SYSTEMS

Columbus BOMA

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ECOLAB | NALCO Water

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- Ohio University Grad – Mech Eng
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  - Charleston, SC
- 13 years Nalco Water
  - Portland, OR
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- Enjoy travel, outdoors, music, time with family and friends

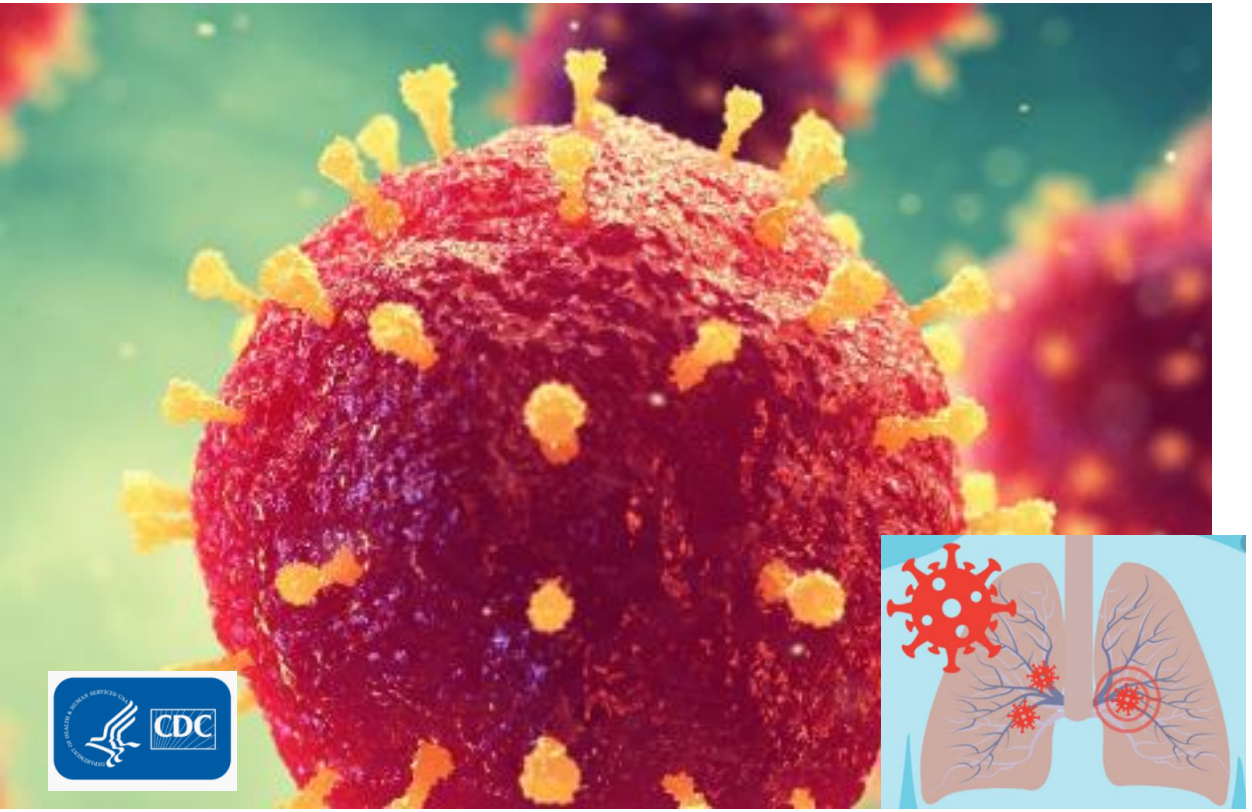
GOAL

- Purpose – Educate on challenges and risks associated with returning commercial buildings to normal occupancy
- Process – learn why low occupancy can lead to increase Legionella risk through short presentation and (hopefully) lots of questions
- Payoff – Everyone will know what steps can be taken to minimize risk as workers and tenants return to buildings

“WE DO NOT WANT TO TRADE A COVID-19 SITUATION WITH A *LEGIONELLA* EVENT WHEN WE OPEN UP”

– VICE PRESIDENT OF ENGINEERING

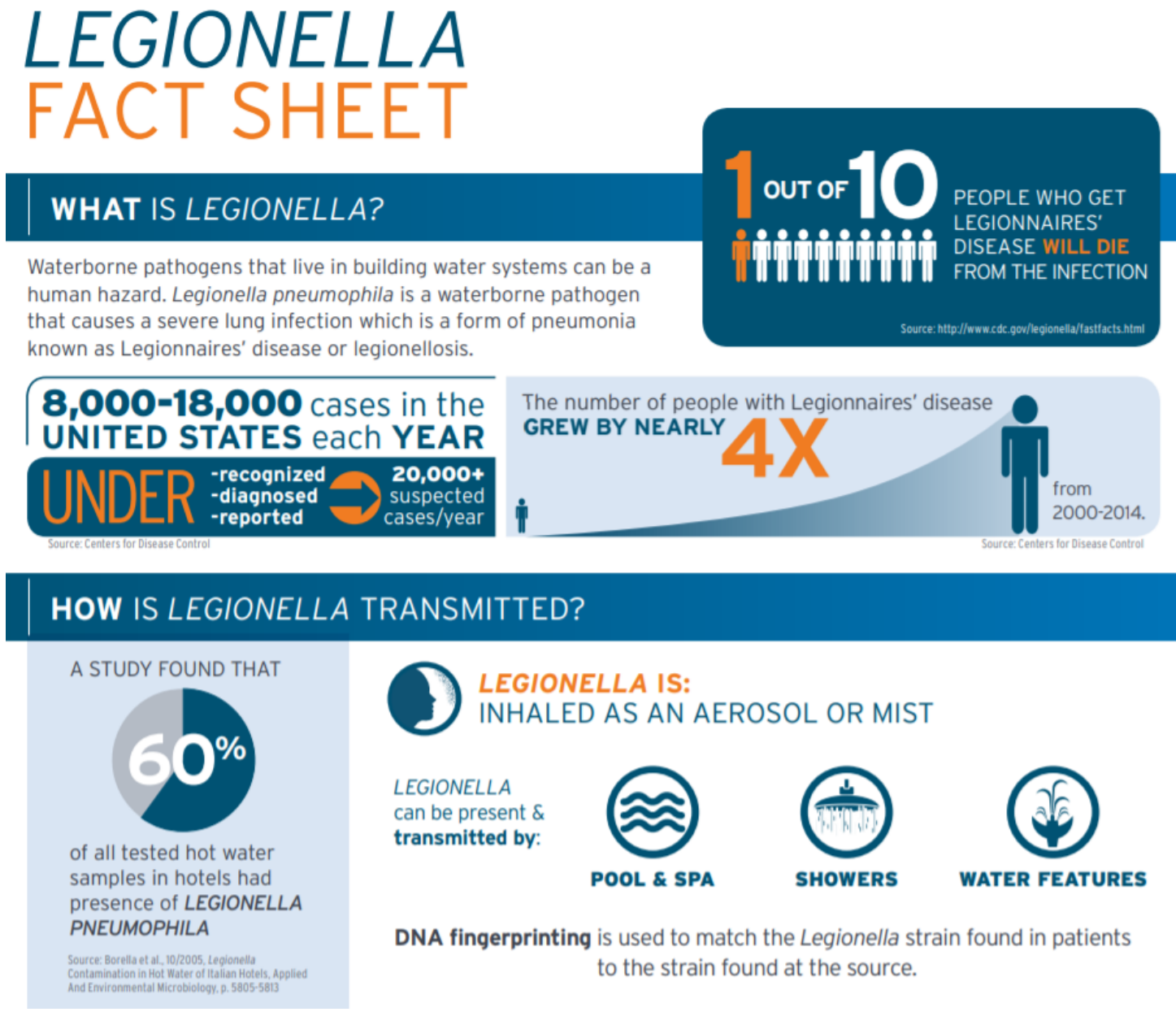
COVID-19



Legionella Bacteria

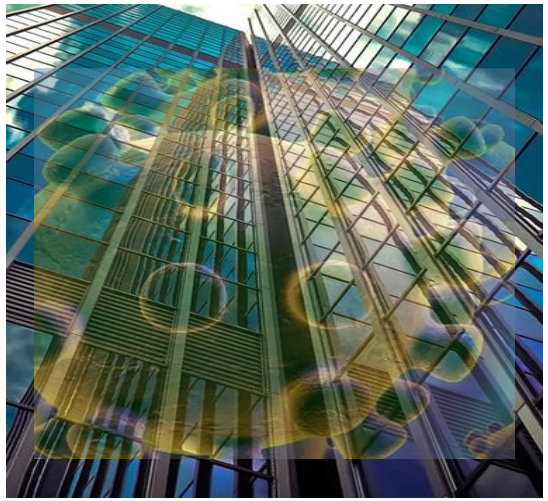
What is Legionella?

- Waterborne pathogen
- Must be breathed in
- Causes sever lung infection
- 1 out of 10 people die
- Elderly, immunocompromised, smokers higher risk
- Cases growing every year
- Prevalent in nature
- Needs biofilm to proliferate



COVID-19 RESULTING WATER CHALLENGES

How would your facility answer the following?



Challenges with Low Building Occupancy. Were Potable Water Systems Shut Down or Fully Operational?

Following Water Management Program? Are flushing protocols being followed?

Recent *Legionella* test results? History of issues?

Business Objectives Building Status

Decision

LOW TO ZERO OCCUPANCY

DO *NOT* SHUT DOWN COOLING WATER SYSTEMS

- Temperatures for comfort cooling or heating can be set to an energy conservation setting in lightly or unoccupied areas.
- Temperatures should never be allowed to drop below 12.8°C (55°F) or above 29.4°C (85°F)
- Humidity should be maintained between 40% and 60% relative humidity in occupied buildings and should never drop below 30% or above 65% in buildings closed for business.

COOLING WATER TREATMENT PROGRAM

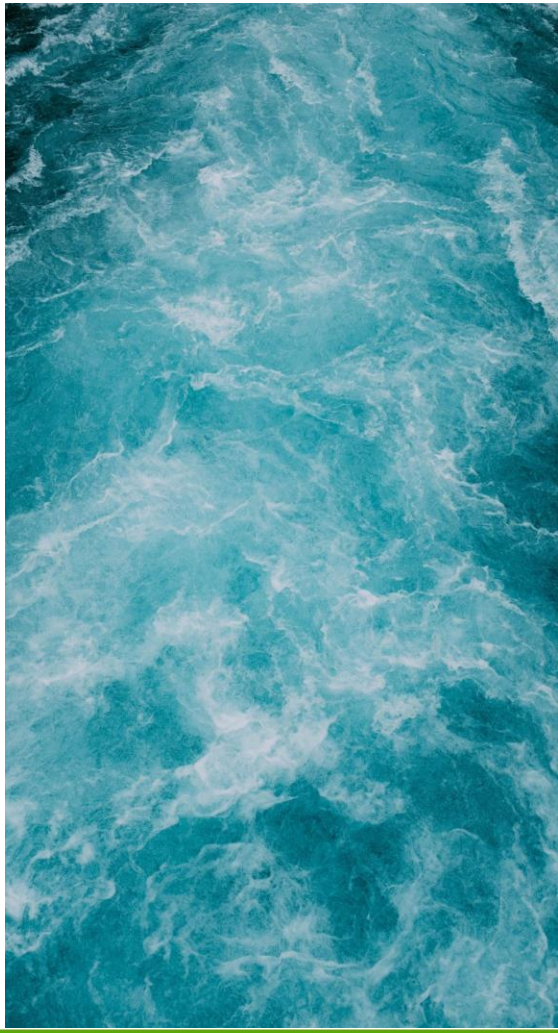
- The cooling water treatment program inclusive of all required monitoring and testing must be maintained throughout the duration of this period.

LOW TO ZERO OCCUPANCY

DO ***NOT*** SHUT DOWN Critical Water Systems

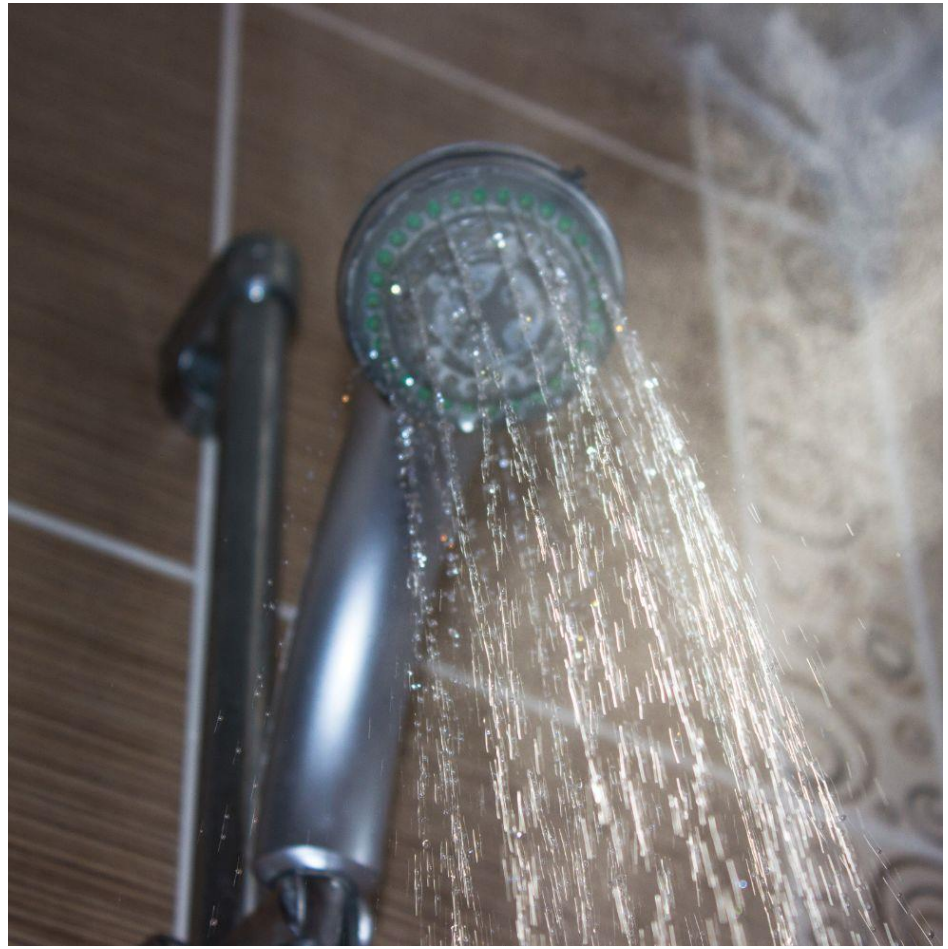
Examples of the critical equipment that should ***NOT*** be shut down include, but are not limited to:

- Fire pump & sprinkler system controls
- All domestic cold & hot water pumps
- All domestic hot water system must be operated to maintain the set point hot water temperature. DO ***NOT*** set back the water temperature.
- Sewage ejection pumps & sump pumps or lift stations (dewatering pumps)
- Building automation system
- Keep all HVAC system components operational to prevent later indoor air quality issues
  - E.g. Chillers, cooling towers, air handlers, MAUs, FUCs, exhaust fans, etc.
  - Some of this equipment can be set to energy saving modes if so equipped.



FLUSH WATER SYSTEMS DURING – LOW TO ZERO OCCUPANCY PERIOD

Depending on the length of the low to zero occupancy, it will be necessary to flow water at multiple locations throughout the building to prevent water from stagnating and to prevent the need for a required disinfection of the system later.

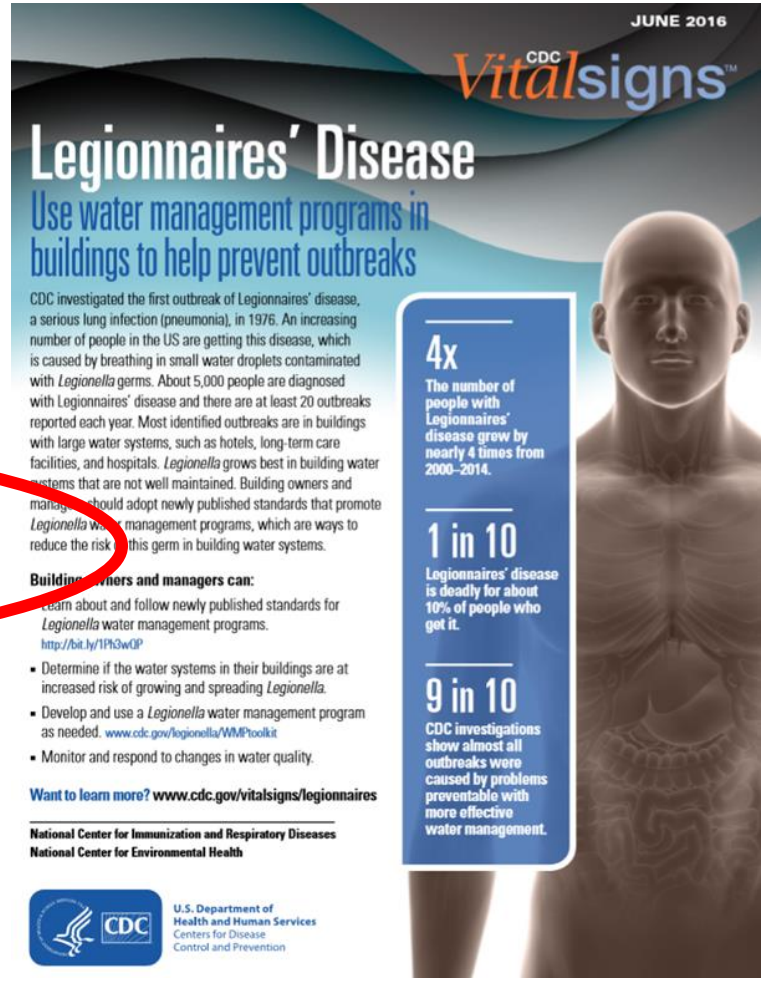


Outlets must be flushed weekly as follows

- In **guest rooms/rest rooms** that have not been occupied/used for more than 7 days, all hot and cold outlets (sinks, tubs, showerheads, and shower wands) must be flushed for at least 5 minutes.
- All showers in the **fitness center and associate locker rooms** that have not been used for 7 days must be flushed by running both hot and cold water through the showerhead and the shower hand wand (if fitted) for at least 5 minutes.

Legionella
Key Insights → Root Causes for Outbreaks

- "Inadequate disinfection in potable water"
- "Inadequate disinfection in cooling tower"
- "Inadequate disinfection in hot tub"
- "Disinfectant not routinely added to decorative fountain"
- "Stagnation… closed wing with unused potable water system"
- "Use of tap water in personal respiratory device"
- "Insufficient clinical testing for *Legionella* among patients with healthcare-acquired pneumonia"



SOURCE: US-CDC, MMWR, June 10, 2016

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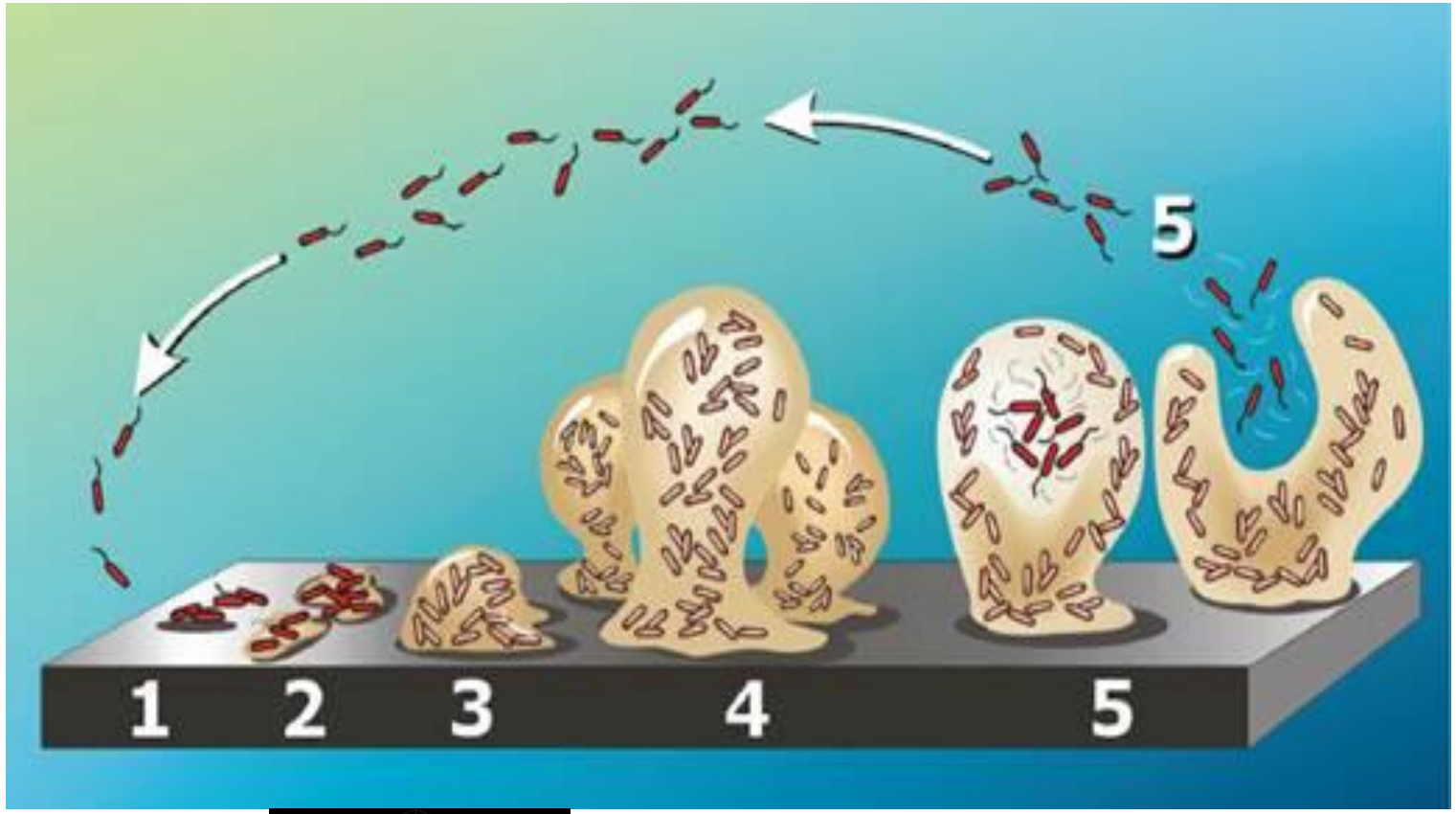
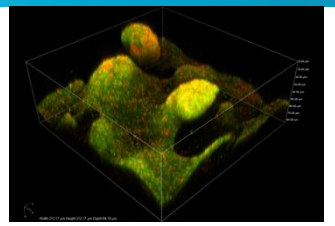
Biofilm Formation & Dispersal

- Bacteria attach to, colonize & form biofilm on surfaces
- Biofilms protects bacteria from disinfectants & heat, proliferate
- Released from Biofilm with shear from water flow

→ **Exposure risk to person using the outlet**





Center for Biofilm Engineering, Montana State University, Bozeman, MT (with thanks)

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RE-COMMISSIONING BUILDING DOMESTIC WATER SYSTEMS

FLUSH WATER SYSTEMS

Re-Commissioning Recommendations

- All outlets, sinks, facets, and toilets must be flushed at least one week before beneficial occupancy.
- Flushing of the system should begin at fixtures closest to the incoming main and should work outward to the fixtures furthest from the incoming main.
- Run all hot and cold-water faucets for 5 minutes before using the water.
- Flush toilets twice.
- Large buildings with water-holding reservoirs or cisterns should consult with their Facility Engineer and health department regarding the need to drain, disinfect, and refill the reservoir.

WHAT ARE MY CURRENT DOMESTIC WATER CONDITIONS?

- Have I followed guidelines?
- Do I test before I take action or open?
- What validation testing is recommended?
  - Copper and lead testing
  - Temperature within range
  - Oxidant levels
  - Legionella test (2-week results)*
- Do I have time to test?

Potential Contaminants in Stagnant Waters in Premise Plumbing

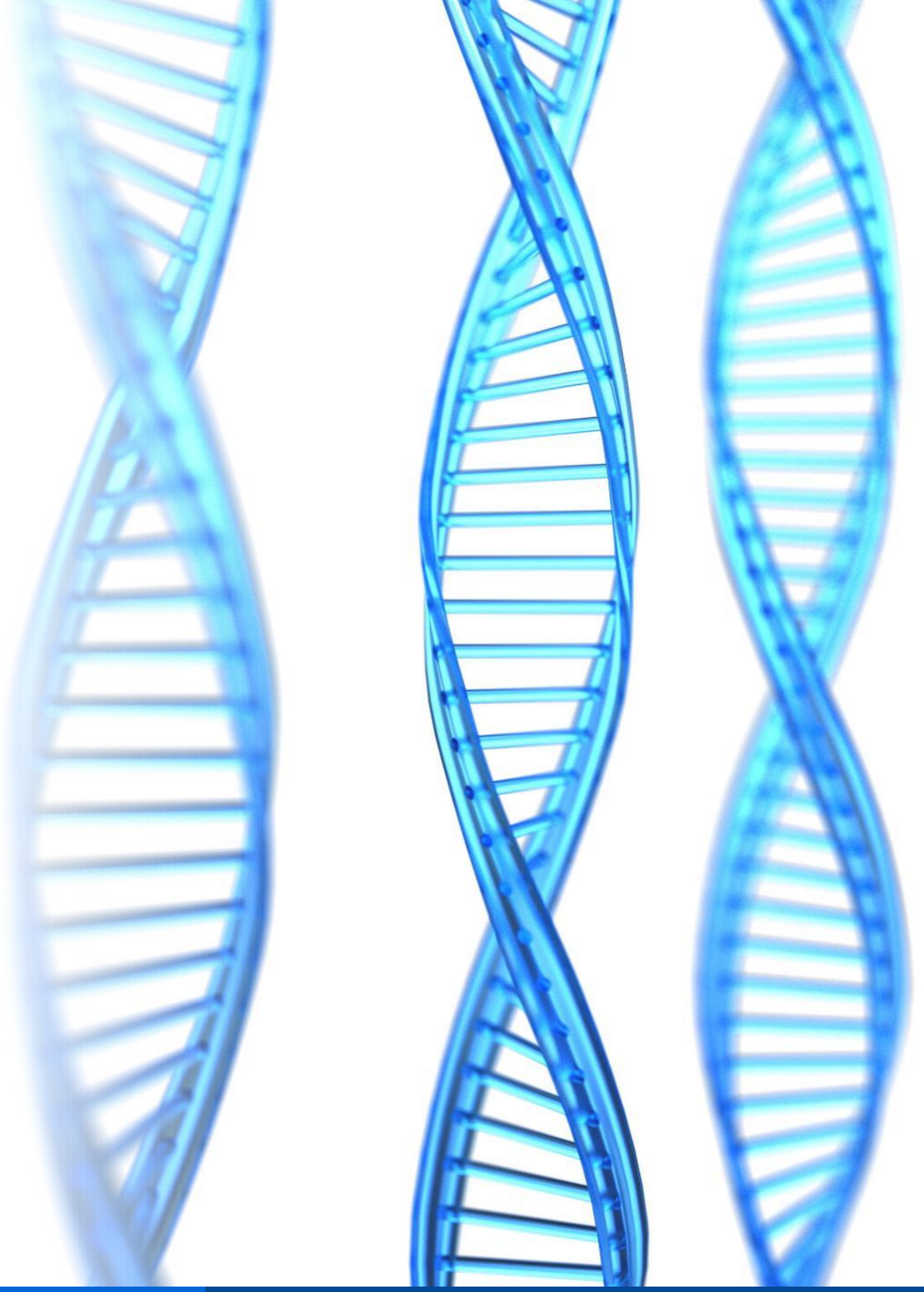
- Metals (lead and copper)
- Opportunistic pathogens (Legionella, Pseudomonas, non-tuberculosis mycobacteria)
- Organics (disinfection byproducts: trihalomethanes and haloacetic acids)

https://epa.ohio.gov/Portals/28/documents/pws/guidance-for-premise-plumbing-water-service-restoration.pdf

What is qPCR testing?

Quantitative Polymerase Chain Reaction

- **A molecular (DNA) based test for *Legionella* species**
- **Does not replace culture method**
  - ✓ *qPCR has no correlation to culture method*
  - ✓ *qPCR reports in Genomic Units (GU) and not CFU/mL*
- **More sensitive test**
- **Faster results**
  - ✓ *2 Options (1-day result or 4-day result upon receipt)*
  - ✓ *Absence/presence and quantitative result respectively*
- **Quantitative result allows for trend of risk (H-M-L)**
  - ✓ *Monthly test develops trend of risk for Legionella*
- **DOH/CDC, recently, has suggested use of qPCR to validate remediation efforts**



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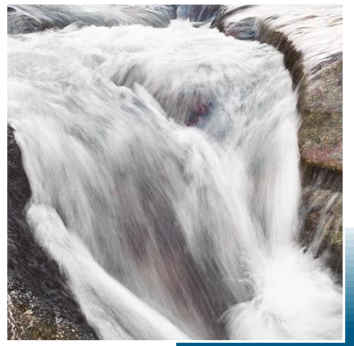
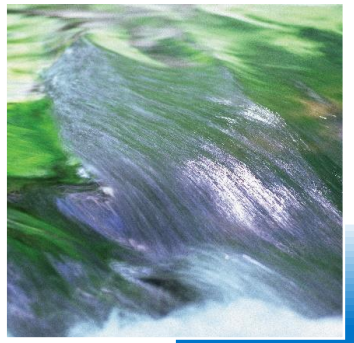
DISINFECTION OPTIONS



Hyperchlorination

- Better option if building is not occupied or specific system not in use
- Quick remediation step
- Inject high dose of oxidant into system, soak and flush
- Short disruption in service
- Facility site personnel required to support flushing measures

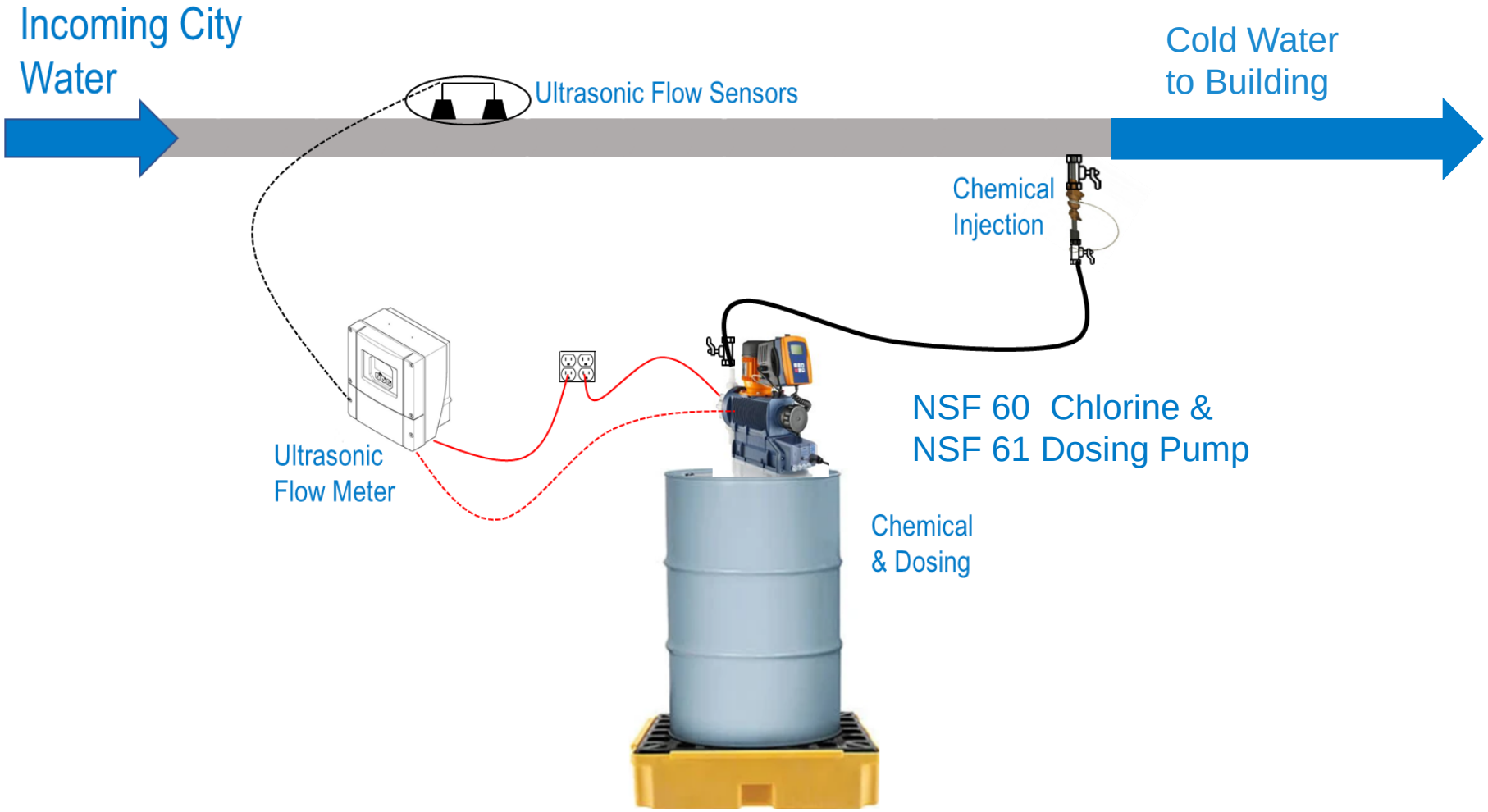


Short-Term Chlorination

- Better option once facility is occupied and cannot shut down nor isolate a system
- Continuous low-level water treatment
- Add supplemental disinfectant NSF-60 oxidant over 60-days
- No disruption in water service for occupants/guests

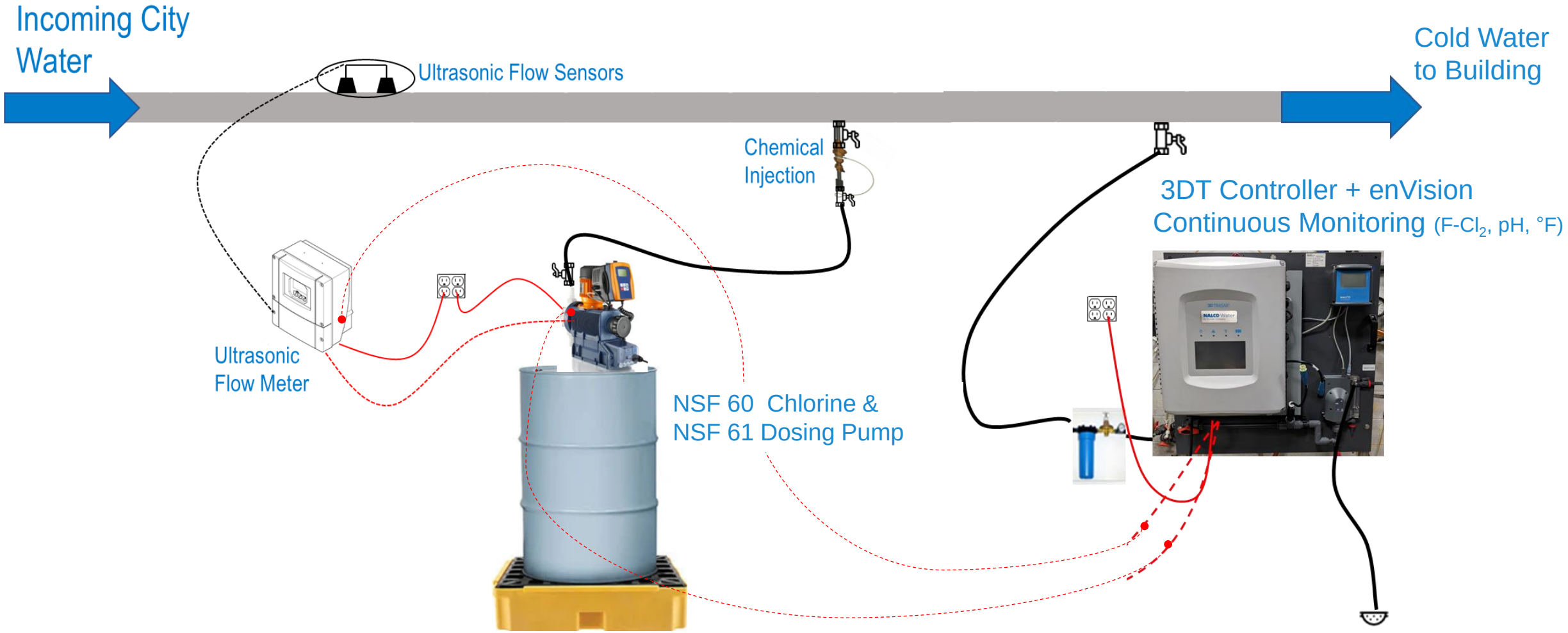
BASIC DISINFECTION APPLICATION

Flow Proportional Feed Equipment



ADVANCED DISINFECTION APPLICATION

Flow Proportional Feed Equipment + Continuous Control | Monitoring & Alarms



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QUESTIONS?

APPENDIX

DECORATIVE WATER FEATURES

Water Features that <u>can</u> be shut-down

- Most water features can be completely drained.
- Prior to re-starting a water feature, follow start-up procedures and perform a shock chlorination if not included as part of the start-up procedure.

NOTE: Care should be taken to avoid the possibility of anyone inhaling mist or vapor from such systems until the water treatment for this equipment is within normal operating limits and stabilized.

Water Features that <u>cannot</u> be shut-down

- Maintain water treatment and documentation throughout the shutdown period.

SWIMMING POOLS & SPAS - RECOMMENDATIONS

Pools

- Do not completely drain pools.
- Maintain water treatment and documentation.
- Prior to re-opening the pool, perform a shock chlorination.
- Do not allow anyone to use the pool until the water chemistry is within normal operating limits and stabilized.

NOTE: If the pool was shut down for an extended period, backwash the filters and change the media. Monitor turbidity and free residual chlorine after start-up.

Spas

- Spas can be completely drained.
- Prior to re-opening the spa, follow startup procedures and perform a shock chlorination if not included as part of the start-up procedure.
- Do not allow anyone to use the spa until the water chemistry is within normal operating limits and stabilized.

NOTE: If the spa has been shut down for an extended period, backwash the filters and change the media. Monitor turbidity and free residual chlorine after start-up.

ICE MACHINES

Re-Commissioning Recommendations

- Shut down ice machines on unused guest floors, and in unused banquet areas or kitchens.
- Remove and discard all ice in the machine and follow the proper start-up procedures when turning machines back on.
- If ice machines were shut off and emptied, they should be cleaned and disinfected according to manufacturer's recommendations before being put back in service, and the water filter should be replaced