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Responding to Crisis: Latest Plumbing Trends in Minimizing Risk of Stagnant Water in Vacant Buildings

Speaker

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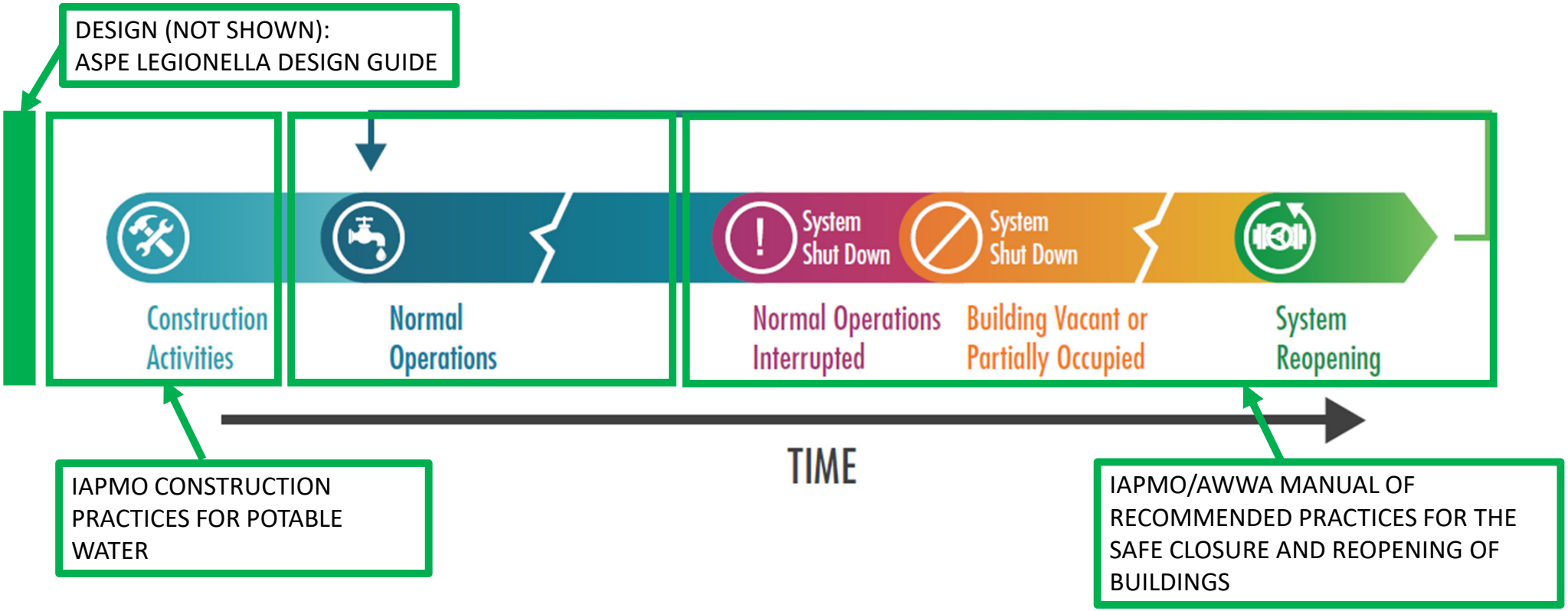
Concentrated Leadership. Respected Energy.

Christoph Lohr has over a decade of experience in designing plumbing systems for healthcare, laboratory, hospitality, sports, and university projects. He has a reputation as a results-oriented expert. Christoph's current responsibilities as Vice President of Strategic Initiatives for IAPMO is to identify long term, high impact projects, developing a business case for them, bring resources to bear, and executing them for maximum results. He has a concentrated focus in honing his personal and organization's strategy on possible breakthrough points which has led to improved effectiveness and growth.

Christoph's professional activities in the industry extend into multiple volunteer associations, of which he has also assumed leadership roles setting strategy and direction for teams including ASPE Phoenix Chapter, ASPE Society, ASPE Legionella Working Group, ASHRAE Committees, PIPE Trust of Arizona, IAPMO's Safe Building Reopening Best Practices among others. Additionally, he has been involved in numerous strategic planning initiatives to help organizations he has belonged to in improving their overall effectiveness. It is with this mindset that Christoph consistently looks to find long-term, holistic solutions that positively impact public health and safety, particularly in the world of water and plumbing.

Holistic Approach to Plumbing System Design, Construction, Operation, and Shutdown.



BTU PER HOUR HEAT LOSS IN BTU / HOUR*FOOT FOR VARIOUS PIPE SIZES AND TEMPERATURES WITH 1" THICK INSULATION

PIPE SIZE	ACTUAL DIAMETER	ln (D_o/D_i)	100	110	120	130	140	150	160
1/2"	0.625	1.435	3.06	3.94	4.82	5.69	6.57	7.44	8.32
3/4"	0.875	1.190	3.70	4.75	5.81	6.87	7.92	8.98	10.04
1"	1.125	1.022	4.31	5.54	6.77	8.00	9.23	10.46	11.69
1-1/4"	1.375	0.898	4.90	6.30	7.70	9.10	10.50	11.90	13.29
1-1/2"	1.625	0.802	5.48	7.05	8.61	10.18	11.75	13.31	14.88
2"	2.125	0.							
2-1/2"	2.625	0.							
3"	3.125	0.							
4"	4.125	0.							
6"	6.125	0.							

BTU PER HOUR HEAT LOSS IN BTU / HOUR*FOOT FOR VARIOUS PIPE SIZES AND TEMPERATURES WITH 1.5" THICK INSULATION

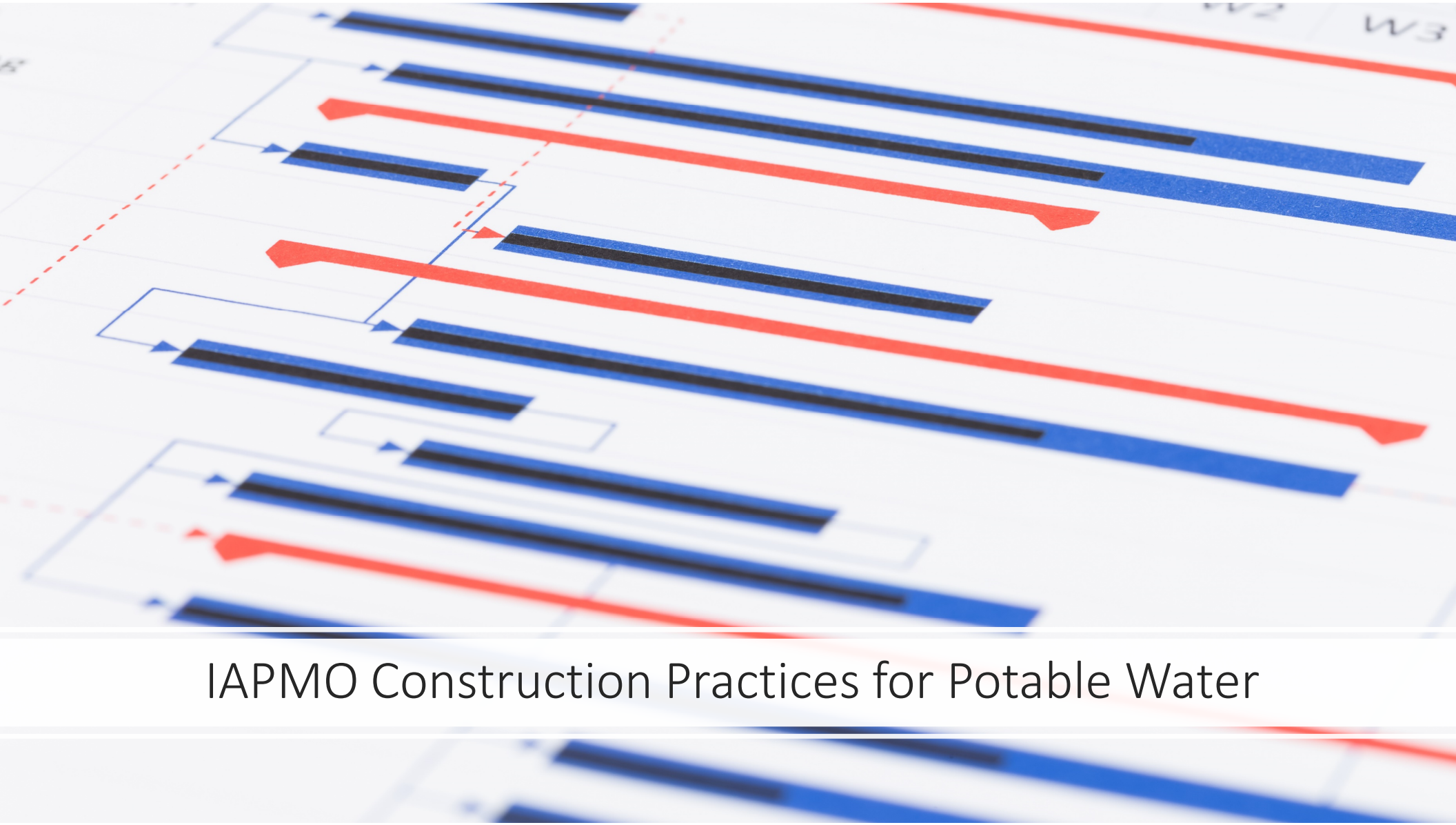
PIPE SIZE	ACTUAL DIAMETER	ln (D_o/D_i)	100	110	120	130	140	150	160
1/2"	0.625	1.758	2.50	3.22	3.93	4.65	5.36	6.08	6.79
3/4"	0.875	1.488	2.96	3.80	4.64	5.49	6.33	7.18	8.02
1"	1.125	1.299	3.39	4.35	5.32	6.29	7.25	8.22	9.19
1-1/4"	1.375	1.157	3.80	4.89	5.97	7.06	8.14	9.23	10.31
1-1/2"	1.625								
2"	2.125								
2-1/2"	2.625								
3"	3.125								
4"	4.125								
6"	6.125								

BTU PER HOUR HEAT LOSS IN BTU / HOUR*FOOT FOR VARIOUS PIPE SIZES AND TEMPERATURES WITH 2" THICK INSULATION

PIPE SIZE	ACTUAL DIAMETER	ln (D_o/D_i)	100	110	120	130	140	150	160
1/2"	0.625	2.001	2.20	2.83	3.45	4.08	4.71	5.34	5.96
3/4"	0.875	1.190	3.70	4.75	5.81	6.87	7.92	8.98	10.04
1"	1.125	1.022	4.31	5.54	6.77	8.00	9.23	10.46	11.69
1-1/4"	1.375	0.898	4.90	6.30	7.70	9.10	10.50	11.90	13.29
1-1/2"	1.625	0.802	5.48	7.05	8.61	10.18	11.75	13.31	14.88
2"	2.125	0.663	6.63	8.53	10.42	12.31	14.21	16.10	18.00
2-1/2"	2.625	0.566	7.77	9.98	12.20	14.42	16.64	18.86	21.08
3"	3.125	0.495	8.89	11.43	13.97	16.51	19.05	21.59	24.13
4"	4.125	0.395	11.13	14.30	17.48	20.66	23.84	27.02	30.20
6"	6.125	0.283	15.57	20.01	24.46	28.91	33.35	37.80	42.25

ASPE Legionella Design Guide

- Cold & Hot Water Design
  - Routing/Sizing
  - Equipment Selection
- Flushing Design Considerations
- Appendix: Pressure Zone Design
- Appendix: Hot Water Return Design
- Appendix: Water Quality Considerations
- Appendix: Design Approach Examples



IAPMO Construction Practices for Potable Water

Coordinate/Communicate with Water Purveyor

Are Secondary Disinfectants Performing as Intended?
Vanessa Speight, Matteo Rubinato, and Fernando L. Rosario-Ortiz

Example Water Distribution Network Depicting Secondary Disinfection Residual Concentrations

Source: Modified from Figure 6-8, M20 *Water Chlorination and Chloramination Practices and Principles*, 2nd Edition (AWWA, 2006)

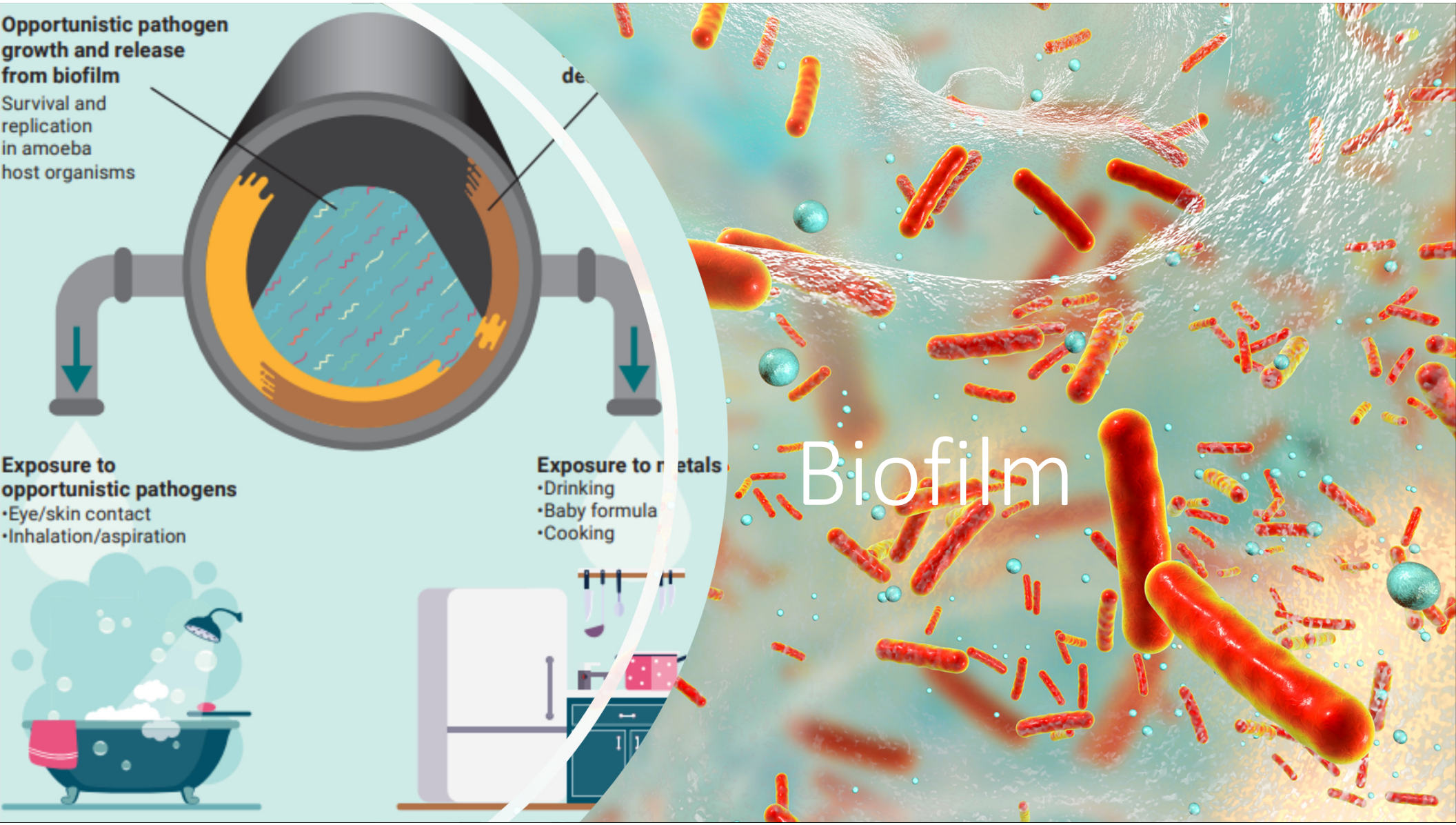
Summary of Required Contact Time in a Distribution System for Inactivation of Selected Microorganisms

Target organism and target level of inactivation	Concentration times time—*mg/L-min*	Required contact time in distribution system—*min*	Source
1-log *Giardia lamblia*	50	100	US Environmental Protection Agency
2-log viruses	4	8	US Environmental Protection Agency
1-log *Escherichia coli*	<0.05	<0.1	World Health Organization
1-log *Cryptosporidium*	Not effective	–	World Health Organization
1-log heterotrophic bacteria	<0.01	<0.02	World Health Organization
2-log *Legionella*[a]	50–250	100–500	US Environmental Protection Agency

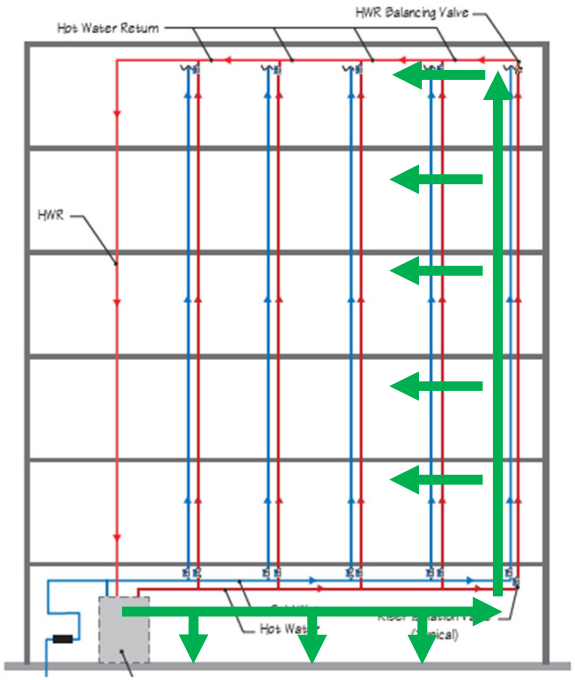
Note: Assumes 0.5 mg/L free chlorine, pH 7, 5 °C

[a]A wide range of values for *Legionella* have been reported in different studies. Generally, *Legionella* inactivation requires higher chlorine concentrations than are typically found in water distribution systems. Biofilm-associated *Legionella* may be as much as 100 times more resistant to inactivation than planktonic *Legionella*.

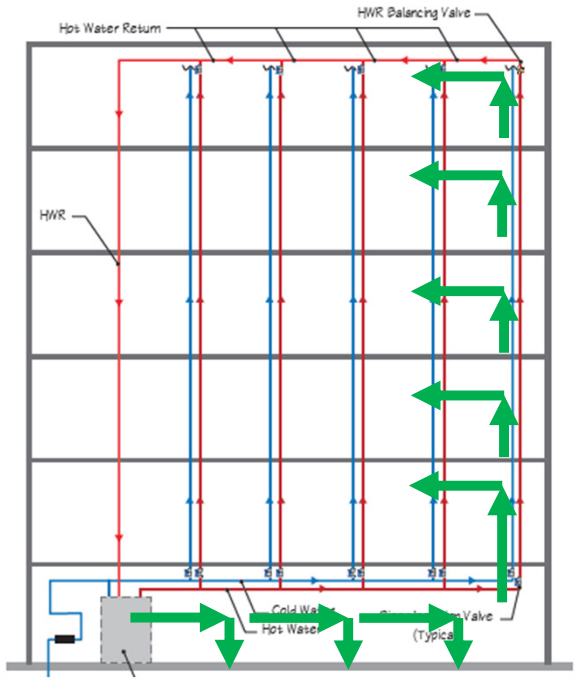
Disinfection in Utility Systems


Opportunistic pathogen growth and release from biofilm
Survival and replication in amoeba host organisms
Exposure to opportunistic pathogens
•Eye/skin contact
•Inhalation/aspiration
Exposure to
•Drinking
•Baby formula
•Cooking
Biofilm


Water Heaters
During Vacancy:
On or Off?



Last-To-First



First-To-Last

Flushing Concepts, Timing, Frequency

Summary and Questions?

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- Plumbing Resiliency: In order to design, install, commission, operate, and maintain plumbing systems, expertise is needed – newest challenges we face need plumbing industry to drive the bus.
- There are many new methods that will require developing new expertise.