



# Model Aquatic Health Code Transition

Proposed Adoption by Reference: October 2020

Recreational Water Team

February 2020

# Outline of Presentation

- What is the Model Aquatic Health Code (MAHC)?
- Why should we do this? - Rationale behind transition to MAHC
- How does this affect me? – Proposed changes, advantages, and potential costs for the public and for operators
- Questions

# Model Aquatic Health Code



# Model Aquatic Health Code (MAHC)

- Developed by the CDC with input from public health, the aquatics industry, and academic partners
- Based on latest science and best practices
- Aimed at reducing the number of recreational water related injuries and disease outbreaks

# Model Aquatic Health Code (continued)

- All-inclusive approach – design, operation, maintenance, policies, and management
- National standards – promotes uniformity across state/county boundaries
- Reviewed and updated every three years to reflect changes in the industry



**Where can I  
find the Model  
Aquatic Health  
Code?**

**<https://www.cdc.gov/mahc/index.html>**



# Rationale Behind Adoption of the MAHC

The MAHC is designed to reduce the risks associated with recreational water use.

1. Drowning
2. Injuries and emergency department (ED) visits
3. Waterborne illness outbreaks
4. Public pool and hot tub/spa closings because of public health hazards
5. Evidence of pool water contamination

# Drowning

- From 2005-2014 - 3,536 fatalities per year on average
- Leading cause of unintentional injury-related death for children 1-14 years old.







# Injuries linked with pool chemicals

- Account for 3,000-5,000 emergency department visits each year.
- Almost half of the patients are under 18 years of age.

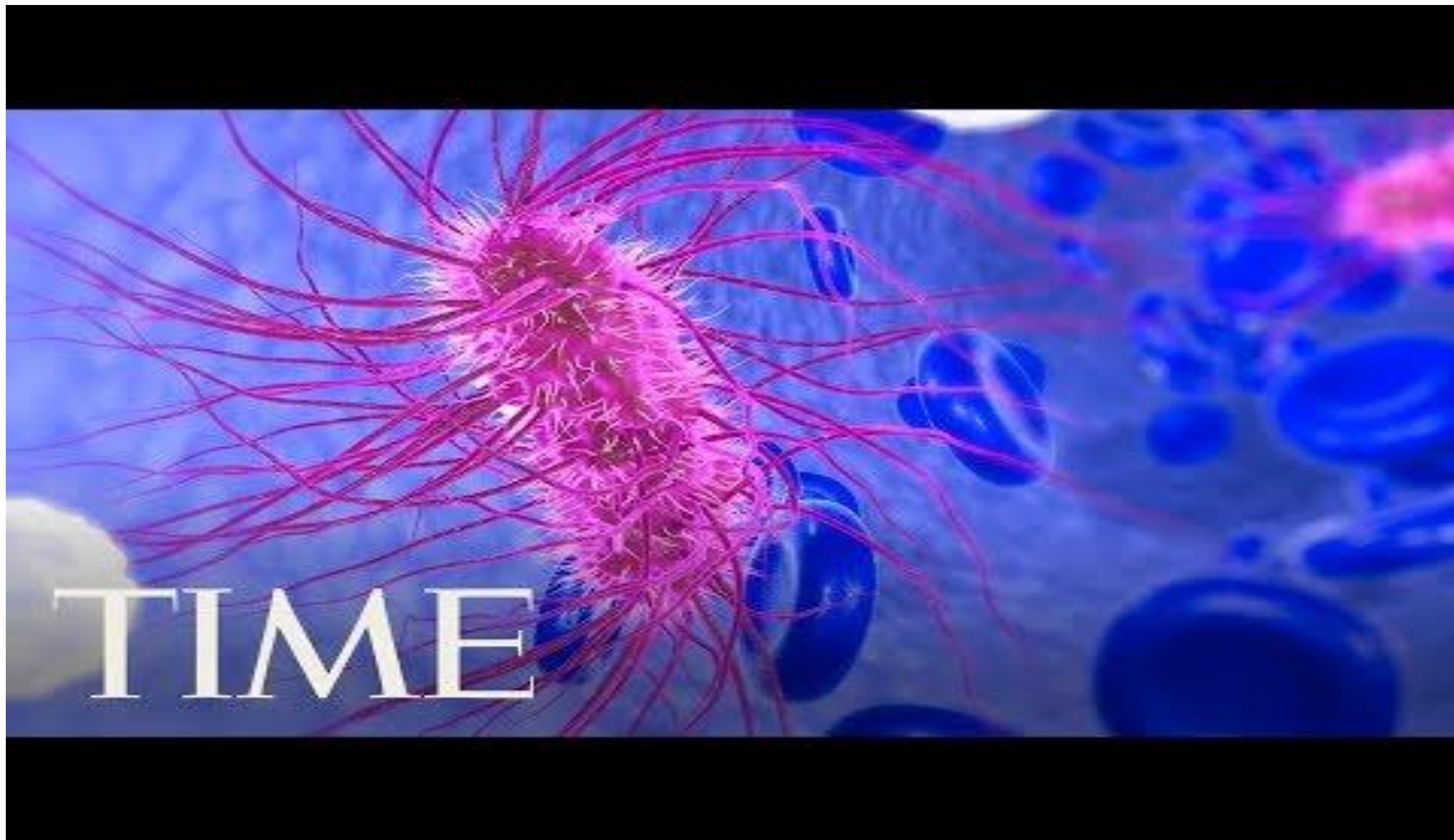
# U.S. Waterborne illness outbreaks 2000 - 2014

- 493 disease outbreaks linked to pools, hot tubs/spas, and water playgrounds
- 27,219 illnesses
- 8 deaths
- Approximately 1/3 of outbreaks happened in hotel pools and hot tubs in the summer
- The Big Three: Cryptosporidium, Pseudomonas, and Legionella



# Cryptosporidium

- Leading cause of waterborne disease in the US – 58% of outbreaks and 89% of illness between 2000-2014
- Microscopic parasite
- Protected by outer shell
- Causes diarrheal illness
- Easily spread - one oocyst can cause infection
- Extremely chlorine tolerant



Video: Swimming at a Minnesota Campground



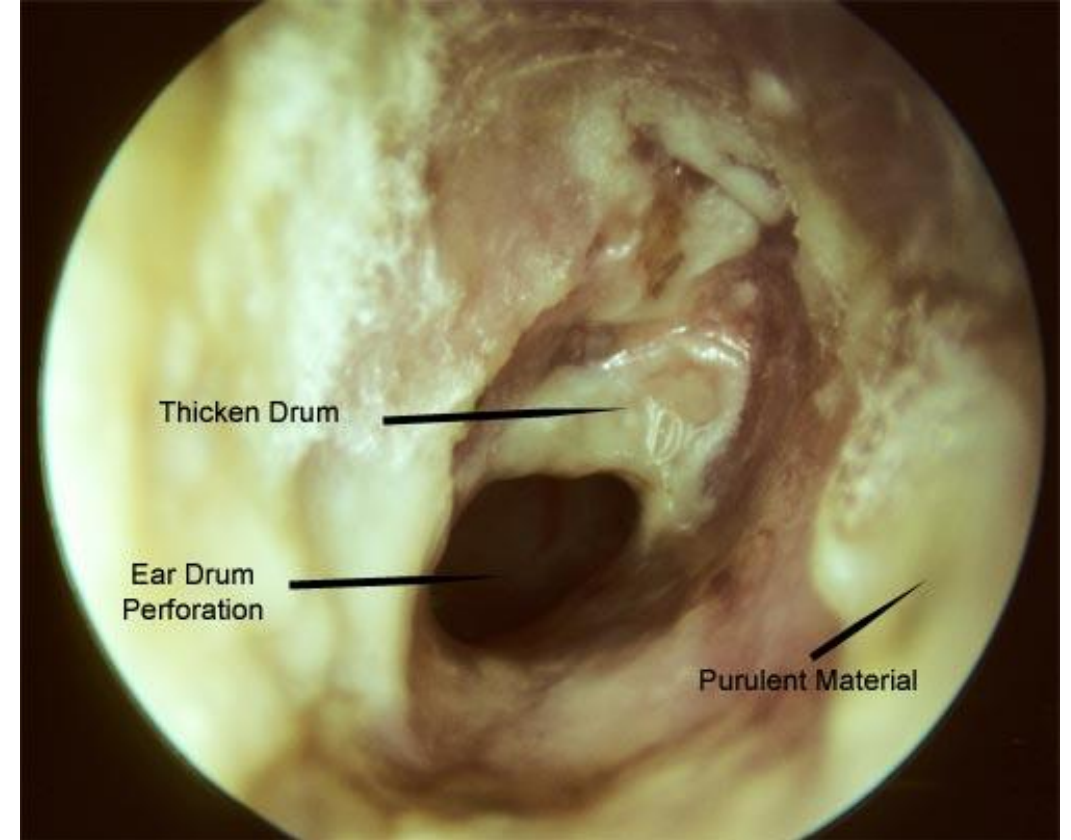


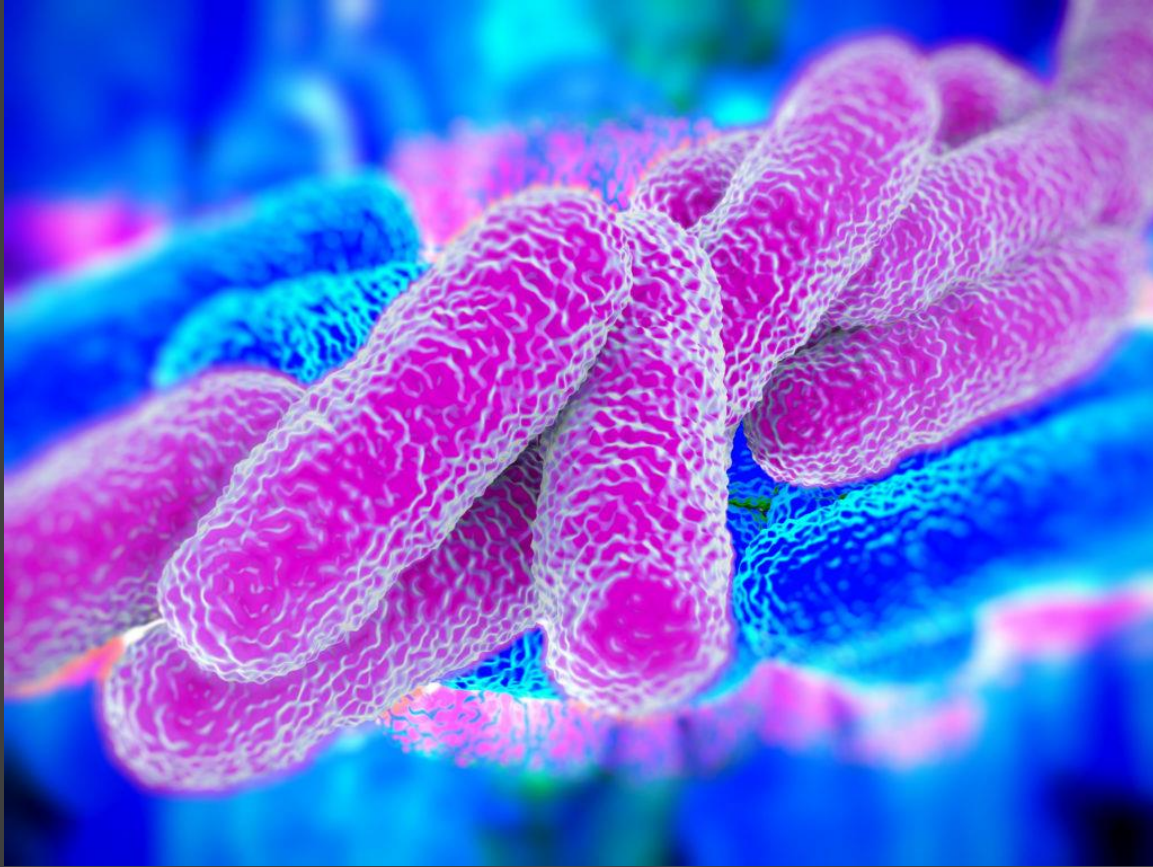
# Pseudomonas

- Bacteria found in water and soil
- Causes “Hot Tub Rash” and “Swimmer’s Ear”
- Free chlorine and pH levels critical for control
- Can form biofilm that protects it from chlorine



# Pseudomonas infections





# Legionella

- Bacteria that causes Legionnaires' disease
- Each year, 8,000–18,000 people are infected in the US
- Naturally found in water
- Inhaled in vapor from water features or ventilation systems especially from spas
- May require hospitalization and can be fatal

# The Effects of Legionellosis



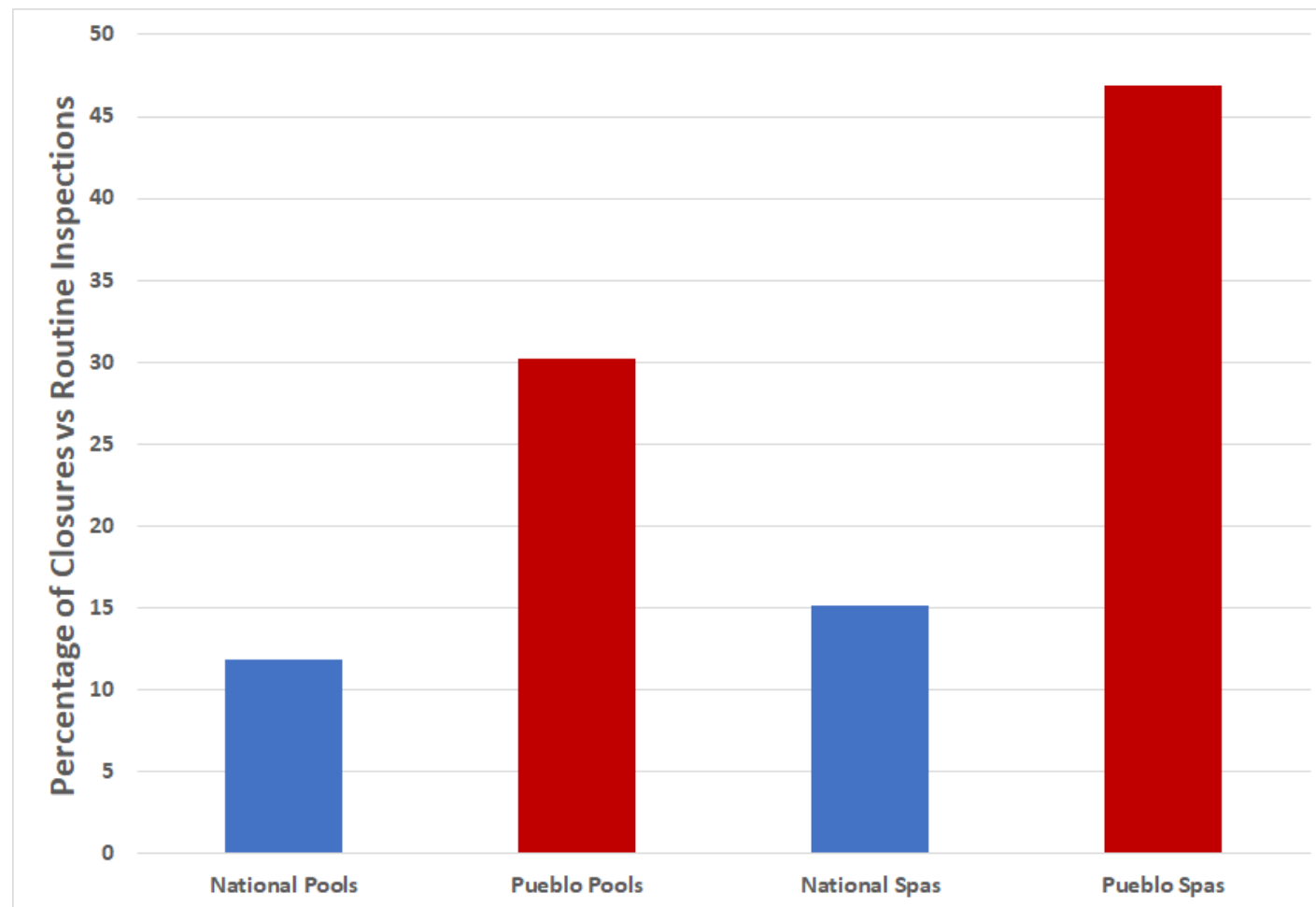


# Public pool and hot tub/spa closings

- Nationally 11.8% (1 in 8) public pool inspections and 15.1% (1 in 7) of public hot tub/spa inspections resulted in immediate closure because of at least one identified violation that represented a serious threat to public health.

**NOTICE**  
**POOL IS**  
**CLOSED**

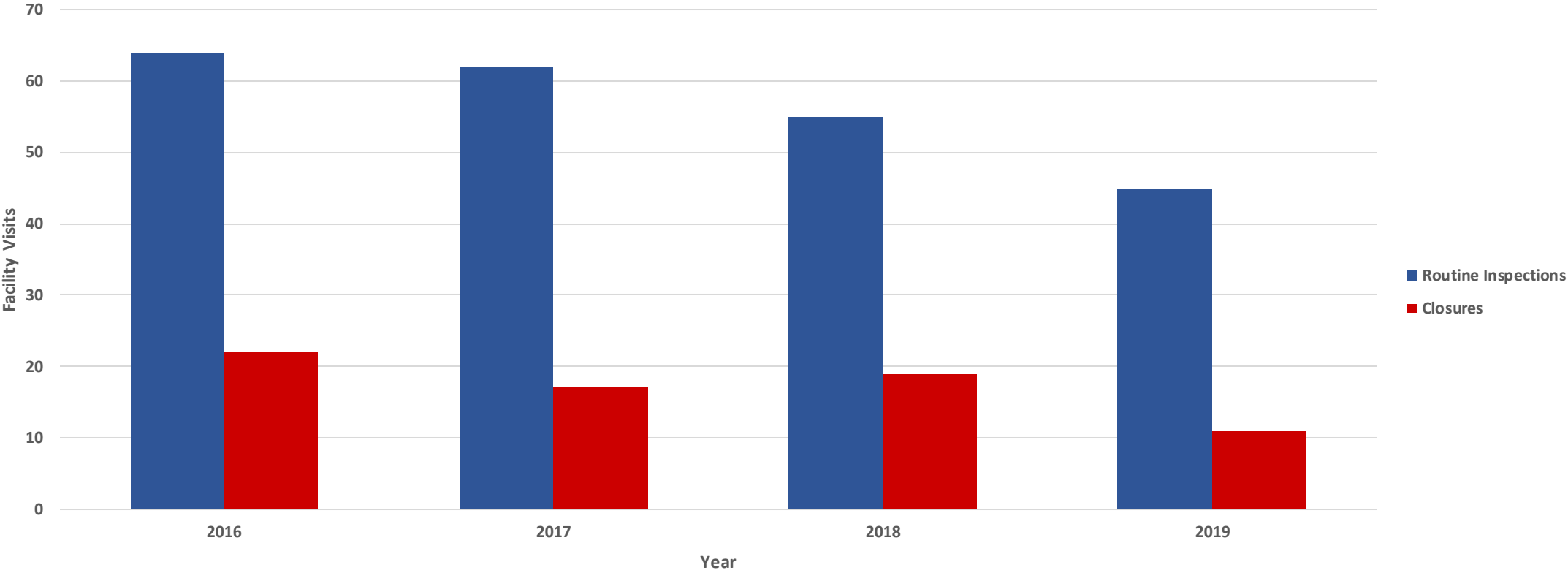
# National versus Local Rates of Closure





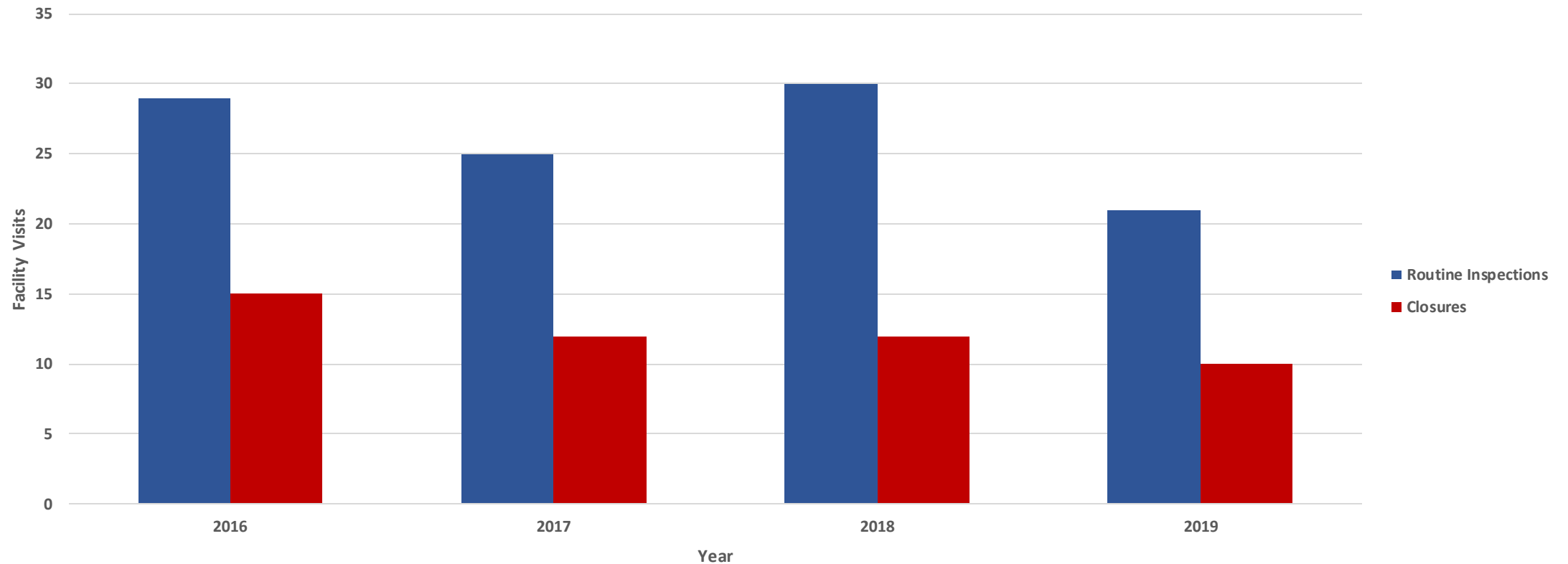
# Rates of Local Pool Closures

Ratio of Pool Closures to Inspections by Year



# Rates of Local Spa Closures

Ratio of Spa Closures to Inspections by Year



# Evidence of pool water contamination

- Sampling of public pool filter water found over half of samples contained *Pseudomonas aeruginosa* (59%) and *E. coli* or feces (58%).
- Approximately 8.1% of pool filter water samples contained the parasites *Cryptosporidium*, *Giardia*, or both.





# Rationale Behind Adoption of the Model Aquatic Health Code

# What about our current regulations?

## Colorado Swimming Pool and Mineral Bath Regulations

- Last updated in 1998
- 25-5-801 - “Swimming Areas” Part 8 of the Colorado Revised Statute has remained largely unchanged since the 1960’s.  
Apartment pools and spas are not covered.



# Colorado Swimming Pool and Mineral Bath Regulations (continued)

- Do not consider scientific developments in disinfection chemistry, filtration technology, and new trends in recreational water usage
- Do not align with the Virginia Graeme Baker Pool and Spa Safety Act
- Do not allow innovation by operators to meet goals of increased bather safety

# Advantages to the MAHC

- The public, regulatory agencies, and aquatics industry all benefit
- Based on scientific research and industry driven best practices
- Brings state in line with a proposed set of national standards
- Creates toolkit with forms/guides to assist facilities

# Advantages to the MAHC (continued)

- Facilitate pool program improvements for regulators
- Improves performance and data-based decision making for operators
- Renewed on biennial basis

# Projected Outcomes of MAHC Adoption

## Short Term:

- Fewer pool and facility closures
- More-meaningful inspection and tracking/surveillance data
- An established research agenda to drive future changes to the MAHC
- Enhanced collaboration among stakeholders

# Projected Outcomes of MAHC Adoption

## Long Term

Reduced risk from the following health hazards

- Outbreaks of waterborne illnesses
- Drowning incidents
- Injuries from pool chemicals and disinfection by-products
- Swimming-related emergency department visits
- Water contamination









# Major Changes for Operators of Existing Facilities

# Areas of Major Change\*\*

1. Recirculation Systems and Filtration
2. Hygiene Facilities
3. Disinfection and Water Quality
4. Facility Maintenance and Operation
5. Lifeguarding and Bather Supervision
6. Risk Management and Safety

**\*\*PLEASE NOTE: These new requirements listed are identified to possibly have an impact on your operation. These are not the only changes to the regulation.**



# Recirculation Systems and Filtration



# Recirculation Systems and Filtration

## What has changed?

- Automatic feeders for sanitizer and pH chemicals upon adoption
- Interlocks between chemical feeders and recirculation system upon adoption
- Improved flow meters (accurate to +/- 5%)
- Automated controllers within 1 year from adoption



# Recirculation Systems and Filtration

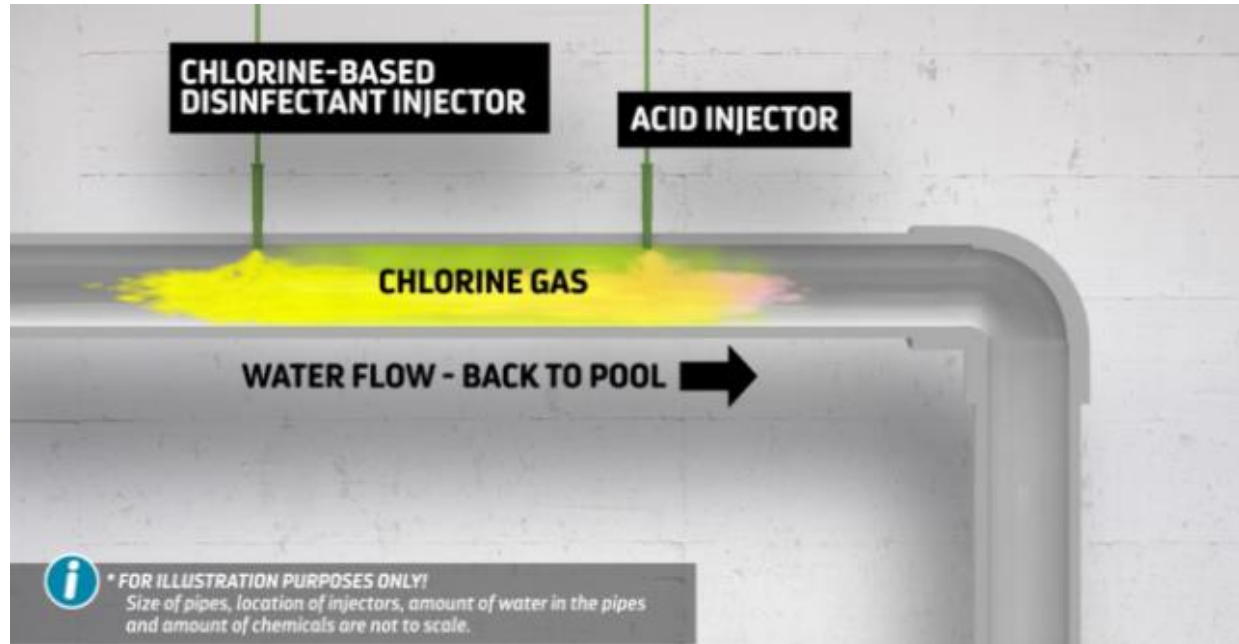
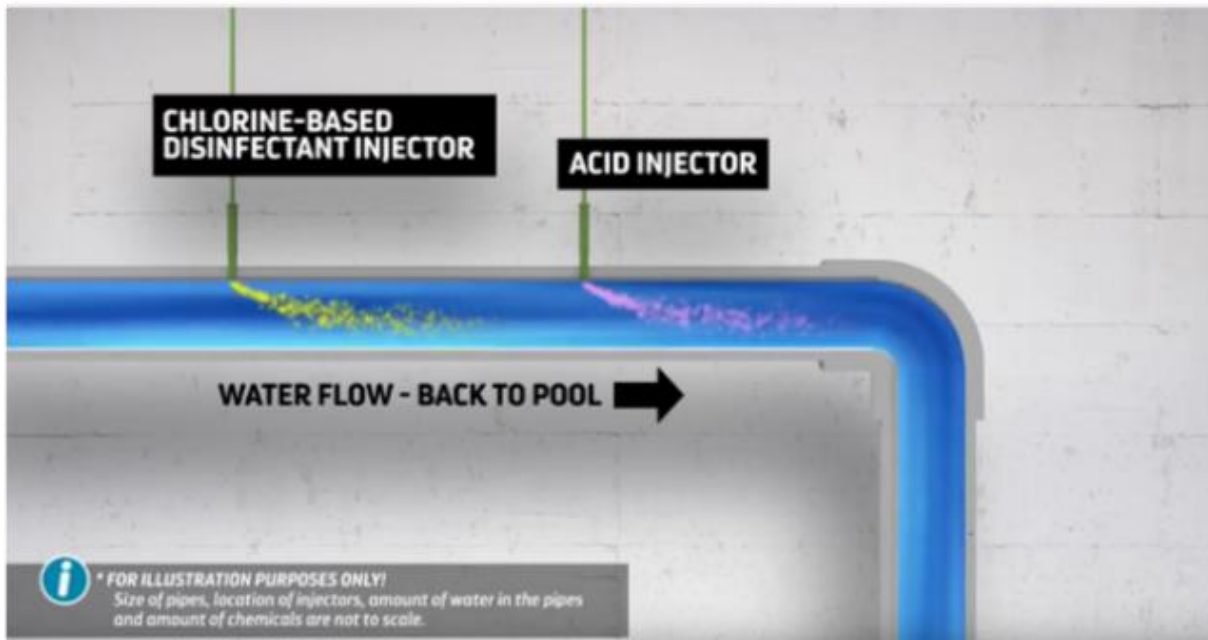
## How this will affect operators?

- Additional equipment costs upfront, reduced costs over time due to more stable pool chemistry and less waste. Reduces the likelihood of injuries to staff by limiting exposure to disinfection and pH related chemicals.

## How this will protect the public's health?

- Reduces the risk of outbreaks by minimizing fluctuations in sanitizer and pH levels.

# Feeder Interlocks





# Hygiene Facilities



# Hygiene Facilities

## What has changed?

- Required diaper-changing stations that must include a diaper-changing unit, an adjacent hand sink, soap with dispenser, trash receptacle, and any necessary cleaning materials for the unit.





# Hygiene Facilities

## How this will affect operators?

- Facilities allowing use by diaper-age bathers must either install at least one diaper changing station in each male and female hygiene facility or a single diaper changing station in a hygiene facility accessible to anyone.

## How this will protect the public's health?

- Infants and children still in diapers are the groups most commonly involved in contamination of recreational water that can lead to outbreaks of illness associated with recreational water.

# Disinfection and Water Quality



# Disinfection and Water Quality

## What has changed?

### Check disinfectant/pH levels

- prior to opening aquatic facility
- every 4 hours for automated controllers
- every 2 hours for disinfectant feeders with no automated controller
- Combined chlorine reduction to levels at or below 0.4 ppm.
- Specifies that numerous pool chemicals must meet NSF/ANSI or EPA standards.

# Disinfection and Water Quality

## Changes (continued)

- Sets maximum bromine level to 8ppm for all aquatic venues.
- Cyanuric acid prohibited in spas and therapy pools to take effect 1 year after adoption.
- Requirements for existing gaseous chlorine disinfection systems.
- Body fluid contamination response plan.
- Guidance for responding to Legionella contamination.



# Disinfection and Water Quality

## How this will affect operators?

- Requires plans to prevent and respond to contamination events.
- Potential to lower cost of chemicals due to increase in efficiency of use.
- Reduces likelihood of closure or illness.



# Disinfection and Water Quality

## How this will protect the public's health?

- Reduces the potential for exposure to harmful bacterial or viral pathogens by ensuring more frequent and consistent control and monitoring of pool chemical levels.
- Provides guidance aimed at controlling and remediating biological contamination.

# Facility Maintenance and Operation

# Facility Maintenance and Operation

## What has changed?

- Permit to operate will be required
- Risk based inspection frequency
- Imminent health hazards redefined and expanded
- Civil penalties for non-compliance



# Facility Maintenance and Operation

## How this will affect operators?

- Operators will be required to obtain an operating permit on a yearly basis. The permit status will be dependent on compliance to code.
- Facilities that are actively managed and shown to be low risk will have fewer inspections than high risk facilities

## How this will protect the public's health?

- Focuses inspections on high risk facilities and provides additional tools to bring facility into compliance with the provisions of the code.

# Imminent Health Hazards Redefined

- 1) Failure to provide supervision and staffing as prescribed
- 2) Failure to provide the minimum disinfectant residual levels
- 3) pH level below 6.5
- 4) pH level above 8.0
- 5) Failure to continuously operate filtration and disinfection equipment



# **Imminent Health Hazards Redefined**

- 6) Use of an unapproved or contaminated water supply
- 7) Unprotected overhead electrical wires
- 8) Non GFCI protected electrical receptacles
- 9) Failure to maintain an emergency lighting source
- 10) Absence of all required lifesaving equipment

# **Imminent Health Hazards Redefined**

- 11) Bottom of pool/spa not visible
- 12) Total absence of or improper depth markings
- 13) Plumbing cross-connections between the drinking water supply or sewage system and aquatic venue water
- 14) Failure to provide and maintain an enclosure or barrier around the aquatic venue
- 15) Use of unapproved chemicals or the application of chemicals by unapproved methods to the pool/spa water

# Imminent Health Hazards Redefined

- 16) Broken, unsecured, or missing main drain or outlet grates
- 17) Number of bathers exceeds the peak occupancy
- 18) Broken glass or sharp objects in pool/spa or on the deck
- 19) Any other item determined to be a public health hazard by the local regulatory authority

# Facility Maintenance and Operation

## What has changed?

- Water replacement of 4 gallons/bather/day for control of organic/inorganic contaminants (generally met by backwashing losses).

## How this will affect operators?

- Potential increase frequency of backwashing/draining for replacement.
- Stabilize pool chemistry by reducing chloramine load.



# Facility Maintenance and Operation

## How this will protect the public's health?

- Reduces the concentration of dissolved contaminants like sweat, oils, urine, chlorination by-products, salts, and metals in the water, as these are not effectively removed by filtration.

# Operator Training

# Operator Training

## What has changed?

- Identifies operator training and course essential topics
- Required on-site, off-site operator staffing requirements by venue type upon adoption
  - Water disinfection
  - Chemical handling
  - Pool operations
  - Health and safety operations





# Operator Training

## How this will affect operators?

- Better water quality
- Fewer accidents and illness

## How this will protect the public's health?

- Reduce risks of illness
- Reduce the risk of injury from pool chemicals or physical hazards





# CPO Class

- PDPHE will be hosting a Certified Pool Operator class June 15-16
- Taught by Rick Stewart of the Pool Training Academy
- Awarded top trainer by the National Swimming Pool Foundation 2014-2017 and 2019
- [www.pooltrainingacademy.com](http://www.pooltrainingacademy.com)

# Lifeguarding/Bather Supervision

# Lifeguarding/Bather Supervision

## What has changed?

- Delineates facilities requiring lifeguards.
- Defines training requirements for lifeguards including yearly CPR training.
- Lifeguard zones of patron surveillance are required in aquatic facility plans submitted for review.
- Required Safety Plan including staffing, zones of patron surveillance, rotation, supervision, and emergency action plan.



# Lifeguarding/Bather Supervision

## How this will affect operators?

- Facilities requiring lifeguards will have to provide them
- Requires development of emergency plans

## How this will protect the public's health?

- Reduces the risk of drowning and physical injuries to bathers



# Facilities requiring lifeguards

- 1) Deeper than 5 feet (1.5 m) at any point (new builds)
- 2) Allow unsupervised children under the age of 14 years
- 3) While being used for the recreation of youth groups, including but not limited to child care usage or school groups
- 4) While being used for group training/competitive events
- 5) Have a configuration in which any point on the surface exceeds 30 feet from the nearest deck

# Facilities requiring lifeguards

- 6) Have an induced current or wave action
- 7) Waterslide landing pools
- 8) Where bathers enter the water from any height above the deck including but not limited to diving boards, drop slides, starting platforms, and/or climbing walls. This does not include pool slides
- 9) Sell or serves alcohol within the aquatic venue enclosure while alcohol is sold or served



# Risk Management/Safety

# Risk/Management Safety

## What has changed?

- Required plans for mitigating risks
  - Required preventive maintenance plan
  - Employee illness policy
  - Daily or other inspection checks



# Risk/Management Safety

## What has changed?

- Modification to facility:
  - Slip resistance must meet requirements of ANSI standard
  - For unguarded aquatic venues, self-latching mechanisms must be at 4.5 feet off the ground
  - Underwater lighting branch circuits require GFCI as per NEC
  - Hardwired phone or system for emergency
  - Enhanced signage requirements

# Risk/Management Safety

## What has changed?

- Swimmer empowerment requirements
  - Posting pool inspection scores
  - Defined imminent health hazards for closure

# Risk/Management Safety

## How this will affect operators?

- Increased control of hazards through prevention
- May require physical changes to the facility to bring current fixtures/surfaces to code

# Risk/Management Safety

## **How this will protect the public's health?**

- Reduces the risk of physical injury and drowning
- Reduces the risk of waterborne illness transmission
- Aids in making informed decisions when choosing where to swim



A serene sunset scene over a calm body of water. The sun is a bright, glowing orb in the upper center, casting a shimmering, golden reflection down the middle of the water. In the lower center, a small, narrow boat with four people inside is visible, their silhouettes dark against the water. The background features a range of low, hazy mountains under a soft, purple-tinged sky. The overall mood is peaceful and contemplative.

If you want to go fast, go alone.

**If you want to go far,  
go together.**

African Proverb



Questions

# Thank you!

## Recreational Water Team

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