Welcome to the

Model Aquatic Health Code Network Webinar

Floatation Tanks: A Review and Discussion of MAHC Requirements

Featured Presenter: Douglas Sackett

Tuesday, March 26, 2019

Join the MAHC Network! Email MAHCnet@naccho.org and request to be added to the mailing list.

Please use your computer speakers to listen to today's presentation.

Questions may be submitted via the chat box.

This webinar is being recorded.

We will begin at 3:00 PM Eastern.

Thank you for your interest and attendance!

NACCHO
National Association of County & City Health Officials

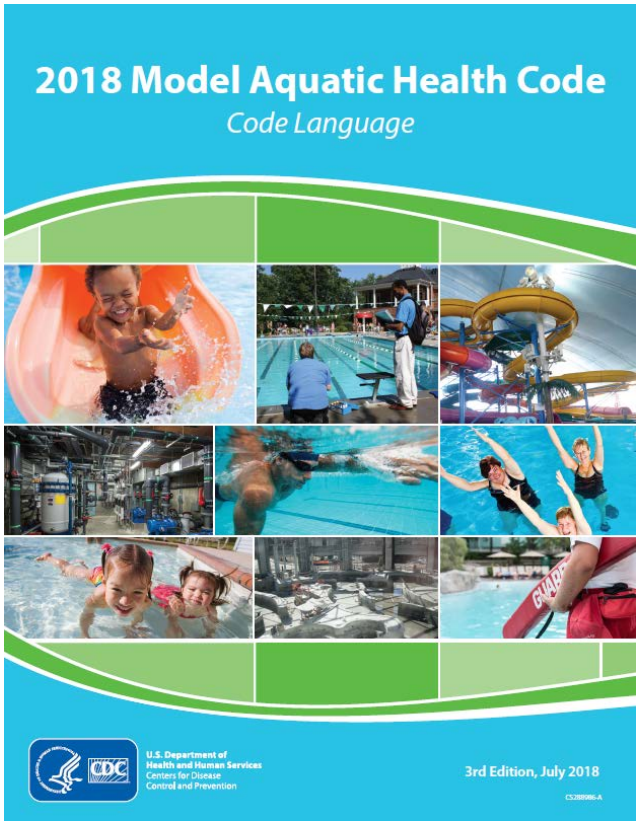
NACCHO Updates

World Water Day: March 22, 2019

- Blog post on essentialelements.naccho.org
- Compendium of three Stories from the Field focusing on water, sanitation, and hygiene (WASH) emergencies
  - City of Milwaukee Health Department, WI
  - Washington County Public Health, OR
  - Public Health Seattle and King County, WA

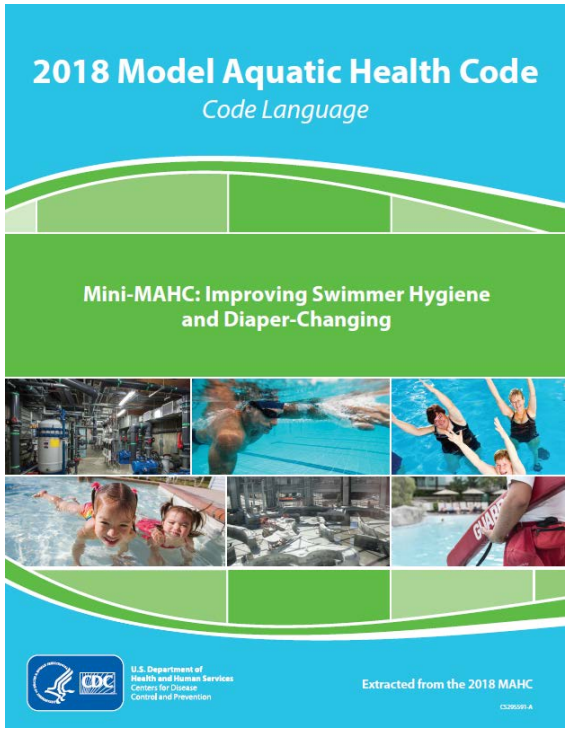
CDC Update

MAHC Network Webinar March 26, 2019



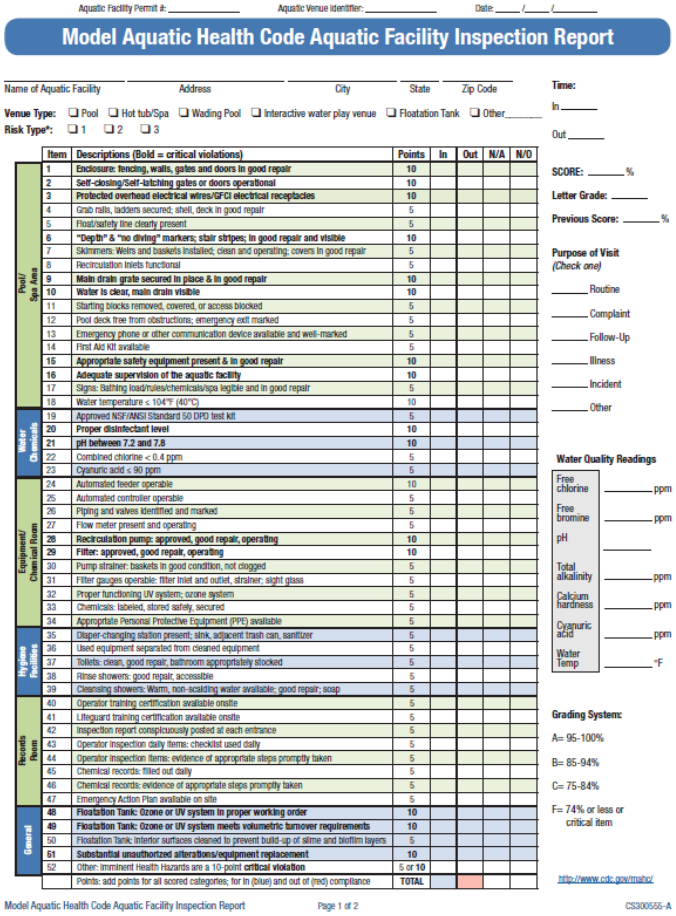
Updates

- **Mini MAHCs**
  - Crypto Prevention
  - Hygiene and Diaper Changing
  - Preventing Pool Chemical–Associated Health Events
    - In Clearance
  - Preventing Unintended Chemical Release Emergencies
    - In Clearance



Updates

- **Inspection Form**
  - 3rd Edition 2018 MAHC
  - Floatation Tanks added
  - Clear Language
  - Cheat Sheet
  - Cross-Reference Guide



Aquatic Facility Permit #: _____ Aquatic Venue Identifier: _____ Date: ____/____/_____

Model Aquatic Health Code Aquatic Facility Inspection Report

Name of Aquatic Facility _____ Address _____ City _____ State _____ Zip Code _____

Venue Type: ❑ Pool ❑ Hot tub/Spa ❑ Wading Pool ❑ Interactive water play venue ❑ Floatation Tank ❑ Other_____

Risk Type*: ❑ 1 ❑ 2 ❑ 3

	Item	Descriptions (Bold = critical violations)	Points	In	Out	N/A	N/O
Pool/ Spa Area	1	**Enclosure: fencing, walls, gates and doors in good repair**	10				
	2	**Self-closing/Self-latching gates or doors operational**	10				
	3	**Protected overhead electrical wires/GFCI electrical receptacles**	10				
	4	Grab rails, ladders secured; shell, deck in good repair	5				
	5	Float/safety line clearly present	5				
	6	**"Depth" & "no diving" markers; stair stripes; in good repair and visible**	10				
	7	Skimmers: Weirs and baskets installed; clean and operating; covers in good repair	5				
	8	Recirculation inlets functional	5				
	9	**Main drain grate secured in place & in good repair**	10				
	10	**Water is clear, main drain visible**	10				
	11	Starting blocks removed, covered, or access blocked	5				
	12	Pool deck free from obstructions; emergency exit marked	5				
	13	Emergency phone or other communication device available and well-marked	5				
	14	First Aid kit available	5				
	15	**Appropriate safety equipment present & in good repair**	10				
	16	**Adequate supervision of the aquatic facility**	10				
	17	Signs: Bathing load/rules/chemicals/spa legible and in good repair	5				
	18	Water temperature ≤ 104°F (40°C)	10				
Water Chemicals	19	Approved NSF/ANSI Standard 50 DPD test kit	5				
	20	**Proper disinfectant level**	10				
	21	**pH between 7.2 and 7.8**	10				
	22	Combined chlorine < 0.4 ppm	5				
	23	Cyanuric acid ≤ 90 ppm	5				
Equipment/ Chemical Room	24	Automated feeder operable	10				
	25	Automated controller operable	5				
	26	Piping and valves identified and marked	5				
	27	Flow meter present and operating	5				
	28	**Recirculation pump: approved, good repair, operating**	10				
	29	**Filter: approved, good repair, operating**	10				
	30	Pump strainer: baskets in good condition, not clogged	5				
	31	Filter gauges operable: filter inlet and outlet, strainer; sight glass	5				
	32	Proper functioning UV system; ozone system	5				
	33	Chemicals: labeled, stored safely, secured	5				
	34	Appropriate Personal Protective Equipment (PPE) available	5				
Hygiene Facilities	35	Diaper-changing station present; sink, adjacent trash can, sanitizer	5				
	36	Used equipment separated from cleaned equipment	5				
	37	Toilets: clean, good repair, bathroom appropriately stocked	5				
	38	Rinse showers: good repair, accessible	5				
	39	Cleansing showers: Warm, non-scalding water available; good repair; soap	5				
Records Room	40	Operator training certification available onsite	5				
	41	Lifeguard training certification available onsite	5				
	42	Inspection report conspicuously posted at each entrance	5				
	43	Operator inspection daily items: checklist used daily	5				
	44	Operator inspection items: evidence of appropriate steps promptly taken	5				
	45	Chemical records: filled out daily	5				
	46	Chemical records: evidence of appropriate steps promptly taken	5				
	47	Emergency Action Plan available on site	5				
General	48	**Floatation Tank: Ozone or UV system in proper working order**	10				
	49	**Floatation Tank: Ozone or UV system meets volumetric turnover requirements**	10				
	50	Floatation Tank: Interior surfaces cleaned to prevent build-up of slime and biofilm layers	5				
	51	**Substantial unauthorized alterations/equipment replacement**	10				
	52	Other: Imminent Health Hazards are a 10-point **critical violation**	5 or 10				
		Points: add points for all scored categories; for In (blue) and out of (red) compliance	TOTAL				

Time:

In _____

Out _____

SCORE: _____ %

Letter Grade: _____

Previous Score: _____ %

Purpose of Visit
(Check one)

_____ Routine

_____ Complaint

_____ Follow-Up

_____ Illness

_____ Incident

_____ Other

Water Quality Readings

Free chlorine	_____ ppm
Free bromine	_____ ppm
pH	_____
Total alkalinity	_____ ppm
Calcium hardness	_____ ppm
Cyanuric acid	_____ ppm
Water Temp	_____ °F

Grading System:

A= 95-100%

B= 85-94%

C= 75-84%

F= 74% or less or critical item

http://www.cdc.gov/mahc/

Model Aquatic Health Code Aquatic Facility Inspection Report Page 1 of 2 CS300555-A

MAHC NETWORK
CMAHC UPDATES

March 26, 2019

Douglas Sackett,
Executive Director
Council for the Model Aquatic Health Code

CMAHC UPDATES:

- CMAHC Certification Program
- CMAHC Ad Hoc Committees
- Membership

CMAHC Certification Program

- **Certifies that services or products comply with the relevant or applicable standards and procedures outlined in the MAHC (www.cmahc.org/cmahc-certification-program.php)**
  - Includes a thorough product evaluation based on the MAHC content related to the specific product or service. Aquatic services and products must meet or exceed all applicable MAHC standards
- **2 Products now certified**
  - Counsilman-Hunsaker “Facility Manager” web-based app.
  - Pool Shark H20 web-based app.
- **2 other web-based apps under review**

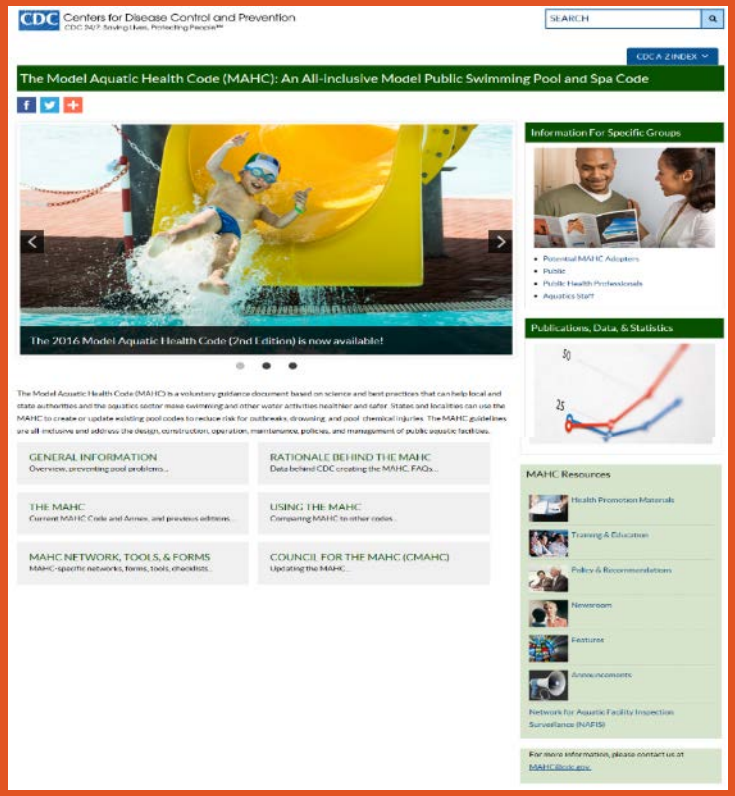
CMAHC Ad Hoc Committees

- Additional committees planned
  - Spray Ground/Spray park (Interactive Water Venue) Design
    - In process of selecting members
  - Pool Shell Design
  - Advanced Oxidation Processes (AOP)

CMAHC UPDATES
Membership

- Renew your membership for the 2018-2020 Conference Cycle or join for the 1st time! (memberships expired Nov. 2017)
  - https://cmahc.org/membership-signup-form.php

MAHC
More Information: Search on "CDC MAHC" or visit the Healthy Swimming MAHC Website: www.cdc.gov/mahc
Email: mahc@cdc.gov



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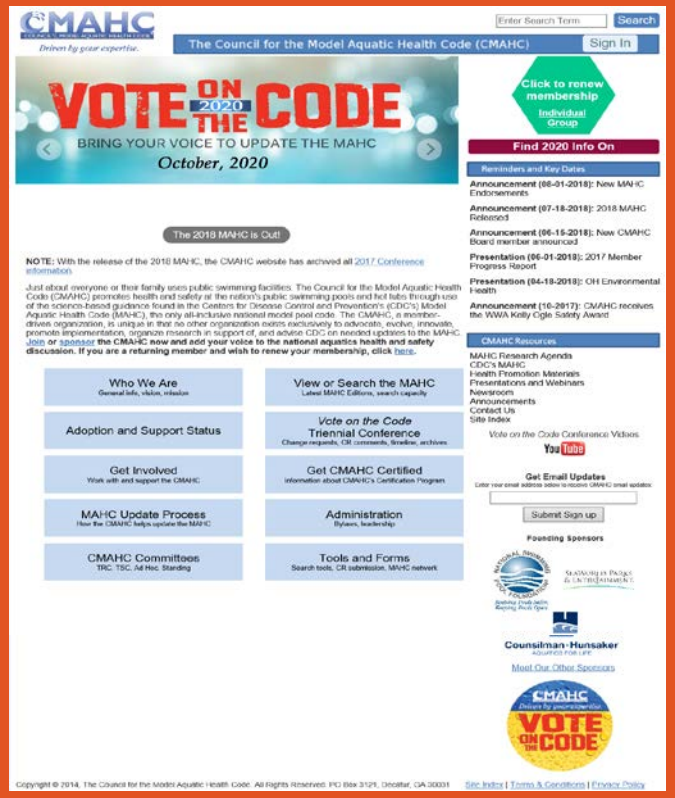

Contact Information

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Model Aquatic Health Code (MAHC)

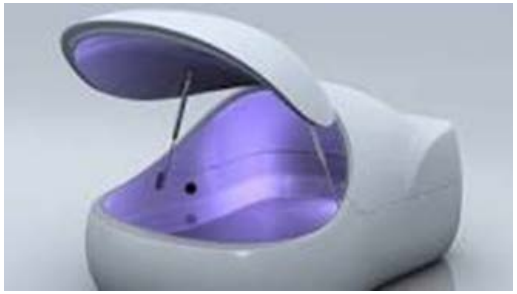
Floatation Tanks: A Review and Discussion of MAHC Requirements




NACCHO MAHC Network Webinar
Douglas Sackett, Executive Director, CMAHC
March 26, 2019

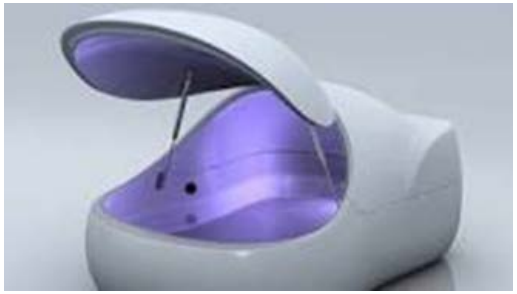
Outline

- Public Health Rationale
- Disinfection
- Circulation/Filtration
- Cleaning/Biofilm Control
- Fecal/Vomit/Blood Contamination Response



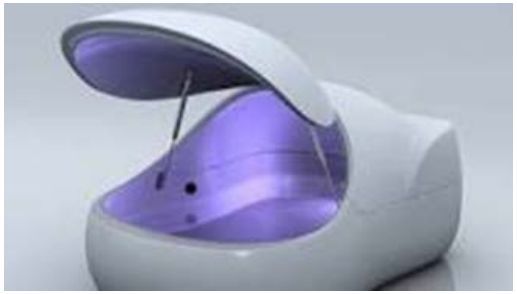
Floatation Tank

(*a.k.a. Float Tank, Float Room/Pod/Spa/Chamber, Isolation Tank, or Sensory Deprivation Tank)* **means a tub that contains a saturated solution of magnesium sulfate having a specific gravity of 1.23 to 1.3, provides a light and sound reduced environment, and is maintained at a temperature of approximately 92-96°F / 33.3-35.6°C**



Floatation Tank Solution

means a saturated solution of magnesium sulfate having a specific gravity of 1.23 to 1.3.



Why Regulate Floatation Tanks?

- Float solution not drained and refilled between users
- General public exposed to “water”/solution intended for recreational or therapeutic purpose
- Disease transmission risk and routes of exposure are different than typical swimming pools, but
- Pathogens can survive in float solution and repeated use could further compromise water quality
- Other safety and health related issues such as electrical safety and slips/falls

Disinfection

- Disinfection by either Ozone or UV treatment systems
- Chlorine or bromine NOT required
- Hydrogen peroxide NOT acceptable as a disinfectant
- Ozone and UV must meet 3-log reduction of influent bacteria disinfection efficacy
  - Per NSF/ANSI Standard 50-2016, Annex H.1
- Ozone level and production testing per NSF/ANSI Standard 50-2016, Annex H.2 and H.3
  - Ozone levels in solution not to exceed 0.1ppm
- Calibrated UV sensors required
  - Alarm to be initiated if required dosage is not produced as measured by calibrated sensor

Rationale-Disinfection Criteria

- Float industry concerned about air quality aesthetics (chlorine smell) and halogen-related DBP's with use of chlorine/bromine
- Ability to accurately test chlorine/bromine in salt solution is in question
- Used by only 1 person at a time (some 2 person tanks available)
- Routes of exposure (ingestion, inhalation, contact) are limited
- Pathogens of concern may be able to persist/survive for short term but unlikely to readily grow
- Ability to adequately disinfect between users with ozone or UV

Rationale-Disinfection Criteria

- Ability to accurately test chlorine/bromine in salt solution is in question
  - NSF International. Recovery analysis of free and total chlorine measurement methods in high MgSO4 solution. Ann Arbor, MI: NSF International; 2015b Feb.

    SCOPE:
    - This report details an initial investigation into the accuracy and repeatability of three methods commonly used in the recreational water industry for field testing residual chlorine levels in swimming pools.

    EXECUTIVE SUMMARY:
    - An analysis was performed on three methods for the measurement of free and total chlorine in pool water with a high MgSO4 concentration. The Hach DPD AccuVac method gave the best average percent recovery, but presented significant repeatability issues. The LaMotte InstaTest Free & Total Chlorine test strip appeared to be the most reliable of the three tested methods, but gave low recovery rates. The Hach AquaChek test strip was greatly affected by the high concentration of MgSO4.
    - Further investigation should be considered with respect to measurement accuracy in the presence of high combined chlorine levels (i.e. low free, high total), the effect of dilution levels on DPD analysis, and the type of DPD sample vial used (non-AccuVac style).

Rationale-Disinfection Criteria

- Hydrogen peroxide NOT acceptable as a disinfectant
  - Levels typically recommended for floatation tanks (50-100ppm) is unlikely to be effective
  - Not an EPA registered disinfectant or sanitizer in recreational water
- Use as a water conditioner, with no claims of disinfection efficacy, is acceptable

Rationale-Disinfection Criteria

- Used by only 1 person at a time (some 2 person tanks available)
  - Potential exposure to pathogens shed from other bathers, as in pools and spas, does not occur during individual float sessions

Rationale-Disinfection Criteria

- Routes of exposure (ingestion, inhalation, contact) are limited
  - Ingestion (G.I. illness) is less likely due to manner of floating and palatability (bitter taste) of tank water
  - Inhalation (respiratory-*Legionella*) is likely minimal/reduced based on little or no agitation/aerosolization of tank water during use in most tank designs
  - Contact with the skin and ear canal occurs, but eye contact unlikely or very short-lived due to extreme irritation of eyes by salt

Rationale-Disinfection Criteria

- Pathogens of concern may be able to persist/survive for short term but unlikely to readily grow
  - NSF International. Organism time kill in float lab water (J-00114729). Ann Arbor, MI: NSF International; November 2012. Available from http://floatlab.com/wp- content/uploads/2012/01/Organism-Time-Kill-in-Float- Lab-Water5.pdf.
  - NSF International. Organism viability testing in Epsom salt and control solution: NSF International; 2015a Oct. Available from https://s3-us-west-2.amazonaws.com/floattanksolutions/NSF-Salt-Only-Tests_2015.pdf. Accessed April 23, 2018.

Rationale-Disinfection Criteria

- Pathogens of concern may be able to persist/survive for short term but unlikely to readily grow
  - <u>SUMMARY OF CONCLUSIONS:</u>
    - Pseudomonas aeruginosa appeared to be the most sensitive of all of the organisms exposed to product water - undetectable after 24 hours in the saltwater
    - Candida albicans ATCC 10231 was the second most sensitive
    - Enterococcus faecium was one of the more resistant organisms in the studies.
    - Aspergillus niger appeared to be the most resistant to the product water with little change in concentration over the 24 hour exposure period

Rationale-Disinfection Criteria

- Ability to adequately disinfect between users with ozone or UV
  - Initial concern with UV alone due to the demonstrated resistance of some viral pathogens to UV DISINFECTION, even at relatively high doses
    - However, it appears that only a limited number of viral pathogens demonstrated resistance to UV alone, and their routes of exposure were typically fecal/oral.
  - Calibrated UV sensors required
    - Necessary to assure appropriate treatment

Filtration/Turnover/Circulation

- Minimum of 3 volumetric turnovers between users
  - Floatation Tank System Controller
    - Minimum time to achieve 3 volumetric turnovers built in as a default
    - If controller lacks capability to set default filtration time, the time required to be posted adjacent to the controller
- If design uses external holding reservoir, all water must pass through filtration/disinfection before returning to floatation tank
- 4 volumetric turnovers at the end of use each day; and
- 1 volumetric turnover before first use of the day

Rationale-Filtration/Turnover Criteria

- Adequate disinfection reliant on consecutive dilution of tank solution contaminants
  - Solution brought through filter and ozone or UV system, 3-log reduction per pass
  - Number of passes based on Gage-Bidwell

The Law of Dilution

Turnovers (t)	1	2	3	4	5	6	10
Gage - Bidwell	63	86	95	98	99.3	99.7	99.99
Exponential Decay Model	63.2	86.4	95.0	98.2	99.3	99.7	99.995

$$Removal = 1 - e^{-t}$$

*where "e" is a constant (~2.718)

Filtration/Turnover/Circulation

- Is 3 volumetric turnovers (95% of total volume of solution treated) enough?
  - Routes of exposure-primarily contact (no ingestion)
  - Potential concentration of pathogen introduction vs. dilution in volume of tank (250 gal)
    - Compare concentration to infectious dose
    - Consider reduction of concentration by 3-log per pass
    - Example from a study using Pseudomonas aeruginosa, initial contamination load introduced, then consider dilution using 250 gal. , resulting concentration 1000 times below estimated threshold for infectivity before any disinfection treatment

Cleaning/Biofilm Control

- Interior surfaces at waterline to be scrubbed daily
  - Prevent build-up of slime and biofilm layers
- Interior surfaces of tank scrubbed or wiped down on weekly basis
- Tanks drained and all interior surfaces scrubbed/wiped down prior to refilling at frequency necessary to prevent build-up of slime or biofilm layers

Rationale-Cleaning/Biofilm Control

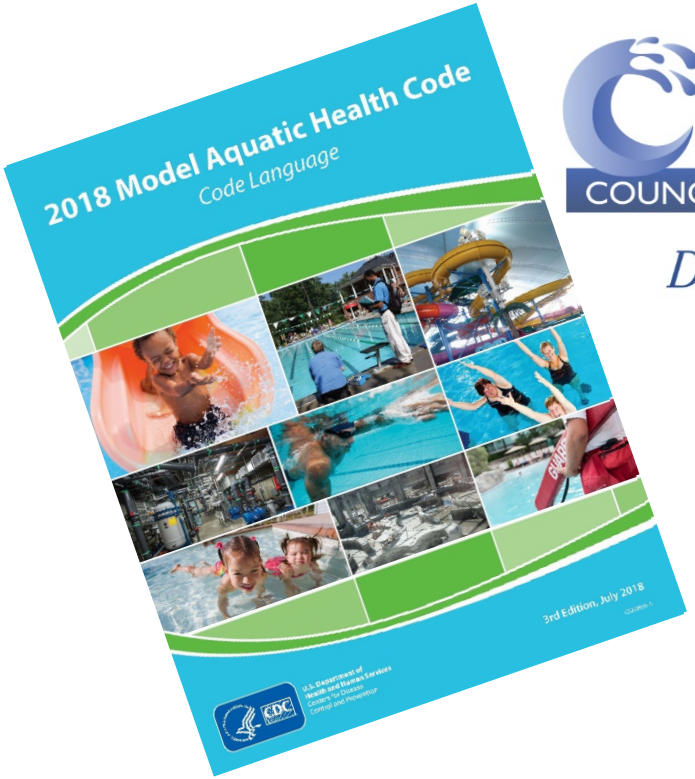
- Control of biofilm through routine physical scrubbing/wiping surfaces
  - No halogen residual to provide contact disinfection of surfaces
  - UV does not provide contact DISINFECTION of surfaces at any other point in the system other than the UV cell itself
  - O_3 treatment, due to its relatively long half-life at 95°F/35°C (8 min) could be expected to permeate all parts of the tank and plumbing
  - Control of biofilm and/or slime through routine physical scrubbing and/or wiping surfaces is necessary

Fecal/Vomit/Blood Contamination Response

- Immediate closure for fecal or vomit contamination
- Formed-Stool & Blood-Contamination
  - Operate filtration and disinfection systems for at least minimum required volumetric turnovers (min. 3 turnovers between users)
- Diarrheal and Vomit Contamination
  - Tank solution to be completely drained and contaminated surfaces disinfected prior to refilling

Rationale-Fecal/Vomit/Blood Contamination Response

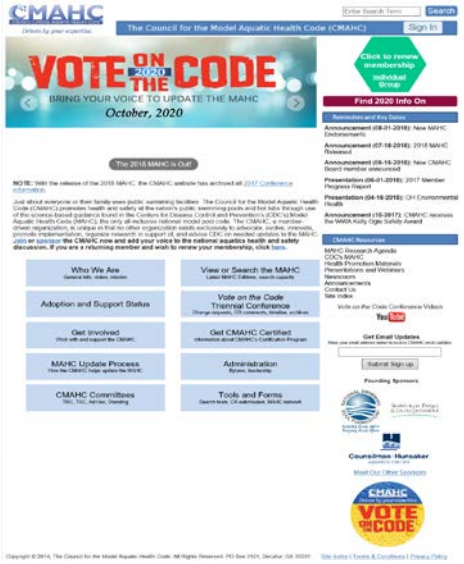
- Addressed separately and specific to float tanks
  - MAHC existing requirements based on chlorine concentrations

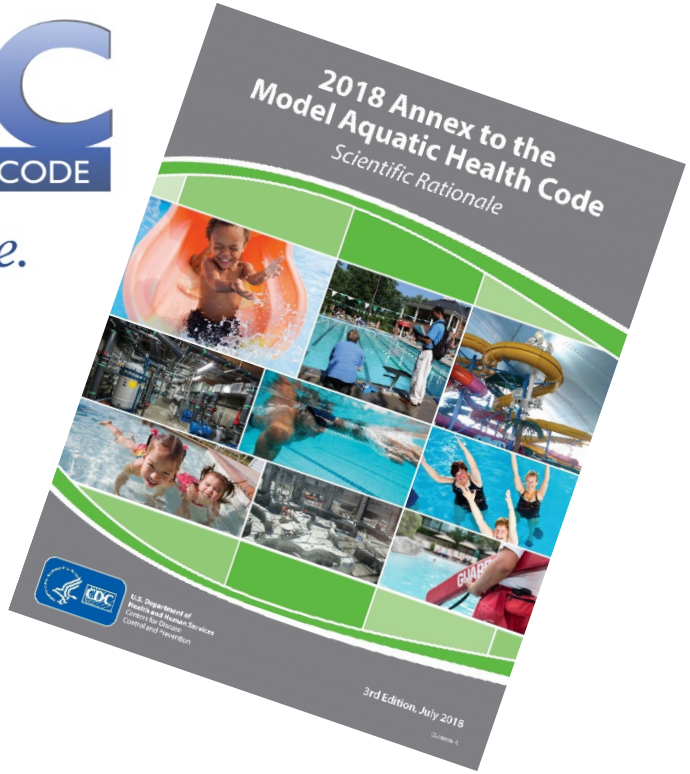


CMAHC

COUNCIL *for the* MODEL AQUATIC HEALTH CODE

Driven by your expertise.





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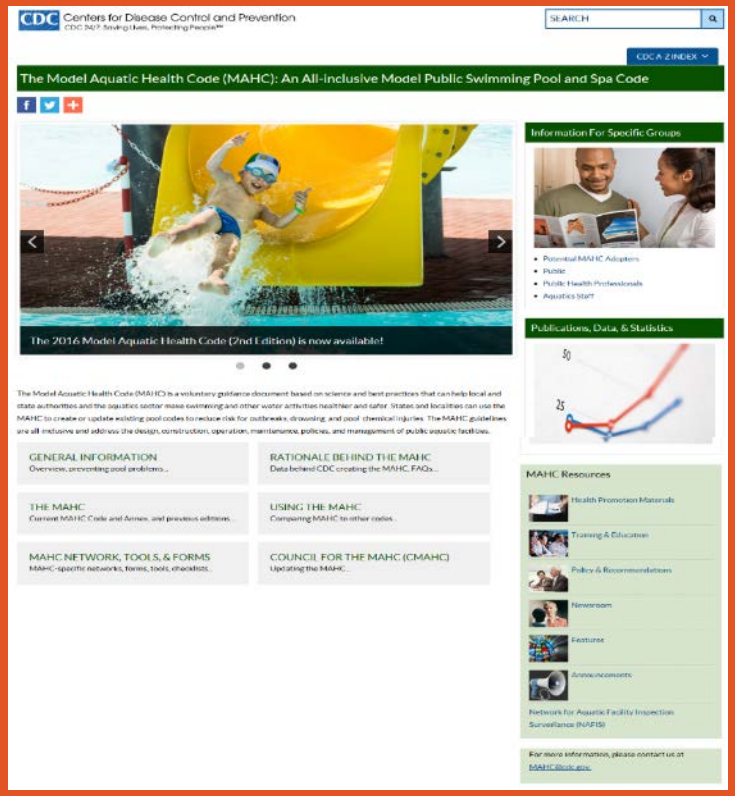

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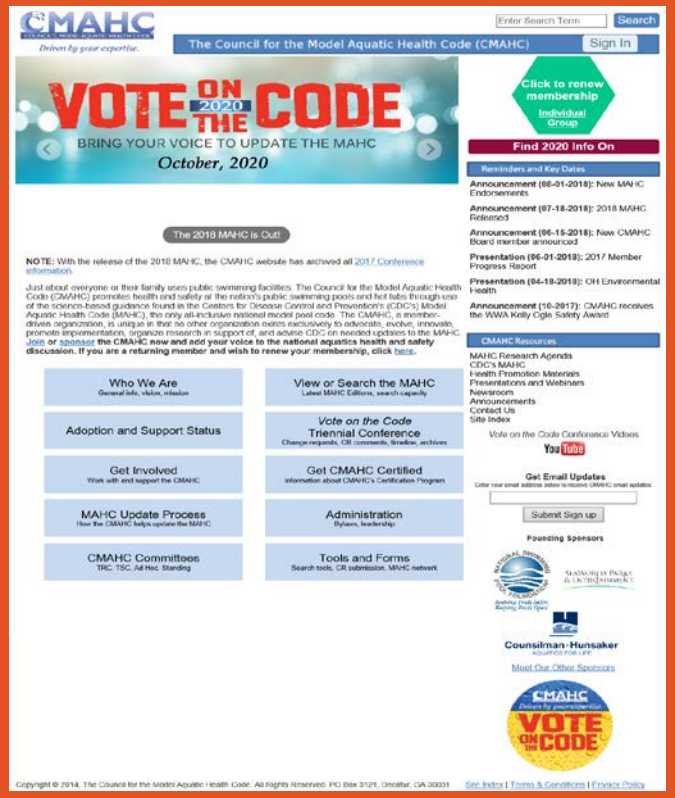

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Questions ?