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Tools To Help Conquer The Model Aquatic Health Code

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Swimming and other water-related activities are excellent ways to get the physical activity and health benefits needed for a healthy life. In the United States, we swim and bathe over 300 hundred million times in pools, oceans, lakes, rivers, and hot tubs/spas each year and most of the time it is healthy, safe, and enjoyable. However, there are risks associated with swimming and other recreational water activities. The number of outbreaks associated with recreational water has increased substantially over the last few decades. Drowning, near-drowning and pool chemical injuries continue to occur (See Table 1). This underscores the need to build, maintain, and inspect public pools, hot tubs/spas, and waterparks to help keep bathers and aquatics staff healthy and safe.

The Model Aquatic Health Code (MAHC) is a guidance document based on the latest science and best practices. It was developed to help local and state authorities and the aquatics sector make swimming and other aquatic activities healthier and safer. States and localities can save time by voluntarily using the MAHC to create or update existing pool codes to reduce risk of outbreaks, drowning, pool-chemical exposures, and other injuries. The MAHC guidelines are all-inclusive, preventing illness and injury the design, construction, operation, and management of public aquatic facilities.

CDC regularly updates the MAHC in partnership with the Council for the Model Aquatic Health Code (CMAHC, <https://www.cmahc.org>), which collects, assesses, and relays national input on MAHC versions. The updates keep the MAHC current with the latest advances in the aquatics industry while also responding to public health reports of disease and injury. The 3rd Edition MAHC (2018) is currently in use, the next edition will be

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released in the summer of 2021. The CMAHC received input for MAHC change requests in late 2019 and early 2020. Proposed changes will be presented and discussed at the 2020 CMAHC conference in Houston, TX in October. At that time, CMAHC membership will vote to accept (or reject) change requests to be incorporated into the 4th Edition MAHC (2021).

Even though the MAHC provides excellent prevention strategies, it does pose some challenges for users and potential adopters. Useful material that addresses a certain topic can be found in multiple sections of both the Code Language and the Annex (supporting rationale). The MAHC is long and can be difficult to digest.

To better serve state and local pool officials, CDC worked with many partners to develop resources to make the MAHC easier to use and navigate. The tools listed below include an inspection form, electronic applications, reporting forms, and MAHC-specific checklists. They are posted on CDC's MAHC website (<https://www.cdc.gov/mahc/networks-tools-forms.html#adoption>).

MAHC Aquatic Facility Inspection Report (Form)

Model inspection form with approximately 50 MAHC elements for health and safe pool operation and management to minimize illness and injury risk and protect public health.

Cheat-Sheet

Instructional guide for each inspection item found on the MAHC Aquatic Facility Inspection Report.

Cross-Reference Guide

The Cross-Reference Guide links the MAHC Aquatic Facility Inspection Report to content in the Code Language and Annex documents. The Guide allows an inspector to quickly locate Code Language requirements and supporting information in the Annex needed to develop a comprehensive and detailed inspection report.

Online Pool Inspector Training (NEHA e-learning) (See Table 2 and Figure 1)

Developed in partnership with NEHA, the online training provides the basics of performing an aquatic facility inspection. Based on CDC's 2nd Edition MAHC (2016), the training addresses aquatic facility systems and walks the user through a pool inspection using the MAHC-based inspection form.

Aquatic Inspector App (See Figure 2)

Aquatic Inspector app provides a digital version of the MAHC's inspection form, along with embedded MAHC text. The app allows environmental health practitioners to integrate the latest science and best practices into routine, follow-up, and investigative inspections of public treated aquatic venues.

MAHC Network

Through a CDC partnership with National Association of County and City Health Officials (NACCHO), the MAHC Network was established to create a community of MAHC users, subject matter experts, and those hoping to learn about the code. Members receive updates on the code, have access to and provide input into newly developed resources, and join bi-monthly webinars featuring the code and user experience.

Mini-MAHCs (See Graphic 1)

CDC developed Mini-MAHCs to make the MAHC more concise and easier to use, and to tackle specific public health concerns. The Mini MAHC focuses on content in the Code Language and Annex documents and allows a user to quickly locate information to address important topics. All mini-MAHCs reference content from the 3rd Edition MAHC (2018). Four Mini-MAHCs are currently available (<https://www.cdc.gov/mahc/mini-mahcs.html>):

- Reducing the Spread of *Cryptosporidium*
- Improving Swimmer Hygiene and Diaper Changing
- Preventing Pool Chemical Injuries
- Preventing In-line Production of Toxic Chlorine Gas Events

CDC continues to support and work with NEHA and other partners to develop recreational water and MAHC related tools. Currently NEHA is working with health departments across the United States to understand how they manage and publicly share aquatic facility inspection data. NEHA conducted a scan and identified only six states that published aquatic facility inspection data online and in a usable format. An additional tool emerging from NEHA's work will be an open data standard for sharing aquatic facility inspection data.

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Figure 1:
The online inspection training has several benefits.

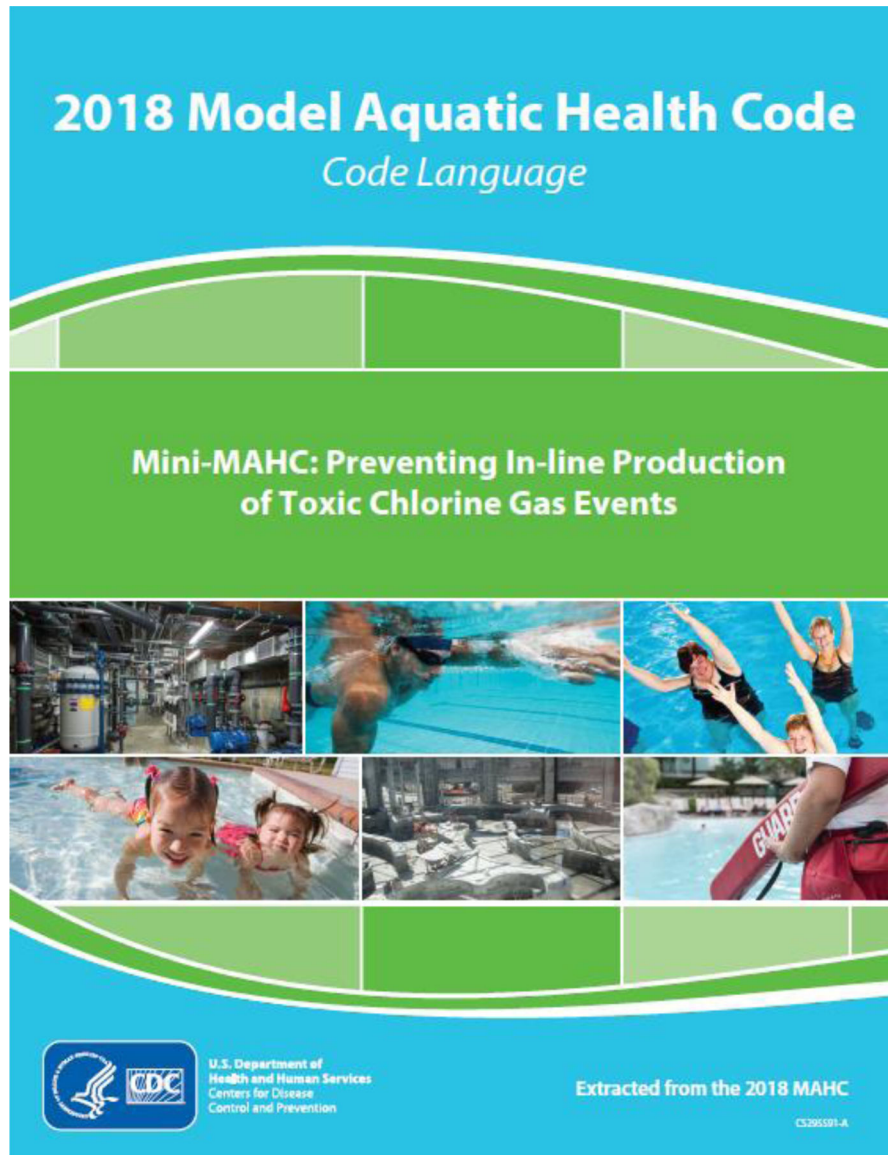
- The training can help you improve pool inspections in your community by better understanding and applying the MAHC and the MAHC inspection form.
- It's free and flexible. You can take the courses you want, when you want, in this online training.
- You can obtain CEUs (optional) from the National Environmental Health Association (NEHA) upon completing the lessons and final evaluation.
- The training includes a guided walk-through of a pool inspection using the MAHC inspection form.
- It addresses the various elements and systems of operating safe aquatic facilities.



Figure 2.
Aquatic Inspector App Facts:

- Free
- Full and searchable MAHC text
- Ability to take and link photos to inspection reports
- Ability to record data on-site and print, save, and share inspection reports

Compatible with iPad (iOS 9 or later). Note: Aquatic Inspector is only for iPads. It may not show up in App Store searches on smart phones.



Graphic 1:
Mini-MAHC cover - Preventing In-line Production of Toxic Chlorine Gas Events

Table 1:**Did You Know?**

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- Drowning is a leading cause of unintentional injury-related death for children ages 1–14 years. Non-fatal drowning can cause brain damage resulting in learning disabilities or even permanent loss of basic functioning.
 - Injuries linked to pool chemicals account for 3,000–5,000 emergency department visits each year. A third to almost half of those patients are under 18 years of age.
 - Nearly 500 disease outbreaks linked to pools, hot tubs/spas, and water playgrounds were reported to CDC for 2000–2014.
 - *Cryptosporidium* is a leading cause of treated recreational water-associated outbreaks in the United States and can cause diarrhea (for up to 3 weeks).
 - Recent studies found that routine inspections resulted in immediate closure of 11.8% (1 out of 8) of public pools and 15.1% (1 out of 7) of public hot tubs/spas because of health hazards.
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Table 2:**Online modules (9) for NEHA Inspector Training**

The nine lessons of the online pool inspection training can be taken in any order, but taking them in order follows the inspection form and can enhance learning:

- 1 Introduction to the MAHC
 - 2 Recirculation Systems
 - 3 Filtration Systems
 - 4 Water Disinfection
 - 5 Pool/Spa Area
 - 6 Water Chemicals
 - 7 Equipment Room
 - 8 Hygiene Facilities
 - 9 Records Room and General
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