

## Model Aquatic Health Code

### Draft Regulatory (formerly Regulatory Program Administration) ANNEX Section Modified After the First 60-day Review that Closed on 02/05/12

**Informational Copy: NOT Currently Open for Public Comment**

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***This version of the MAHC Regulatory Module has been modified based on the first round of public comments received. It is being re-posted so users can view how it was modified but is not currently open to public comment. The complete draft MAHC, with all of the individual module review comments addressed will be posted again for a final review and comment before MAHC publication. This will enable reviewers to review modules in the context of other modules and sections that may not have been possible during the initial individual module review. The public comments and MAHC responses can be viewed on the web at <http://www.cdc.gov/healthywater/swimming/pools/mahc/structure-content/index.html>***

***The MAHC committees appreciate your patience with the review process and commitment to this endeavor as we all seek to produce the best aquatic health code possible.***

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**NOTE:** A large number of comments correctly pointed out that a model code cannot “regulate the regulators”. Therefore we have pulled all information speaking to the Authority Having Jurisdiction (AHJ) into a separate document that will be specifically for pool programs. From the beginning of the MAHC process all partners have agreed that the success of this health and safety effort will depend on improvements in both aquatic facilities and operation as well as in regulatory pool programs. The information for AHJ’s will be retained and posted separately on the MAHC site at a later date.

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## MAHC Regulatory Module Abstract

Regulatory guidance forms the framework around which an effective model aquatic health code is built. The Regulatory Module follows a best practice and research-based protocol to ensure the AQUATIC FACILITY is operating safely. The guidance reflected in this module promotes all parties working together from the initial building permits to the code enforcement process. The Regulatory Module contains requirements for but not limited to:

- 1) Plans and permits guidelines
- 2) Delineation of imminent aquatic health hazards and corresponding remediation and enforcement procedures.
- 3) Establishment of facility staffing requirements based on facility size and type.
- 4) Recordkeeping requirements

The Regulatory Code Module shows a Table of Contents giving the context of the Regulatory Module in the Design, Construction, Operation, Maintenance, Policies and Management in the overall Model Aquatic Health Code's Strawman Outline (<http://www.cdc.gov/healthywater/pdf/swimming/pools/mahc/structure-content/mahc-strawman.pdf>).

### *Note on the MAHC Annex*

## Rationale

The annex is provided to:

- (a) Give explanations, data, and references to support why specific recommendations are made;
- (b) Discuss the rationale for making the code content decisions;
- (c) Provide a discussion of the scientific basis for selecting certain criteria, as well as discuss why other scientific data may not have been selected, e.g. due to data inconsistencies;
- (d) State areas where additional research may be needed;
- (e) Discuss and explain terminology used; and
- (f) Provide additional material that may not have been appropriately placed in the main body of the model code language. This could include summaries of scientific studies, charts, graphs, or other illustrative materials.

## Content

The annexes accompanying the code sections are intended to provide support and assistance to those charged with applying and using Model Aquatic Health Code provisions. No reference is made in the text of a code provision to the annexes which support its requirements. This is necessary in order to keep future laws or other requirements based on the Model Aquatic Health Code straightforward. However, the annexes are provided specifically to assist users in understanding and applying the

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provisions uniformly and effectively. They are not intended to be exhaustive reviews of the scientific or other literature but should contain enough information and references to guide the reader to more extensive information and review.

It is, therefore, important for reviewers and users to preview the subject and essence of each of the annexes before using the document. Some of the annexes (e.g., References, Public Health Rationale) are structured to present the information in a column format similar to the code section to which they apply. Other annexes or appendices provide information and materials intended to be helpful to the user such as model forms that can be used, recreational water illness outbreak response guidelines, and guidelines for facility inspection.

## Appendices

Additional information that falls outside the flow of the annex may be included in the Model Aquatic Health Code Appendix

**Acronyms and Initialisms in this Module:** See the Regulatory Module, Code Section

**Glossary Terms in this Module:** See the Regulatory Module, Code Section

**Preface:** *This document does not address all health and safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to each use.*

## Model Aquatic Health Code Regulatory Draft Annex

### 4.0 Design Standards and Construction

Key word	Section	Annex
<i>Design and Construction</i>	<b>4.0</b>	<b>Design Standards and Construction</b>
<i>Plans and Permits</i>	<b>4.1</b>	<b>Plans and Permits</b>
<i>Plan Submittal</i>	<b>4.1.1</b>	<b>Plan Submittal</b>
<i>Content</i>	<b>4.1.2</b>	<b>Content of Design Report</b>
<i>Basis</i>	<b>4.1.2.1</b>	<b>Basis of Design Report</b>
<i>Names / Addresses</i>	4.1.2.1.1	AQUATIC FACILITY plans should include a map indicating the exact location of the AQUATIC FACILITY with street address and geographic location information including the GPS coordinates.
<i>Plans and Specifications</i>	<b>4.1.2.2</b>	<b>Plans and Specifications</b>
<i>Technical Specifications</i>	<b>4.1.2.3</b>	<b>Technical Specifications</b>
<i>Detailed</i>		Detailed specifications are required to ensure that there is no misunderstanding, ambiguity, or omission between the design professional and the Health Department reviewer.
<i>Accompany Drawings</i>	4.1.2.3.1	Appurtenances include diving platforms, diving boards, and water slides.
<i>Plan Approval</i>	<b>4.1.3</b>	<b>Plan Approval</b>
<i>Review</i>		<p>The construction of public swimming pools should not be undertaken without a thorough review and approval of the proposed construction plans by the AHJ. Construction costs for public pools can be in the millions of dollars and very costly mistakes in design and equipment choices can occur if plans are not reviewed before construction. These mistakes could result in both public health hazards and additional remodeling costs.</p> <p>Most of the states require that plans be submitted for review and approval by the regulatory authority before a public swimming pool can be constructed. Although there</p>

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		<p>is considerable variation in the amount of information and detail required on the plans, most of the jurisdictions require at least a plot plan with sufficient detail to allow for a reasonable review of the proposed project.</p> <p>The licensed professional engineer or architect should have at least one year of previous experience with public swimming pool design. Most states will allow any professional engineer or architect to design a swimming pool. However, since pool technology is sufficiently complex, specific prior experience in pool construction and design is strongly recommended. A minimum of one year of previous experience in pool construction and design is recommended.</p> <p>Any final approval of plans by the AHJ should be dependent on approval by all other appropriate agencies.</p> <p>For example, the assumption of responsibility for reviewing plans for structural safety and ensuring pool is designed to withstand anticipated loading, not only the pool shell, but also in cases where the pool may be located on an upper floor of a building or a rooftop is generally that of the local building department. If there is no local building code department or requirements, the design engineer or architect must assume responsibility. This may include requiring architect/engineer to certify structural stability of pool shell during full and empty conditions.</p>
<i>New Construction</i>	<b>4.1.3.1</b>	<b><i>New Construction</i></b>
<i>Plan Review Training</i>	4.1.3.1.2	
<i>Plans Maintained</i>	4.1.3.1.7	
<i>Alterations</i>	<b>4.1.3.2</b>	<b><i>Alterations</i></b>
<i>Replacements</i>	<b>4.1.3.3</b>	<b><i>Replacements</i></b>
<i>Sample Form</i>		Most jurisdictions allow for replacements in-kind.
<i>Certificate of Compliance</i>	<b>4.1.4</b>	<b><i>Certificate of Compliance</i></b>
<i>Systems Commissioning</i>	4.1.4.4	“Commissioning” or “testing of bather safety” means completing a test, evaluation, or demonstration that confirms that the pool, pool feature, or other equipment in question does not compromise the safety of the pool patrons.

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Key word	Section	Annex
<i>Permits</i>	<b>4.1.5</b>	<b>Construction Permits</b>
<i>Permit Denial</i>	<b>4.1.5.4</b>	

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**Model Aquatic Health Code**  
**Regulatory Program Administration Draft ANNEX**  
**5.0 Operation and Maintenance**

Key word	Section	Annex
<i>Operation</i>	<b>5.0</b>	<b>Operation and Maintenance</b>
<i>Operating Permits</i>	<b>5.1</b>	<b>Operating Permits</b>
<i>Owner Responsibilities</i>	<b>5.1.1</b>	<b>Owner Responsibilities</b>
<i>Permits</i>	<b>5.1.2</b>	<b>Operating Permits</b>
<i>Inspections</i>	<b>5.2</b>	<b>Inspections</b>
<i>Preoperational Inspections</i>	<b>5.2.1</b>	<b>Preoperational Inspections</b>
<i>Exemptions</i>	<b>5.2.2</b>	<b>Exemptions</b>
<i>Variances</i>	<b>5.2.3</b>	<b>Variances</b>
<i>Variance Authority</i>	5.2.3.1	The permit issuing official may waive, in writing, any of the requirements of this code, and include the variance as a condition of the permit to operate, when it reasonably appears that the public health and safety will not be endangered by granting of such a variance and adequate alternative provisions have been made to protect the health and safety of the bathers and the public. The burden of providing the data and proof that any alternative provision is at least as protective as the code requirement is entirely on the permit holder.
<i>Variance Requests</i>	<b>5.2.4</b>	<b>Variance Requests</b>
<i>Hearing</i>	5.2.4.3.1	

**Model Aquatic Health Code:**  
**Regulatory Program Administration Draft ANNEX**  
**6.0 Policies and Management**

Key word	Section	Annex
<i>Policies and Management</i>	<b>6.0</b>	<b>Policies and Management</b>
<i>Operator Training</i>	<b>6.1</b>	<b>Operator Training</b>

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Lifeguard Training	6.2	<b>Lifeguard Training</b>
Facility Staffing	6.3	<b>Facility Staffing</b>
Operator Availability	6.3.1	<p><b>Operator Availability</b></p> <p>Numerous studies have concluded that pools with operators that have gone through formal training on maintenance and operation of pools, have less violations than pools without a trained person available. <sup>1,2</sup></p> <p>Results from a cross-sectional study after a 2006 outbreak in Nebraska demonstrated that pools without certified operators are more likely to have free chlorine and pH violations than those with certified operators and might pose increased risk of recreational water illness.</p> <p>Another study showed significant differences between certified versus non-certified operators in levels of pH and combined chlorine, and compliance with combined chlorine standards. The authors conclude the need for increased knowledge and training on maintaining safe chemical conditions in the water.</p> <p>The etiologic agent of approximately one quarter to one-third of reported recreational water illness outbreaks associated with treated venues are chlorine sensitive. This indicates that the implicated venues were poorly operated and maintained. The occurrence of waterborne disease outbreaks associated with inadequate public pool operation concludes the need for trained operators. <sup>3,4,5,6,7</sup></p> <p>The need for trained personnel on site at aquatic facilities</p>

<sup>1</sup> Buss BF et al. Association between swimming pool operator certification and reduced pool chemistry violations — Nebraska, 2005–2006. *J Environ Hlth.* 2009;71(8):36–40.

<sup>2</sup> Johnston K et al. Certified operators: does certification provide significant results in real-world pool and spa chemistry? *Int J Aquatic Res Ed.* 2007;1(1):18–33.

<sup>3</sup> Dziuban EJ et al. Surveillance for waterborne disease and outbreaks associated with recreational water — United States, 2003–2004. *MMWR Surveill Summ.* 2006;55(SS-12):1–30.

<sup>4</sup> Yoder J et al. Surveillance for waterborne disease and outbreaks associated with recreational water use and other aquatic facility-associated health events — United States, 2005–2006. *CDC. MMWR Surveill Summ.* 2008;57(SS-9):1–38.

<sup>5</sup> Hlavsa MC et al. Surveillance for waterborne disease outbreaks and other health events associated with recreational water use — United States, 2007–2008. *MMWR Surveill Summ* 2011;60:1-37.

<sup>6</sup> CDC. Surveillance data from swimming pool inspections — selected states and counties, United States, May–September 2002. *CDC. MMWR Morb Mortal Wkly Rep.* 2003;52 (22):513–6.

<sup>7</sup> CDC. Violations identified from routine swimming pool inspections --- selected states and counties, United States, 2008. *MMWR Morb Mortal Wkly Rep.* 2010;59(19):582-587.

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		<p>and accessible on weekends when pool use is highest is also illustrated by surveillance data.<sup>3</sup> One common lesson learned is that outbreaks often occur on weekends and involve large events, and in many cases the primary operator is off on weekends.</p> <p>Other surveillance data depict the settings of the pools where outbreaks occurred. Twenty-two of 58 (38%) outbreaks associated with treated recreational water venues were linked to venues in hotels or membership clubs.<sup>4</sup></p> <p>When the CDC reviewed spa inspection reports from regulatory jurisdictions, the authors concluded the “data emphasizes that spa operators can protect the health of users by obtaining appropriate training. Successful prevention strategies must address operator and inspection training.”<sup>8</sup></p> <p>CDC has not only concluded that operator training is necessary to prevent waterborne illness, they also concluded it is necessary to prevent chemical accidents and injuries. Research highlights the need for improved staff training on how to safely store and handle chemicals, and emergency response protocols.<sup>4,9</sup></p> <p>Further, “the disproportionate (86%) number of pool chemical--associated health events occurring in settings where pools were not the primary focus (e.g., schools or hotels) specifically calls for emphasizing training efforts in these settings.”<sup>10</sup></p> <p>An evaluation of violation data in one municipality showed a higher level of violations and repeat violations in facilities that did not have a nationally trained operator on staff.<sup>11</sup></p> <p>These studies reveal that many pools when operated by inadequately trained staff are more likely to have significant operational violations that result in injury or</p>

<sup>8</sup> CDC. Surveillance data from public spa inspections — United States, May–September 2002. MMWR Morb Mortal Wkly Rep. 2004; 53(25):553–5.

<sup>9</sup> CDC. Acute illness and injury from swimming pool disinfectants and other chemicals --- United States, 2002–2008. MMWR Morb Mortal Wkly Rep. 2011;60(39):1343-1347.

<sup>10</sup> CDC. Pool chemical—associated health events in public and residential settings---United States, 1983-2007. CDC. MMWR Morb Mortal Wkly Rep. 2009;58(18):489-93.

<sup>11</sup> Vyles, T. Growth and evolution of a municipal pool safety and inspection program. J Environ Hlth. 2009;71(10):40-44.

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		<p>illness. Ideally, all pools should have adequately trained staff on-site. However, this is not practical or economically feasible. The committee took into consideration the increased risk in larger, more frequently used pools in striking the definition of where an on-site versus off-site trained operator is required. This is considered the first step in which the overall goal is to have on-site qualified operators provided at all aquatic venues.</p> <p>Although the benefit of having trained personnel operating aquatic venues seems clear, the MAHC would still like to see more data collected on the benefit of training and the cost-effectiveness of this requirement.</p>
On-site Qualified Operator	6.3.1.1	<i>On-Site Qualified Operator</i>
Definition		<p>In constructing the definition of which classes of aquatic facilities needed to have an on-site or a qualified operator immediately available within two hours, the MAHC committee did not want to include all aquatic facilities with just one or two aquatic venues—a main pool and a wading pool—but would otherwise not fall into a class requiring an on-site operator. However, the committee believed that any aquatic facility with three or more aquatic venues, regardless of all other factors, reached a threshold of needing a qualified operator that is available to respond within two hours. The other categories of aquatic facilities that are listed as requiring an immediately available qualified operator were selected after much discussion and review and were based on aquatic venue size, higher patron load, venue usage (e.g., diaper-aged children that are more likely to contaminate), use by increased risk groups, and aquatic venues with inherent increased risk because of design features (e.g., spray pads). Spray pads have been implicated in a number of cryptosporidiosis outbreaks. The committee reviewed the HICPAC guidelines for infection control at health care facilities<sup>12</sup>. The guidelines do not require any training certification for therapy pool operators, which the MAHC would change. The final category—those with a history of code violations—is designed to give the AHJ the opportunity to require on-site qualified operators in cases were</p>

<sup>12</sup> Schulster L. et al. Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). MMWR Recomm Rep. 2003 Jun 6;52(RR-10):1-42.

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		operational violations are repeatedly found. This is similar to the discretion given by code to many AHJ to require that operators of restaurants with repeated violations complete a food manager's training course.
Off-Site Qualified Operator	6.3.1.2	<i>Contracted Off-Site Qualified Operator</i>
		Off-site qualified operators should be able to respond immediately by phone to emergency calls from their client aquatic facilities. They should discuss the problems with the aquatic facility owner or responsible supervisor by phone, advise the on-site individual to make simple adjustments where appropriate, and inspect the pool as soon as possible.
Facility Management	6.4	<p>Facility Management</p> <p>Facility management is critical in preventing illness and injury as summarized in this section. The Centers for Disease Control and Prevention (CDC) identifies the most frequently reported contributing factors to the spread of recreational water illnesses, in particular gastroenteritis. Another report identified the most frequently reported type of recreational water illness (RWI) outbreak as gastroenteritis, the incidence of which is increasing.<sup>5</sup> Prevention of RWIs at treated venues requires pool operators to:</p> <ul style="list-style-type: none"> <li>• Maintain appropriate disinfectant and pH levels to maximize disinfectant effectiveness and</li> <li>• Ensure optimal water circulation and filtration.</li> </ul> <p>A study of pool inspection data underscored the need for improved maintenance.<sup>7</sup> A total of 13,532 (12.1%) of 111,487 inspections identified serious violations that threatened the public's health and resulted in immediate pool closure. Of 120,975 inspections, 12,917 (10.7%) identified disinfectant level violations; of 113,597 inspections, 10,148 (8.9%) identified pH level violations. Other water chemistry violations were documented during 12,328 (12.5%) of 98,907 inspections, with the number identified per inspection ranging from zero to four. Circulation and filtration violations were documented during 35,327 (35.9%) of 98,361 inspections, with the number identified per inspection ranging from zero to nine. The following violations also were identified: improperly maintained pool log (12,656 [10.9%] of 115,874</p>

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		<p>inspections), unapproved water test kit used (2,995 [3.3%] of 90,088 inspections), valid pool license not provided and/or posted (741 [2.7%] of 28,007 inspections), and operator training documentation not provided and/or posted (1,542 [18.3%] of 8,439 inspections). Of the 121,020 inspection records, 59,890 (49.5%) included pool setting data. Among venues with known pool settings, child-care pool inspections had the highest percentage of immediate closures (17.2%), followed by hotel/motel and apartment/condominium pool inspections (15.3% and 12.4% respectively) (Table 1: <a href="http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5919a2.htm#tab1">http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5919a2.htm#tab1</a>). Apartment/condominium and hotel/motel pool inspections had the highest percentage of disinfectant level violations (13.1% and 12.8%, respectively). Child-care and apartment/condominium pool inspections had the highest percentage of pH level violations (11.8% and 10.0%, respectively). Approximately 35% of inspections of apartment/condominium pools, hotel/motel pools, and water parks identified circulation and filtration violations. Of the 121,020 inspection records, 113,632 (93.9%) included pool type data. Interactive fountain inspections had the highest percentage of immediate closures (17.0%). Kiddie/wading pool inspections had the highest percentage of disinfectant level violations (13.5%), followed by interactive fountain inspections (12.6%). Therapy pool inspections had the lowest percentage of disinfectant and pH level violations but the highest percentage of other water chemistry violations (43.9%). Interactive fountain inspections identified the lowest percentage of circulation and filtration violations (12.8%).</p> <p>Drowning and falling, diving, chemical use, and suction injuries continue to be major public health injuries associated with aquatic venues. Drowning is a leading cause of injury death for young children ages 1 to 4, and the fifth leading cause of unintentional injury death for people of all ages.<sup>13</sup> From 2008 through 2010, an average of 5,100 pool- or spa-related emergency department (ED)-treated submersion injuries occurred each year. For 2006-2008, 383 pool- or spa-related fatalities involved children younger than 15 years of age. Approximately 45% of the estimated injuries for 2008 through 2010 and 28% of the</p>

<sup>13</sup> Centers for Disease Control and Prevention. Wide-ranging OnLine Data for Epidemiologic Research (WONDER) [online]. (2010) Available from URL: <http://wonder.cdc.gov/mortsql.html>.

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		<p data-bbox="576 191 1404 260">fatalities for 2006 through 2008 involving children younger than 15 occurred in a public setting.<sup>14</sup></p> <p data-bbox="576 302 1404 953">For 2007-2008, 32 pool chemical--associated health events that occurred in a public or residential setting were reported to CDC by Maryland and Michigan. These events resulted in 48 cases of illness or injury; 26 (81.3%) events could be attributed at least partially to chemical handling errors (e.g., mixing incompatible chemicals). ATSDR's Hazardous Substance Emergency Events Surveillance System received 92 reports of hazardous substance events that occurred at aquatic facilities. More than half of these events (55 [59.8%]) involved injured persons; the most frequently reported primary contributing factor was human error. Estimates based on CPSC's National Electronic Injury Surveillance System (NEISS) data indicate that 4,574 (95% confidence interval [CI]: 2,703--6,446) emergency department (ED) visits attributable to pool chemical--associated injuries occurred in 2008; the most frequent diagnosis was poisoning (1,784 ED visits [95% CI: 585--2,984]).<sup>5</sup></p> <p data-bbox="576 995 1404 1205">The information identified in this report along with existing recreational water injury data and first hand inspector experience drove the development of the critical risk factors for recreational water injury and illness at treated aquatic venues. The eight broad critical risk factors for recreational water illness and injury are:</p> <ul data-bbox="625 1247 1323 1562" style="list-style-type: none"> <li>• Management; supervision; training; operation</li> <li>• Lifeguard services</li> <li>• Disinfectant residual</li> <li>• pH level (low or hi)</li> <li>• Water clarity</li> <li>• Facility enclosure; entry protection</li> <li>• Entrapment protection</li> <li>• Water supply/waste disposal</li> </ul> <p data-bbox="576 1604 1404 1667">Low or absent disinfectant levels lead to reduced inactivation of pathogens and these conditions have been</p>

<sup>14</sup> Gipson K. Pool or Spa Submersion: Estimated Injuries and Reported Fatalities, 2011 Report. U.S. Consumer Product Safety Commission, May 2011. Available online at <http://www.cpsc.gov/LIBRARY/FOIA/FOIA11/os/poolsub2011.pdf>.

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		associated with infectious disease outbreaks. <sup>5</sup> Low pH has been associated with loss of dental enamel. <sup>15,16,17</sup> Dental erosion begins to occur below pH 6.0 and rapidly accelerates as the pH drops. High pH reduces the efficacy of chlorine-based disinfection by reducing the amount of molecular hypochlorous acid (HOCl), the active form that is available for disinfection. At pH 7.0, about 70% of the hypochlorous acid is molecular, at pH 7.5 about 50% is molecular, at pH 8.0 about 20% is molecular, and at pH 8.5 only 10% is molecular. As a result, the MAHC decided to set upper and lower limits for pH as an imminent health hazard.
Operations	6.4.1	Operations
Operations Manual	6.4.1.1	Operations Manual
Systems Check Program	6.4.1.2	Systems Check Program
Recordkeeping	6.4.1.3	Recordkeeping
Daily Operation Records	6.4.1.3.1	Daily Operation Records
Daily Inspection Items	6.4.1.3.1.2	Please refer to MAHC Section 6.5 located in the <i>Fecal-Vomit-Blood Contamination Response Module</i> .
Monitoring and Testing Records	6.4.1.3.2	Monitoring and Testing Records
Illness and Injury Reports	6.4.1.3.3	Illness and Injury Reports
Record	6.4.1.3.3.1	Aquatic injuries and illnesses can occur after normal office working hours; therefore, a 24/7 system for reporting and responding to injury and illnesses at AQUATIC VENUES must be maintained. Early reporting and intervention could reduce the spread of illness or prevent additional injury.
Notify	6.4.1.3.3.3	The pool owner/operator should immediately report to the permit issuing official any injuries resulting in death or that require emergency medical response, resuscitation or transport to medical facility, or any illness suspected of

<sup>15</sup> Centerwall BS *et al.* Erosion of dental enamel among competitive swimmers at a gas-chlorinated swimming pool. *Am J Epidemiol.* 1986;123(4):641-7.

<sup>16</sup> Dawes C, Boroditsky CL. Rapid and severe tooth erosion from swimming in an improperly chlorinated pool: case report. *J Can Dent Assoc.* 2008;74(4):359-61.

<sup>17</sup> Geurtsen W. Rapid general dental erosion by gas-chlorinated swimming pool water. Review of the literature and case report. *Am J Dent.* 2000;13(6):291-3.

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		<p>being associated with bathing water quality or use of the aquatic facility. The pool owner/operator will have posted and available for use the routine phone numbers and after hours phone numbers necessary for reporting to the permit issuing official. This will facilitate a rapid investigation of the incident and could result in limiting further spread of disease and additional injuries.</p> <p>Most jurisdictions have some reporting requirements. This section is more comprehensive than the existing reporting requirements of many jurisdictions. Prompt reporting of significant injuries or waterborne illness allows for the permit issuing agency to immediately assess the conditions at the aquatic venue to determine if it can continue to operate safely or must be closed. Prompt reporting and investigation also allows for more accurate investigations to determine the causes of injury and illness. This information can be used to prevent future injuries or illness.</p>
<i>Remediation</i>	<i>6.4.1.3.4</i>	<i>Body Fluids Remediation Log</i>
<i>Staff Certifications Maintained</i>	<i>6.4.1.3.5</i>	<i>Staff Certifications on File</i>
<i>Patron-Related Management Aspects</i>	<b>6.4.2</b>	<b>Patron-Related Management Aspects</b>
<i>Bather Load</i>	<b>6.4.2.1</b>	<b><i>Bather Load</i></b>
<i>Signage</i>	<b>6.4.2.2</b>	<b><i>Signage</i></b>
<i>User Guidelines</i>	<b>6.4.2.3</b>	<b><i>User Guidelines</i></b>
<i>Swimmer Empowerment Methods</i>	<b>6.4.2.4</b>	<b><i>Swimmer Empowerment Methods</i></b>
<i>Post Inspection Score</i>	<b>6.4.2.4.1</b>	<p>There are only a relatively small number of municipal organizations that require public or web-based disclosure of inspection reports. However, as inspection activity is tax-payer supported, there is a growing trend toward requiring public disclosure. One recent example is the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, a Federal Act that requires public disclosure of coastal beach closings. Additionally, DeKalb County, Georgia requires the public posting of inspection results for aquatic facilities as well as posting them on the internet, which is similar to the ever expanding requirement for posting inspection results at food service</p>

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Key word	Section	Annex
		establishments. The posting of inspections at aquatic facilities will increase public awareness of aquatic safety and health and encourage aquatic operators to comply with all code requirements.
<i>Certificates Retained</i>	6.4.2.4.2	Most jurisdictions require the permit to be conspicuously posted. This is to inform the public that the facility has met the minimum safety standards required by law.
<i>Contamination Response</i>	<b>6.5</b>	<b>Fecal/Blood/Vomit Contamination Response</b>
<i>Inspections</i>	<b>6.6</b>	<b>Investigations and Inspections</b>
<i>Inspection Process</i>	<b>6.6.1</b>	<b>Inspection Process</b>
<i>Inspection Authority</i>	6.6.1.1	The Health Department has the authority to enter the facility for both routine inspections and to investigate reports of illness and injury. At the time of investigation, all records and facility personnel required for interviews must be available.
<i>Based on Risk</i>	6.6.1.3	
<i>Inspection Publication</i>	<b>6.6.2</b>	<b>Publication of Inspection Forms</b>
<i>Forms</i>	<b>6.6.3</b>	<b>Forms</b>
		This section in Code is applicable to jurisdictions with oversight by a higher authority.
<i>Imminent Health Hazards</i>	<b>6.6.4</b>	<b>Imminent Health Hazard Violations</b>
<i>Violations</i>	6.6.4.1	<p>Imminent health hazard violations must be corrected at the time of inspection or the pool must be closed until the violations are corrected. Whenever a pool is closed due to a public health violation, signage must be posted stating that the facility is closed due to an imminent health hazard. Before removing the closure sign and reopening the feature, A follow-up inspection or other evidence of correction of the violations is required to ascertain correction and re-open the pool. The violations constituting imminent health hazards are listed in the code under 6.6.4.1.</p> <p>The factors being considered imminent health hazards cover known risk areas:</p>

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Key word	Section	Annex
		<ul style="list-style-type: none"> <li>• Low or absent disinfectant levels lead to reduced inactivation of pathogens and these conditions have been associated with infectious disease outbreaks.</li> <li>• Low pH has been associated with loss of dental enamel. Dental erosion begins to occur below pH 6.0 and rapidly accelerates as the pH drops.<sup>4,5,6</sup> High pH reduces the efficacy of chlorine-based disinfection by reducing the amount of molecular hypochlorous acid (HOCL), the active form that is available for disinfection. At pH 7.0, about 70% of the hypochlorous acid is molecular, at pH 7.5 about 50% is molecular, at pH 8.0 about 20% is molecular, and at pH 8.5 only 10% is molecular. As a result, the MAHC decided to set upper and lower limits for pH as an imminent health hazard.</li> <li>• Injuries/deaths occur to persons using equipment such as vacuums and reach poles at swimming pools when this equipment contacts overhead wires which are too close to the pool.</li> <li>• Clearance in any direction from the water, edge of pool, etc. is to protect people using rescue and service equipment at pools, which are typically aluminum.</li> <li>• Clearance in any direction to the diving platform, tower, waterslide or other fixed pool related structure is to protect a swimmer using these items.</li> <li>• Follow-up procedure for observance of electrical lines within 20 feet of a swimming pool during an inspection: <ul style="list-style-type: none"> <li>• Determine whether the electrical lines are owned by the utility company or by the owner/operator of the swimming pool/property.</li> <li>• If they are owned by the utility company, the operator should obtain a letter from the utility company stating that these lines are in compliance with NEC 680 standards.</li> <li>• If the lines are owned by the owner/operator, and there is no waiver or variance, it is a PHH.</li> <li>• This requirement does not apply to wiring inside walls/ceilings, etc. at an indoor pool.</li> </ul> </li> </ul>
Enforcement	6.6.5	<b>Enforcement</b>
Enforcement Penalties	6.6.6	<b>Enforcement Penalties</b>
Public Nuisance	6.6.7	<b>Public Nuisance</b>

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Key word	Section	Annex
Fees	6.6.8	Fees

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## A Note About Resources

The resources used in all MAHC modules come from peer-reviewed scientific journals and government publications. No company-written, non peer-reviewed publications have been permitted to be used as a basis for writing code or annex materials.

## Codes Referenced

NEC Article 800  
U.S. National Model Food Code

## References cited in Module

Buss BF, Safranek TJ, Magri JM, Török TJ, Beach MJ, Foley BP. Association between swimming pool operator certification and reduced pool chemistry violations — Nebraska, 2005–2006. *J Environ Health*. 2009;71(8):36–40.

CDC. Acute illness and injury from swimming pool disinfectants and other chemicals --- United States, 2002—2008. *MMWR Morb Mortal Wkly Rep*. 2011;60(39):1343-1347.

CDC. Pool chemical—associated health events in public and residential settings--- United States, 1983-2007. *MMWR Morb Mortal Wkly Rpt*. 2009;58(18):489-493.

CDC. Surveillance data from public spa inspections — United States, May–September 2002. *MMWR Morb Mortal Wkly Rep*. 2004;53(25):553–555.

CDC. Surveillance data from swimming pool inspections — selected states and counties, United States, May–September 2002. *MMWR Morb Mortal Wkly Rep*. 2003;52(22):513–516.

CDC. Violations identified from routine swimming pool inspections --- selected states and counties, United States, 2008. *MMWR Morb Mortal Wkly Rep*. 2010;59(19):582-587.

CDC. Wide-ranging OnLine Data for Epidemiologic Research (WONDER) [online]. (2010) Available from URL: <http://wonder.cdc.gov/mortsql.html>.

Centerwall BS, Armstrong CW, Funkhouser LS, Elzay RP. Erosion of dental enamel among competitive swimmers at a gas-chlorinated swimming pool. *Am J Epidemiol*. 1986;123(4):641-7.

Dawes C, Boroditsky CL. Rapid and severe tooth erosion from swimming in an improperly chlorinated pool: case report. *J Can Dent Assoc*. 2008;74(4):359-61.

Dziuban EJ, Liang JL, Craun GF, Hill V, Yu PA, Painter J, Moore MR, Calderon RL, Roy SL, Beach MJ. Surveillance for waterborne disease and outbreaks associated with recreational water — United States, 2003–2004. *MMWR Surveill Summ*. 2006;55(SS-12):1–30.

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Geurtsen W. Rapid general dental erosion by gas-chlorinated swimming pool water. Review of the literature and case report. *Am J Dent*. 2000;13(6):291-3.

Gipson K. Pool or Spa Submersion: Estimated Injuries and Reported Fatalities, 2011 Report. U.S. Consumer Product Safety Commission, May 2011. Available online at <http://www.cpsc.gov/LIBRARY/FOIA/FOIA11/os/poolsb2011.pdf>.

Hlavsa MC, Roberts VA, Anderson AR, Hill VR, Kahler AM, Orr M, Garrison LE, Hicks LA, Newton A, Hilborn ED, Wade TJ, Beach MJ, Yoder JS. Surveillance for waterborne disease outbreaks and other health events associated with recreational water use — United States, 2007–2008. *MMWR Surveill Summ* 2011;60:1-37.

Sehulster L, Chinn RY; CDC; HICPAC. Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). *MMWR Recomm Rep*. 2003 Jun 6;52(RR-10):1-42. Available at <http://www.cdc.gov/mmwr/PDF/rr/rr5210.pdf>

Johnston K, Kinziger M. Certified operators: does certification provide significant results in real-world pool and spa chemistry? *Int J Aquatic Res Ed*. 2007;1(1):18–33.

Vyles, T. Growth and evolution of a municipal pool safety and inspection program. *J Environ Hlth*. 2009;71(10):40-44.

Yoder J, Hlavsa MC, Craun GF, Hill V, Roberts V, Yu PA, Hicks LA, Alexander NT, Calderon RL, Roy SL, Beach MJ. Surveillance for waterborne disease and outbreaks associated with recreational water use and other aquatic facility–associated health events — United States, 2005–2006. *MMWR Surveill*. 2008;57(SS-9):1–38.