

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED
REPEAL AND REPLACEMENT OF
7.18.1 THROUGH 7.18.5 NMAC

No. EIB 16-01(R)

Environmental Health Bureau,
Environmental Protection Division of the
New Mexico Environment Department,

Petitioner.



DEPARTMENT'S NOTICE OF INTENT TO PRESENT TECHNICAL TESTIMONY

The Environmental Health Bureau within the Environmental Protection Division of the New Mexico Environment Department ("Department") files this Notice of Intent to Present Technical Testimony for the hearing in this matter currently scheduled for May 13, 2016.

1. **Entity for whom the witness will testify:** The New Mexico Environment Department.
2. **Identity of witness:** Eugene Knight is the Manager of the Department's Pool Program. His resume is attached as Exhibit 2. A copy of his written testimony is attached as Exhibit 3.
3. **List of Exhibits:** A complete list of exhibits the Department intends to offer into evidence in this matter is attached as Exhibit 1.

Respectfully submitted,

NEW MEXICO ENVIRONMENT DEPARTMENT

By:

A handwritten signature in blue ink, appearing to read "Andrew P. Knight".

Andrew P. Knight
Assistant General Counsel
121 Tijeras Avenue NE, Suite 1000
Albuquerque, New Mexico 87102-3400
(505) 222-9540
andrew.knight@state.nm.us

List of Exhibits

EIB 16-01(R) – LIST OF EXHIBITS

Exhibit No.	Description
1	List of Exhibits
2	Resume of Eugene R. Knight, Manager, Pool Program, New Mexico Environment Department
3	Written Testimony of Eugene R. Knight
4	Council for the Model Aquatic Health Code: Description, Vision and Mission
5	Statement of Policy Advocating Adoption of the Model Aquatic Health Code by the National Association of County and City Health Officials
6	Endorsement of Model Aquatic Health Code by the National Swimming Pool Foundation
7	Developmental History of the Model Aquatic Health Code by the Council of State and Territorial Epidemiologists
8	Public Notice of Proposed Rulemaking as Published in Albuquerque Journal – March 11, 2016
9	Public Notice of Proposed Rulemaking as Published in the New Mexico Register – March 15, 2016
10	Public Comments on Proposed Regulations Received Through NMED Website
11	October 16, 2015 Letter to All NM Public Pool Owners Providing Notice of Proposed Rulemaking
12	Sign-in Sheets and Notes on Discussions from Three Public Meetings Held in Albuquerque, Santa Fe, and Las Cruces
13	PowerPoint Presentation on Proposed Regulations Given at Three Public Meetings
14	March 31, 2016 Letter to NM Small Business Regulatory Advisory Commission
15	Acute Illness and Injury from Swimming Pool Chemicals, 2002-2008 from the Centers for Disease Control and Prevention (CDC)
16	Pool Chemical-Associated Health Events, 1983-2007 (CDC)
17	Pool Chemical-Associated Health Events, 2003-2012 (CDC)
18	Swimming Pool Injury Statistics – By Year, from Edgar Snyder and Associates
19	Descriptions of Injuries and Fatalities Involving Chlorine Gas Release and Pool Chemical Fires – From Chemaxx.com
20	Respiratory and Ocular Symptoms Among Employees of a Hotel Indoor Waterpark (CDC)

Exhibit 2

Eugene R Knight

03-14-2016

1354 Little Bighorn, Alto NM 88312

1-575-937-8388

eugene.knight@state.nm.us

OBJECTIVES

Career advancement in the NM Environment Department in field of work that I have the expertise in. The Swimming Pool Program.

EDUCATION

M.T.I Meteorological Technical Institute, Inc. Lewistown MT
1993

Weather Observation Certificate

West Virginia University, Morgantown WV

1979

Bachelor of Science in Forestry

Aurora High School, Aurora WV

1974

National Honor Society

EXPERIENCE

Swimming Pool Program Manager, New Mexico Environment Department
09-14-2013 - Present

Oversight of Swimming Pool Program and pool specialists. Reviewing policies and guidances on day to day operations of program. Training, compliance and technical assistance of staff and industry. Technical assistance for Department of Health Epidemiology for disease outbreaks in swimming pools. Part of Environmental Health Bureau management team to improve the bureau as a whole through strategic planning for better efficiency, communication and employee satisfaction

**Acting Swimming Pool Program Manager, New Mexico Environment
Department**

05-15-2011- 09-14-2013

Oversight of Swimming Pool Program and pool specialists. Reviewing polices and guidances on day to day operations of program. Training, compliance and technical assistance of staff and industry. Technical assistance for Department of Health Epidemiology for disease outbreaks in swimming pools. Part of Environmental Health Bureau management team to improve the bureau as a whole through strategic planning for better efficiency, communication and employee satisfaction

**Environmental Scientist & Specialist A, New Mexico Environment
Department**

01-12-2008 – 05-15-2011

Training, Compliance, and Technical Assistance of staff and industry in the Swimming Pool Program and Swimming Pool facility plan reviews. Technical assistance for DOH Epidemiology for disease outbreaks in swimming pool facilities

Environmental Scientist & Specialist O, New Mexico Environment Department

03-03-2003-01-12-08

Inspections permit reviews, enforcement and compliance, and training, outreach and technical assistance for the Food, Liquid Waste and Swimming Pool Programs.

Deputy Livestock Inspector, New Mexico Livestock Board

04/01/2002 - 03-03-2003

Inspected livestock brands for identification of ownership and enforced Livestock Board rules and regulations.

Correctional Officer, Cibola County Correctional Center, Milan NM

11-27-2000 – 10-20-2001

Provided security and directed supervision of inmates in housing units, at meals, during recreation, on work sites for the protection and safety of inmates, staff and the public.

Senior Weather Observer, Gallup Airport Weather Station, Gallup NM

12-01-1994-10-01-2000

Staff supervisor at the Gallup Weather Station and performed weather observations for aircraft and National Weather Service use.

Owner, Blue Nugget Outfitters, Utica MT

06-01-1985 – 11-31-1994

Owner/operator of outfitted hunts for big game

Owner, Nugget Consulting, Utica MT

06-01-1985 – 11-31-1994

Owner/operator of consulting business that bid and executed US Forest Service contracts.

CERTIFICATIONS

REHS/RS (Registered Environmental Health Specialist/Registered Sanitarian)
The National Environmental Health Association

CPO (Certified Pool- Spa Operator) National Swimming Pool Foundation

CPOI (Certified Pool-Spa Operator Instructor) National Swimming Pool Foundation

LAFT (Basic Licensed Aquatic Facilities Technician) American Swimming Pool and Spa Association

LAFTI (Basic Licensed Aquatic Facilities Technician Instructor) American Swimming Pool and Spa Association

NAWT (Certified Inspector) National Association of Wastewater Transporters

HAZWOPER (Hazardous Waste Operations and Emergency Response) Field Sciences Institute

Standard First Aid, American Red Cross

CPR, American Red Cross

AED-Adult, American Red Cross

NM Water Sampler Tech Level 2, NM Utility Operator Certification, NM Water Quality Control Commission

Defensive Driving Certified, State of New Mexico

STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT BOARD

IN THE MATTER OF PROPOSED
REPEAL AND REPLACEMENT OF
7.18.2 THROUGH 7.18.5 NMAC –
Public Swimming Pools, Spas and Baths

No. EIB 16-01 (R)

Environmental Health Bureau,
Environmental Protection Division of the
New Mexico Environment Department,

Petitioner.

WRITTEN TESTIMONY OF EUGENE R KNIGHT
April 20, 2016

1 **I. Witness Qualifications**

2

3

My name is Eugene R. Knight. I am the Swimming Pool Program Manager for the New

4 Mexico Environment Department (“Department” or “NMED”) Environmental Health Bureau

5 also known as EHB. I have been employed by the Bureau for the past 13 years, starting as an

6 Environmental Scientist Operational in March 2003. During my tenure with the Environmental

7 Health Bureau, I was promoted to Swimming Pool Specialist and then Acting Swimming Pool

8 Program Manager. I have been in my current position as Swimming Pool Program Manager

9 since September 2013, where I oversee the swimming pool program, manage the budget and

10 direction of the program, and act as the point of contact for the U.S. Consumer Products Safety

11 Commission for swimming pool safety issues.

12 I hold a B.S. in Forestry from West Virginia University and REHS/RS (Registered

13 Environmental Health Specialist/ Registered Sanitarian) certification from the National

14 Environmental Health Association. I am also a National Swimming Pool Foundation Authorized

15 Instructor and an American Swimming Pool and Spa Association Certified Instructor. (See

16 **NMED Exhibit 2**, Resume of Eugene R. Knight).

1 **II. Background**

2 The purpose of my testimony is to provide a brief overview of the operational status of
3 the Swimming Pool Program, its relationship with citizens of New Mexico and stakeholders in
4 the aquatics industry, and the reasons why the Environmental Health Bureau is proposing new
5 regulations for the aquatics industry in New Mexico.

6 The Environmental Health Bureau Swimming Pool Program performs inspections and
7 enforces the New Mexico 7.18.2-5 NMAC Public Swimming Pools, Spas and Baths regulations
8 (“NM Pool Regulations”). The EHB has 22 field offices distributed throughout the state with 96
9 employees that all work in the swimming pool program in one aspect or another, through
10 inspections, data entry, administration and enforcement.

11 The current NM Pool Regulations were adopted on July 30, 2008 and there have been
12 significant changes in the aquatics industry over the past eight years. The Environmental Health
13 Bureau’s Swimming Pool Program proposes a complete repeal of 7.18.1, 7.18.2, 7.18.3, 7.18.4,
14 and 7.18.5 NMAC, and replacement with a new version of 7.18.1 and 7.18.2 NMAC that will
15 include adoption of the U.S. Department of Health and Human Services Center for Disease
16 Control and Prevention Model Aquatic Health Code, 1st Edition (“MAHC”). The MAHC covers
17 new equipment requirements, chemical requirements, training requirements, and safety plans, in
18 addition to revised construction requirements for new or substantially altered facilities. The
19 EHB is also proposing an incremental re-inspection fee for repeated non-compliance with the
20 aquatic venue regulations.

21 The MAHC was created to help programs that regulate public aquatic facilities reduce the
22 risk of disease, injury, and drowning in their communities. The MAHC was developed over
23 several years with input from public health officials, the aquatics industry, and academia from
24 across the United States. (See **Exhibit 4**, Description of CMAHC, its vision and mission). There

1 were two 60 day comment periods, and a comprehensive cycle of editing and revising individual
2 modules and incorporating them into the “knitted” version. The MAHC was published in August
3 2014. The EHB Swimming Pool Program team has performed a thorough review of the model
4 code and believes it is about eighty percent similar to the current NM Pool Regulations. EHB
5 has proposed slight alterations to the MAHC in order to account for the specific situations that
6 arise in the jurisdiction of the New Mexico Environment Department.

7 The MAHC is becoming the national standard for the design, construction and operation
8 of public swimming facilities. It is comparable to the Plumbing Code, Electrical Code and
9 Building Codes which have become national standards. The MAHC has been adopted by the
10 State of Delaware and is under consideration by numerous other jurisdictions including the State
11 of Colorado. It has been endorsed by a number of national level organizations that urge its
12 adoption by all state and local health departments. (See Exhibits 5, 6, and 7 for examples).

13 **II. Statutory Rulemaking Considerations**

14 The Environmental Improvement Act, NMSA §74-1-9(B) states, in part,

15 “...In making its regulations, the board shall give the weight it deems appropriate to all
16 relevant facts and circumstances presented at the public hearing, including but not limited
17 to:

- 18 (1) character and degree of injury to or interference with health, welfare, animal
19 and plant life, property and the environment;
- 20 (2) the public interest, including the social, economic and cultural value of the
21 regulated activity and the social, economic and cultural effects of
22 environmental degradation; and

1 (3) technical practicability, necessity for and economic reasonableness of
2 reducing, eliminating or otherwise taking action with respect to environmental
3 degradation.”

4 These statutory criteria apply to the NM Pool Regulations as follows:

5 Criterion #1 - character and degree of injury to or interference with health, welfare, animal and
6 plant life, property and the environment.

7 Aquatic facilities that are not designed, installed, operated and maintained properly can
8 be a hazard to public health and safety. Disease outbreaks have occurred from improper
9 levels of disinfectants. Chemical burns from improper pH and disinfection levels have
10 occurred. Entrapment hazards in suction outlet covers that are not properly maintained
11 and changed out according their expiration dates have been discovered. Drownings and
12 near drowning have occurred when proper supervision of aquatic venues was not
13 maintained.

14 Criterion #2 - the public interest, including the social, economic and cultural value of the
15 regulated activity and the social, economic and cultural effects on public health and safety.

16 With thousands of visits to aquatic facilities in New Mexico each year bathers expose
17 themselves to many potential dangers in and around these facilities. In recent decades,
18 public health practitioners have seen a dramatic increase in waterborne disease outbreaks
19 associated with public disinfected aquatic facilities. Drowning and falling, diving,
20 chemical use, and suction injuries continue to be major sources of public health injuries
21 associated with aquatic facilities, particularly for young children.

22 Criterion #3 - technical practicability, necessity for and economic reasonableness of reducing,
23 eliminating or otherwise taking action with respect to public health and safety.

1 The proposed regulations have been vetted for technical practicability and economic
2 reasonableness. There have been numerous technical advancements in pool equipment in
3 recent years that will allow operators to better maintain and operate their pools to better
4 protect public health without unreasonably increasing the cost of building or operating
5 these facilities.

6 **III. Public Outreach**

7 The public notices for this petition and hearing were published in the Albuquerque
8 Journal in both English and Spanish on March 11, 2016 (See NMED **Exhibit 8**) and in the New
9 Mexico Register on March 15, 2016, (See NMED **Exhibit 9**). The bureau also posted notice of
10 this petition and hearing on the Bureau website at [www. env.state.nm.us](http://www.env.state.nm.us) and received comments
11 via email (See NMED **Exhibit 10** for comments received through the Department's website).

12 The bureau conducted additional outreach directly to potential stakeholders by sending out an
13 annual letter in 2015 to all public pool facilities stating we were planning on presenting to the
14 board a petition for adopting the Model Aquatics Code 1st Edition. The Bureau mailed a letter to
15 all pool owners, operators and builders that are listed in the swimming pool data base (1298
16 letters) (See NMED **Exhibit 11**). The Bureau conducted three public meetings in Albuquerque,
17 Santa Fe and Las Cruces. There were 14 attendees at the Albuquerque, Las Cruces 21 attendees
18 and 13 at the Santa Fe public meetings (See NMED **Exhibit 12**, sign-in sheets and notes on
19 discussion at public meetings, and NMED **Exhibit 13**, copy of PowerPoint presentation given at
20 public meetings). 2016 annual letters were sent to all pool facilities in March to announce the
21 public hearing May 13, 2016 on proposed regulation change.

22 **IV. Summary of Requirements in the Model Aquatic Health Code**

23 The MAHC is a science and best practices based guidance document and if adopted
24 would become the core of the swimming pool regulations for the Swimming Pool Program.

1 One half of the code deals with design and construction of new facilities and has little
2 bearing on existing facilities. Over the last few years there have been improvements and new
3 technology in the aquatic industry. The MAHC will allow aquatic facilities in New Mexico to
4 use most of the new technology that is currently available within the industry yet is not allowed
5 under our current regulations. Facilities in New Mexico would be able to build aquatic venues
6 like they do in other parts of the nation.

7 **VI. MAHC Recommendations for Aquatic Facilities**

8 Below is a list of MAHC recommendations for existing aquatic facilities and a list for
9 newly constructed facilities. These recommendations encompass major changes for some
10 jurisdictions. Some of the MAHC requirements are similar to our current regulations while some
11 are different, as I have highlighted below. The EHB proposes that the MAHC be accepted in its
12 entirety except the omissions and additions indicated in proposed 7.18.1.11 NMAC.

13 **A. MAHC Recommendations for Existing Facilities**

- 14 • Interlocks between chemical feeders and recirculation system will be required upon adoption
15 (4.4.7.3.2.1.3; 5.7.3.5.1.2; 5.7.3.7)
- 16 ○ Most new automated controllers have the interlock built into the system.
17 Aquatic facilities in New Mexico without an interlock built into the automated
18 controller system will be required to meet this regulation.
- 19 • Improved flow meters (accurate to +/- 5%) (4.7.1.9.1; 5.7.1.8)
- 20 ○ Most of the current flowmeters being used in New Mexico have an accuracy
21 of +/- 10%. This requirement will be phased in as flow meters are replaced.
- 22 • Automatic feeders upon adoption (4.7.3.2.7.1) (5.7.3.5.1; 5.9.2.4.1)
- 23 ○ Automated chemical feeders are already required on spas and spray pads in
24 the current regulations.



1 • Required diaper-changing stations (sink, etc.) for facilities that allow diaper-aged individuals
 2 (4.10.4.5; 5.10.4.5)

3 ○ There has been no requirement for this in our current regulations.

4 • Automated controllers within 1 year from adoption (4.7.3.2.8; 5.7.3.7.1)

5 ○ Automated controllers are already required on spas and spray pads in the
 6 current regulations. We are proposing a two year period for installation
 7 instead of one year, to give facilities time to budget for the change.

8 • New policies / The Department is developing templates to assist facilities that do not have
 9 these plans in place.

10 ○ Required preventive maintenance plan (5.4.2.1.1)

11 ○ Combined chlorine reduction (5.6.2.8)



12 ○ Employee illness (6.3.4.7)

13 ○ Daily or other inspection checks (6.4.1.3)

14 ○ Body fluid contamination response (6.5) Water replacement of 4
 15 gallons/bather/day for control of organic/inorganic contaminants, (5.6.7.4.2)
 16 The EHB proposes to omit this section from the proposed regulation to save
 17 New Mexico water resources.

18 • Cyanuric acid prohibited in spas and therapy pools four years after adoption (5.7.3.1.3)

19 ○ Cyanuric acid is already prohibited for all indoor facilities in our current
 20 regulations.

21 • Requirements for existing gaseous chlorine disinfection systems (5.7.3.1.4.1)

22 ○ The requirements for gaseous chlorine are the same as our current regulations.





- 1 • Check disinfectant/pH levels at beginning of each day (5.7.5.1) (every four hours for
2 automated controllers (5.7.5.2); every two hours for disinfectant feeders with no automated
3 controller (5.7.5.2))
 - 4 ○ Our current regulations require a four hour time frame for checking chemicals
5 in vessels that do not have automated chemical controllers. The EHB
6 proposes to keep the four hour time frame and not accept the MAHC
7 requirement of checking every two hours for disinfectant feeders with no
8 automated controller.
- 9 • Starting platforms must be removed, covered, or blocked from use during all recreational or
10 non-competitive swimming activities (5.8.3.1.2)
 - 11 ○ This requirement is the same as our current regulations.
- 12 • Hardwired phone or other system for emergencies (5.8.5.2.1)
 - 13 ○ Our current regulations require a hardwired emergency phone. This section
14 would allow other means of emergency phone systems such as cell phone and
15 radios.
- 16 • Delineates operator training qualifications (6.1.1.1) and course essential topics (6.1.2)
 - 17 ○ Certified operators are required in our current regulations.
- 18 • Lifeguard training course content (6.2.1.1)
 - 19 ○ Certified lifeguards are required by certain facilities in our current regulations.
- 20 • Required CPR training every year (6.2.1.3.5)
 - 21 ○ CPR training is required for pool attendants in our current regulations.
- 22 • Required Lifeguard supervisor training course content (6.2.2)



1 ○ If a facility has more than two lifeguards a lifeguard supervisor would be
2 required.

3 ○ Most large lifeguarded facilities in New Mexico already comply with this
4 requirement.

5 • Required on-site (6.3.1.1), off-site (6.3.1.2) operator staffing requirements by venue type
6 upon adoption.

7 ○ The current regulations require a qualified operator that delineates their
8 availability.

9 • Facilities requiring lifeguards (while used for group training), (with water depth of over 5
10 feet for new construction), (while used by recreation/school groups, wave pools, lazy rivers,
11 waterslide landing pools) (6.3.2)

12 ○ Required under our current regulations.

13 • Required Safety Plan including staffing, zones of patron surveillance, rotation, supervision,
14 emergency action plan (6.3.3)

15 ○ Required under our current regulations.

16 • Lifeguarding zones of patron surveillance are now performance-based with performance
17 criteria (6.3.3.1.1)

18 ○ Our current regulations are based on the number of bathers.

19 • Lifeguard supervisor required (6.3.4.4)

20 ○ If more than two lifeguards are at a facility a lifeguard supervisor will be
21 required under 6.3.4.4.

22 ○ Most large lifeguarded facilities in New Mexico currently follow this practice.

23 • Enhanced signage requirements (6.4.2.2)

1 ○ These requirements are already in our current regulations.

2 • Swimmer empowerment requirements (6.4.2.3)

3 ○ This requires public information to be available to patrons by having the
4 health messaging program inform patrons of their impact on the air quality of
5 the indoor aquatic facilities. The EHB also proposes that posters be available
6 to help educate the public.

7 ○ Our current regulations do not require all of this.

8 • Posting pool inspection scores (6.4.2.3.2)

9 ○ This is not a current requirement but a good idea to let patrons know how well
10 a facility is being operated.

11 • Definition for imminent health hazards for closure (6.6.3)

12 ○ This is defined in our current inspection reports based on our current
13 regulations.

14 **B. MAHC Recommendations for Newly Constructed or**
15 **Substantially Altered Facilities**

16
17 • Incorporation of water type (flat, agitated, hot) in aquatic venue design for “Theoretical Peak
18 Occupancy” (4.1.2.3.5)

19 ○ A better way of designing the occupancy of a facility compared to our current
20 regulations.

21 • Prohibition of wood, earth, or sand as an interior finish on aquatic venues (4.2.1.11)

22 ○ This is already prohibited under our current regulations.

23 • Interlocks between chemical feeders and recirculation system upon adoption (4.4.7.3.2.1.3;
24 5.7.3.5.1.2; 5.7.3.7)

1 ○ Most automatic chemical feeders in New Mexico have an Interlock system
2 built into them.

3 • Design needs to include consultation with owner/aquatic risk manager and address the layout
4 of zones of patron surveillance (4.5.1)

5 ○ Our current regulations do not require this.

6 • Decreased filtration flow rate used in design

7 ○ No more than 15 gallons/min/ft² of surface area for bed depth of 15 inches or
8 more (4.7.2.2.3.1; 5.7.2.1.1).

9 ○ Our current regulations allow up to 20 gallons/min/ft². By reducing the flow
10 rate, filters will do a better job of filtering contaminants from the water.

11 ○ No more than 12 gallons/min/ft² of surface area for bed depth of less than 15
12 inches (4.7.2.2.3.1; 5.7.2.1.1).

13 • Increased backwash rates to no less than 15 gallons/min/ft² of surface area (4.7.2.2.3.2;
14 5.7.2.1.2)

15 ○ By increasing backwash flow rates filters will be cleaned better.

16 ○ Our current regulations do not require this.

17 • Secondary disinfection on increased risk venues (4.7.3.3.1.2)

18 ○ This will help reduce incidents of cryptosporidium which is of major concern
19 in swimming venues.

20 ○ Our current regulations do not require this.

21 • Fencing to 6 ft. (4.8.6.2.4.2), chain link fence with 1.75 inch mesh (4.8.6.2.1.2)

22 ○ Our current regulations do not require this.

23 • Eye wash stations required near chemical storage area (4.9.2.1.4)

- 1 ○ Our current regulations do not require this.
- 2 • Interior chemical storage spaces must be under negative pressure and must exhaust to
- 3 exterior (4.9.2.5)
- 4 ○ Our current regulations do not require this.
- 5 • Prohibition of gaseous chlorine disinfection systems (4.9.2.11)
- 6 ○ Our current regulations do not require this.
- 7 • Hygiene facility distance from pools; 300 ft. for general venues, 200 ft. for kiddie pool
- 8 (4.10.2)
- 9 ○ Our current regulations do require this.
- 10 • Rinse showers required at aquatic venues (4.10.4.3)
- 11 ○ Our current regulations do not require this.
- 12 • Any new pool over 5 feet in depth at any point will require a lifeguard from the date of
- 13 acceptance of the code (6.3.2.1)
- 14 ○ Our current regulations do not require this.

15 **VIII. Effect on Existing Swimming Pools in New Mexico**

16 The effect on existing Swimming Pools in New Mexico would be minimal but there are

17 some changes that will better protect public health and safety upon adoption, such as;

18 **Interlocks between chemical feeders and the recirculation system.** There have been

19 chemical exposures across the country that occur when chemical feeders continue to feed

20 chemicals into the recirculation system, even when the circulation system is shut down. As a

21 result, a large amount of chemicals may build up inside the pipes and shoot out an excess of

22 chemicals when the circulation system is turned back on. Large amounts of chemicals that are

23 used in pools can gas off and cause respiratory problems and possible hospitalization or death if

1 inhaled. The interlock system shuts off all automatic feeders if the circulation pumps are shut
2 off. Some of the new aquatic venues that have been built in recent years already have interlock
3 systems, but a lot of older facilities do not have them For further information see page 124 of
4 Annex 4.7.3.2.1 General.

5 **Automatic feeders for chemicals upon adoption.** Our current regulations require
6 automatic feeders for disinfectant chemicals but not pH control. All spas are currently required
7 to have automatic control and feed systems installed for disinfection and pH control. All other
8 aquatic venues hand dose pH control chemicals. Hand dosing of pH adjustment chemicals could
9 result in over dosing or under dosing of chemicals which could cause public health issues due to
10 the pH being too high or too low. For further information see page 123 of annex 4.7.3
11 Disinfection and pH Control.

12 **Diaper-changing stations for facilities that allow diaper age individuals.** This will
13 help with public health by having a place to change a diaper that is not at the pool side. For
14 further information see page 175 of annex 4.10.4.5 Diaper-Changing Stations.

15 **Automatic controllers within two years of adoption.** In 2005, regulations that required
16 automatic controllers on spas were adopted, resulting in a large decrease in the number of disease
17 outbreaks in spas. Adding automatic controllers to all aquatic vessels should have the same
18 effect. About half of all newly constructed facilities in New Mexico are being built with
19 automatic controllers on all vessels even though they are not required for pools in the NM Pool
20 Regulations. Constant and regular monitoring of key water quality parameters such as
21 disinfectant levels and pH levels are critical to prevent recreational water illness and outbreaks.
22 For further information see annex page 124 4.7.3.2.8 Automated Controllers.

23

1 **Safety, maintenance, operation, and staffing plans.** Some facilities have these plans in
2 place but others need to develop them for their own protection in case of an accident and also to
3 reduce their liability. The current regulations only refer to these plans by stating that the facility
4 must comply with all other governmental requirements. The Department is working on a
5 template of the required plans for use by facilities that do not have them in place. For further
6 information see annex page 295.

7 **Lifeguard zones of patron surveillance now performance-based.** The current
8 regulations require a minimum of two lifeguards on duty no matter the size or shape of the
9 aquatic venue or number of bathers in the vessel. The MAHC would require some facilities to
10 have more lifeguards and some facilities would be required to only have one depending on the
11 facilities' size and shape. Patron protection zone would be established by being able to scan the
12 area of surveillance within 10 seconds and being able to reach any part of assigned area in 20
13 seconds.

14 **IX. New Construction Advantages with Adoption of the MAHC**

15 In recent years there has been new pool design proposals presented to the Department for
16 approval which were not allowable under the current regulations. Some examples of these
17 proposals are infinity edge pools, under water benches, underwater ledges, underwater shelves,
18 moveable floors, moveable bulkheads, and swim up bars and spas incorporated into the pool.
19 These new designs would be allowable under the proposed regulations incorporating the MAHC.

20 **X. Effect on Small Businesses**

21 Pursuant to the Small Business Regulatory Relief Act, NMSA 1978, Sections 14-4A-1 to
22 -6 (2005), the Bureau has determined that the regulatory changes proposed in this action will not
23 have an adverse effect on small businesses (See NMED **Exhibit 14**, Letter to NM Small
24 Business Advisory Commission).

1 **XI. Other Proposed Changes to Regulations**

2 The Department proposes the removal of hot spring from the NM Pool Regulations. Hot
3 springs do not fit under the current regulations as an aquatic facility since they do not recirculate
4 water or use chemicals to control pH levels and disinfection. Regulating hot springs is
5 comparable to trying to regulate natural waters such as rivers and lakes for swimmers' health and
6 safety.

7 The Department is proposing some minor change to the pool classes. The Department
8 would like to merge class E pools with class C pools, thus reducing the number of pool classes in
9 our current regulations. By eliminating pool class E, which requires as much scrutiny as pool
10 class C, the pool structure will improve. Class A, class B and class D pools will remain the same
11 as in the current regulations.

12 The Department is proposing some changes to the fee regulations. Construction permit
13 fees will remain the same, except for class E pool and spray pads; these fees will increase from
14 \$125 to \$150 as a result of merging with pool class C. The plan reviews for class E pools and
15 spray pads are as labor intensive as any other pool. Operating Permit Fees will remain the same
16 except for class E pools and spray pads which will increase from \$100 to \$150 as a result of
17 merging with pool class C. A reinspection fee of \$50 is currently in the regulation. The
18 Department is proposing an escalation clause which will increase the reinspection fees by \$50 for
19 each subsequent reinspection, up to \$250 per year. The cost to the Department is approximately
20 \$250 to perform an inspection. The escalation clause would be used for pool facilities that do not
21 want to comply with the NM Pool Regulations even after we have exhausted all efforts at
22 compliance assistance. The escalation clause provides the Department with another level of
23 enforcement action before revoking a facilities' permit.

1 **XII. Summary**

2 The current New Mexico 7.18.2-5 NMAC Public Swimming Pools, Spas and Baths
3 regulations are about 80% comparable to the Model Aquatics Health Code. The other 20%
4 mainly concerns new construction with very few changes to existing swimming pool facilities.
5 The most notable changes to existing facilities is the addition of automated chemical controllers
6 to all pools, not just spas, and the development of safety plans and diaper changing stations for
7 pools that allow diaper age children.

Exhibit 4

The Council for the Model Aquatic Health Code (CMAHC)

The Council for the Model Aquatic Health Code promotes the safety and health of individuals and families by encouraging swimming and other aquatic exercise at facilities protected by the Centers for Disease Control and Prevention's (CDC) Model Aquatic Health Code (MAHC), the only all-inclusive national model pool code.

The CMAHC is a unique, non-profit 501(c)(3) organization that educates local and state authorities, aquatic facility owners, operators, designers, manufacturers, builders and retailers about the MAHC and promotes its updating and voluntary adoption across the U.S.

The CMAHC is a conduit for funneling advice to CDC as well as data-driven, science-based information from public health and aquatic industry experts committed to keeping the MAHC current, sustainable, and easily understood and implemented.

Every other year, The CMAHC invites public health and industry leaders to gather at the *Vote on the Code* Biennial Conference for discussion and member voting on new language and content for the MAHC. The CMAHC discussion and decision-making is driven by its membership and is sustained through affordable individual and organizational memberships and sponsorships.

The CMAHC is unique in that no other organization exists exclusively to advocate, evolve, innovate, promote implementation, and organize research in support of, the Model Aquatic Health Code (MAHC).

CDC's Model Aquatic Health Code (MAHC)

The MAHC is unique in that it is kept sustainable, current, and complete because the people who use it vote on its content every other year via membership in The CMAHC. It is based on scientific data and best practices gathered through a strong partnership between public health and aquatics industry experts, which makes it easier to adopt and implement. Unlike legislation, the MAHC is voluntarily adopted wholly or in part and driven by your expertise. It is free, accessible to all, and backed by the Centers for Disease Control and Prevention (CDC).

The Centers for Disease Control and Prevention (CDC) worked for 7 years with public health, academia, and aquatics industry representatives across the United States on guidance to prevent drowning, injuries, and the spread of recreational water illnesses at public swimming pools and spas. The Model Aquatic Health Code (MAHC) is voluntary guidance based on science and best practices that can help local and state authorities make swimming and other water activities healthier and safer. The MAHC serves as a voluntary model and guide for local and state agencies needing to update or implement swimming pool and spa code, rules, regulations, guidance, law, or standards governing the design, construction, operation, and maintenance of public swimming pools, spas, hot tubs, and other disinfected aquatic facilities.

Vision

An up-to-date, knowledge-based Model Aquatic Health Code (MAHC) that supports healthy and safe aquatic experiences for everyone and is used by pool programs across the U.S.

Mission

The CMAHC works to achieve this vision by:

- Collecting, assessing, and relaying national input on needed MAHC revisions back to CDC for final consideration for acceptance
- Advocating for improved health and safety at aquatic facilities
- Providing assistance to health departments, boards of health, legislatures, and other partners on MAHC uses, benefits, and implementation

- Providing assistance to the aquatics industry on uses, interpretation, and benefits of the MAHC
- Soliciting, coordinating, and prioritizing MAHC research needs

The CMAHC collects, assesses, and relays MAHC Change Request recommendations to CDC using a biennial conference of members to gather, assess, and decide on proposed Change Requests to the MAHC. The first CMAHC *Vote on the Code* Biennial Conference was held October 6-7, 2015 in Phoenix Arizona, a little over 1 year after CDC's release of the MAHC 1st Edition. CDC will use the CMAHC's input to revise the MAHC and plans to post the MAHC 2nd Edition for summer swim season 2016.

The CMAHC is a membership organization where member input drives discussion and decision making on how to improve the MAHC. Become a member or sponsor the CMAHC and help the organization become the driving force for improved health, safety, and fun at the nation's public swimming facilities. The CMAHC is driven by member expertise!

CMAHC Administration and Operation

[Top of Page](#)

REMINDERS

Update (02-01-2016): [CMAHC Posts Sector Percentage CR Voting Results](#)

Update (01-24-2016): [CMAHC Posts CR Voting Results](#)

Copyright © 2014, The Council for the Model Aquatic Health Code. All Rights Reserved. PO Box 3121, Decatur, GA 30031 | [Terms & Conditions](#) | [Privacy Policy](#) | [Contact Us](#)



- Download a button for your website.
- Send to a colleague.
- Don't Be Left Behind. Join CMAHC.
- Share this Badge over social media.

YouTube

Tweet

Like Share



Join CMAHC

Sign up for our newsletter.

Submit





National Association of County & City Health Officials

The National Connection for Local Public Health

15-01

STATEMENT OF POLICY

Recreational Water Safety

Policy

The National Association of County and City Health Officials (NACCHO) urges national, state, and local health departments and related agencies to engage policymakers, government agencies, non-governmental organizations, businesses, and communities to produce and support policies, legislation, regulations, programs, research, and resources to promote healthy and safe swimming.

NACCHO supports activities to increase recreational water safety, including the following:

- Incorporating the Model Aquatic Health Code into local health department policies and practices to decrease instances of waterborne injury and illness, working toward a national set of guidelines.
- Improving regulatory oversight of recreational waters, including pools, spas, interactive fountains, waterparks, lakes, rivers, and oceans and private pools and spas where possible.
- Implementing standardized and uniform recreational water testing guidelines across health departments.
- Increasing levels and sources of funding for local health departments to secure resources for conducting adequate surveillance of recreational water environments and investigating incidents such as outbreaks, pool chemical-associated events, and drowning.
- Promoting communication between local health departments and pool owners and operators (including private and residential pools and spas), especially at facilities with high employee turnover, to ensure local regulations are followed and pool employees are properly educated.
- Encouraging owners and operators of recreational water facilities to complete certification courses, such as Certified Pool/Spa Operator[®] or Aquatic Facilities Operator[™] training, ensuring they are able to safely manage their facilities.
- Supporting the use of educational materials to encourage hygienic and healthy best practices at pools and other recreational water facilities to limit recreational water illness.
- Promoting community education regarding the importance of swimming skills, supervision, knowledge of swimming-focused emergency medical response, and use of life jackets.
- Increasing use of predictive modeling to monitor public beaches in order to decrease community exposure to infectious and chemical pathogens and decrease the number of days beaches are closed unnecessarily.



- Encouraging cooperation between public health officials, owners of recreational water facilities, and the community to promote healthy and safe swimming practices.

Justification

Swimming in recreational waters, including natural sites such as lakes, rivers, and oceans and man-made sites such as pools, spas, and waterparks, is a popular pastime in the United States. With over 300 million visits to recreational water sites each year, these venues can pose serious health threats if not managed properly.¹

The recent economic recession has had detrimental impacts on health departments across the country. From 2008 to 2013, local health departments lost approximately 50,000 employees.² A study conducted by NACCHO in 2012 illustrates the effect of budget cuts on environmental health services in local health departments. In addition to job loss, 33.7% of local health departments reduced or eliminated at least one environmental health service. Specifically, 13.6% of local health departments polled cited reducing or eliminating recreational water services. Water services saw the third largest reductions at health departments, behind food safety and vector control. Departments and staff that had acknowledged budget cuts reported a number of negative consequences, including reduced education and training for local health department employees.³

The survey, "Looking for Trouble," documents the shortcomings in aquatic venue surveillance, specifically examining types of monitoring and the most common reasons for violations. The survey of local health departments found a relationship between high employee turnover rates at facilities and a lack of employee knowledge of pool water quality and equipment maintenance. This lack of knowledge can lead to mistakes and violations. To combat these violations, the report stresses the importance of health departments working with facility owners and operators to ensure that best practices are followed.⁴ The report also indicates limitations in inspections of pool equipment and water quality. Most health departments surveyed indicated that they always or most of the time checked basic, common certification requirements. Unfortunately, less common requirements are often neglected. For example, saturation index and type of chlorine used may be overlooked if overall chlorine levels are on target. However, using the wrong type of chlorine can still result in nullification of certification and increase the transmission of infectious pathogens.⁴

Most recreational water sites are regulated at the state or local level, with 68% of local health departments having pool inspection programs.⁴ This results in policy and practice differences across the country and is resource-intensive as individual jurisdictions devote staff and time to policy development, implementation, and updates. To address this problem, the Centers for Disease Control and Prevention (CDC) created the Model Aquatic Health Code (MAHC) for swimming pool and spa surveillance. The MAHC is a comprehensive guide based on research and best practices used to improve the ability of health inspectors to reduce the risk for drowning, outbreaks, and chemical poisoning at public pools and other man-made recreational water sites in their jurisdictions.¹

Recreational water illness (RWI) is a serious public health threat, significantly increasing in incidence. In 2009–2010, *Cryptosporidium* caused 24 (30%) of 81 reported RWI outbreaks and

has become the leading cause of RWI outbreaks in the United States. In addition to *Cryptosporidium*, *Giardia*, *Shigella*, norovirus, and *E. coli* are prominent causes of RWI outbreaks.⁵ Although most reported RWI outbreaks are of acute gastrointestinal illness, outbreaks of skin, ear, respiratory, eye, and neurologic infections have also been reported.⁵ A 2010 study conducted by CDC found that one in eight pools were closed immediately in 2008 after inspection due to serious code violations. Examples of these code violations include disinfectant level violations and lack of safety equipment.⁶

One of the most serious health risks associated with recreational waters is drowning. Between 2005 and 2009, there were 3,880 fatal unintentional drowning incidents annually, making it the fifth leading cause of unintentional injury death in the United States.⁷ According to CDC, those at highest risk of drowning are children ages one to four and minorities. From 1999 to 2010, drowning rates among American Indians/Alaska Natives and blacks were two and 1.4 times higher than drowning rates for whites, respectively.^{7,8} Factors that influence drowning risk include lack of swimming ability, lack of physical barriers around water, and lack of close supervision. Additionally, failure to wear life jackets, alcohol use, and seizure disorders play a large role in accidental drowning events.⁷ Many of these incidents are preventable with awareness and education, particularly of swimming skills. It should be the goal of local health departments to ensure community members are mindful of the risks and know how to keep themselves and others safe.

Predictive modeling has become an increasingly useful public health tool for determining levels of dangerous bacteria, such as *E. coli*, in natural waters. The majority of beaches in the United States are currently monitored by culturing fecal indicator bacteria (FIB) in water samples, which takes approximately 24 hours to yield results.^{9,10} This delay is problematic due to the rate at which FIB levels change in the environment, leading to possible public exposure to contaminated beaches.⁹ New predictive monitoring approaches use historic water quality and other environmental data, allowing health departments to determine the public health consequences of current conditions.¹⁰ This may decrease the likelihood of exposure to infectious pathogens and the number of days beaches are closed unnecessarily.

Using public health resources to support recreational water safety can effectively decrease preventable illness and injury associated with these popular sites. Additionally, local incorporation of the Model Aquatic Health Code will provide owners and operators of recreational water facilities with the most recent standards and guides for operation, thereby reducing the risk of illness and injury. Through cooperation with the community and facility operators, health departments can achieve positive, sustainable goals at recreational water sites.

References

1. Centers for Disease Control and Prevention. (2014). Healthy Swimming/Recreational Water webpage. Retrieved November 1, 2014, from <http://www.cdc.gov/healthywater/swimming/pools/mahc/overview.html>
2. National Association of County and City Health Officials. (2014). *Local Health Department Budget Cuts and Job Losses: Findings from the 2014 Forces of Change Survey* [research brief]. Retrieved November 1, 2014, from <http://naccho.org/topics/research/forcesofchange/upload/Budget-Cuts.pdf>
3. Li, J., & Elligers, A. (2014). Impact of budget cuts on environmental health services at local health departments. *Journal of Environmental Health*, 76(10), 38-40. Retrieved November 1, 2014, from <http://www.cdc.gov/nceh/ehs/docs/jeh/2014/june-budget-cuts.pdf>

4. Axiell Water Treatment Products and the National Association of County and City Health Officials. (2014). *Looking for Trouble Seeing Eye to Eye with Health Inspectors. A Report on U.S. Aquatic Venue Inspections, Findings, and Recommendations*. Washington, DC: NACCHO.
5. Centers for Disease Control and Prevention. (2013). Recreational Water Illnesses (RWIs) webpage. Retrieved November 1, 2014, from <http://www.cdc.gov/healthywater/swimming/rwi/index.html>.
6. Centers for Disease Control and Prevention. (2010). Violations identified from routine swimming pool inspections — selected states and counties, United States, 2008. *Morbidity and Mortality Weekly Report*, 59(19), 582-7.
7. Centers for Disease Control and Prevention. (2014). Unintentional Drowning: Get the Facts webpage. Retrieved November 1, 2014, from <http://www.cdc.gov/HomeandRecreationalSafety/Water-Safety/waterinjuries-factsheet.html>
8. Centers for Disease Control and Prevention. (2014). Racial/ethnic disparities in fatal unintentional drowning among persons aged ≤ 29 years — United States, 1999–2010. *Morbidity and Mortality Weekly Report*; 63(19), 421-426. Retrieved November 1, 2014, from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6319a2.htm?s_cid=mm6319a2_w
9. Nevers, M.B., & Whitman, R.L. (2010). Efficacy of monitoring and empirical predictive modeling at improving public health protection at Chicago beaches. *Water Research*; 45(4), 1659-1668.
10. Thoe, W., Gold, M., & Griesbach, A. (2014). Predicting water quality at Santa Monica Beach: Evaluation of five different models for public notification of unsafe swimming conditions. *Water Research*; (15)67, 105-117.

Record of Action

Proposed by Environmental Health Committee

Approved by NACCHO Board of Directors

February 25, 2015

Exhibit 6



Healthy Pools
Healthy Bodies.

For Immediate Release

**Non-Profit, Leading Education and Research Organization,
National Swimming Pool Foundation,
Endorses First Module of Model Aquatic Health Code**

MEDIA Contact

Laurie Batter, BatterUp!

Voice 760-438-9304; FAX 760-931-5735

Email batterup@batterupproductions.com

NSPF Contact

Margaret Smith

Voice 719-540-9119; FAX 719-540-2787

Email Margaret.Smith@nspf.org

COLORADO SPRINGS, COLORADO, May 3, 2011—The board of directors for the leading pool/spa/education and research organization, non-profit National Swimming Pool Foundation[®], voted last week to endorse the first module of the Model Aquatic Health Code (MAHC), entitled "Operator Training." The Model Aquatic Health Code is being created by the world's chief public health organization, the Centers for Disease Control and Prevention (CDC) and dozens of volunteers. This standard is the first public-domain, scientifically-based standard that is free for all jurisdictions. The first of twelve modules entitled "Operator Training" was issued on April 8, 2011. A second module on "Ventilation/Indoor Air Quality" was released for public comment on April 13, 2011. Another half dozen modules are in final review and being formatted. The final MAHC will consist of twelve main modules.

"The National Swimming Pool Foundation endorses the concept and process of the Model Aquatic Health Code and urges every health department and every association to adopt the first module, 'Operator Training,' without exception."

"When the foremost aquatic education and research foundation stands behind this standard, it's a sign that the Model Aquatic Health Code is the right direction to lead us into the future," said Michael Beach, Ph.D., Associate Director for Healthy Water in the CDC's National Center for Emerging and Zoonotic Diseases.

"Leaders from industry, academia, and government collaborated to create a standard that is based on the best available science," said Doug Sackett, Director of the Model Aquatic Health Code Steering Committee. State and many county health departments update their pool and spa health codes periodically. This is an expensive and time-consuming process. Often an individual state will not have access to experts from around the country. "The Model Aquatic Health Code saves local resources, improves standards, and provides for consistency around the country, so states will not have to reinvent the wheel to update their codes," he added.

"The release of the first modules that will make up the complete national Model Aquatic Health Code from the CDC is a seminal moment," commented Thomas M. Lachocki, Ph.D., and CEO of the National Swimming Pool Foundation. "The National Swimming Pool Foundation endorses the concept and process of the Model Aquatic Health Code and urges every health department and every association to adopt the first module, 'Operator Training,' without exception."

Healthier living through aquatic education and research™
4775 Granby Circle, Colorado Springs, CO 80919-3131

National Swimming Pool Foundation Endorses Model Aquatic Health Code-Page 1 of 3



Healthy Pools.
Healthy Bodies.

For Immediate Release

science can be best used by influencing ONE model code that is not limited to a single jurisdiction," he concluded.

About NSPF

The National Swimming Pool Foundation® (NSPF®) is a non-profit organization founded in 1965, giving back over \$3.7 million in the past seven years to fund grants to prevent illness, injury, and drowning, and to demonstrate the benefits of aquatic activity. NSPF instructors have trained over 282,000 professionals worldwide and their materials have been used in over 64 countries. Visit www.nspf.org.

Exhibit 7

Enter search criteria...

[JOIN CSTE](#) • [CAREER CENTER](#) • [PRINT PAGE](#) • [CONTACT US](#) • [REPORT ABUSE](#) • [SIGN IN](#)



COUNCIL OF STATE AND TERRITORIAL EPIDEMIOLOGISTS

Using the power of epidemiology to improve the public's health

[MEMBERS ONLY](#) [WORKFORCE DEVELOPMENT](#) [FELLOWSHIPS](#) [ACTIVITIES](#) [ABOUT US](#)

CSTE FEATURES

[Blog Home](#) [All Blogs](#)

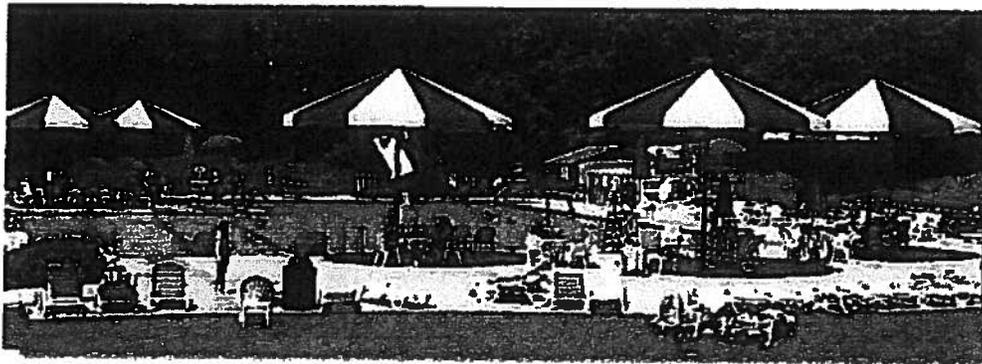


Search all posts for:

[View all \(103\) posts »](#)

[A DECADE AFTER CSTE'S CALL TO ACTION, A NEW VOLUNTARY MODEL HEALTH CODE LAUNCHES](#)

Posted By Douglas Sackett, Friday, October 24, 2014



What began with strong surveillance and epidemiologic data supporting a CSTE position statement has spurred a national, multidisciplinary model pool code development process, a multi-thousand-person public dialogue, and the creation of a new non-profit organization to ensure the model code remains up to date. Learn how you can improve health and safety at public pools while saving staff time and resources by adopting this exciting, new model health code in your state or local health department.

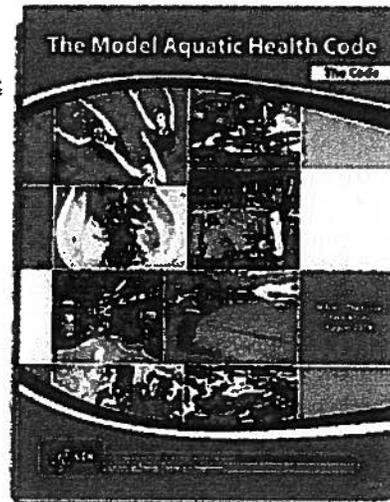
In 2004, CSTE issued a [position statement](#), citing the increasing trend in reporting of waterborne outbreaks at swimming pools across the country. It called for Centers for Disease Control and Prevention (CDC) to lead a national workshop to develop a unified strategy to reduce future occurrence of waterborne outbreaks at public swimming venues. The following year, over 100 individuals from public health, academia, and the aquatics industry met to develop this strategy: the major recommendation was an open-access, national model

code that would help local and state agencies incorporate science-based practices without having to reinvent the wheel each time they create or revise pool codes.

What our subsequent efforts produced became the Model Aquatic Health Code (MAHC), 1st Edition, released by CDC in August 2014. The scope of the MAHC reflects its multidisciplinary approach. We expanded the prevention guidance beyond just infectious disease prevention to make the MAHC an all-inclusive guidance document covering prevention of infectious diseases, drowning, and injuries through a data and best practices-driven approach to design and construction, operation and maintenance as well as policies and management.

The steering committee set to work in 2007 with a development working plan followed by the recruitment of technical committee volunteers. As an all-volunteer effort, we took time to discuss and incorporate the multifaceted perspectives and evidence from both public health and industry participants. We opened the MAHC to two rounds of public comment. After receiving more than 4400 comments, we incorporated 72 percent of comments—over 3,000 citizen suggestions made a substantive impact. The depth, quality, and practicability of the MAHC stem from our recognition of the importance of partnerships, data-driven change, incorporation of input from all sides of aquatics, and implementable changes.

The culmination of our efforts, the MAHC 1st Edition, is now available to assist health departments in working on their pool codes through voluntary adoption. In targeting aquatic design, operation, and management, the code reflects modern epidemiological practice. The code's foundation is built on strong surveillance and investigation data from key national surveillance systems, such as National Electronic Injury Surveillance System, the National Outbreak Reporting System, and the Waterborne Disease and Outbreak Surveillance System. The annex that accompanies the MAHC lays out the rationale for code-specific requirements with scientific data and references to explain *the why behind the what*. The MAHC also recommends decision making informed by incorporating routine pool inspections as surveillance data.



Finally, CDC is setting up sentinel surveillance to track the impact of key MAHC elements on aquatic venue operation. We will have the opportunity to analyze these data, evaluate the model code's impact, and update the code based on findings. This will occur every two years as part of a meeting convened by the new non-profit organization, the Conference for the Model Aquatic Health Code, which is tasked with collecting national input and advising CDC on necessary updates.

If you work with or for a state or local health department, please consider taking the next step for improving health and safety at aquatic facilities: familiarize yourself with the Model Aquatic Health Code.

Your community can benefit from the MAHC's guidance for the prevention of chlorine-tolerant diseases such as cryptosporidiosis, improved training requirements, enhanced design features to reduce chemical injuries, and improved drowning and injury prevention. As the MAHC is fresh out of the box, you can also get involved with our conference to help drive future improvements. What CSTE members precipitated 10 years ago, based on sound epidemiologic practice and strong surveillance data, has now come to fruition.

We need CSTE to take a fresh look at the data and the MAHC and renew its commitment to health and safety improvement. CSTE members can bring the best of epidemiology to bear by raising awareness about the MAHC, driving discussion about potential adoption, and participating in future MAHC update discussions.

With this renewed commitment, CSTE can continue drive data based improvements in public health and safety at our nation's aquatic facilities.

Douglas Sackett is Executive Director for the Conference for the Model Aquatic Health Code. To learn more, look at CDC's easy-to-read [infographic](#), outlining the problem, process, and product.

Are you a member with an important message to tell the CSTE community? [Tell us](#) about it!

Do you use social media? Stay tuned to CSTE on [Facebook](#) and [Twitter](#) for daily updates!

Tags: [aquatics](#) [cryptosporidiosis](#) [epidemiology](#) [health code](#) [MAHC](#) [occupational health](#) [pool](#) [rwi](#) [waterborne diseases](#)

[Permalink](#) | Comments (0)

[Share](#) |

CSTE NATIONAL OFFICE

2872 WOODCOCK BLVD | SUITE 250 | ATLANTA, GA

30341

OFFICE 770-458-3811 | FAX 770-458-8516

ASSOCIATION MANAGEMENT SOFTWARE POWERED BY YOURMEMBERSHIP.COM® :: LEGAL

CONNECT WITH CSTE



Exhibit 8

Albuquerque Publishing Company
7777 Jefferson N.E. Albuquerque, New Mexico 87109
P.O. Drawer J-T Albuquerque, New Mexico 87103
(505) 823-7777

Account Number
1027287

Ad Order Number
0001275430

Ad Proof / Order Confirmation

N M DEPT OF ENVIRONMENT
ENVIRONMENT IMPROVEMENT BOARD
525 CAMINO DE LOS MARQUEZ #1
SANTA FE NM 87505

Ordered By ANDREW KNIGHT Customer Phone 505-476-8602 Pickup #
Customer EMail PO Number QUOTE Joint Ad #
Ad Cost \$126.00 Sales Rep mshije
Tax Amount \$9.06 Order Taken by: dnoel
Total Amount \$135.06 Payment Method
Amount Due \$135.06 Payment Amount \$0.00

Product Albuquerque Journal Placement Legal Notices
Ad Number 0001275430-01 Classification Government-0000
Ad Type APC-Legals Sort Text NEWMEXICOENVIRONMENTALIMPRO
Ad Size : 1.0 X 200 LI VEMENTBOARDNOTICEOFFUBLICHEA
Color <NONE>
Run Dates 3/11/2016

Affidavits
0



NEW MEXICO ENVIRONMENTAL
IMPROVEMENT BOARD
NOTICE OF PUBLIC HEARING
TO CONSIDER AMENDMENTS
TO 7.18.1 THROUGH 7.18.5
NMAC -
PUBLIC SWIMMING POOLS,
SPAS, AND BATHS

The New Mexico Environmental
Improvement Board (Board) will
hold a public hearing beginning at
9:00 a.m. on Friday, May 13,
2016, and continuing thereafter as
necessary at the New Mexico
State Capitol Building, Room 307,
490 Old Santa Fe Trail, Santa Fe,
New Mexico. The hearing location
may change prior to the hearing
date, and those interested in at-
tending should check the EIB web-
site: http://www.env.nm.gov/eib
prior to the hearing. The purpose
of the hearing is to consider pro-
posed amendments to the Public
Swimming Pools, Spas, and Baths
Rules, 7.18.1 through 7.18.5
NMAC (Rules). The New Mexico
Environmental Department (NMED)
is the proponent of the proposed
amendments.

Albuquerque Publishing Company
 7777 Jefferson N.E. Albuquerque, New Mexico 87109
 P.O. Drawer J-T Albuquerque, New Mexico 87103
 (505) 823-7777



**NEW MEXICO ENVIRONMENTAL
 IMPROVEMENT BOARD
 NOTICE OF PUBLIC HEARING
 TO CONSIDER AMENDMENTS
 TO 7.18.1 THROUGH 7.18.5
 NMAC -
 PUBLIC SWIMMING POOLS,
 SPAS, AND BATHS**

The New Mexico Environmental Improvement Board (Board) will hold a public hearing beginning at 9:00 a.m. on Friday, May 13, 2016, and continuing thereafter as necessary at the New Mexico State Capitol Building, Room 307, 490 Old Santa Fe Trail, Santa Fe, New Mexico. The hearing location may change prior to the hearing date, and those interested in attending should check the EIB website: <http://www.env.nm.gov/eib> prior to the hearing. The purpose of the hearing is to consider proposed amendments to the Public Swimming Pools, Spas, and Baths Rules, 7.18.1 through 7.18.5 NMAC (Rules). The New Mexico Environment Department (NMED) is the proponent of the proposed amendments.

The amendments proposed by NMED to 7.18.1 through 7.18.5 NMAC would adopt the federal Model Aquatic Health Code, 1st Edition, with a number of additions, modifications, and deletions, and would also set fees for construction permits and operating permits.

In addition, the proposed amendments include several other minor changes and clarifications to current definitions, regulations, and procedures. Please note that formatting and minor technical changes in the regulations other than those proposed by NMED may be proposed at the hearing. In addition, the Board may make other changes as necessary to accomplish the purpose of providing public health and safety in response to public comments and evidence presented at the hearing.

The proposed amendments may be reviewed during regular business hours at the office of the Environmental Improvement Board located in the Harold Furness Building, 1180 South St. Francis Drive, Room S-2102 Santa Fe, NM, 87505. In addition, a copy of the NMED proposed amendments is posted on the NMED website at http://www.env.nm.gov/fod/Swim_Pools/

The hearing will be conducted in accordance with 20.1.1 NMAC (Rulemaking Procedures - Environmental Improvement Board), the Environmental Improvement Act, Section 74-1-9 NMSA 1978, and other applicable procedures.

All interested persons will be given reasonable opportunity at the hearing to submit relevant evidence, data, views and arguments orally or in written form.

Ad Proof / Order Confirmation

Account Number
 1027267

Ad Order Number
 0001275430

N M DEPT OF ENVIRONMENT

produce exhibits, and to examine witnesses. Any person who wishes to submit a non-technical written statement for the record in lieu of oral testimony must file such statement prior to the close of the hearing.

Pursuant to 20.1.1.302 NMAC, persons wishing to present technical testimony must file with the Board a written notice of intent to do so on or before 5:00 p.m. on April 22, 2016. The notice of intent shall:

- identify the person or entity for whom the witness(es) will testify;
- identify each technical witness that the person intends to present and state the qualifications of the witness, including a description of his or her education and work background;
- include a copy of the direct testimony of each technical witness in narrative form;
- include the text of any recommended modifications to the proposed regulatory change; and
- list and attach all exhibits anticipated to be offered by that person at the hearing, including any proposed statement of reasons for adoption of the rule language being proposed.

Notices of intent for the hearing must be received in the Office of the Environmental Improvement Board no later than 5:00 p.m. on April 22, 2016 and should reference the name of the regulation, the date of the hearing, and docket number EIB 16-01(P). Notices of intent to present technical testimony should be submitted to:

Pam Castaneda, Administrator of
Boards and Commissions
Office of the Environmental
Improvement Board
Harold Flannels Building
1190 South St. Francis Dr.,
Room S-2102
Santa Fe, NM 87505

Any person who wishes to do so may offer non-technical public comment at the hearing, or submit a non-technical written statement in lieu of oral testimony at or before the hearing. Written comments regarding the proposed revisions may be addressed to Ms. Pam Castaneda, Administrator of Boards and Commissions, at the above address, and should reference docket number EIB 16-01(P).

If you are an individual with a disability and you require assistance or an auxiliary aid, e.g. sign language interpreter, to participate in any aspect of this process, please contact Juan-Carlos Sorrego by April 14, 2016. The Human Resources Bureau can be reached at the New Mexico Environment Department, 1190 St. Francis Drive, Santa Fe, NM 87502, (505) 363-2508. TDD or TDY users may access this number via the New Mexico Relay Network (Albuquerque TDD users: (505) 275-7333; outside of Albuquerque: 1-800-828-1779 (voice); TTY users: 1-800-459-8331). Copies of the proposed amendments will be available in alternative forms if requested by April 14, 2016.

The Board may make a decision on the proposed regulatory change at the conclusion of the hearing, or the Board may convene a meeting after the hearing to consider action on the proposal.
Journal: March 11, 2016

Albuquerque Publishing Company
7777 Jefferson N.E. Albuquerque, New Mexico 87109
P.O. Drawer J-T Albuquerque, New Mexico 87103
(505) 823-7777

Account Number
1027267

Ad Order Number
0001275432

Ad Proof / Order Confirmation

N M DEPT OF ENVIRONMENT
ENVIRONMENT IMPROVEMENT BOARD
525 CAMINO DE LOS MARQUEZ #1
SANTA FE NM 87505

Ordered By ANDREW KNIGHT Customer Phone 505-476-8602 Pickup # 0001275430
Customer Email PO Number QUOTE Joint Ad #
Ad Cost \$135.45 Sales Rep mshije
Tax Amount \$9.74 Order Taken by: dnoel
Total Amount \$145.19 Payment Method
Amount Due \$145.19 Payment Amount \$0.00

Product Albuquerque Journal Placement Legal Notices
Classification Government-0000
Sort Text JUNTADENUEVOMEXICOAMBIENTALM
EJORAAVISODEAUDIENCIAPUBLICAP
Ad Number 0001275432-01
Ad Type APC-Legals
Ad Size : 1.0 X 215 LI
Color <NONE>
Run Dates 3/11/2016

Affidavits
0



JUNTA DE NUEVO MEXICO
AMBIENTAL MEJORA
AVISO DE AUDIENCIA PÚBLICA
PARA EXAMINAR ENMIENDAS
AL 7.18.1 7.18.5 A TRAVÉS
NHAC -
PISCINAS DE USO PÚBLICO,
SPAS Y BAÑOS

La Junta de Mejoramiento Ambiental de Nuevo México (Junta) llevará a cabo una audiencia pública que comienza a las 9:00 am el viernes 13 de mayo de, 2016, y de ahí en adelante como sea necesario en el edificio del capitolio del estado de Nuevo México, de habitaciones 307, 490 Old Santa Fe Trail, Santa Fe, Nuevo México. La ubicación de la audiencia puede cambiar antes de la fecha de la audiencia, y los interesados en asistir deben consultar la página web del ERA: http://www.era.nm.gov/eb antes de la audiencia. El propósito de la audiencia es considerar las enmiendas propuestas al Reglamento de Nativación Pública Piscinas, spas y baños, 7.18.1 7.18.5 (versión de 2014) (Anexo)

Albuquerque Publishing Company
7777 Jefferson N.E. Albuquerque, New Mexico 87109
P.O. Drawer 1-T Albuquerque, New Mexico 87103
(505) 823-7777



**JUNTA DE NUEVO MEXICO
AMBIENTAL MEJORA
AVISO DE AUDIENCIA PÚBLICA
PARA EXAMINAR ENMIENDAS
AL 7.18.1 7.18.5 A TRAVÉS
NMAC -
PISCINAS DE USO PÚBLICO,
SPAS Y BAÑOS**

La Junta de Mejoramiento Ambiental de Nuevo México (Junta) llevará a cabo una audiencia pública que comienza a las 9:30 am el viernes 13 de mayo de, 2016, y de ahí en adelante como sea necesario en el edificio del capitolio del estado de Nuevo México, de habitaciones 307, 400 Old Santa Fe Trail, Santa Fe, Nuevo México. La ubicación de la audiencia puede cambiar antes de la fecha de la audiencia, y los interesados en asistir deben consultar la página web del EIB: <http://www.env.nm.gov/eib> antes de la audiencia. El propósito de la audiencia es considerar las enmiendas propuestas al Reglamento de Notación Pública Piscinas, spas y baños, 7.18.1 7.18.5 través de NMAC (Reglas). El Departamento de Medio Ambiente de Nuevo México (NMED) es el autor de las enmiendas propuestas. Las enmiendas propuestas por NMED a través 7.18.1 7.18.5 NMAC adoptarían el modelo federal Código Acústico, 1st Edición, con una serie de adiciones, modificaciones y omisiones, y serían también fijadas para los permisos de construcción y permisos de operación. Además, los cambios propuestos se encuentran varios otros pequeños cambios y aclaraciones a las definiciones actuales, reglamentos y procedimientos. Tenga en cuenta que el formato y los cambios técnicos menores en los reglamentos distintos de los propuestos por NMED pueden ser propuestos en la audiencia. Además, la Junta podrá hacer otros cambios que sean necesarios para llevar a cabo el propósito de proporcionar salud y la seguridad pública en respuesta a los comentarios del público y las puestas presentadas en la audiencia.

Las modificaciones propuestas pueden ser revisadas durante las horas de oficina regulares en la oficina de la Junta de Mejoramiento Ambiental ubicado en el Harold Burnett Building, 1190 South St. Francis Drive, Room S-2102 Santa Fe, NM, 87505. Además, una copia de la NMED propone enmiendas está publicado en el sitio web de NMED en http://www.env.nm.gov/eib/Win_Pools/

La audiencia se llevará a cabo de acuerdo con 20.1.1 (Procedimientos de Reglamentación - Tablón de Mejora Ambiental) NMAC, la Ley de Mejora Ambiental, Sección 74-1-9 NMSA 1978, y otros www.legis.state.nm.us/

Ad Proof / Order Confirmation

Account Number
1027267

Ad Order Number
0001275432

N M DEPT OF ENVIRONMENT

Todas las personas interesadas se les dará oportunidad razonable en la audiencia para presentar pruebas pertinentes, datos, opiniones y argumentos, oralmente o por escrito, a presentar pruebas, y para interrogar a los testigos. Cualquiera persona que desee presentar una declaración escrita de carácter no técnico para el registro en lugar de testimonio oral debe presentar dicha declaración antes del día de la audiencia.

De conformidad con 20.1.1.302 NMAC, las personas que deseen presentar testimonio técnico deberá presentar a la Junta una notificación por escrito de la intención de hacerlo antes de las 5:00 pm el 22 de abril de 2016. La notificación de intención deberá:

- Identificar a la persona o entidad a quien el testigo (s) dará testimonio;
- Identificar cada testigo técnico que la persona tiene la intención de presentar y exponer las capacidades del testigo, incluyendo una descripción de su educación y el trabajo de fondo;
- Incluir una copia del testimonio directo de cada testigo técnico en forma narrativa;
- Incluir el texto de las modificaciones recomendadas para el cambio regulatorio propuesto; y
- Lista y conectar todas las exposiciones previstas para ser ofrecido por esa persona en la audiencia, incluyendo cualquier propuesta se propone modificación de la adopción del lenguaje de reglas.

Las notificaciones de intención para la audiencia deben ser recibidas en la Oficina de la Junta de Mejoramiento Ambiental no más tarde de las 5:00 pm el 22 de abril de 2016, y deben hacer referencia al nombre de la regulación, la fecha de la audiencia, y el número de expediente EIS 16- 01 (R). Las notificaciones de intención de presentar testimonio técnico deben enviarse a:

Pam Castañeda, Administrator of
Boards and Commissions
Office of the Environmental
Improvement Board
Harold Rumeta Building
1180 South St. Francis Dr.,
Office S-2102
Santa Fe, NM 87505

Cualquier persona que desee hacerlo puede ofrecer comentarios del público no técnico en la audiencia, o enviar una declaración no técnica por escrito en lugar de testimonio oral en o antes de la audiencia. Los comentarios por escrito en relación con las revisiones propuestas pueden dirigirse a la Sra Pam Castañeda, Administrador de Juntas y Comisiones, a la dirección anterior, y deben hacer referencia al número de expediente EIS 16-01 (R).

Si usted es una persona con una discapacidad y necesita asistencia o ayuda auxiliar, por ejemplo, intérprete de lenguaje de signos, para participar en cualquier aspecto de este proceso, por favor, póngase en contacto con Juan Carlos Bonego antes del 14 de abril de 2016. La Oficina de Recursos Humanos puede ser alcanzado en el Departamento de Medio Ambiente de Nuevo México, 1180 San Francisco Drive, Santa Fe, NM 87502, (505) 363-2508. TDD o TDY pueden acceder a este número a través de la Red de relés de Nuevo México (Albuquerque usuarios TDD: (505) 273-6733; las sucursales de Albuquerque: 1-800-898-1779 (voz); los usuarios de TTY: 1-800-898-8331). Las copias de las enmiendas propuestas estarán

describles en formas alternativas
al así lo solicita el 14 de abril
2016.
El Consejo podrá tomar una
decisión sobre el cambio
regulador propuesto en la
conclusión de la audiencia, o el
Consejo pueden convocar una
reunión después de la audiencia
para considerar la acción sobre la
propuesta.
Journal: March 11, 2016

Exhibit 9

New Mexico Register / Volume XXVII, Issue 5 / March 15, 2016

NOTICE OF PUBLIC HEARING TO CONSIDER AMENDMENTS TO 7.18.1 THROUGH 7.18.5 NMAC - PUBLIC SWIMMING POOLS, SPAS, AND BATHS

The New Mexico Environmental Improvement Board (Board) will hold a public hearing beginning at 9:00 a.m. on Friday, May 13, 2016, and continuing thereafter as necessary at the New Mexico State Capitol Building, Room 307, 490 Old Santa Fe Trail, Santa Fe, New Mexico. The hearing location may change prior to the hearing date, and those interested in attending should check the EIB website: <http://www.env.nm.gov/eib> prior to the hearing. The purpose of the hearing is to consider proposed amendments to the Public Swimming Pools, Spas, and Baths Rules, 7.18.1 through 7.18.5 NMAC (Rules). The New Mexico Environment Department (NMED) is the proponent of the proposed amendments.

The amendments proposed by NMED to 7.18.1 through 7.18.5 NMAC would adopt the federal Model Aquatic Health Code, 1st Edition, with a number of additions, modifications, and omissions.

In addition, the proposed amendments include several other minor changes and clarifications to current definitions, regulations, and procedures. Please note that formatting and minor technical changes in the regulations other than those proposed by NMED may be proposed at the hearing. In addition, the Board may make other changes as necessary to accomplish the purpose of providing public health and safety in response to public comments and evidence presented at the hearing.

The proposed amendments may be reviewed during regular business hours at the office of the Environmental Improvement Board located in the Harold Runnels Building, 1190 South St. Francis Drive, Room S-2102 Santa Fe, NM, 87505. In addition, a copy of the NMED proposed amendments is posted on the NMED website at http://www.env.nm.gov/fod/Swim_Pools/.

The hearing will be conducted in accordance with 20.1.1 NMAC (Rulemaking Procedures - Environmental Improvement Board), the Environmental Improvement Act, Section 74-1-9 NMSA 1978, and other applicable procedures.

All interested persons will be given reasonable opportunity at the hearing to submit relevant evidence, data, views and arguments, orally or in writing, to introduce exhibits, and to examine witnesses. Any person who wishes to submit a non-technical written statement for the record in lieu of oral testimony must file such statement prior to the close of the hearing.

Pursuant to 20.1.1.302 NMAC, persons wishing to present technical testimony must file with the Board a written notice of intent to do so on or before 5:00 p.m. on April 22, 2016. The notice of intent shall:

- identify the person or entity for whom the witness(es) will testify;
- identify each technical witness that the person intends to present and state the qualifications of the witness, including a description of his or her education and work background;
- include a copy of the direct testimony of each technical witness in narrative form;
- include the text of any recommended modifications to the proposed regulatory change; and
- list and attach all exhibits anticipated to be offered by that person at the hearing, including any proposed statement of reasons for adoption of the rule language being proposed.

Notices of intent for the hearing must be received in the Office of the Environmental Improvement Board no later than 5:00 p.m. on April 22, 2016 and should reference the name of the regulation, the date of the hearing, and docket number EIB 16-01(R). Notices of intent to present technical testimony should be submitted to:

Pam Castaneda, Administrator of Boards and Commissions
Office of the Environmental Improvement Board
Harold Runnels Building
1190 South St. Francis Dr., Room S-2102

Santa Fe, NM 87505

Any person who wishes to do so may offer non-technical public comment at the hearing, or submit a non-technical written statement in lieu of oral testimony at or before the hearing. Written comments regarding the proposed revisions may be addressed to Ms. Pam Castaneda, Administrator of Boards and Commissions, at the above address, and should reference docket number EIB 16-01(R).

If you are an individual with a disability and you require assistance or an auxiliary aid, e.g. sign language interpreter, to participate in any aspect of this process, please contact Juan-Carlos Borrego by April 14, 2016. The Human Resources Bureau can be reached at the New Mexico Environment Department, 1190 St. Francis Drive, Santa Fe, NM 87502, (505) 383-2506. TDD or TDY users may access this number via the New Mexico Relay Network (Albuquerque TDD users: (505) 275-7333; outside of Albuquerque: 1-800-659-1779 (voice); TTY users: 1-800-659-8331). Copies of the proposed amendments will be available in alternative forms if requested by April 14, 2016.

The Board may make a decision on the proposed regulatory change at the conclusion of the hearing, or the Board may convene a meeting after the hearing to consider action on the proposal.

Exhibit 10

Knight, Eugene, NMENV

From: nmenv-envwebmaster@state.nm.us
Sent: Tuesday, November 03, 2015 11:36 AM
To: Knight, Eugene, NMENV
Subject: NMEnv Website Swimming Pool Proposed Regulation Comment/Feedback

Greetings:

You have received a Website Swimming Pool Proposed Regulation Comment/Feedback from the <https://www.env.nm.gov> site.

Contact Name : Imesh Vaidya
Contact Email : imesh@premierhospitality.net
Contact IP : 75.150.16.57
Message :

1. Page # 6.3.1 Line # 1.2

Comment : On-site qualified operator on site immediately or within 4 hours (two hours on holidays and weekends is not always feasible).

2. Page # 4.10 Line # 4.5

Comment : Allow diaper changing station to be near the aquatic facility (adjacent restroom).

3. Page # Line #

Comment :

4. Page # Line #

Comment :

5. Page # Line #

Comment :

Knight, Eugene, NMENV

From: nmenv-envwebmaster@state.nm.us
Sent: Tuesday, November 24, 2015 8:52 AM
To: Knight, Eugene, NMENV
Subject: NMEnv Website Swimming Pool Proposed Regulation Comment/Feedback

Greetings:

You have received a Website Swimming Pool Proposed Regulation Comment/Feedback from the <https://www.env.nm.gov> site.

Contact Name : MICHAEL H REYNOLDS
Contact Email : mhreynolds47@ymail.com
Contact IP : 69.21.209.7
Message : .

On page 56, Section 3.2 Glossary, of the Proposed Regulation, defines "Aquatic Venue" as a "structure where the general public is exposed to water intended for recreational or therapeutic purpose". If a pool is restricted to a minimal number of persons, persons who must meet stringent and unique qualifications in order to be admitted to the pool, it should not be considered "open to the general public". On page 64 of these definitions, "Therapy Pool" categorically presumes that the pool sanitation is adversely impacted by special needs patients. In these cases, the pool sanitation requirements should be evaluated based upon a concept involving estimated "person hours" and pool volume, rather than a presumption of general immunocompromise. Assessment of each therapy pool based upon the number of qualified users of the pool, the pool volume, and the "person hours" during which the pool is exposed to users, should be the determinant of how often and in what manner the pool chemistry is tested.

1. Page # Line #
Comment :

2. Page # Line #
Comment :

3. Page # Line #
Comment :

4. Page # Line #
Comment :

5. Page # Line #
Comment :

Knight, Eugene, NMENV

From: nmenv-envwebmaster@state.nm.us
Sent: Thursday, November 12, 2015 11:06 AM
To: Knight, Eugene, NMENV
Subject: NMEnv Website Swimming Pool Proposed Regulation Comment/Feedback

Greetings:

You have received a Website Swimming Pool Proposed Regulation Comment/Feedback from the <https://www.env.nm.gov> site.

Contact Name : Scott Forster
Contact Email : scottygolf@mac.com
Contact IP : 98.22.101.129
Message :

With regards to Float Pods/Tanks with high concentrations of Epsom Salt we believe the state should not regulate these and adopt the US Float Standards. <http://www.floatation.org/resources/healthinfo/health-standard-introduction/>

1. Page # Line #
Comment :

2. Page # Line #
Comment :

3. Page # Line #
Comment :

4. Page # Line #
Comment :

5. Page # Line #
Comment :

Knight, Eugene, NMENV

From: nmenv-envwebmaster@state.nm.us
Sent: Wednesday, November 04, 2015 1:35 PM
To: Knight, Eugene, NMENV
Subject: NMEnv Website Swimming Pool Proposed Regulation Comment/Feedback

Greetings:

You have received a Website Swimming Pool Proposed Regulation Comment/Feedback from the <https://www.env.nm.gov> site.

Contact Name : Kelby Stephens
Contact Email : kelbystephens@gmail.com
Contact IP : 67.42.60.208
Message :

We have a therapy pool that has one corner at six feet for therapy use of traction on patients. All patients are supervised by a therapist. Does that qualify for life guards. I feel having to test PH, Bromine levels more than twice a day is excessive. The pool does not fluctuate that much with an autimated feeder. Are all pools going to require a diaper changing table? Even a therapy pool? Will all CPO have to retest for new certification?

1. Page # Line #
Comment :

2. Page # Line #
Comment :

3. Page # Line #
Comment :

4. Page # Line #
Comment :

5. Page # Line #
Comment :

Exhibit 11



SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

1216 Mechem, Bldg. 2
Ruidoso, NM 88345
Phone (575) 258-3272 Fax (575) 258-4891
www.env.nm.gov



RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

October 16, 2015

TO: Public Swimming Pool Owners or Operators

FROM: Swimming Pool Program, New Mexico Environment Department

PROPOSED REGULATIONS

The New Mexico Environment Department Public Swimming Pool Program is proposing changes to the state public pool regulations covering the construction and operation of Aquatic Venues. The proposed changes include adoption of the Model Aquatic Health Code First Edition.

The pPool pProgram is currently seeking feedback and/or comments concerning the proposed changes prior to filing a formal petition with the Environmental Improvement Board. You may attend one of the scheduled public meetings listed below or visiting the NMED Pool Program web page at http://envweb1.nmenv.state.nm.us/fod/Swim_Pools/poolrules.html to view the proposed changes and to provide written comments.

Public Meeting Schedule:

December 1, 2015 Albuquerque District Field Office, 121 Tijeras Ave. NE. Ste. 100,
Albuquerque, NM 87102
2:00- 4:00 pm

December 3, 2015 Las Cruces Field Office, 2310 Estrada del Sol, Las Cruces, NM 88001
2:00 – 4:00pm

December 8, 2015 Runnels Building, 1190 St. Francis Drive, Santa Fe NM 87502
2:00 – 4:00pm

If you have further questions concerning the proposed regulations or the comment process please call contact Eugene Knight, Swimming Pool Program Manager, at 575-937-8388 (phone) or e-mail at eugene.knight@state.nm.us (e-mail).

Exhibit 12

**NMED - ENVIRONMENTAL HEALTH BUREAU
PUBLIC MEETING - SWIMMING POOLS
DECEMBER 1, 2015**

Facilitator:

Eugene Knight, Swimming Program Manager NMED-EHB

Place/Room:

Rio Grande Training Room
ABQ District I Office - Springer Building

Name (Please PRINT)	Company/Agency Name	Phone or E-Mail (preferred method of contact)
1. Tristan Olgun	City of Albuquerque	tdolgun@ciabq.org
2. Barbara Rodriguez	Belen Consolidated Schools	(505) 363 6065 caribguez@obelene.org
3. JOE F AUGUIRUA	City of Albuquerque/CRD	505 768 2563 /ra50560 cell
4. Imesh Vaidya	Premier Hospitality	imesh@premierhospitality.net
5. Teri Chalgreen	INDS MANAGEMENT	Teri@INDSgroup.com
6. SANDHY BHAKTA	SIX DEVELOPMENT	(310) 422 3460
7. HEMAL PATEL	PARAD CONSTRUCTION + MANAGEMENT	HPATEL@FLASH.NET
8. Tushar Patel	TNS MANAGEMENT, LLC	tushar@tnsgrp.com
9. R. Italiano	NMFD	
10. Mike Kennedy	Pool Pro	Sales@PoolProLLC.com
11. Dilip Patel	Gene Hotel Group Inc	MR.DHPATEL@GMAIL.COM
12. Ian Fausnaugh	PoolPro LLC	sales@poolprollc.com
13. SANJAY PATEL		78jaypatel@gmail.com

Name (Please PRINT)	Company/Agency Name	Phone or E-Mail (preferred method of contact)
14. NEIL PITEI	AGLI SANTA FE	mpistiny@gmail.com
15.		
16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		
25.		
26.		
27.		
28.		
29.		
30.		



PROPOSED SWIMMING POOL REGULATION

PUBLIC MEETING ALBUQUERQUE DECEMBER 1, 2015

MEETING NOTES

- 1 Water replenishment omission? Still would be used but would not be required.
- 2 If adopted one year to install automatic controllers (ORP) on all vessels. No Comments
- 3 Diaper changing station allowed in restrooms outside of pool area? Have to be within 300 feet.
- 4 Signage requirement if diaper age children not allowed in pool area? Yes then diaper changing station not required.
- 5 Distance from pool to diaper changing station? Page 178 MAHC no greater than 300 feet.
- 6 Closure of pool for accuracy of flow meter? Page 123 MAHC code requires a flow meter to be within +/- 5%. This applies to new construction.
- 7 Types of flow meters – Chart to help figure out which flow meter needed. Flow meters need to fit pipe size and flow-rate.
- 8 Add pool lifts to covering of starting blocks. 5.8.3.1.2 MAHC
- 9 Issues with other forms of communication devices for emergency phones. All devices will not to be approved by the department if not using standard land line.
- 10 Lifeguards in large pools with a lot of bathers. Lifeguard numbers based on performance not on number of bather. Criteria to be used in 10/20 zone of surveillance not number.
- 11 Would hotels be allowed to post inspections at front desk? Yes the regulations require to be posted in conspicuous place.
- 12 Aquatic Feature definition do fountains count? Only if they are intended for bather use.
- 13 Arbitrary number on substantially altered facilities to upgrade to MAHC. Agree but a place to start.
- 14 Low, medium or high pressure UV Units? Not specified in MAHC only states they be third party evaluated for the intended use and validated in accordance with practices outlined in US EPA Ultraviolet Disinfectant Guidance Manual.
- 15 Are most sand filters designed to meet filtration rates? All NSF 50 approved models will meet filtration requirements.

16 Percent of pool that can have infinity edge? 4.5.15.1 MAHC not more than 50% infinity edge.

17 Is the reason for new aquatic venues only being 5 feet to deter diving? Yes not for not requiring lifeguards.

18 How does the MAHC mesh with other codes? During the development the MAHC was a major consideration.

19 Do we do our own detailed construction review? Yes we do compliance reviews for compliance with the regulations.

**NMED - ENVIRONMENTAL HEALTH BUREAU
PUBLIC MEETING - SWIMMING POOLS
DECEMBER 8, 2015**

Facilitator: Eugene Knight, Swimming Program Manager NMED-EHB

Place/Room: Auditorium
Runnels Building, Santa Fe

Name (Please PRINT)	Company/Agency Name	Phone or E-Mail (preferred method of contact)
1. Laura Danielson	Town of Springer	tos-water@yahoo.com
2. Brenda Taylor	City of Hobbs	btaylor@hobbsnm.org
3. Matthew Baird	City of Hobbs	mbaird@hobbsnm.org
4. Lisa D. Sbr	Los Alamos county	lensd@esuthlink.net
5. MARK COTTLE	CITY OF SANTA FE	MCOTTLE@SANTAFENM.GOV
6. Will Cavin	City of Roswell Chaves County	hammer@dfn.com
7. Andrew (Drew) N. Gonzales	City of Santa Fe	angonzales1@santafenm.gov
8. DAVID MILLER	TRAVEL RANCH	travelerranch@comcast.net
9. LORETTA A. ABELL-MARTIN	CITY OF LAS VEGAS	LMAERTIN@CI.LAS-VEGAS.NV.US
10. ALBERT TRFOYA	CITY OF LAS VEGAS	Albert.trfoya@lvhdc.com
11. Liz Ruybal	City of Santa Fe	eruybal@sanatafenm.gov
12. Ron Yates	Acquatic Pools Inc	
13. Jim Apperson	West Mesa Sys	japperson@westmesa.com

Santa Fe

Pool Public Meeting

Notes

- 1) Why doesn't State have jurisdiction over Albuquerque and Bernalillo County? They have their own Environmental Health Department.
- 2) Will the department accept AFO Aquatics Facility Operator course for qualified operator. Yes if they meet the course criteria specified in the MAHC.
- 3) What is the cost of the regulation to everyone \$10,000? The cost to existing facilities will be diaper changing stations for facilities that allow diaper age children and ORP unit for pool that do not already have one.
- 4) Roswell: 650,000 gallon pool will we need an automated controller on our pool? All pools will need to have an automatic controller.
- 5) What if you do not have to do any pH control? Where do you expect a town of 1000 people to get the money to put on an ORP? It was explained to person that the use of an ORP will reduce the amount of disinfectant should be reduced so cost saving would pay for the equipment over time.
- 6) Where will the EIB meet so we can voice our opinion? The board will most likely meet in Santa Fe. The meeting time and location will be posted on the New Mexico Environment Departments Swimming Pool Program website when date and time are set.
- 7) If you do not have a diaper changing station do you need to post signage. Signage stating no diaper changing on the deck is part of required signage. Pools that do not allow diaper age children should post a sign stating such.
- 8) What if you are using Bromine outdoors is it legal? There are no restrictions on using bromine outdoors.
- 9) It was recommended that temperature and humidity be measured and recorded in the daily logs at time of chemical readings.
- 10) Chemical reading be recorded every 4 hours? Once all facilities have their automatic controllers in place the requirement is take readings every 4 hours until they are in place it is required to do tests every 2 hours. The requirement for recording these reading are for the protection of the facility for maintenance and liability issues.
- 11) When will new regulations be adopted? Time frame is still fluid but proposed time frame would be to go before the Environmental Improvement Board in March for Hearing on proposed regulation. If the Board approves the proposed regulation they would not go into effect for at least 60 days.

12) Is the Qualified Operator required to be on site? The qualified operator must be on site under certain conditions and be available within 2 hours.

More than two Aquatic Venues, venue with over 50,000 gallons, venue with aquatic features, therapy pools or venue used to provide swimming training.

13) Has the Red Cross changed to re-certification of CPR and first aid to a yearly basis? I am not certain if they have changed their certification expiration or not. The CPR and First aid requirements in the MAHC are dealing with lifeguards and lifeguards are required to do in service training every year, CPR and first aid training are part of the in service training and would meet the requirements of the MAHC.

14) The department requires ring buoys at lifeguarded pools will this requirement remain even though the lifeguards are not trained in their use? The ring buoy requirement will remain in place for the public to use them in case of emergency.

15) Concerns for changing lifeguard number form required amount per number of bathers to performance based 10-20 rule. 10-20 rule states that lifeguard must be able to scan area of surveillance and be able to reach a person in distress in 20 seconds. This would be the minimum lifeguards required; depending on the size and configuration of the pool would control the number of lifeguards required instead of one size fit all situations.

16) Will the department make better copies of the inspection report for posting? The department will be changing the inspection forms and procedures in the near future and better paper will be used.

17) Fees? Comment that \$150 fee for spray pads is too high because they are easier to inspect. It costs the department about \$250 to do an inspection.

18) Is the presentation available? Yes the presentation is available on the New Mexico Environment Departments Swimming Pool website.

19) For the sake of the grandfathered pool how are we going to keep up with what is allowed? Grandfathered or existing pools will remain to be operated as they are except for the three main new requirements of ORP, Diaper Changing Stations, and Operation Plans.

20) With new regulations would it allow a spa to be built inside the pool? On new construction a spa would be allowed to be built with a one foot separation to the pool.

**NMED - ENVIRONMENTAL HEALTH BUREAU
PUBLIC MEETING - SWIMMING POOLS
DECEMBER 3, 2015**

Facilitator:

Eugene Knight, Swimming Program Manager NMED-EHB

Place/Room:

Conference Room
Las Cruces District Office

Name (Please PRINT)	Company/Agency Name	Phone or E-Mail (preferred method of contact)
1. JAY MILLER	CCCE	ccandl@concast.net
2. MASO APADACA	A.I.S.D.	mopadaca@ai.sisd.kizumi
3. JENY FOSTER	Highland Bath & Spa	managore@hresort.com
4. SHIMON PRATSCHKE	City of Alamogordo	spatschke@ci.alamogordo.nm.us
5. JONATHAN JOHNSON	City of Alamogordo	johanson@ci.alamogordo.nm.us
6. MARY HOFFMAN	Valle Encantado Home Owners' Association	(575) 525-1050
7. RICHARD BENTLEY	Crestline	575-202-3742
8. TOM BUTTS	Basin Pool & Outdoors	575-921-2967
9. DAVID McOFF	Basin Entertain	575-522-1141
10. E. COOK / MARIN	Leadsburg KOA	575-542-8003
11. TABATHA GREENGLEN	FIRST VALLEY	575-640-1675
12. PHILIP DAVIS	"	"
13. JAMES HORNWATER	"	575-601-2500

Name (Please PRINT)	Company/Agency Name	Phone or E-Mail (preferred method of contact)
14. Kelly Rodwin	Mamungudo KOA	575-437-3003
15. Becki Overdorf	Casitas @ Morning Star	575-532-9416
16. Thomas Weyandoffen	Casitas @ Morning Star	
17. Dan Mabeck		875-338-6906
18. James Siddick	YES COMMUNITIES	James Siddick @ yes communities.com
19. Art Salinas	Pinnacle	casalinas pp @ yahoo.com
20. SSSREMNWENES R	City of Winston	Jim Wad @ Winston.com
21. Way Ozmena	THRIVE FIT	6408406
22.		
23.		
24.		
25.		
26.		
27.		
28.		
29.		
30.		

Presentation Questions/ Discussion:

- 1) Slide #2: Attendee expressed concern at to deciphering the use, purpose and meaningfulness between the Model Aquatic Health Code (MAHC) Codes, the Annex and the proposed NMAC Regulations.
- 2) Discussion concerning chemical feeders, Slide #3:
 - a. Attendee had confusion over the present CPO Certification versus the Qualified Operator Certification being a terminology changed opposed to a completely different certification.
 - b. **Question Posed**: "Would my present certification remain valid until its expiration date?"
 - i. **Answer**: Yes
- 3) One attendee expressed a desire to have the Hot Springs still regulated.
 - a. **Hypothetical Question Posed**: "if I filled my pool with geothermal water and removed the sanitizer dispensers and filtration could I avoid being regulated?"
 - i. **Answer**: if you removed all of the pool equipment maintaining the chemistry and filtration units and only filled with natural waters, no treatment or alteration, you would not be regulated.
- 4) Discussion concerning chemical feeders, Slide #8:
 - a. Some clarification was needed concerning the chemical feeder requirements upon adoption of the MAHC and the 1-yr time limit
 - i. Clarification was provided that the time limit would be 1-year for all facilities.
 - b. **Question Posed**: "What is the rationale in requiring ORP's on all pools?"
 - i. There was discussion on non-CDC reported outbreaks, operator negligence and ineptitude, and the variability of testing equipment results
 - c. **Question Posed**: "In the 1-year interim between adoption of the MAHC and the installation of an ORP will we still have to maintain records and check every 2-hrs of pool operation (per Slide #10)?"
 - i. **Answer**: Yes
- 5) Discussion concerning diaper changing station requirements, Slide #8:
 - a. **Question Posed**: "If you allow children do you have to have a diaper changing station?"
 - i. **Answer**: Yes
 - b. **Question Posed**: "If I don't allow children under the age of 14, would I be required to have a diaper changing station?"
 - i. **Answer**: No
 - c. **Question Posed**: "Can you designate any area, such as a picnic table, as a diaper changing station?"
 - i. **Answer**: You may, as long as it is not in the immediate area, i.e. the pool deck, and you meet the all of the requirements of a diaper changing station.
 - d. **Question Posed**: "Can a clubhouse be a diaper changing station, or can you put the changing station on the wall of a building outside?"
 - i. **Answer**: You may, as long as it is not in the immediate area, i.e. the pool deck, and you meet the all of the requirements of a diaper changing station.
 - e. **Question Posed**: "Can you have a diaper changing station inside the pool area?"
 - i. **Answer**: Not in the immediate area of the pool.
- 6) Discussion concerning the flow meter requirements, slide #8:
 - a. **Question Posed**: "How do you check flow meter calibration?"
 - i. **Answer**: they are factory certified calibrated.
 - b. **Question Posed**: "Will NMED check the calibration of the flow meter?"
 - i. **Answer**: No

Public Discussion (BLB)

- c. **Question Posed:** "Is the calibration good for the life of the flow meter, or will this be something we have to keep a record of purchase, and replace every 5-years like the VGB drain covers?"
- i. **Answer:** The flow meters are factory calibrated and you will not have to replace them after a given amount of time in service – either they work or they don't.
- 7) This discussion is in regards to training requirements in relation to new training requirements, Slide #11:
- a. **Statement Posed:** "So in reading the MAHC it is my understanding that training requirements will double, as operators must now know hydraulics, chemicals handling and chemistry, filtration dynamics, etc."
- i. **Answer:** No, all of these aspects are covered in the Qualified Operator course offered by NMED.
- 8) This discussion is in regards to training requirements in relation to CPR certification, Slide #11:
- a. **Question Posed:** "if you are a hot springs and have no lifeguard, would you be required to obtain CPR training yearly?"
- i. **Answer:** Yes
- b. **Question Posed:** "Will the NM Department of Health CPR certification course fulfill this certification requirement per the MAHC, as it is good for 4-years?"
- i. **Answer:** Yes
- c. **Question Posed:** "Is the CPR requirement to be imposed on qualified operators?"
- i. **Answer:** That depends on whether the QO is always on site, if that person is an off-site contractor, then not necessarily. However, it is required that someone on site is certified, and recommended that multiple persons be certified.
- 9) This discussion is in regards to emergency phone requirements, Slide #12:
- a. **Question Posed:** "What type of phone is required, and how close to the aquatic venue does it have to be?"
- i. **Answer:** the communication device does not have to be hardwired, but must be readily accessible in an emergency. It may be a radio, cell phone, etc.
- 10) This discussion concerns the written safety plan requirements, Slide #14:
- a. **Question Posed:** "Has anyone ever evaluated the cost effectiveness of implementing these new policies?"
- i. **Answer:** These policies have been introduced by OSHA, do to numerous employee accidents. Previously OSHA has not touched the aquatics industry but is now starting to look at it. In the near future OSHA will likely become heavily involved in the aquatics industry.
- b. **Question Posed:** "What about home owners associations, whom will manage, train and administrate these programs. Most of them are not on site, nor would know what is needed; would we have to hire a consultant?"
- i. **Answer:** NMED will provide fill-in-the-blank templates for the venue operators and our inspectors will work hand-in-hand with the operators to ensure they meet and understand the policy requirements.
- c. **Question Posed:** "How will these template plans be available?"
- i. **Answer:** through the NMED field offices, from your inspector and online, or through the NMED, CDC and OSHA webpages.
- 11) The question and discussion was raised by an attendee after Slide #14:
- a. **Question Posed:** "Why is New Mexico, one of the poorest states in the Union, trying to adopt the MAHC when there have been no documented cases of outbreaks?"

Public Discussion (BLB)

- i. **Answer:** the New Mexico Department of Health has several documented cases of water-borne illnesses, and the MAHC references the period of time in 2008 that the most prominent studies were conducted and which the MAHC is based upon.
- 12) This discussion concerns the On- and Off-site operator requirements, Slide #15:
 - a. **Question Posed:** "What if my operator or myself want to go on a 2-week vacation?"
 - i. **Answer:** Then you would need to have more than one person whom is a qualified operator, or contract a qualified operator for the time period of time you or you QO are on vacation.
- 13) This discussion concerns the On- and Off-site operator requirements, Slide #15:
 - a. **Question Posed:** "So if I had a pool and a spa in 2 different locations of a apartment complex would it be more than 2 aquatic venues?"
 - i. **Answer:** if it is the same complex it would be not be considered 2 separate aquatic venues.
- 14) This discussion concerns construction approval of new facilities, Slide #16:
 - a. **Question Posed:** "I design new aquatic venues, how am I to be sure that I have learned and included all of the requirements that are in the MAHC?"
 - i. **Answer:** All of the requirements are given in Section 4 of the MAHC.
- 15) Clarification was needed over the definition of Substantially Altered aquatic venues, Slide #16:
 - a. **Question Posed:** "What is a substantially altered aquatic venue?"
 - i. **Answer was discussed, however, clarification was needed as to whether, substantially altered was based off of 50% of the *original cost* of the venue or 50% of the *replacement cost*.**
 - b. **Question Posed:** "So if I remodeled by facility and it is classified substantially altered, I must comply with the NM adopted MAHC?"
 - i. **Answer:** Yes
- 16) This discussion pertains to grammatical clarification concerning chain-link fences, Slide #17:
 - a. **Question Posed:** "So you are telling me that if I ever want to replace my white picket fencing I will have to get chain-link fencing of ≤ 1.75 -in. when the standard is 2-in.?"
 - i. **Answer:** No, you will not be required to install chain-link fencing, however, if you do put in chain-link fencing you will have to meet this requirement.
- 17) An attendee asked for clarification of the physical state of the chemicals that must be used per the MAHC, and the requirement of having a ORP and an eyewash station on all aquatic venues, Slide #18:
 - a. **Question Posed:** "Do all chemical have to be liquid form per the MAHC?"
 - i. **Answer:** No
- 18) This discussion is in regards to chemical/ equipment room requirements per the MAHC, Slide #18:
 - a. **Question Posed:** "In 1-yr after adoption of the MAHC would we have to buy or build a separate storage room for chemicals?"
 - i. **Answer:** No, this only pertains to new construction or substantial renovation.
 - b. **Question Posed:** "what if I have an off-site QO whom carries the chemical with them, and I don't have chemical storage on site?"
 - i. **Answer:** The MAHC still considers venue equipment room a chemical storage room due to the chemicals in use.
 - c. **Question Posed:** "So I would need an eyewash station in the equipment room?"
 - i. **Answer:** Yes, in maintaining and operating the venue equipment a safety risk is still posed by those chemicals that are in use.
 - d. **Question Posed:** "But you are increasing the cost exponentially, as I will have to by pumps and run line from a one room through to the equipment room, even through a 2-in. wall?"
 - i. **Answer:** I am not arguing that it will add to the cost.

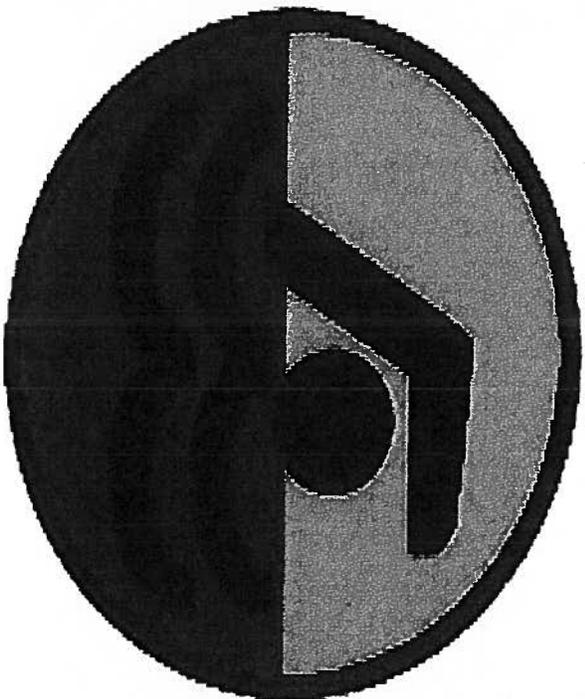
Post Presentation Questions/ Discussion:

- 1) **Question Posed:** "How will we know what regulations and requirements apply to which type of facilities, especially since I have to design the pools?"
 - a. **Answer:** You will work with your inspector and/or NMED office.
- 2) **Question Posed:** "Can we get a cheat sheet that break down the requirements into new/ substantially altered venues or existing/ grandfathered venues, and further breaks them down into facility classes A, B, C, etc?"
 - a. **Answer:** At one point during the adoption of the MAHC the pool specialist core team broke down the requirement by class, and new construction. I will track it down or have it re-done and made available.
- 3) **Question Posed:** "Can you put a frequently asked questions page on the internet?"
 - a. **Answer:** I will work on having that accomplished.
- 4) **Question Posed:** "How long until life-guards will be required on existing pools?"
 - a. **Answer:** Never, unless the regulation is re-written a facility that does not have a lifeguard will not have one required.
- 5) **Question Posed:** "Does the MAHC have anything to say on the use of hydrogen peroxide as a sanitizer?"
 - a. **Answer:** There is a fair amount of scientific literature supporting the use of hydrogen peroxide, however, it is not an EPA approved sanitizer and therefore cannot be used.
- 6) **Question Posed:** "Has there been thought to giving small aquatic venues with limited resources more than 1-yr grace period?"
 - a. **Answer:** There has, and that is why we welcome these public meetings, to the stakeholders' input. Please write your comment to the website.
- 7) **Question Posed:** "Where can I find exemptions in writing in the MAHC? I have a Class B pool and I can find that exemption provided I meet one of three conditions (current regulation). However, I can't find it in the MAHC?"
 - a. **Answer:** The exemptions you are seeing are from our current regulations. If it is an increased risk pool, or allows children under the age of 14, unsupervised, and it is a new construction than a lifeguard will be required.
- 8) **Question Posed:** "Can we just put the adoption to a democratic vote within the room?"
 - a. **Answer:** 6 voted for the adoption, 4 voted opposition to the adoption, the rest abstained from voting.

Brian L Barrick Observations:

- I overheard discussion during the end, speculating that NMED inspectors would be more inclined to close a pool to pump up the re-inspection fee charges.
- There was prevailing confusion over what would fall under new construction and what would not (I think they were too overwhelmed by the changes to follow the structure of the presentation) → maybe a side-by side breakdown or handouts would be preferable.
- Policy template examples could be good.

Exhibit 13



**New Mexico
Environment Dept
Swimming Pool Program**

**Proposed Changes to NM Swimming Pool
Regulations 7.18.2- 7.18.5 NMAC**

Proposed Regulations

Eugene R. Knight

Swimming Pool Program Manager

New Mexico Environment Department

Environmental Health Bureau

Overview of Changes

- The New Mexico Environment Department (NMED) is in the process of proposing adoption by reference the United States Department of Health and Human Services Center for Disease Control and Prevention's (CDC) Model Aquatic Health Code 1st Edition (MAHC).
- By adopting the MAHC by reference means that all public pools and spas in NM will have to follow the provisions set forth in the MAHC unless otherwise provided as a modification, addition, or omission to the MAHC in 7.18.1-2 NMAC.

New Terms

- Aquatic Venue replaces Public Pools
- Aquatic Facility replaces Public Pools Facility
- Qualified Operator replaces CPO or Certified Operator

Additions to the MAHC

- Aquatic Venue Classes
 - Class A
 - Class B
 - Class C
 - Class D

Class E pools have been moved under Class C.

Hot Springs and Public Baths have been removed from the regulations.

Replacements to the MAHC

Definitions:

“Aquatic Venue” means any artificially constructed structure that is expressly designated or used with the knowledge or consent of the owner or operator for swimming, water recreation, or bathing for the use of any segment of the public. Such structures do not necessarily contain standing water, so water exposure may occur via contact, ingestion, or aerosolization. The term “aquatic venue” includes all class A, class B, class C, and class D aquatic venues and spas. This term does not include residential housing or lodging facilities having five or less living units. Plumbing fixtures associated with a specific living unit, hot springs, and fill-and-draw tubs are also excluded. The term “aquatic venue” includes, but is not limited to, public pools and spas owned or operated by:

- (a) travelers’ accommodations including hotels, motels, inns, lodging and bed and breakfast facilities, hostels and recreational vehicle parks;
- (b) residential housing or lodging facilities having six or more living units;
- (c) apartments or apartment complexes, condominiums and mobile home parks;
- (d) recreation parks;
- (e) colleges or universities;
- (f) schools and group homes;
- (g) organizational camps;
- (h) clubs;
- (i) associations;
- (j) business establishments for their patrons or employees;
- (k) private persons with pools that are open to the public;
- (l) recreation districts; or
- (m) cities, municipalities, counties, the state of New Mexico or other political subdivisions.

Replacements to the MAHC

- Interactive Play Aquatic Venue: means any indoor or outdoor installation that includes sprayed, jetted or other water sources containing bathers and not incorporating standing or captured water as part of the bather activity area. Only those intended for public use and recreation shall be regulated. These aquatic venues are also known as splash pads, spray pads, wet decks.

Omissions to the MAHC

- 4.1.4 Compliance Certificates
- 4.1.5.3 Permit Issuance
- 5.2.2 Exemptions
- 5.6.7.4 Water Replenishment
- 6.3.2.1(4) List of aquatic facilities requiring qualified life guards.

New Requirements For All Facilities

New Equipment Requirements

- Chemical Feeders will be required for pH control chemicals on all aquatic venues upon adoption of the MAHC, and shall include interlock controls that disable feeding during no or low flow events. (4.7.3.2.1.1 & 4.7.3.2.1.3)
- Automated controllers (ORP) that monitor and turn on and off chemical feeders will be required on all aquatic venues within one year of adoption of the MAHC.(4.7.3.2.8)
- Diaper changing stations will be required upon adoption of the MAHC. (4.10.4.5)
- A hand wash sink adjacent to the diaper changing station shall be installed and operational within one year from the adoption of the MAHC. (5.10.4.5.1)
- Flow meters must be accurate within +/- 5% (4.7.1.9.1).

New Chemical Requirements

- Cyanuric acid and stabilized chlorine products are prohibited in all spas and therapy pools four (4) years after the adoption of the MAHC. These will remain prohibited in all indoor aquatic venues. (5.7.3.1.3)
- Free available chlorine (FAC) minimum (5.7.3.1.1.2)
 - Not using cyanuric acid – 1.0 PPM
 - Using cyanuric acid – 2.0 PPM
 - Spas – 3.0 PPM
- Free available chlorine (FAC) maximum – 10 PPM (5.7.3.1.1.5)

- Total available bromine minimum (5.7.3.1.2)
 - All aquatic venues: 3.0 PPM
 - Spas: 4.00 PPM
- Total available bromine maximum: 8 PPM (7.18.1.26(B) NMAC)
- Increased safety measures for existing facilities using compressed chlorine gas. (5.7.3.1.4.1)
- Chemical Testing Frequency (pH & disinfectant) (5.7.5.1)
 - Beginning of each day.
 - Automated controller in use: every 4 hours
 - No automated controller in use: every 2 hours
 - In-line ORP readings shall be recorded at the same time as disinfection and pH tests are performed.

New Training Requirements

- Specifies qualified operator training requirements and training course essential topics. (6.1.1 & 6.1.2)
- Lifeguard training course content. (6.2.1.1)
- Yearly CPR training required. (6.2.1.3.5)
- Aquatic Supervisor Training. (6.2.2)

New Safety Requirements

- Starting platforms shall be removed, covered, or blocked from usage during all recreational or non-competitive swimming activities. (5.8.3.1.2)
- Aquatic facility shall have a hardwired telephone or other communication system or device capable contacting or notifying emergency services. (5.8.5.2.1)
- Specifies facilities that require lifeguards. (6.3.2)
- Lifeguarding zones of patron surveillance now performance-based with performance criteria(6.3.3.1.1)

- Lifeguard supervisor required for aquatic facilities that are required to have two or more lifeguards per the zone plan of bather surveillance. (6.3.4.4.1)
- Enhanced signage requirements. (6.4.2.2)
- Swimmer empowerment (6.4.2.3)
 - The results of the most recent NMED inspection of the aquatic facility shall be posted in a location conspicuous to the public. (6.4.2.3.2)
- Defined imminent health hazards that require closure of the facility. (6.6.3)

New Required Policies

- A written comprehensive preventive maintenance plan for each aquatic venue shall be available. (5.4.2.1)
- The qualified operator shall develop and implement a plan to minimize combined chlorine compounds in indoor aquatic facilities. (5.6.2.8)
- Employee Illness and Injury Policy. (6.3.4.7)
- The qualified operator or responsible supervisor shall conduct and record in a log safety and preventive maintenance inspections. (6.4.1.3)
- All aquatic facilities shall create and implement a safety plan. (6.3.3)
 - Staffing plan
 - Emergency action plan
 - Biohazard action plan
 - Pre-service training plan
 - In-service training plan
- Fecal/Vomit/Blood Contamination Response (6.5)

New Requirements for Staffing

- On and off site qualified operator staffing and availability requirements upon adoption. (6.3.1)
 - On-site qualified operator on site immediately or within 2 hours for: (6.3.1.1.2)
 - More than 2 aquatic venues
 - Aquatic venue containing greater than 50,000 gallons
 - Aquatic venues that have aquatic features with recirculated water.
 - Aquatic venue used as a therapy pool
 - Aquatic venue used to provide swimming training.
 - Off-site contracted qualified operators are a minimum for all facilities that do not meet the above criteria. (6.3.1.2)

**New Requirements for
Substantially Altered or Newly
Constructed Facilities**

- Hygiene facility design provisions (location, rinse showers) will be required on all new construction or substantial alterations of existing aquatic facilities. (4.10)
- Secondary disinfection will be required on all new construction or substantially altered increased risk aquatic venues upon the adoption of the MAHC. (4.7.3.3.1.2)
- Fencing must be 6 feet tall, chain link fence cannot exceed 1.75 inch mesh (4.8.6.2.4.2 & 4.8.6.2.1.2)

- Emergency eye wash station shall be provided in pool chemical storage spaces. (4.9.2.1.4)
- Interior chemical storage spaces shall be under negative pressure and shall not exhaust to any other interior space of a building intended for occupancy. (4.9.2.5)
- Filtration rates:
 - No more than 15 gallons/min/ft² of surface area for bed depth of 15 inches or more (4.7.2.2.3.1 & 5.7.2.1.1)
 - No more than 12 gallons/min/ft² of surface area for bed depth of less than 15 inches. (4.7.2.2.3.1 & 5.7.2.1.1)
- Increased backwash rate to no less than 15 gallons/min/ft² of filter surface area. (4.7.2.2.3.2 & 5.7.2.1.2)

- Incorporation of water type (flat, agitated, hot, waterslide landing pool, interactive water play), deck density and stadium seating in aquatic venue design for theoretical peak occupancy. (4.1.2.3.5.3)

- Theoretical Peak Occupancy = is calculated by dividing surface area in square feet by density factor:
Flat water = 20 square feet

Agitated water = 15 square feet

Hot water = 10 square feet

Interactive water play = 10 square feet

- Use of compressed chlorine gas is prohibited on all new or substantially altered facilities. (4.9.2.11)
- Design of aquatic venues and facilities shall include the owner and/or an aquatic risk management consultant to incorporate operational considerations such as the layout of zones of patron surveillance. (4.5.1)
- Any new pool constructed of a depth greater than 5 feet at any point will be required to have a qualified lifeguard. (6.3.2.1)

- New construction will allow vessels to be built with infinity edges, underwater benches, ledges, shelves, moveable floors, and bulkheads, and swim up bars. None of these are allowed under current regulations.

Posting

The MAHC , proposed regulations 7.18.1-2
NMAC, and presentation are posted on the New
Mexico Environment Department website:

https://www.env.nm.gov/fod/Swim_Pools/poolrules.html

Contact

Comments or concerns should be made to
Eugene R. Knight, Swimming Pool Program
Manager

Email: eugene.knight@state.nm.us

Mail: 1216 Mechem, Bldg. 2

Ruidoso, NM 88345

Phone: 575-258-3272 office

575-937-8388 cell

Comments

- Questions
- Comments
- Concerns

Exhibit 14



SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lt. Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

Harold Runnels Building

1190 Saint Francis Drive (87505)

PO Box 5469, Santa Fe, NM 87502-5469

Phone (505) 827-2990 Fax (505) 827-1628

www.env.nm.gov

March 31, 2016



RYAN FLYNN
Cabinet Secretary

BUTCH TONGATE
Deputy Secretary

Via Email

Small Business Regulatory Advisory Commission
c/o Ms. Leslie Porter
New Mexico Economic Development Department
1100 St. Francis Drive
Santa Fe, New Mexico 87505

**Re: Proposed Amendments to Public Swimming Pools, Spas and Baths Regulations
7.18.1-7.18.5 NMAC**

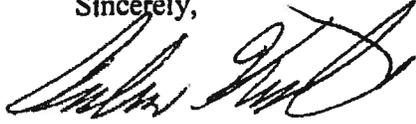
Dear Chairman and members of the Small Business Regulatory Advisory Commission,

The New Mexico Environment Department ("Department") hereby provides notice to the Small Business Regulatory Advisory Commission, pursuant to NMSA 1978 Section 14-4A-1, *et seq.* that the Department's Environmental Health Bureau has petitioned the Environmental Improvement Board ("EIB") for regulatory amendments to Sections 7.18.1 through 7.18.5 NMAC - *Public Swimming Pools, Spas, and Baths*. The proposed amendments would adopt the federal Model Aquatic Health Code, 1st Edition, with a number of additions, modifications, and omissions, and would also set fees for construction permits and operating permits.

These changes are being proposed with the objective of reducing the incidence of both accidental injury and water-borne infectious diseases that have occurred in public aquatic venues throughout the state. Development of the Model Aquatic Health Code was a collaborative effort between a large number of state health agencies throughout the country (including NMED), and the Centers for Disease Control (CDC). By adopting national standards for the construction of new facilities, and operational requirements such as improved methods for monitoring levels of disinfectant chemicals in the water, the Department hopes to significantly reduce the number of fall injuries, near drownings, chemical burns, and cases of *cryptosporidium*, *e. coli*, and listeria infection that have been reported in recent years.

The Department has held public meetings in different areas of the state to present these proposed changes and gather additional stakeholder input. The EIB is scheduled to hold a hearing on May 13, 2016 in Room 307 of the Roundhouse to decide whether to adopt these amendments. If you would like to have us present at your next meeting to discuss this rule change and answer any questions, please contact me at (505) 222-9540 or via email at andrew.knight@state.nm.us.

Sincerely,



Andrew P. Knight, *Esq.*
Assistant General Counsel

cc: Eugene Knight, NMED/EHB Pool Program Manager
Bill Chavez, NMED/EHB Bureau Chief
Michael Vonderheide, NMED/EPD Division Director

Exhibit 15



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

Morbidity and Mortality Weekly Report (MMWR)

Persons using assistive technology might not be able to fully access information in this file. For assistance, please send e-mail to: mmwrq@cdc.gov. Type 508 Accommodation in the subject line of e-mail.

Acute Illness and Injury from Swimming Pool Disinfectants and Other Chemicals --- United States, 2002--2008

Weekly

October 7, 2011 / 60(39);1343-1347

Swimming pools require disinfectants and other chemicals to maintain water quality and prevent swimmers from acquiring infections (1). When these chemicals are stored or used improperly or when they are handled or applied by persons not using appropriate personal protective equipment (PPE), illness or injury can result (2). To assess the frequency of illness and injury related to pool chemicals, CDC analyzed data for the period 2002--2008 from six states participating in the Sentinel Event Notification System for Occupational Risk (SENSOR) --Pesticides surveillance program and from the National Electronic Injury Surveillance System (NEISS). This report describes the results of that analysis, which identified 584 cases of illness or injury associated with pool chemicals in the six SENSOR-Pesticides states and indicated an estimated national total of 28,071 cases (based on 688 NEISS cases) during that period. For the 77% of state cases and 49% of NEISS cases that had sufficient information to determine factors contributing to illness or injury, the most common contributing factors included mixing incompatible products, spills and splashes of chemicals, lack of appropriate PPE use, and dust clouds or fumes generated by opening a chemical container. Adhering to existing CDC recommendations can prevent some of the reported illnesses and injuries, but additional measures (e.g., improving package design to limit the release of dust clouds and fumes when a container is opened, making containers child-proof, and making product labels easier to understand) might reduce them further.

In the six SENSOR-Pesticides states (California, Iowa, Louisiana, Michigan, North Carolina, and Texas),* a case of poisoning associated with pool disinfectants was defined as two or more acute adverse health effects resulting from exposure to any pool disinfectant. Cases were categorized by certainty of exposure, reported health effects, and consistency of health effects with known toxicology of the chemical (3) (Table 1). State cases categorized as definite, probable, possible, and suspicious and California Department of Pesticide Regulation cases categorized as definite, probable, and possible were included in the analysis. NEISS cases† were those involving exposure to swimming pool chemicals (product code 938). State cases were excluded if the event occurred during crop farming activities. Neither state nor NEISS cases were included if the illness or injury was not directly caused by pool chemicals.§ Data were analyzed for demographic characteristics, event location, health effects, outcomes (e.g., hospitalization), and factors contributing to illness or injury. Data from the SENSOR-

Pesticides states also were analyzed for reporting source, illness or injury severity, ¶ chemical toxicity, ** active ingredients, work-relatedness, and time lost from work.

For the period 2002--2008, a total of 584 cases were identified in the six SENSOR-Pesticides states (Table 2); most cases occurred in California (306 [52%]). Most cases reported by the states (65%) were identified through poison control centers, followed by cases identified from workers' compensation claims (28%). The number of cases from NEISS for the period 2002--2008 was 688, which yields a weighted national estimate of 28,071 cases (Table 2). A substantial proportion of cases were in children aged <15 years (25% of state cases and 34% of NEISS cases). Cases were most frequently poisonings at private residences (48% of state cases and 56% of NEISS cases) followed by nonmanufacturing facilities, which included hotels, health clubs, and other facilities (28% of state cases and 14% of NEISS cases). Symptoms most frequently reported were respiratory symptoms, such as cough, upper respiratory irritation, and dyspnea (65% of state cases and 24% of NEISS cases), eye injuries (33% of state cases and 42% of NEISS cases), and skin injuries (18% of state cases and 19% of NEISS cases). In the six SENSOR-Pesticides states, the active ingredients most frequently associated with acute illness or injury were sodium hypochlorite (31%), triazine compounds (22%), and calcium hypochlorite (16%). Most of the disinfectants were toxicity category I (87%). The majority of state cases (85%) involved low-severity illnesses or injuries. Forty percent of state cases were work-related, 9% of which involved loss of 1 or more days from work. A small proportion of cases involved hospitalization (2% of state cases and 4% of NEISS cases).

Factors most frequently associated with illness or injury included mixing incompatible products (21% of state cases and 6% of NEISS cases), spills and splashes of pool chemicals (18% of state cases and 33% of NEISS cases), and dust clouds or fumes generated by opening a chemical container (15% of state and NEISS cases) (Table 3). Factors that contributed to worker illness or injury included spills and splashes of liquid or dust (33%), lack of appropriate PPE use (24%), and equipment failure (19%). Among state and NEISS cases, 9% occurred when a child gained access to chemicals not securely stored, and 6% of state cases and 2% of NEISS cases involved other improper storage. Of cases that involved storage within reach of a child, 14% of state cases involved children aged 4--11 years who opened containers.

Five high-severity cases were identified by the six SENSOR-Pesticides states. One case occurred in a man aged 39 years in Louisiana with no pertinent medical history. He was in a public recreational swimming pool when chlorine was added to shock chlorinate it. He inhaled fumes and developed nausea, headache, cough, upper respiratory irritation, dyspnea, wheezing, hypoxia, and tachycardia. He was diagnosed with chlorine inhalation and ingestion, and was hospitalized for 4 days. The second case occurred in a boy aged 5 years in Louisiana who stuck his face in a bucket of pool shock treatment (65% calcium hypochlorite). Cyanosis and dyspnea were documented, and the boy was admitted to the critical-care unit, where he was hospitalized for 4 days. The third case involved a previously healthy woman aged 61 years in California who mixed two pool chemicals, calcium hypochlorite and cyanuric acid, in her kitchen sink. The chemicals reacted and created fumes in the poorly ventilated kitchen. She reported cough, upper respiratory irritation, and dyspnea, and was treated with oxygen. The next day, she was wheezing and was diagnosed with pulmonary edema and hospitalized for 6 days. The fourth case occurred in a woman aged 42 years in Iowa who had asthma. She inhaled dust while applying chlorinating granules, resulting in cough, dyspnea, and lower respiratory pain and irritation. She received a diagnosis of asthma exacerbation caused by chemical exposure and was admitted to an intensive-care unit, where she was hospitalized for 4 days. The fifth case occurred in a woman aged 54 years in Michigan who had allergies. She was exposed to chlorine fumes when an excessive amount of chlorine was added to a pool in which

she was swimming. She had cough, dyspnea, wheezing, and vomiting. She received a diagnosis of chemical pneumonitis and was hospitalized for 7 days.

Reported by

Louise Mehler, MD, PhD, California Dept of Pesticide Regulation; John Beckman, California Dept of Public Health. Roshan Badakhsh, MPH, Louisiana Dept of Health and Hospitals. Brienne Diebolt-Brown, MA, Texas Dept of State Health Svcs. Abby Schwartz, MPH, Michigan Dept of Community Health. Sheila Higgins, MPH, Div of Public Health, North Carolina Dept of Health and Human Svcs. Rita Gergely, MA, Iowa Dept of Public Health. Geoffrey M. Calvert, MD, Div of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health; Naomi L. Hudson, DrPH, EIS Officer, CDC. Corresponding contributor: Naomi L. Hudson, nhudson1@cdc.gov, 513-841-4424.

Editorial Note

Chlorine-based disinfectants are the most commonly used disinfectants for treating swimming pool water. A total of 36 pool chemical--associated events were reported in New York during 1983--2007, of which 31 events were attributed to chlorine gas exposure, which most often resulted from mixing sodium hypochlorite solutions (e.g., household chlorine bleach) with acid (4). In England and Wales, 13 events involving pool chemicals were reported during June--October 2007, of which 10 events involved sodium hypochlorite and nine events resulted from equipment failure or mixing incompatible chemicals (5). Several individual cases of illness or injury attributed to pool disinfectants have been reported and include respiratory illness and eye and skin injury (6,7).

The findings in this report are subject to at least five limitations. First, illnesses and injuries related to pool chemicals likely are underreported. Case identification by states relies on a passive surveillance system, so cases in persons experiencing minor symptoms who do not seek medical treatment or advice from poison control centers are not reported. Also, cases reported in NEISS only involve persons who sought treatment in a hospital emergency department. Second, cases might have been excluded because insufficient information was provided to meet the case definition. Third, symptoms for illness or injury associated with pool chemicals are nonspecific and not pathognomonic, so false-positives might have occurred. Fourth, some cases that were not work-related might have been missed in Iowa, Louisiana, Michigan, North Carolina, and Texas because CDC's National Institute for Occupational Safety and Health advises these states to prioritize work-related cases when staffing limitations preclude follow-up of all cases. Finally, the NEISS dataset had limited information, which for some cases precluded the identification of symptoms and contributing factors. Furthermore, no product-identifying information was available in NEISS. Thus, whether illnesses and injuries were caused by nondisinfectant pool chemicals or whether noncompliance with product labels contributed to the reported illnesses and injuries could not be determined. However, most NEISS cases are thought to be disinfectant-related, based on the pool chemical--associated events reported in New York and England and Wales (4,5). Pool disinfectant byproducts, such as chloramines, are responsible for many illnesses and injuries reported (8--10). No cases from the six SENSOR-Pesticides states were attributed to chloramines; however, chloramines might have contributed to some NEISS injuries, but their involvement could not be discerned given the limited product and event information.

Current CDC recommendations to reduce illness and injury from pool chemicals, including disinfectants, are available at <http://www.cdc.gov/healthywater/swimming/pools/preventing-pool-chemical-injuries.html>. These recommendations address contributing factors related to

application equipment failure, storage within reach of a child and other improper storage, illegal dumping, and inadequate PPE used by workers. In addition to the existing CDC recommendations, the findings described in this report suggest that pool chemical manufacturers should design containers so that dust clouds or fumes are minimized when containers are opened and should make the containers child-proof. Label information on appropriate PPE usage should be easy to find and understand; the addition of pictograms depicting appropriate PPE might increase the likelihood of correct use. Instructions for consumers to point the container away from their face while opening might also reduce illness and injury from pool chemicals.

References

1. World Health Organization. Guidelines for safe recreational waters. Volume 2: swimming pools and similar recreational-water environments. Geneva, Switzerland: World Health Organization; 2006. Available at http://www.who.int/water_sanitation_health/bathing/bathing2 . Accessed September 26, 2011.
2. CDC. Healthy swimming/recreational water: recommendations for preventing pool chemical-associated injuries. US Department of Health and Human Services, CDC; 2011. Available at <http://www.cdc.gov/healthywater/swimming/pools/preventing-pool-chemical-injuries.html>. Accessed September 26, 2011.
3. Calvert GM, Mehler LN, Alsop J, De Vries A, Besbelli N. Surveillance of pesticide-related illness and injury in humans. In: Krieger R, ed. Hayes' handbook of pesticide toxicology. 3rd ed. London, England: Academic Press; 2010:1313--69.
4. CDC. Pool chemical--associated health events in public and residential settings---United States, 1983--2007. MMWR 2009;58:489--93.
5. Thomas HL, Murray V. Review of acute chemical incidents involving exposure to chlorine associated with swimming pools in England and Wales, June--October 2007. *J Public Health (Oxf)* 2008;30:391--7.
6. Vohra R, Clark RF. Chlorine-related inhalation injury from a swimming pool disinfectant in a 9-year-old girl. *Pediatr Emerg Care* 2006;22:254--7.
7. Martinez TT, Long C. Explosion risk from swimming pool chlorinators and review of chlorine toxicity. *J Toxicol Clin Toxicol* 1995;33:349--54.
8. CDC. Ocular and respiratory illness associated with an indoor swimming pool---Nebraska, 2006. MMWR 2007;56:929--32.
9. Dang B, Chen L, Mueller C, et al. Ocular and respiratory symptoms among lifeguards at a hotel indoor waterpark resort. *J Occup Environ Med* 2010;52:207--13.
10. Bowen AB, Kile JC, Otto C, et al. Outbreaks of short-incubation ocular and respiratory illness following exposure to indoor swimming pools. *Environ Health Perspect* 2007;115:267--71.

* Currently, 12 states conduct surveillance of pesticide-related illness and injury, and these states comprise the SENSOR-Pesticides program. Of these states, only California, Louisiana, Michigan, and Texas collected data on illnesses and injuries related to disinfectants for the period 2002--2008. The North Carolina Department of Health and Human Services Division of Public Health began collecting data on illnesses and injuries related to disinfectants in 2008. The Iowa Department of Public Health has a collaborative relationship with the poison control centers in Iowa and was able to identify pesticide poisoning cases associated with swimming pool disinfectants for the period 2005--2008. The California Department of Public Health provided data for the period 2006--2008 (14 cases), and the California Department of Pesticide Regulation provided data for the period 2002--2008 (292 cases). The numbers of

cases contributed by each state were as follows: California, 306; Louisiana, 138; Texas, 57; Michigan, 43; North Carolina, 25; and Iowa, 15.

† NEISS is a probability sample of emergency departments based on a sampling frame of 100 emergency departments in the United States and its territories. Each case is assigned a weight based on the sample design. The national estimate is the sum of weights.

§ NEISS cases that did not meet the case definition for inclusion in this analysis did not directly involve the pool chemical, did not have acute symptoms related to pool chemicals, or involved intentional exposure (e.g., drug use). Examples of cases that were excluded include a case in a person who injured his back while lifting a bucket of pool chlorine, a case in a person who sprained their ankle when they fell into the pool while adding pool chemicals to the pool water, cases in persons who had symptoms because they were drowning, cases in persons who lived in a home where chlorine, fertilizer, or muriatic acid was stored but did not have any symptoms, and cases in other persons whose illnesses or injuries did not directly involve pool chemicals or for whom no symptoms after exposure were reported. A total of 55 NEISS cases with product code 938 occurred during 2002--2008 that did not meet the case definition for this analysis. If these cases were included, the national estimate for illnesses and injuries associated with pool chemicals during that period would be 30,235 cases.

¶ Severity of illness or injury of cases was categorized into four groups using standardized criteria for state-based surveillance programs. In low-severity cases, illness or injury usually resolves without treatment and <3 days are lost from work. In moderate-severity cases, illness or injury is non--life-threatening but requires medical treatment and <6 days are lost from work. In high-severity cases, illness or injury is life-threatening and requires hospitalization and >5 days are lost from work. The category for fatal poisonings is death.

** The toxicity category of a pesticide is determined by the Environmental Protection Agency under guidance from Code of Federal Regulations Title 40 Part 156. Pesticides in category I have the greatest toxicity, and pesticides in category IV have the least toxicity.

What is already known on this topic?

Swimming pools require frequent application of disinfectants and other pool chemicals, and exposure to these chemicals can cause illness and injury.

What is added by this report?

During 2002--2008, an estimated 28,071 cases of illness or injury associated with pool disinfectants and other pool chemicals occurred nationally (an average of 4,010 cases per year). Most cases occurred at private residences. In the six states participating in the Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides surveillance program, 40% of cases were work-related, 9% of which involved loss of 1 or more days from work. The most frequently identified causes of illness or injury were mixing incompatible chemicals, spills and splashes of pool chemicals, lack of appropriate personal protective equipment (PPE) use, lack of proper training and supervision, and dust clouds or fumes generated by opening a pool chemical container.

What are the implications for public health practice?

Some of the identified illnesses and injuries resulted from failure to follow CDC recommendations to prevent illnesses and injuries associated with pool chemicals. Additional

measures to reduce exposures to pool chemicals that are suggested by these findings include altering pool chemical container design and modifying labels to make them easier to understand, including using pictograms to depict appropriate PPE use.

TABLE 1. Case classification matrix for acute illnesses and injuries associated with pool disinfectants --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states, 2002--2008

Classification criteria†	Classification category*				
	Definite	Probable	Possible	Suspicious	
Exposure	1	1	2	2	1 or 2
Health effects	1	2	1	2	1 or 2
Causal relationship	1	1	1	1	4

Source: CDC. Case definition for acute pesticide-related illness and injury cases reportable to the national public health surveillance system. Cincinnati, OH: US Department of Health and Human Services, CDC, National Institute for Occupational Safety and Health; 2005. Available at http://www.cdc.gov/niosh/topics/pesticides/pdfs/casedef2003_revapr2005.pdf.

* Case classifications are slightly different between the SENSOR-Pesticides program and the California Department of Pesticide Regulation (CDPR) Pesticide Illness Surveillance system. CDPR classifies cases as definite, probable, and possible based on the relationship between exposure and health effects: definite = both physical (e.g., disinfectant residue on clothing) and medical evidence document exposure and consequent health effects; probable = limited or circumstantial evidence supports a relationship to pesticide exposure; and possible = evidence neither supports nor contradicts a relationship. Additional information available at <http://www.cdpr.ca.gov/docs/whs/pisp/brochure.pdf>.

† Cases are classified as definite, probable, possible, or suspicious based on scores for exposure, health effects, and causal relationship. Exposure score: 1 = laboratory, clinical, or environmental evidence for exposure; 2 = evidence of exposure based solely on written or oral report from the patient, a witness, or applicator. Health effects scores: 1 = two or more new postexposure signs or laboratory findings reported by a licensed health professional; 2 = two or more postexposure symptoms reported by the patient. Causal relationship scores: 1 = the observed health effects are consistent with the known toxicology of the disinfectant; 4 = insufficient toxicologic information available to determine the causal relationship.

TABLE 2. Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS	
	No.	(%)†	No.	U.S. estimate§ (%)†

TABLE 2. Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS		
	No.	(%)†	No.	U.S. estimate§	(%)†

TABLE 2. Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS		
	No.	(%)†	No.	U.S. estimate§	(%)†
Total cases	584	(100)	688	28,071	---
Year of exposure					
2002	103	(18)	95	3,753	(13)
2003	49	(8)	116	4,813	(17)
2004	42	(7)	64	3,111	(11)
2005	45	(8)	121	4,015	(14)
2006	97	(17)	79	3,507	(12)
2007	99	(17)	109	4,508	(16)
2008	149	(26)	104	4,364	(16)
Age group (yrs)					
0--5	43	(7)	109	3,619	(13)
6--14	106	(18)	186	5,960	(21)
15--24	121	(21)	89	3,580	(13)
25--44	175	(30)	171	8,389	(30)
≥45	125	(21)	133	6,523	(23)
Unknown	14	(2)	---	---	---
Sex					

TABLE 2. Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS		
	No.	(%)†	No.	U.S. estimate§	(%)†
Male	360	(62)	388	15,986	(57)
Female	218	(37)	300	12,086	(43)
Unknown	6	(1)	---	---	---
Status					
Definite	89	(15)	---	---	---
Probable	246	(42)	---	---	---
Possible	246	(42)	---	---	---
Suspicious	3	(1)	---	---	---
Work-related					
Yes	233	(40)	---	---	---
Lost time from work					
Yes	51	(9)	---	---	---
Reporting source					
Physician report	32	(5)	---	---	---
Poison control center	377	(65)	---	---	---
Workers' compensation	165	(28)	---	---	---
State health department	4	(1)	---	---	---
Other	6	(1)	---	---	---
Event location					
Agriculture¶	1	(<1)	---	---	---
Private residence	281	(48)	339	15,699	(56)
Institutions	29	(5)	3	115	(<1)

TABLE 2. Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS		
	No.	(%)†	No.	U.S. estimate§	(%)†
Manufacturing facility	2	(<1)	---	---	---
Nonmanufacturing facility	161	(28)	145	4,021	(14)
Other	68	(12)	---	---	---
Unknown/Missing	42	(7)	201	8,236	(29)
Toxicity**					
I-Danger	510	(87)	---	---	---
II-Warning	5	(1)	---	---	---
III-Caution	6	(1)	---	---	---
Missing/Unknown	63	(11)	---	---	---

TABLE 2. (Continued) Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS		
	No.	(%)†	No.	U.S. estimate§	(%)†
Active ingredient†† §§					
Sodium hypochlorite	189	(31)	---	---	---
Triazines	133	(22)	---	---	---
Calcium hypochlorite	99	(16)	---	---	---
Chlorine	72	(12)	---	---	---
Other	111	(18)	---	---	---
Illness severity					
Fatal	---	---	---	---	---

TABLE 2. (Continued) Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS		
	No.	(%)†	No.	U.S. estimate§	(%)†
High	5	(1)	---	---	---
Moderate	78	(13)	---	---	---
Low	499	(85)	---	---	---
Missing/Unknown	2	(<1)	---	---	---
Body part/System affected †† ¶¶					
Respiratory	379	(65)	193	6,846	(24)
Eye	194	(33)	271	11,813	(42)
Skin	103	(18)	125	5,216	(19)
Neurologic	94	(16)	24	732	(3)
Gastrointestinal	95	(16)	59	1,686	(6)
Cardiovascular	28	(5)	6	256	(1)
Other	18	(3)	6	333	(1)
Unknown	---	---	57	2,592	(9)
Hospitalization					
Yes	14	(2)	32	1,062	(4)

* Case classifications are slightly different between the SENSOR-Pesticides program and the California Department of Pesticide Regulation (CDPR) Pesticide Illness Surveillance system. CDPR classifies cases as definite, probable, and possible based on the relationship between exposure and health effects: definite = both physical (e.g., disinfectant residue on clothing) and medical evidence document exposure and consequent health effects; probable = limited or circumstantial evidence supports a relationship to pesticide exposure; and possible = evidence neither supports nor contradicts a relationship. Additional information available at <http://www.cdpr.ca.gov/docs/whs/pisp/brochure.pdf> ¶ .

† Percentages might not sum to 100 because of rounding.

§ Weighted national estimate.

TABLE 2. (Continued) Number and percentage of acute illnesses and injuries associated with pool chemicals, by selected characteristics --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Characteristic	SENSOR states		NEISS		
	No.	(%)†	No.	U.S. estimate§	(%)†

¶ The injury occurred when a horse ranch maintenance worker applied chlorine to a pool for horses.

** Toxicity categories are classified by the Environmental Protection Agency based on established criteria, with I being the most toxic and IV the least.

†† The total might exceed the number of cases because multiple active ingredients or body parts/systems might have been involved in a single case.

§§ Information was not available to identify active ingredients in 19 cases in the six SENSOR-Pesticides states.

¶¶ Symptoms were derived from narratives of the illness or injury included in the NEISS dataset and were coded using SENSOR criteria. Narratives that lacked specific symptoms were coded as "Unknown."

TABLE 3. Number and percentage of acute illnesses and injuries associated with pool chemicals, by contributing factor --- six Sentinel Event Notification System for Occupational Risk (SENSOR)--Pesticides states and the National Electronic Injury Surveillance System (NEISS), 2002--2008*

Contributing factor†	SENSOR states						NEISS§		
	Total		Workers		Nonworkers		No.¶	U.S. estimate**	(%)
	No.¶	(%)	No.¶	(%)	No.¶	(%)			
One or more contributing factors identified††	451	---	183	---	267	---	335	14,412	---
Mixing incompatible products	94	(21)	21	(11)	73	(27)	21	832	(6)
Spill or splash of liquid or dust	80	(18)	61	(33)	19	(7)	90	4,728	(33)
Required PPE not worn/PPE inadequate	75	(17)	44	(24)	31	(12)	---	---	---
Not properly trained or supervised	68	(15)	19	(10)	49	(18)	---	---	---

Application equipment failure	50	(11)	35	(19)	15	(6)	19	301	(2)
Dust cloud or fumes generated upon opening container	68	(15)	13	(7)	55	(21)	39	2,164	(15)
Stored within reach of child	42	(9)	---	---	42	(16)	41	1,359	(9)
Other improper storage	29	(6)	13	(7)	16	(6)	9	343	(2)
Exposure to fumes/dust during application	30	(7)	10	(5)	20	(7)	31	1,636	(11)
Illegal pesticide used/Illegal dumping	12	(3)	12	(7)	---	---	---	---	---
Inadequate ventilation	12	(3)	5	(3)	7	(3)	41	946	(7)
Decontamination not adequate or timely	8	(2)	7	(4)	1	(<1)	8	329	(2)
Early reentry	5	(1)	2	(1)	3	(1)	25	1,369	(10)
Persons in treated area	8	(2)	2	(1)	6	(2)	10	479	(3)
Excessive application	10	(2)	4	(2)	6	(2)	23	817	(6)
Label violation not otherwise specified	8	(2)	3	(2)	5	(2)	1	77	(1)
Person poisoned but no label violation identified	8	(2)	6	(3)	2	(1)	---	---	---

Abbreviation: PPE = personal protective equipment.

* Case classifications are slightly different between the SENSOR-Pesticides program and the California Department of Pesticide Regulation (CDPR) Pesticide Illness Surveillance system. CDPR classifies cases as definite, probable, and possible based on the relationship between exposure and health effects: definite = both physical (e.g., disinfectant residue on clothing) and medical evidence document exposure and consequent health effects; probable = limited or circumstantial evidence supports a relationship to pesticide exposure; and possible = evidence neither supports nor contradicts a relationship. Additional information available at <http://www.cdpr.ca.gov/docs/whs/pisp/brochure.pdf>.

† For 133 cases (23%) in the six SENSOR-Pesticides states and 353 (51%) cases in NEISS, information was not available to determine contributing factors.

§ Because there was no product-identifying information available in NEISS, label information about directions for use and required PPE could not be determined.

¶ A case can have multiple contributing factors that resulted in illness or injury; thus, the sum of the categories exceed the total number of cases with sufficient information to determine contributing factors, and the total percentage exceeds 100%.

** Weighted national estimate.

†† The denominator for the proportions was the total cases that had sufficient information to determine contributing factors.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of pages found at these sites. URL addresses listed in *MMWR* were current as of the date of publication.

All *MMWR* HTML versions of articles are electronic conversions from typeset documents. This conversion might result in character translation or format errors in the HTML version. Users are referred to the electronic PDF version (<http://www.cdc.gov/mmwr>) and/or the original *MMWR* paper copy for printable versions of official text, figures, and tables. An original paper copy of this issue can be obtained from the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, DC 20402-9371; telephone: (202) 512-1800. Contact GPO for current prices.

**Questions or messages regarding errors in formatting should be addressed to mmwrq@cdc.gov.

Page last reviewed: October 07, 2011

Page last updated: October 07, 2011

Content source: [Centers for Disease Control and Prevention](#)

Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA
30329-4027, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)



Exhibit 16

Persons using assistive technology might not be able to fully access information in this file. For assistance, please send e-mail to: mmwrq@cdc.gov. Type 508 Accommodation in the subject line of e-mail.

Pool Chemical--Associated Health Events in Public and Residential Settings --- United States, 1983--2007

Swimming is the second most popular exercise in the United States, with approximately 339 million swimming visits to recreational water venues, including disinfected ones (e.g., pools, water parks, and interactive fountains), each year (1). Pool chemicals* are added to the water in these venues to prevent transmission of infectious pathogens. These chemicals can cause injury when handled inappropriately or when operators fail to use appropriate personal protective equipment. This report summarizes 36 pool chemical--associated health events reported to the New York State Department of Health (NYSDOH) for public aquatic venues during 1983--2006 and includes analyses of 1998--2007 data from the National Electronic Injury Surveillance System (NEISS) and 2007 data from the National Poison Data System (NPDS). NYSDOH reported primarily summertime health events resulting in acute respiratory illness. NEISS and NPDS data revealed that pool chemical--associated injuries or exposures led to thousands of estimated annual emergency department (ED) visits or actual poison center consultations, respectively. These pool chemical--associated health events can be prevented through 1) improved design and engineering and 2) education and training that stresses safe pool-chemical handling and storage practices and safe and preventive maintenance of equipment.

New York State Surveillance

Since 1948, NYSDOH has mandated the reporting of injury or illness occurring at public aquatic facilities. Since 1986, events resulting in 1) death, 2) referral to hospitals or other facilities for medical attention, or 3) illness associated with water quality, specifically must be reported. NYSDOH conducted a retrospective review of reports on pool chemical--associated injuries for the period 1983--2006. Subsequently, NYSDOH reported 36 pool chemical--associated health events (range: 0--4 events/year) to CDC's Waterborne Disease and Outbreak Surveillance System (WBDOS) (2). These health events were characterized by acute respiratory illness (34 [94%]) and affected a median of five persons (range: 1--91 persons), with no deaths reported. The reported health events occurred in schools or colleges (13 [36%]), membership clubs (10 [28%]), housing complexes or hotels (six [17%]), community aquatic facilities (five [14%]), and institutions (two

[6%]). The majority of events (31 [86%]) occurred in settings where pools might be viewed as an amenity (i.e., not in a community aquatic facility). Twenty-one (58%) occurred during the summer swim season, from Memorial Day through Labor Day. Five events (14%) involved direct exposure to chlorine bleach or acid. The other 31 health events (86%) resulted from exposure to toxic chlorine gas. Of these 31 events, 27 (87%) were caused by exposure to chlorine gas generated by mixing incompatible pool chemicals, most frequently chlorine bleach and acid (24 [89%]). The primary contributing factors to the 36 events were poor chemical handling or storage practices (25 events [69%]), poor equipment maintenance practices (six [17%]), poor facility design and engineering (four [11%]), and unknown (one [3%]). Two New York state health events that illustrate the contributing factors follow.

Poor facility design and engineering. In 1988, the main recirculation pump of an outdoor community pool shut down after a momentary power outage. However, the chlorine bleach and acid† delivery pumps continued running, allowing chlorine bleach and acid to mix within the piping without dilution. When the recirculation pump was restarted, the chlorine gas generated in the static water return lines vented in the shallow end of the pool. Consequently, according to the police report, 21 children were taken to the hospital for difficulty breathing; of these, three were admitted to the pediatric intensive-care unit and seven to the general pediatric unit. Emergency response required seven ambulances, two paramedic units, and 11 police officers. This and similar events supported New York state pool code revisions requiring installation of a device that automatically deactivates chlorine bleach and acid delivery pumps when no water is flowing in the recirculation system (3).

Poor chemical handling or storage practices. In 1995, a custodian maintaining the indoor school pool ordered 5-gallon containers of chlorine bleach but instead received 5-gallon containers that looked the same but contained acid. Two custodians reported failing to read the product labels and mistakenly pouring acid into the chlorine bleach tank, thus generating chlorine gas. The school was evacuated; at least 81 students, likely exposed to gas spread through the ventilation system, and the two custodians were taken to the hospital with acute respiratory symptoms. Emergency response involved multiple fire departments and government agencies (e.g., the county disaster office). NYSDOH consequently developed a health education campaign focused on safe chemical handling and storage practices.

National Surveillance Systems

NEISS. The U.S. Consumer Product Safety Commission's NEISS captures data on ED visits for injuries associated with consumer products, such as pool chemicals. NEISS records include NEISS product codes (pool chemical code: 938); primary diagnosis; primary injured body part; disposition; incident location; age, sex, and race/ethnicity of the patient; and brief narratives describing activities leading to injury. The program collects these data from a nationally representative probability sample of approximately 100 hospitals in the United States (4). Each case was weighted based on the inverse probability of the hospital being selected, and the weights were summed to produce national estimates. Rates per 100,000 population were calculated using these estimates and U.S. Census Bureau population estimates; 95% confidence intervals were calculated using statistical software that accounted for the sample weights and complex sampling design. During 1998--2007, the estimated median number of annual ED visits for pool chemical--associated injuries was 4,120 (range: 3,315--5,216) (Figure). In 2007, an estimated 4,635 persons (1.5 per 100,000 population [95% confidence interval = 1.0--2.1]) visited the ED for pool chemical--associated injuries (Table). More than half (58% [2,698 (range: 1,992--3,404)]) of the estimated injuries occurred during the summer swim season. Some patients inhaled chemical fumes (38 [33%] of the 115 actual NEISS

ED visits) when opening pool chemical containers, attempting to predissolve pool chemicals, or handling chemicals; eye injuries resulting from pool chemicals splashing also occurred (22 [19%] of 115). No deaths were documented.

NPDS. The American Association of Poison Control Centers maintains the NPDS, which collects real-time exposure data from the majority (60 of 61) of poison centers. During 2007, the poison centers received calls regarding 9,573 human exposures to a single pool or aquarium chemical (5).§ Of these exposures, 39% (3,775) involved persons aged <6 years, 97% (9,287) were unintentional, and 19% (1,781) resulted in injuries for which patients sought health-care treatment. No deaths were documented.

Reported by: *DC Sackett, EJ Wiegert, JS Egan, MPH, DC Nicholas, MPH, Bur of Community Environmental Health and Food Protection, New York State Dept of Health. MC Hlavsa, MPH, MJ Beach, PhD, Div of Parasitic Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases; J Gilchrist, MD, Div of Unintentional Injury Prevention, National Center for Injury Prevention and Control, CDC.*

Editorial Note:

Operation of public aquatic venues requires balancing different risk reduction plans to protect the health of staff members and patrons. Since the 1920s, chemical disinfection and filtration have served as the primary barriers to waterborne pathogen transmission at aquatic venues. However, the need for chemical disinfection to control waterborne disease outbreaks must be balanced with reducing the number of injuries associated with use of these same chemicals. With the increasing number of reports of recreational water--associated outbreaks, public pool operators and residential pool owners need to remain vigilant in maintaining good water quality and disinfection to protect swimmer health (2).

Reporting of pool chemical--associated health events in the United States is not universally mandated, and no single surveillance system exists to characterize completely the number of exposures or associated injuries. The national NEISS and NPDS data presented in this report indicate that pool chemical exposures and associated injuries are common. Although no one data source alone elucidates completely the epidemiology of pool chemical--associated injuries, together they reveal multiple commonalities that suggest these injuries are preventable. Poor chemical handling and storage practices at public aquatic venues, particularly those leading to mixing of incompatible chemicals, were the primary contributing factors to New York state health events. Data from NEISS show that inhalation of chemical fumes and splashing pool chemicals into the eyes were the primary pool chemical--associated injuries for which patients sought ED treatment. Finally, NPDS data reveal that nearly all single pool chemical exposures likely were unintentional.

New CDC recommendations for preventing injuries associated with pool chemicals were based on a review of the health events and data in this report and other government regulatory guidance (6). These recommendations focus on improving 1) facility design and engineering and 2) education and training (Box) that stresses safe chemical handling and storage practices and safe and preventive maintenance of equipment.

The NYSDOH reports illustrate that these health events at public aquatic venues can injure a large number of persons and likely are preventable through appropriate education and training (e.g., instructing persons to never mix chlorine products with acid). Previous studies underscore that requiring pool operator training can reduce the number of water-quality violations (7,8). Future

prevention efforts should require training for all public pool operators. 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. Additionally, because at least 43% of ED-treated, pool chemical--associated injuries occurred at a residence, messages about safe chemical handling and storage, particularly the use of personal protective equipment (e.g., safety glasses and appropriate masks), also should target residential pool owners.

Health departments conducting or considering surveillance of pool chemical--associated injuries might consider formalizing mechanisms to capture data from emergency response agencies. This could increase the representativeness of the data by increasing detection of events that otherwise might not be reported. Data completeness and validity also might improve because emergency responders often are on scene soon after these health events occur.

Pool codes governing aquatic venue design, construction, operation, and maintenance are written and approved by state and/or local officials. No single federal agency is responsible for regulating treated aquatic venues. To raise national awareness and minimize the occurrence of preventable health events, CDC supports the development of a nonregulatory, model aquatic health code (MAHC) (9). The MAHC effort, currently led by NYSDOH, will produce a code for voluntary adoption by health jurisdictions as individual modules are finalized. The MAHC is designed to be a data-driven, knowledge-based, national model pool code that balances the control measures needed for both waterborne disease transmission and safe chemical use.

Acknowledgments

The findings in this report are based, in part, on contributions by staff members in local health departments and first responder units in New York State; and JS Yoder and V Roberts, Div of Parasitic Diseases, National Center for Zoonotic, Vector-Borne, and Enteric Diseases, and J Carpenter, Div of Healthcare Quality Promotion, National Center for Preparedness, Detection, and Control of Infectious Disease, CDC.

References

1. US Census Bureau. 2009 statistical abstract of the United States. Recreation and leisure activities: participation in selected sports activities 2006. Available at <http://www.census.gov/compendia/statab/tables/09s1209.pdf>.
2. CDC. Surveillance for waterborne disease and outbreaks associated with recreational water use and other aquatic facility-associated health events--United States, 2005--2006. MMWR 2008;57(No. SS-9).
3. New York State Department of Health. Official compilation of codes, rules, and regulations of the state of New York (NYCRR), Title 10 (health), state sanitary code, subpart 6-1, section 6-1.29, item 11.7. Available at <http://www.health.state.ny.us/nysdoh/phforum/nycrr10.htm>.
4. National Electronic Injury Surveillance System. Estimates query builder [Internet]. Bethesda, MD: US Consumer Product Safety Commission; 2009. Available at <https://www.cpsc.gov/cgi-bin/neissquery/home.aspx>.
5. Bronstein AC, Spyker DA, Cantilena JF, et al. 2007 annual report of the American Association of Poison Control Centers' National Poison Data System (NPDS): 25th annual report. Clin Toxicol 2008;46:927--1057.

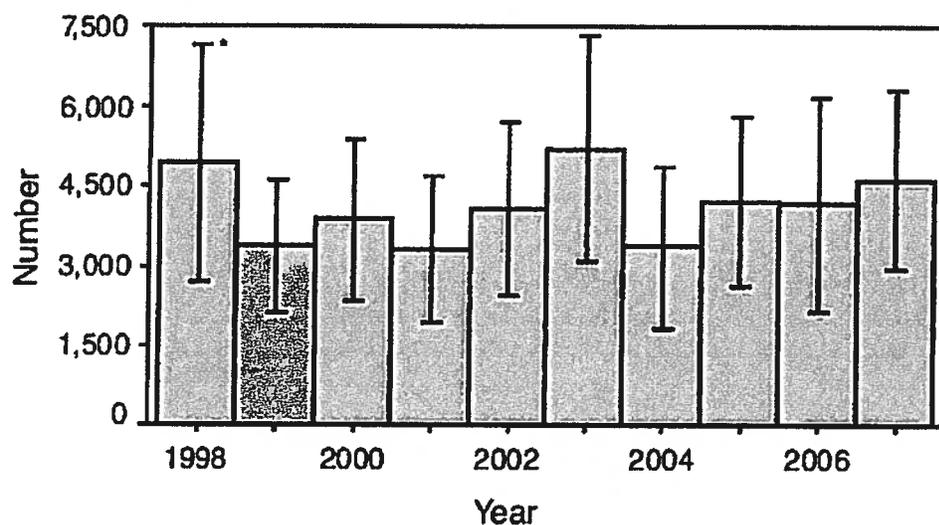
6. CDC. Recommendations for preventing pool chemical--associated injuries. Available at http://www.cdc.gov/healthyswimming/pdf/pool_chem_assoc_inj.pdf.
7. Buss BF, Safranek TJ, Magri JM, Torök TJ, Beach MJ, Foley BP. Association between swimming pool operator certification and reduced pool chemistry violations---Nebraska, 2005--2006. *J Environ Health* 2009;71:36--40.
8. Johnston K, Kinziger M. Certified operators: does certification provide significant results in real-world pool and spa chemistry? *Int J Aquatic Res Educ* 2007;1:18--33.
9. CDC. Model aquatic health code. Available at http://www.cdc.gov/healthyswimming/mahc/model_code.htm.

* The term "pool chemicals" includes but is not limited to chlorine bleach (calcium hypochlorite or sodium hypochlorite used to make a hypochlorous acid solution), stabilized chlorine (dichloro-s-triazinetrione or trichloro-s-triazinetrione), bromine (hypobromous acid), hydrogen peroxide, and hydrochloric (muriatic) acid.

† Typically, hydrochloric acid or another acid is added to swimming pools to maintain pH at 7.2--7.8 to improve the disinfection efficacy of chlorine bleach.

§ Report cited in reference aggregates statistics for exposures to pool and aquarium chemicals.

FIGURE. Estimated number of emergency department visits for injuries associated with pool chemicals --- United States, 1998--2007



SOURCE: National Electronic Injury Surveillance System. Estimates query builder [Internet]. Bethesda, MD: US Consumer Product Safety Commission; 2009. Available at <https://www.cpsc.gov/cgibin/neissquery/home.aspx>.

* 95% confidence interval.

Alternative Text: The figure above shows the estimated number of emergency department visits for injuries associated with pool chemicals, by year. During 1998-2007, the estimated median number of annual emergency department visits for pool chemical-associated injuries was 4,120 (range: 3,315-5,216).

TABLE. Estimated number, percentage, and rate of pool chemical--associated injuries treated in emergency departments, by selected characteristics --- United States, 2007

Characteristic	No.	Weighted estimate*†	(95% CI)§	%¶	Annual rate**	(95% CI)
Total	115	4,635	(2,929--6,341)	100	1.5	(1.0--2.1)
Injury diagnosis						
Poisoning††	47	1,844	(1,216--2,472)	40	0.6	(0.4--0.8)
Dermatitis/Conjunctivitis	31	1,245	(691--1,799)	27	0.4	(0.2--0.6)
Chemical burns	16	820	(187--1,454)	18	---	---
Other	21	725	(282--1,169)	16	---	---
Affected body part						
All parts of the body (more than 50% of body)§§	59	2,255	(1,704--2,807)	49	0.7	(0.6--0.9)
Eye	41	1,938	(1,123--2,752)	42	0.6	(0.4--0.9)
Other (e.g., upper trunk [not shoulder], hand, or foot)	15	442	(74--809)	10	---	---
Patient disposition						
Treated and released, or examined and released without treatment	111	4,391	(3,230--5,551)	95	1.5	(1.1--1.8)
Treated and admitted for hospitalization (within same facility)	2	160	(0--369)	3	---	---

Left without being seen, or left against medical advice	1	69 (0--208)	1	---	---
---	---	-------------	---	-----	-----

Treated and transferred to another hospital	1	15 (0--46)	0	---	---
---	---	------------	---	-----	-----

Incident location

Residence	51	2,010 (1,125--2,896)	43	---	---
-----------	----	----------------------	----	-----	-----

Place of recreation or sports	11	486 (98--874)	10	---	---
-------------------------------	----	---------------	----	-----	-----

School	1	15 (0--46)	0	---	---
--------	---	------------	---	-----	-----

Other identified location	6	311 (30--592)	7	---	---
---------------------------	---	---------------	---	-----	-----

Unknown	46	1,812 (935--2,689)	39	---	---
---------	----	--------------------	----	-----	-----

Patient age (yrs)

≤5	22	442 (86--798)	10	---	---
----	----	---------------	----	-----	-----

6--11	18	808 (279--1,337)	17	---	---
-------	----	------------------	----	-----	-----

12--17	18	445 (167--723)	10	---	---
--------	----	----------------	----	-----	-----

18--45	39	1,975 (1,180--2,769)	43	1.7 (1.0--2.4)	
--------	----	----------------------	----	----------------	--

46--64	18	966 (477--1,455)	21	---	---
--------	----	------------------	----	-----	-----

≥65	0	0	0	---	---
-----	---	---	---	-----	-----

Patient sex

Male	65	2,537 (1,695--3,379)	5	1.7 (1.1--2.3)
Female	50	2,098 (1,383--2,813)	5	1.4 (0.9--1.8)
Patient race/ethnicity				
White	57	2,429 (1,364--3,494)	2	---
Hispanic¶¶	9	152 (0--308)	3	---
Black¶¶	8	136 (0--324)	3	---
American Indian/Alaska Native	2	140 (0--423)	3	---
Unknown	39	1,778 (780--2,776)	38	---

SOURCE: National Electronic Injury Surveillance System (NEISS). Estimates query builder [Internet]. Bethesda, MD: US Consumer Product Safety Commission; 2009. Available at <https://www.cpsc.gov/cgibin/neissquery/home.aspx>.

* Each case was weighted based on the inverse probability of the hospital being selected, and the weights were summed to produce national estimates.

† Categorical counts might not total 4,635 because of rounding.

§ Confidence interval.

¶ Categorical percentages might not total 100% because of rounding.

** Rates per 100,000 population were calculated using U.S. Census Bureau population estimates; 95% confidence intervals were calculated using statistical software that accounted for the sample weights and complex sampling design. If the sample count was <20 or the coefficient of variation was >30%, the estimate was unstable and not reported. Rates by incident location and race/ethnicity are not reported because of the high percentage of patients with unknown race/ethnicity.

†† Poisoning includes ingestion or inhalation of vapors, fumes, or gases.

§§ For a poisoning injury diagnosis, NEISS requires that the affected body part be coded as "all parts of the body (more than 50% of body)."

¶¶ Black includes Hispanic and non-Hispanic blacks, whereas Hispanics excludes Hispanic blacks.

BOX. CDC recommendations for preventing pool chemical--associated injuries for public pool operators and residential pool owners*

Learn about pool chemical safety

- Always read entire product label or material safety data sheet (MSDS).
- Always complete appropriate training or education.

Store pool chemicals safely

- Always secure chemicals away from children and animals.
- Always store chemicals as recommended by the manufacturer.
- Always protect stored chemicals from mixing or getting wet.
- Always respond to pool chemical spills immediately.

Use pool chemicals safely

- Always read product label and manufacturer's directions before each use.
- Always use chemicals in manufacturer's original, labeled container.
- Always use appropriate protective gear, such as safety glasses and gloves.
- Never predissolve solid chemicals or add water to liquid chemicals.
- Never mix chlorine products with each other, with acid, or with any other substance.

* Additional information available at http://www.cdc.gov/healthyswimming/pdf/pool_chem_assoc_inj.pdf.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of pages found at these sites. URL addresses listed in *MMWR* were current as of the date of publication.

All *MMWR* HTML versions of articles are electronic conversions from typeset documents. This conversion might result in character translation or format errors in the HTML version. Users are referred to the electronic PDF version (<http://www.cdc.gov/mmwr>) and/or the original *MMWR* paper copy for printable versions of official text, figures, and tables. An original paper copy of this issue can be obtained from the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, DC 20402-9371; telephone: (202) 512-1800. Contact GPO for current prices.

**Questions or messages regarding errors in formatting should be addressed to mmwrq@cdc.gov.

Date last reviewed: 5/14/2009

[HOME](#) | [ABOUT MMWR](#) | [MMWR SEARCH](#) | [DOWNLOADS](#) | [RSS](#) | [CONTACT](#)
[POLICY](#) | [DISCLAIMER](#) | [ACCESSIBILITY](#)

SAFER • HEALTHIER • PEOPLE™
Morbidity and Mortality Weekly Report
Centers for Disease Control and Prevention
1600 Clifton Rd MailStop E-90 Atlanta GA
30333 U.S.A.

USA.gov
Government Made Easy

Department of Health
and Human Services



Exhibit 17



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

Morbidity and Mortality Weekly Report (MMWR)

Pool Chemical–Associated Health Events in Public and Residential Settings – United States, 2003–2012, and Minnesota, 2013

Weekly

May 16, 2014 / 63(19);427-430

Michele C. Hlavsa, MPH¹, Trisha J. Robinson, MPH², Sarah A. Collier, MPH¹, Michael J. Beach, PhD¹ (Author affiliations at end of text)

Pool chemicals are added to treated recreational water venues (e.g., pools, hot tubs/spas, and interactive fountains) primarily to protect public health by inactivating pathogens and maximizing the effectiveness of disinfection by controlling pH. However, pool chemicals also can cause injuries when handled or stored improperly. To estimate the number of emergency department (ED) visits for injuries associated with pool chemicals in the United States per year during 2003–2012, CDC analyzed data from the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS). This report summarizes the results of that analysis. In 2012 alone, an estimated 4,876 persons (95% confidence interval [CI] = 2,821–6,930) visited an ED for injuries associated with pool chemicals. Almost half of the patients were aged <18 years. This report also describes a pool chemical–associated health event that occurred in Minnesota in 2013, which sent seven children and one adult to an ED. An investigation by the Minnesota Department of Health (MDH) determined the cause to be poor monitoring of or response to pool chemistry. Pool chemical–associated health events are preventable. CDC's Model Aquatic Health Code (MAHC) (1) is a resource that state and local agencies can use to optimize prevention of injuries and illnesses associated with public treated recreational water venues, including pool chemical–associated health events.

NEISS captures data on ED visits for injuries associated with consumer products, including product codes (e.g., pool chemical code: 938); the most severe diagnosis; the most seriously injured body part; incident location; disposition, age, sex, and race/ethnicity of the patient; and two 71-character narrative fields to describe events leading to injury. These data are collected from a nationally representative probability sample of approximately 100 hospitals across the United States, and thus can be used to calculate national estimates. Each case was weighted based on the inverse probability of the hospital being selected, and the weights were summed to produce national estimates; 95% CIs were calculated, accounting for the sample weights and complex sampling design. Rates per 100,000 person-years were calculated using these estimates and U.S. Census Bureau population estimates (2).

In the United States during 2003–2012, the median estimated number of persons visiting an ED for pool chemical–associated injuries per year was 4,247 (range = 3,151–5,216) (Figure). In 2012, an estimated 4,876 persons (95% CI = 2,821–6,930; 1.6 per 100,000 person-years) visited an ED for injuries associated with pool chemicals (Table). Almost half (46.9%) of the patients were aged <18 years (an estimated 2,289 persons [95% CI = 965–3,613]; 3.1 per

100,000 person-years). The most frequent diagnosis was poisoning (an estimated 2,167 injuries [95% CI = 1,219–3,116]; 0.7 per 100,000 person-years). Of the 50 actual visits to NEISS-participating EDs resulting in a poisoning diagnosis, 46 (92.0%) stemmed from inhalation of vapors, fumes, or gases rather than ingestion. More than a third (36.1%) of the injuries occurred at a residence. Of the total 109 actual visits to NEISS-participating EDs, 79 (72.5%) occurred over the summer swim season (Saturday of Memorial Day weekend through Labor Day); 47 (43.1%) occurred on a Saturday or Sunday. No deaths were documented. Patients were injured when handling pool chemicals without using personal protective equipment such as goggles (especially while opening containers), when pool chemicals were added to the water just before the patient entered the water (frequently in residential and hotel settings), and when pool chemicals were not secured away from children.

In December 2013, a mother notified MDH that multiple persons had developed rashes and symptoms of respiratory illness after attending a child's birthday party on the previous Saturday in December at an indoor hotel swimming pool and spa. MDH conducted a cohort study and enrolled all 12 party attendees, who were interviewed by telephone using a standardized questionnaire. Eight of the 12 reported developing a raised, red rash all over their body. Ill persons also reported headache, cough, sore throat, vomiting, and difficulty urinating. The eight ill persons reported illness onset 5.5–7.0 hours after first exposure to the swimming pool or spa. All eight ill persons sought medical attention at an ED, where their signs and symptoms were clinically diagnosed as chemical burns. Inspection by an MDH environmental health specialist 2 days after the birthday party revealed free chlorine* levels ≥ 15 –30 ppm in both the swimming pool and spa, exceeding the state limit of 5.0 ppm. The pH was measured at 9.0 in both bodies of water, exceeding the state pH maximum of 8.0. Review of the daily log for the previous 10 days indicated the combined chlorine† level had been 10–17 ppm in the pool and 0.8–8.4 ppm in the spa, exceeding the state limit of 0.5 ppm. No remediation steps were documented. As a result of this outbreak investigation, the hotel installed new automated controllers and liquid chlorine feeders to ensure chemical disinfectant levels were kept within regulatory limits.

Discussion

For almost 100 years, pool chemicals have provided the primary barrier to the transmission of infectious pathogens in treated recreational water venues. However, improper pool chemical handling and storage practices and poor pool operation can cause injuries (3–6), despite their preventable nature. The need to maximize the health benefits of water-based physical activity (7) while minimizing the risk for transmission of infectious pathogens and pool chemical–associated health events should translate into pool owners and operators making prevention of these adverse health events a core element in managing risk at both public and residential treated recreational water venues (Box). With NEISS estimating approximately 4,900 pool chemical–associated injuries for 2012, increased awareness about these injuries and how they can be prevented is needed.

The Minnesota pool chemical–associated health event highlights the need for improvements in training and pool operation. Multiple factors might have contributed to this event. First, chlorine levels and pH documented days after the event exceeded Minnesota's maximum allowable limits and suggest that the original automated systems to monitor and feed chemicals were not functioning properly. Second, the pool operators either 1) did not check the pool chemistry or equipment as required or 2) identified problems and either did not resolve them or failed to document remediation steps taken. Third, as with almost half of NEISS pool chemical–associated health events, this event occurred during a weekend, a time when pool

and spa use might be increased and the likelihood of a trained operator being on duty might be decreased.

The findings in this report are subject to at least four limitations. First, although NEISS data provide a snapshot of pool chemical–associated injuries leading to ED visits, they do not characterize the epidemiology of pool chemical–associated injuries that do not result in an ED visit. Second, missing NEISS data limits understanding of basic characteristics of these adverse health events (e.g., patient's race) and appropriate points for intervention (e.g., public versus residential settings). Third, a few of the events could have been misclassified as being caused by pool chemicals when they were not (e.g., dermatitis caused by *Pseudomonas* rather than pool chemicals). Finally, water chemistry can change quickly, making it difficult to determine the etiology of and factors contributing to a pool chemical–associated health event.

The continuing occurrence of pool chemical–associated health events and drowning in pools (9,10), as well as the significantly increased annual incidence of recreational water–associated outbreaks (range = 6–84 outbreaks) during 1978–2010 (which primarily is associated with treated recreational water venues and caused by the extremely chlorine-tolerant *Cryptosporidium* [8]), underscore the need for regulators at the state and local levels to optimize protection of swimmer and aquatics staff health, in part, by regularly updating state and local codes for public treated recreational water venues. This updating process requires staffing, resources, and expertise that might not always be available to individual jurisdictions. Consequently, CDC has been leading a national consortium of public health, aquatics sector, and academic stakeholders to develop model guidance (i.e., the MAHC [1]) to aid state and local agencies in incorporating the latest science and best practices into their codes covering design and construction, operation and maintenance, and policies and management of public treated recreational water venues. The first edition of the MAHC will be posted in summer 2014 after the last of two public comment periods closes May 27, 2014. The MAHC will be periodically updated based on the latest reported data in peer-reviewed scientific journals, changes occurring in the aquatics sector (e.g., development of new treated recreational water venue types), and stakeholder input. Areas of the MAHC that should assist in decreasing the incidence of pool chemical–associated health events include requiring operator training, which covers pool chemical safety (e.g., wearing personal protective equipment while handling pool chemicals), and engineering changes to prevent incompatible pool chemicals from mixing.

1Division of Foodborne, Waterborne, and Environmental Diseases, National Center for Emerging and Zoonotic Infectious Diseases, CDC; 2Minnesota Department of Health (Corresponding author: Michele C. Hlavsa, mhlavsa@cdc.gov, 404-718-4695)

References

1. CDC. The Model Aquatic Health Code (MAHC): a national model public swimming pool and spa code. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at <http://www.cdc.gov/mahc>.
2. US Census Bureau. Population estimates: current estimates data. Washington, DC: U.S. Department of Commerce; 2014. Available at <http://www.census.gov/popest/data>.
3. CDC. Pool chemical–associated health events in public and residential settings—United States, 1983–2007. *MMWR* 2009;58:489–93.
4. CDC. Acute illness and injury from swimming pool disinfectants and other chemicals—United States, 2002–2008. *MMWR* 2011;60:1343–7.
5. CDC. Surveillance for waterborne disease outbreaks and other health events associated with recreational water—United States, 2007–2008. *MMWR* 2011;60(No. SS-12):1–39.

6. Anderson AR, Welles WL, Drew J, Orr MF. The distribution and public health consequences of releases of chemicals intended for pool use in 17 states, 2001–2009. *J Environ Health* 2014;76:10–5.
7. CDC. Health benefits of water-based exercise. Atlanta, GA: US Department of Health and Human Services, CDC; 2013. Available at http://www.cdc.gov/healthywater/swimming/health_benefits_water_exercise.html.
8. CDC. Recreational water–associated disease outbreaks — United States, 2009–2010. *MMWR* 2014;63:6–10.
9. CDC. Racial/ethnic disparities in fatal unintentional drowning among persons aged ≤29 years—United States, 1999–2010. *MMWR* 2014;63:421–6.
10. CDC. Drowning—United States, 2005–2009. *MMWR* 2012;61:344–7.

* Chlorine in water (found as an aqueous mixture of hypochlorous acid and hypochlorite anion) that can serve as an effective disinfectant (also referred to as free available chlorine or residual chlorine).

† Chlorine that has reacted with organic or inorganic compounds in the water is no longer an effective disinfectant, and might cause ocular and respiratory irritation.

What is already known on this topic?

Chemicals are added to treated recreational water venues (e.g., pools, hot tubs/spas, and interactive fountains) to inactivate pathogens and maximize the efficacy of the disinfection process by controlling pH. However, these chemicals can cause injuries when handled or stored improperly. Pool chemical–associated health events are preventable.

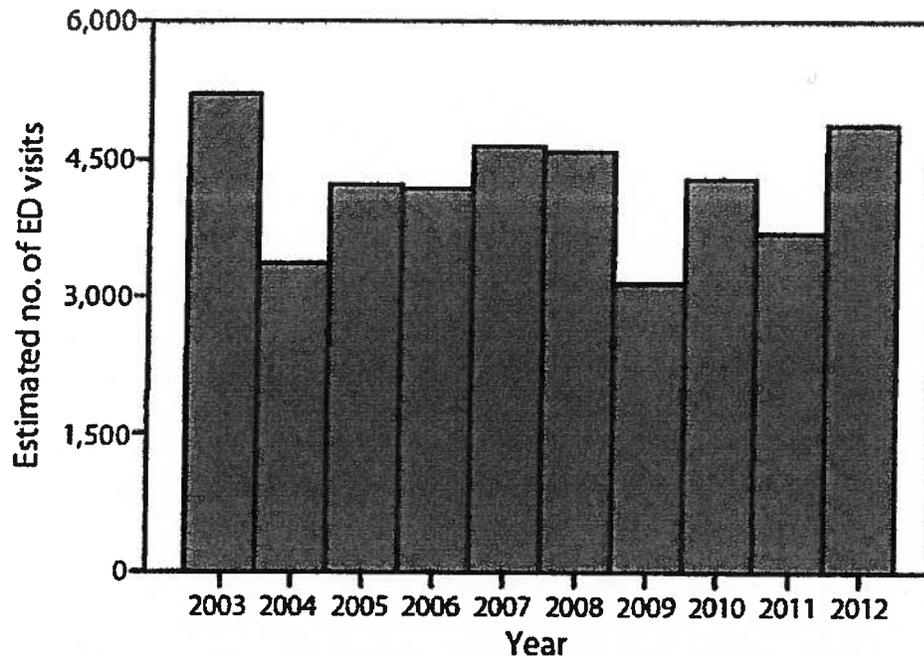
What is added by this report?

In 2012, an estimated total of approximately 4,900 persons visited an emergency department for pool chemical–associated injuries. Almost half of the patients (46.9%) were aged <18 years. More than a third (36.1%) of the injuries occurred at a residence.

What are the implications for public health practice?

CDC's Model Aquatic Health Code (available at <http://www.cdc.gov/mahc>) is a resource that state and local agencies can use to optimize prevention of injuries and illness associated with public treated recreational water venues.

FIGURE. Estimated number of emergency department (ED) visits for injuries associated with pool chemicals — United States, National Electronic Injury Surveillance System, 2003–2012



Alternate Text: The figure above shows the estimated number of emergency department (ED) visits for injuries associated with pool chemicals in the United States during 2003-2012. During this period, the median estimated number of persons visiting an ED for pool chemical-associated injuries per year was 4,247 (range = 3,151-5,216).

BOX. CDC recommendations for prevention of pool chemical-associated injuries for public pool operators and residential pool owners

Before you use pool chemicals

- Get trained in pool chemical safety (e.g., during an operator training course)
- Ask for help if you are not trained for specific tasks
- Read entire product label or Safety Data Sheet (SDS) before using

Using pool chemicals safely

- Keep young children away when handling chemicals
- Dress for safety by wearing appropriate safety equipment (e.g., safety goggles, gloves, and respirator)
- Read chemical product label before each use
 - Handle in a well-ventilated area
 - Open one product container at a time and close it before opening another
 - Minimize dust, fumes, and splashes
 - Measure carefully
- Never mix
 - chlorine products with acid; this could create toxic gases
 - different pool chemicals (e.g., different types of chlorine products) with each other or with any other substance
- Only predissolve pool chemicals when directed by product label
 - If product label directs predissolving, add pool chemical to water; never add water to pool chemical because a violent (potentially explosive) reaction can occur

Additional information on pool chemical safety is available at <http://www.cdc.gov/healthywater/swimming/pools/preventing-pool-chemical-injuries.html>.

TABLE. Estimated number, percentage, and rate of pool chemical–associated injuries treated in emergency departments – United States, National Electronic Injury Surveillance System (NEISS), 2012

Characteristic	Actual count	Weighted estimate*†	95% CI	%§	Annual rate¶
Total	109	4,876	(2,821–6,930)	100.0	1.6
Injury diagnosis					
Poisoning**	50	2,167	(1,219–3,116)	44.5	0.7
Dermatitis/Conjunctivitis	33	1,581	(385–2,778)	32.4	—
Chemical burns	9	469	(16–922)	9.6	—
Other	17	657	(234–1,081)	13.5	—
Affected body part					
All parts of the body (>50% of body)††	55	2,218	(1,269–3,167)	45.5	0.7
Eyeball	34	1,525	(572–2,478)	31.3	—
Other (e.g., upper trunk [not shoulder], hand, or foot)	20	1,133	(419–1,847)	23.2	—
Patient disposition					
Treated and released (or examined and released) without treatment	101	4,394	(2,804–5,983)	90.1	1.4
Treated and admitted for hospitalization (within same facility)	6	332	(0–701)	6.8	—
Treated and transferred to another hospital	1	79	(0–240)	1.6	—
Held for observation (includes admitted for observation)	1	71	(0–214)	1.5	—



Incident location

Residence	40	1,759	(718 -2,799)	36.1	—
Place of recreation or sports	10	408	(32-784)	8.4	—
School	1	70	(0-212)	1.4	—
Other public property	13	641	(0-1,380)	13.1	—
Unknown	45	1,998	(1,057 -2,940)	41	—

Patient age (yrs)



0-17	53	2,289	(965 -3,613)	46.9	3.1
18-45	23	850	(421 -1,278)	17.4	0.7
46-64	28	1,518	(811 -2,225)	31.1	1.9
≥65	5	218	(0-441)	4.5	—

Patient sex

Male	72	3,144	(1,832 -4,456)	64.5	2.0
Female	37	1,731	(894 -2,569)	35.5	1.1

Patient race/ethnicity

White, non-Hispanic	66	3,468	(2,536 -4,401)	71.1	—
Hispanic	7	443	(0-1,062)	9.1	—
Black, non-Hispanic	14	309	(69-549)	6.3	—
Other (e.g., multiple race)	1	6	(0-18)	0.1	—
Unknown	21	649	(34-1,264)	13.3	—



Abbreviation: CI = confidence interval.

* Each case was weighted based on the inverse probability of the hospital being selected, and the weights were summed to produce national estimates.

† Categorical counts might not total 4,876 because of rounding.

§ Categorical percentages might not total 100% because of rounding.

¶ Rates per 100,000 person-years were calculated using U.S. Census Bureau population estimates (available at <http://www.census.gov/popest/data>); 95% CIs were calculated using SAS survey procedures that accounted for the sample weights and complex sampling design. If the sample count was <20 or the coefficient of variation >30%, the estimate was considered unstable and not reported. Rates by incident location and race/ethnicity are not reported because of the high percentage of missing data.

** Poisoning includes ingestion as well as inhalation of vapors, fumes, or gases.

†† For a poisoning injury diagnosis, NEISS requires that affected body part be coded as "all parts of the body (>50% of body)."

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of pages found at these sites. URL addresses listed in *MMWR* were current as of the date of publication.

All *MMWR* HTML versions of articles are electronic conversions from typeset documents. This conversion might result in character translation or format errors in the HTML version. Users are referred to the electronic PDF version (<http://www.cdc.gov/mmwr>) and/or the original *MMWR* paper copy for printable versions of official text, figures, and tables. An original paper copy of this issue can be obtained from the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, DC 20402-9371; telephone: (202) 512-1800. Contact GPO for current prices.

**Questions or messages regarding errors in formatting should be addressed to mmwrq@cdc.gov.

Page last reviewed: May 16, 2014

Page last updated: May 16, 2014

Content source: [Centers for Disease Control and Prevention](#)

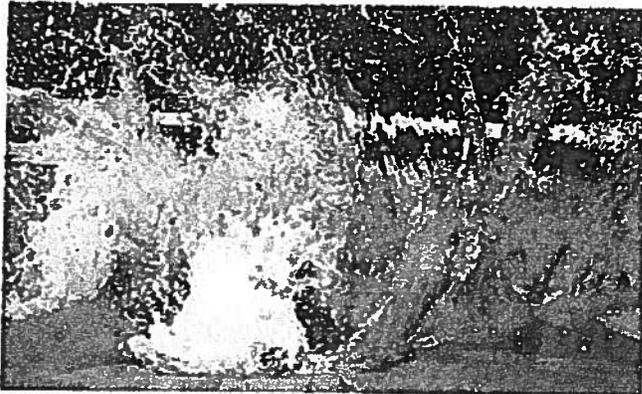
Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA
30329-4027, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)



Edgar Snyder & Associates®
A Law Firm Representing Injured People

1-866-9-4EDGAR
Toll Free 24/7 (1-866-943-3427)

Swimming Injury Statistics



Many people enjoy swimming pools and don't think about drowning. And yet every day, nine people drown in the United States. The statistics can be quite alarming, especially for parents with young kids – but it does help people to realize the reality of the potential dangers of swimming pools. Be sure to check out our swimming pool safety tips as well to help prevent accidents from occurring.

Drowning Statistics

- Each day in the United States, nine people drown.
- For each death caused by drowning, there are 1-4 nonfatal submersion accidents serious enough for the victim to be hospitalized.
- Drowning is the second leading cause of accidental injury-related death among children ages 1 to 14.
- Drowning is the leading cause of accidental injury-related death among children ages 1 to 4.
- Male children have a drowning rate more than two times that of female children. However, females having a bathtub drowning rate twice that of males.
- Among children ages 1 to 4 years, most drownings occur in residential swimming pools.
- Four-sided fencing that isolates the pool from the house and the yard has shown to decrease the number of drowning injuries anywhere from 50 to 90 percent.
- More than half of drownings among infants (under age 1) occur in bathtubs, buckets or toilets.
- Portable pools make up 11% of all pool drownings for children under age 5.
- Nonfatal drownings can result in brain damage that may result in long-term disabilities including memory problems, learning disabilities, and permanent loss of basic functioning.
- Nineteen percent of child drowning fatalities take place in public pools with certified lifeguards on duty.
- Roughly 5,000 children 14 and under go to the hospital because of accidental drowning-related incidents each year; 15% die and about 20% suffer from permanent neurological disability.
- Seventy-seven percent of those involved in a home-drowning accident had only been missing for five minutes or less when found in the swimming pool; 70% weren't expected to be in or near the pool at that time.
- The most common place for a 1-4-year old child to drown is in a home swimming pool.
- In nearly 9 out of 10 child-drowning deaths, a parent or caregiver claimed to be watching the child.
- Participation in formal swimming lessons can reduce the risk of drowning by 88% among children ages 1-4.

2011 Drowning Statistic

- Between Memorial Day June 28, 2011, there were 48 drownings and 75 near-drowning events in 35 states and territories.

2008 Drowning Statistic

- According to the United States Lifesaving Association, there were a total of 101 drowning fatalities on America's lifeguarded beaches in 2008; 83 deaths occurred without a lifeguard present, and 18 while a lifeguard was present.

2007 Drowning Stats

- In 2007, there were 3,443 fatal unintentional drownings – 10 deaths per day. About 1 in 5 were children ages 14 and younger.
- More than half of the drowning victims treated in emergency departments needed hospitalization or transferred to a higher level of care – like a trauma unit.
- Nearly 80 percent of people who died from drowning were male.
- There were approximately 283 drowning deaths for children 5 and under per year between 2005 and 2007 and 2,100 children were taken to the ER for submersion-related injuries.

- Drowning deaths on America's lifeguarded beaches reached 109 in 2007 according to the United States Lifesaving Association; 89 individuals while the area was unguarded and 20 while it was guarded.

2006 Drowning Statistics

- 3,703 children under the age of five were injured in near-drowning incidents in 2006.
- 2006 U.S. Coast Guard reports included 4,967 boating incidents, 3,474 boating injuries, and 710 boating deaths. Nine out of ten of those who drowned were not wearing life jackets.
- Of the fatal boating accidents in 2006, 70% involved an operator who had no boating safety training.
- Twenty percent of the boating-related deaths in 2006 involved alcohol.
- In comparison to 2005, almost twice as many children drowned in boating incidents in 2006.
- For the second year in a row, boating fatalities have increased with a total of 710 deaths.
- According to the United States Lifesaving Association, there were a total of 100 drowning fatalities on America's lifeguarded beaches in 2006; 89 deaths occurred without a lifeguard present, and 11 while a lifeguard was present.

2005 Drowning Statistics

- In 2005, there were 3,582 accidental drowning-deaths in the United States, an average of ten deaths per day.
- More than one in four fatal drowning victims are children ages 14 and younger.
- For every child who died from drowning in 2005, another four received emergency room care for nonfatal injuries.
- In 2005, males were four times more likely than females to die from accidental drownings in the United States.
- Of all children 1 to 4 years old who died in 2005, almost 30 percent died from drowning.
- Between 2000 and 2005, the fatal unintentional drowning rate for African Americans was 1.3 times that of whites. For American Indians and Alaskan Natives, the rate was 1.8 times that of whites.

2003 Drowning Stats

- In 2003, nearly 4,200 children ages 14 and under were treated in hospital emergency rooms for accidental drowning-related incidents.
- In 2003, males accounted for 80 percent of people who drowned in the U.S.
- Nine of 10 drowning-related deaths occurred while a child was being supervised.
- Alcohol use is involved in 25-50 percent of adolescent and adult deaths associated with water recreation. Medical costs for a near-drowning victim aged 14 and under can cost more than \$8,000 for initial hospital treatment to over \$250,000 a year for long-term care. If the injury resulted in brain damage, the cost could rise over \$5.5 million, including medical, work loss and quality of life costs.

Circulation Entrapment Injury Statistics for Swimming Pools and Hot Tubs

Circulation entrapment occurs when a swimmer is trapped by the suction generated by the water rushing out of the drain in a pool, hot tub, spa, or whirlpool. Individuals can be caught by a limb, jewelry, hair, hair accessory, or swimsuit. Young swimmers are the most common victims because of their weak physical strength against the suction, leading to injury and sometimes even death.

2007, 2006, 2005, and 2004 Circulation Entrapment Statistics:

- In 2007, two fatalities and three injuries associated with circulation entrapment were reported.
- There were nine injuries caused by circulation entrapment in 2006.
- Ten injuries due to circulation entrapment were reported in 2005.
- In 2004, there was one fatality and three injuries associated with circulation entrapment.

1999-2007 Circulation Entrapment Stats

- Due to circulation entrapment during the period of 1999-2007, six deaths and 28 injuries occurred in pools; three deaths and 22 injuries took place in hot tubs and spas; and 13 injuries happened in whirlpools.
- Between 1999 and 2007, two deaths and 20 injuries happened in public pools, hot tubs, spas and whirlpools, while seven deaths and 33 injuries occurred in residential pools, hot tubs, spas and whirlpools.
- The highest number of total fatality and injury victims of circulation entrapment involved victims between the ages of 5 and 14.

1990-2004 Drowning and Circulation Entrapment Statistics

- More than 800 drownings in hot tubs and spas have been reported to the CPSC from 1990-2004.
- From 1990-2004, the Consumer Product Safety Commission (CPSC) has reports of 74 incidents involving bodypart entrapment. Of those 74 reports, 13 people died and two were disemboweled.
- The CPSC knows of 43 incidents, including 12 deaths, from 1990-2004 in which the victim's hair was the object suctioned into the drain.
- From 1990-2004, several deaths have been reported to the CPSC that were caused by extremely hot water (approximately 110 degrees Fahrenheit) in a spa.

Sources: "Water Related Injuries: Fact Sheet" Centers for Disease Control and Prevention, March 12, 2007

"Water Related Injuries: Fact Sheet" Centers for Disease Control and Prevention, June 12, 2008
www.pool-safety.gov

Exhibit 19

[CHEMAXX Home](#)[Contact Chemaxx](#)[Areas of Expertise](#)[Michael Fox, PhD](#)[Search for Subject](#)

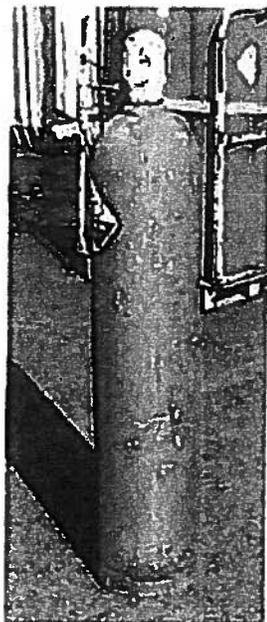
Chlorine Gas Release

[Hazardous Chemical links](#)[Chemical Mixing Plant Explosion](#)[CHEMRAP](#)[Chlorine Gas Release](#)[Drain Opener - Chlorine Gas Exposure](#)[Hazardous Freight](#)[Hydrogen Gas Explosion](#)[Hypochlorite + Urea Explosion](#)[Inhalation Exposure](#)[Nitric Oxide Explosion](#)[PzSs Accident](#)[Pool Chemical Explosion](#)[Pool Chemical Fire](#)[Pyrotechnics Explosion](#)[Semi-trailer fire](#)[Sulfuric Acid](#)[Swimming Pool Chlorine](#)[Welding Gas Explosion](#)[Zirconium Dust Explosion](#)

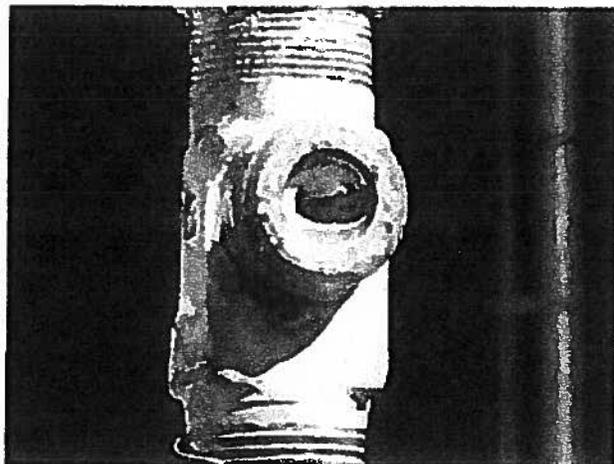
Chlorine Gas Release

A swimming pool technician at a high school was changing over chlorine (gas) cylinders when allegedly the empty chlorine cylinder valve would not close. As a result, the pool technician was exposed to chlorine gas and he claimed inhalation injuries. Chemaxx was hired to investigate this incident.

There was some uncertainty whether the first responders were able to shut off the chlorine valve. Nevertheless, the chlorine cylinder was placed into a salvage cylinder, sometimes referred to as a coffin. The heavy corrosion on the outside of the cylinder when it was removed suggests that it was leaking chlorine when it was put into the coffin. In fact, the valve on chlorine cylinder was found to be wide open when it was removed from the coffin, suggesting that the pool tech or first responders had turned the valve the wrong way. Instead of closing the valve he had opened it.



When the valve was removed from the cylinder and tested using 500-psig nitrogen pressure it was found to be perfectly gas tight. A soap film remained intact over the outlet of the valve while the inlet pressure was 500-psig, as seen in the photo below.



A witness at the high school had testified to seeing frost on the lower portion of the chlorine cylinder. Such frost would develop if there is evaporating liquid remaining in the cylinder, which in turn meant that the cylinder was not empty. In other words, the pool technician may have thought the cylinder was empty when in fact it was not. This human error may have contributed to the incident.

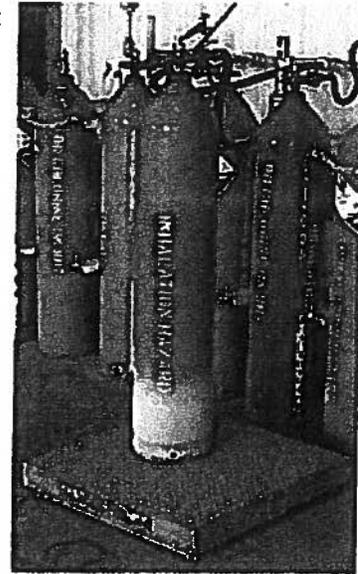
To verify the formation of frost, Chemaxx conducted chlorine release experiments under controlled conditions, as seen in the photo below.

In the chlorine-frost experiments the weight of the cylinder was measured versus time together with the temperature near the bottom. Two thermocouples were attached at two locations from the bottom of the cylinder. The figure below

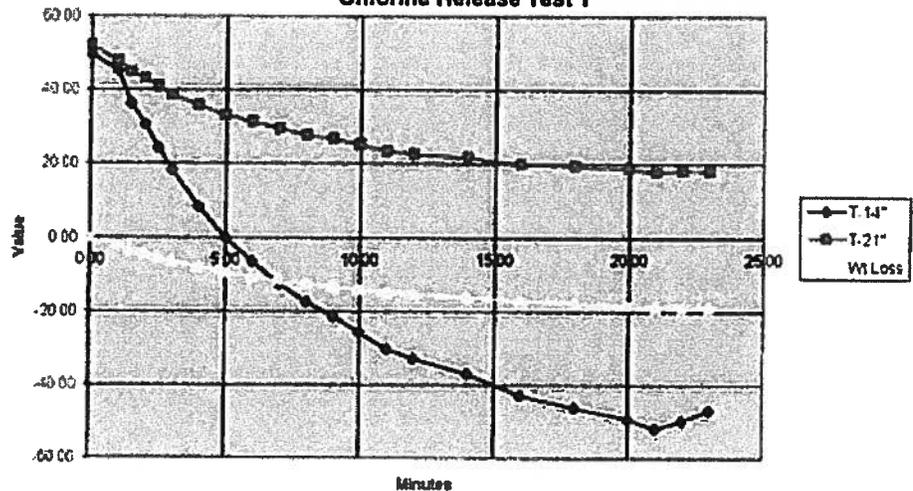
illustrates the changes in temperature and weight loss with time.

While the case went to trial and the jury found for the plaintiff, the relatively low award was less than what the chlorine company had been willing to settle for before the trial.

Dr. Fox has his Ph.D. in Physical Chemistry and is a Certified Fire & Explosion Investigator with substantial experience investigating complex industrial chemical accidents, fires and explosions as well as chemical-related consumer produce accidents, fires and explosions. He is also a Certified Team Leader in OSHA Process Hazard Analysis.



Chlorine Release Test 1



©2006 CHEMAXX, INC

[SEARCH](#)

[CHEMAXX HOME](#)

[Areas of Expertise](#)

[Michael Fox, PhD.](#)

[CONTACT US:](#)
[800-645-3369](#)

[E-mail:](#)
service@chemaxx.com

[CHEMAXX Home](#)[Contact Chemaxx](#)[Areas of Expertise](#)[Michael Fox, PhD](#)[Search for subject](#)

Pool Chemical Fire

Hazardous Chemical links

[Chemical Mixing Plant Explosion](#)[CHEMRAP](#)[Chlorine Gas Release](#)[Drain Opener - Chlorine Gas Exposure](#)[Hazardous Freight](#)[Hydrogen Gas Explosion](#)[Hypochlorite + Urea Explosion](#)[Inhalation Exposure](#)[Nitric Oxide Explosion](#)[PzSs Accident](#)[Pool Chemical Explosion](#)[Pool Chemical Fire](#)[Pyrotechnics Explosion](#)[Semi-trailer fire](#)[Sulfuric Acid](#)[Swimming Pool Chlorine](#)[Welding Gas Explosion](#)[Zirconium Dust Explosion](#)

Pool Chemicals Fire

Chemaxx was hired to investigate pool chemicals believed to have been responsible for a sudden, unexpected vigorous fire. The tragic incident took place inside the rear of an SUV that was traveling with two parents in the front and three children in the back seat. It is believed that an aerosol product leaked an organic solvent that made contact with the pool chemicals. The mixture burst into flames that instantly engulfed the entire vehicle in flames. While the parents were just able to exit the vehicle they were not able to rescue all their children even though they received severe burns trying. Only one child was saved and two children perished in the fire. It just doesn't get any more horrific than this.



The specific nature of the pool chemical is calcium hypochlorite, or $\text{Ca}(\text{OCl})_2$. Different pool products contain varying amounts of $\text{Ca}(\text{OCl})_2$.

Chemaxx conducted experiments in which a small amount of flammable liquid was added to different pool products. In general, the products with the highest percentage of $\text{Ca}(\text{OCl})_2$ burst into flames the fastest and the strongest, as shown in Video 1.



Video 1- Press play button (38 seconds)

The unexpected part was the lack of early warning, such as smoke. For example, a thermocouple placed in the container of pool product showed little to no increase until the sample burst into flames, as seen in Figure A.

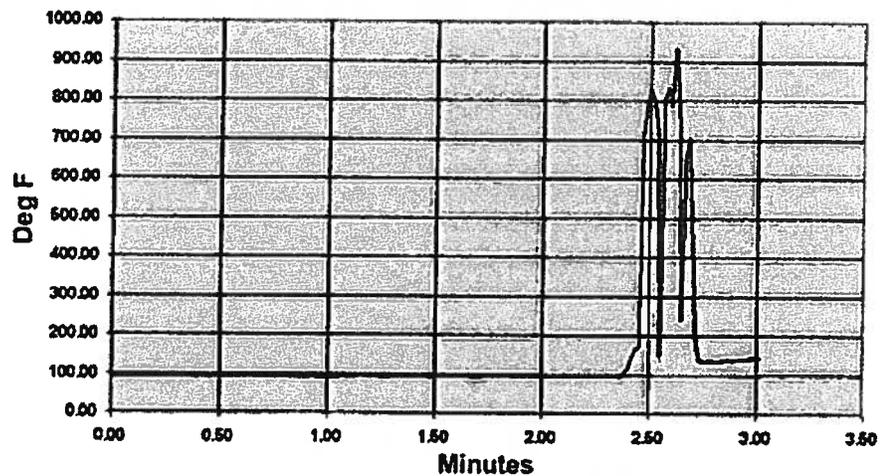


Figure A - Temperature vs. Time for High $\text{Ca}(\text{OCl})_2$ Pool Chemical

The dangerous nature of the high percentage $\text{Ca}(\text{OCl})_2$ pool products stands in sharp contrast to pool products with less $\text{Ca}(\text{OCl})_2$ plus other ingredients. When these low $\text{Ca}(\text{OCl})_2$ products are mixed with a small amount of flammable liquid, they eventually react but produce only smoke and do not burst into any flames, as seen in Video 2.

Video 2- Press play button
(Allow up to 3-4 minutes to download with slow connection- Video length: 4 min. 28 Seconds)

Likewise, the temperature of the sample remains low compared to the higher $\text{Ca}(\text{OCl})_2$ products, as seen in Figure B.

SEARCH

CHEMAXX HOME

Areas of Expertise

Michael Fox, PhD.

CONTACT US
800-645-3369

E-mail:
service@chemaxx.com

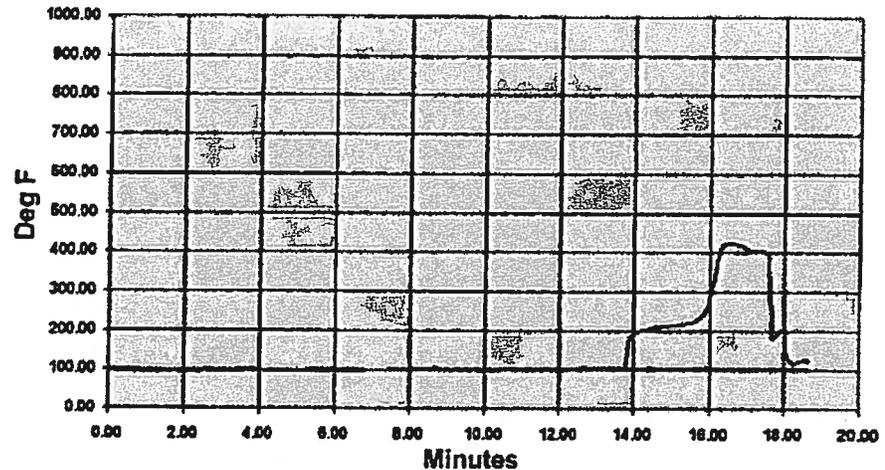


Figure B - Temperature vs. Time for Low $\text{Ca}(\text{OCl})_2$ Pool Chemical

The lessons learned are many. For the manufacturers of pool chemicals the lesson is that $\text{Ca}(\text{OCl})_2$ based products can be made safer by lowering $\text{Ca}(\text{OCl})_2$ percentages and label warnings need to be more prominent. Packaging should ensure that the leakage of $\text{Ca}(\text{OCl})_2$ powder does not occur. For example, the identical $\text{Ca}(\text{OCl})_2$ pool chemicals are sold in Europe in solid plastic containers while being sold in the US in less sturdy plastic bags prone to leakage. For consumers the lesson is to be extremely careful about the storage and use of $\text{Ca}(\text{OCl})_2$ based pool chemicals. They should be kept separated in vented metal containers and kept safely away from children and any combustible materials.

Additional scientific research was conducted in conjunction with this project that included thermal gravimetric analysis (TGA), conventional chemical analysis and packaging considerations. There are also plans to do differential scanning calorimetry (DSC).

Dr. Fox has his Ph.D. in Physical Chemistry and is a Certified Fire & Explosion Investigator with substantial experience investigating complex industrial chemical accidents, fires and explosions as well as chemical-related consumer product accidents, fires and explosions.

©2006 CHEMAXX, INC

CHEMAXX Home | Contact Chemaxx | Areas of Expertise | Michael Fox, PhD | Search for Subject

Pool Chemical Explosion

Hazardous Chemical links

[Chemical Mixing Plant Explosion](#)

[CHEMRAP](#)

[Chlorine Gas Release](#)

[Drain Opener - Chlorine Gas Exposure](#)

[Hazardous Freight](#)

[Hydrogen Gas Explosion](#)

[Hypochlorite + Urea Explosion](#)

[Inhalation Exposure](#)

[Nitric Oxide Explosion](#)

[P₂S₅ Accident](#)

[Pool Chemical Explosion](#)

[Pool Chemical Fire](#)

[Pyrotechnics Explosion](#)

[Semi-trailer fire](#)

[Sulfuric Acid](#)

[Swimming Pool Chlorine](#)

[Welding Gas Explosion](#)

[Zirconium Dust Explosion](#)

Pool Chemical Explosion

During an investigation of a pool chemical explosion that caused a significant loss of vision due to chemical eye burns, Chemaxx discovered the explosive incompatibility of two seemingly very similar pool chemical products:

Calcium Hypochlorite or Ca(OCl)₂

and

Trichlor or Trichloro-s-triazinetriene

Since both products are sold as a form of "pool chlorine," consumers most likely would not expect them to be incompatible with each other and might even consider them to be the same pool chemical product.

The video below demonstrates the incompatible, explosive nature of a dry mixture of these two forms of "pool chlorine" after a small amount of water was added. The first explosion occurred within less than one minute of the water being added.

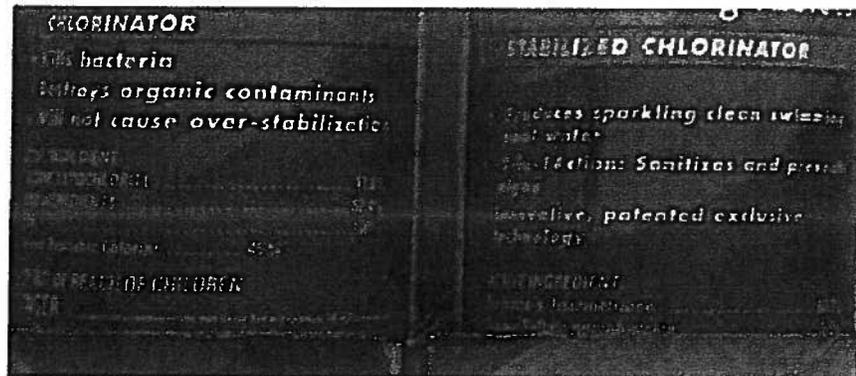


Video 1- Press play button

In other tests, another form of "pool chlorine" generally referred to as Dichlor was also shown to be explosively incompatible with calcium hypochlorite.

Consumers need to be aware that these seemingly similar pool chemical products are explosively incompatible. Chemaxx believes that short of drastic measures, the ordinary consumer is not likely to appreciate the full seriousness of the hazard via conventional warnings.

It is unfortunate that the pool chemical industry sells these two explosively incompatible chemicals side-by-side in retail outlets.



Photograph of Incompatible "Pool Chlorine" Products Side-by-Side on Retail Shelf

Until that changes, it is recommended that consumers purchase only one type of "pool chlorine" to avoid even having the two different types available at their homes. It is further recommended that when pool chemicals are purchased, single-shot packaging should be used to avoid having large quantities of unused, exposed, granular chemicals that might be easily contaminated or co-mingled.

Pool chemicals should never be mixed with any other pool chemical, pool product or any product or substance of any type and should always be added directly to the pool water without any intermediate steps, such as mixing or predissolving in water. If Trichlor must be used, the slow dissolving Trichlor tablets placed inside floaters is the recommended approach.

If a chemical feeder or floater is used, only one type of pool chemical product should ever be put into that feeder or floater. If for some reason more than one type of chemical is needed, the use of separate, distinct feeders or floaters for each chemical is recommended.

Protective goggles, gloves and clothing should be worn when handling pool chemicals.

If a consumer has any doubts about how to handle, apply, store or care for pool chemicals, it is recommended that he/she hire a professional pool maintenance company.

Dr. Fox has his Ph.D. in Physical Chemistry and is a Certified Fire & Explosion Investigator with substantial experience investigating complex industrial chemical accidents, fires and explosions as well as chemical-related consumer product accidents, fires and explosions. He is also a Certified Team Leader in OSHA Process Hazard Analysis.

[SEARCH](#)

[CHEMAXX HOME](#)

[Areas of Expertise](#)

[Michael Fox, PhD](#)

[CONTACT US](#)
[800-645-3369](#)

E-mail:
service@chemaxx.com

©2009 CHEMAXX, INC

CDC

CDC Home

Search

Health Topics A-Z

MMWR

Weekly

February 6, 2009 / 58(04);81-85

Persons using assistive technology might not be able to fully access information in this file. For assistance, please send e-mail to: mmwrq@cdc.gov. Type 508 Accommodation in the subject line of e-mail.

Respiratory and Ocular Symptoms Among Employees of a Hotel Indoor Waterpark Resort --- Ohio, 2007

During January--March 2007, the Warren County Combined Health District (WCCHD) received 665 reports of respiratory and eye irritation from patrons and lifeguards at a hotel indoor waterpark resort in Ohio. Tests revealed normal water chemistry and air chlorine concentrations, and exposure to airborne trichloramine in the waterpark was suspected as the cause of the symptoms. Because of the number of symptom reports and WCCHD's limited ability to measure trichloramine, the district requested an investigation by CDC's National Institute for Occupational Safety and Health (NIOSH). This report describes the results of that investigation, which revealed that trichloramine concentrations in the waterpark ranged from below the limit of detection to 1.06 mg/m³, and some concentrations were at levels that have been reported to cause irritation symptoms (≥ 0.5 mg/m³) (1). Lifeguards reported significantly more work-related symptoms (e.g., cough, wheezing, shortness of breath, chest tightness, and eye irritation) than unexposed hotel employees. Lifeguards also reported significantly more eye irritation and cough on days when hotel occupancy was high versus low. Insufficient air movement and distribution likely led to accumulation of trichloramine and exacerbation of symptoms. Based on recommendations to increase air movement and distribution at pool deck level, hotel management modified the ventilation system extensively, and subsequently no new cases were reported to WCCHD. The results of this investigation emphasize the importance of appropriate design and monitoring of ventilation and water systems in preventing illness in indoor waterparks.

The indoor waterpark measures approximately 80,000 square feet and has a maximum occupancy of 3,746 persons. It contains 11 waterslides, two activity pools, two hot tubs, a wave pool, a leisure river, a four-story interactive play system, and several features that splash, spray, and aerate large amounts of water. Water flows by gravity through the main drains and gutter systems from the pool into designated surge tanks. The water is pumped out of the surge tanks and filtered. An automated chemical controller tests and adjusts the water's pH and chlorine concentration as needed by adding a sodium hypochlorite solution (to disinfect) and sulfuric acid (for pH).

The indoor waterpark opened in December 2006. Within 1 month, WCCHD had received 79 reports of eye and respiratory irritation from patrons and employees. Symptoms included red, burning, or

itchy eyes; itchy or runny nose; cough; wheezing; shortness of breath; chest tightness; and sore throat. Initial tests revealed normal water chemistry and air chlorine concentrations. In February and March 2007, management added additional air distribution outlets to the ventilation system, increased the frequency of water chemistry checks, and added more fresh water to all systems; however WCCHD continued to receive health complaints. By March 2007, WCCHD had received an additional 586 symptom reports ([Figure](#)). A marked increase in reported symptoms with onset of March 4 might be attributed to media coverage; on March 7, a family reported symptoms to the local media, and the ensuing media coverage resulted in a marked increase in telephone calls to the local health department with reports of symptoms with earlier onset dates. WCCHD's concern over the number of reports and limited technical resources prompted a technical assistance request to NIOSH, which focused its investigation on resort employees.

The investigation began in early March 2007. Initially, NIOSH investigators interviewed 10 lifeguards. All 10 reported having a cough during work at the waterpark that improved on days off work. Seven reported eye irritation, and three reported nose irritation. Symptoms were worse when the number of persons using the waterpark was high. In March and April 2007, investigators reviewed the facility water chemistry logs and tested pool water on 2 separate days at multiple locations for pH and free and total chlorine. Investigators also reviewed facility plans to assess water and ventilation system designs. To assess the effect of the number of occupants in the pools (bather load) on trichloramine air concentrations, investigators collected 99 trichloramine area air samples on 2 high bather load days (more than 1,000 guests) and 1 low bather load day (fewer than 100 guests). Because no direct counting of bathers was possible, the number of persons booked at the hotel (i.e., hotel occupancy) was used as a proxy for bather load.

During March 20--April 24, 2007, NIOSH investigators conducted a survey of lifeguards working inside the waterpark (exposed) and hotel employees working outside the waterpark (unexposed). All participants filled out an initial questionnaire during this period concerning demographics, work and medical history, and work-related symptoms occurring during the preceding month. Symptoms were considered work-related if they occurred on work days and improved on days off work. Lifeguards also completed an additional questionnaire about symptoms experienced during their shift on each day of trichloramine air sampling. Employees were defined as having asthma if they reported having asthma currently, it was diagnosed by a health professional, and it began before starting work at the waterpark.

Using data from the initial questionnaire, prevalence ratios (PRs) with 95% confidence intervals (CIs) were calculated to compare work-related symptoms during the preceding month for exposed and unexposed employees. Generalized linear models were used to compare respiratory symptoms for the exposure groups while controlling for smoking status and asthma. Using data from the questionnaires filled out on days of air sampling, work-related symptoms for lifeguards on days of high occupancy were compared with symptoms on days of low occupancy. Because some lifeguards filled out this questionnaire on more than 1 day of air sampling, generalized estimating equations were used to account for possible correlations between responses. The analyses involving respiratory symptoms for lifeguards on high and low occupancy days were adjusted for smoking status, and employees with asthma were excluded.

Seventy (68%) of 103 lifeguards working inside the waterpark and 74 (75%) of 99 employees working outside the waterpark completed the initial questionnaire. Lifeguards had significantly higher prevalences of work-related symptoms than unexposed employees ([Table 1](#)). Lifeguards also had significantly more work-related cough (PR = 2.2; CI = 1.14.5) and eye irritation (PR = 2.0; CI =

1.23.2) on days when hotel occupancy was high (Table 2). No other symptoms were significantly more prevalent on high occupancy days.

A total of 99 area air samples for trichloramine were taken at approximately 3--4 feet above pool deck level over 3 separate sampling days: March 20 (high occupancy day 1), April 14 (high occupancy day 2), and April 24, 2007 (low occupancy day). Twenty-four of the samples were quantifiable (i.e., concentrations could be determined); the remaining samples were found at trace levels (i.e., trichloramine was detected but levels were too low to quantify) or trichloramine was not detected. All quantifiable samples were collected on high occupancy days, and 13 (54%) of the 24 exceeded 0.5 mg/m^3 , the level at which irritation symptoms have been documented (1). The highest trichloramine concentration found was 1.06 mg/m^3 . On the low occupancy day, no samples were quantifiable. However, on this day, the lowest level at which investigators could quantify samples was substantially higher than on the other days (2).

Water chemistry tests at the waterpark met state standards. However, review of the ventilation and water system designs identified several areas of concern. In the children's pool water system, the spray features drew water directly from the surge tank, bypassing the filtration and chemical treatment system. In addition, the ventilation system might not have provided sufficient air movement and distribution to guarantee adequate capture and removal of air contaminants, including trichloramine, at the pool surface and deck levels. Concerns also included the high placement of air supply and return ducts. Furthermore, recirculation of air during winter months might have resulted in increased concentrations of airborne contaminants, including trichloramine. The ventilation system recirculates up to 33% of indoor air when outdoor temperatures fall below 40°F (4°C), which occurred in January and February 2007. NIOSH recommended that the indoor waterpark modify its water and ventilation systems to address the identified design concerns that could help reduce the amount of airborne contaminants, including trichloramine. Subsequently, substantial ventilation system modifications were made by repositioning air supply and return ducts closer to the pool deck.

Reported by: *D Stansbury, MPH, C Yeager, Warren County Combined Health District, Ohio. L Chen, MS, C Mueller, MS, Div of Surveillance, Hazard Evaluations, and Field Studies, KH Dunn, MS, D Almaguer, MS, J Ernst, Div of Applied Research and Technology, National Institute for Occupational Safety and Health; C Otto, MPA, Div of Emergency and Environmental Health Svcs, National Center for Environmental Health; B Dang, MD, F Gong, PhD, EIS officers, CDC.*

Editorial Note:

Chloramines are disinfection by-products formed when chlorine combines with nitrogen-containing compounds such as sweat and urine. They include monochloramine, dichloramine, and trichloramine. Trichloramine is the main chloramine compound present above chlorinated water surfaces (3) and has been suspected as the cause of outbreaks of eye and respiratory irritation at indoor pools (4,5). Increased bather load has been associated with increased trichloramine levels (6), most likely because of increased nitrogen compounds from bathers. Other factors affecting airborne trichloramine concentration include water chemistry, air recirculation, and aerosolization of water contaminants from splashing and spraying (1, 7). This investigation identified airborne trichloramine exposure as the likely cause of ocular and respiratory symptoms experienced by lifeguards and patrons. This conclusion is supported by the detection of trichloramine at or exceeding levels known to cause irritation symptoms, the significant excess of work-related symptoms among lifeguards compared with unexposed hotel employees, and the significant excess

of work-related cough and eye irritation among lifeguards on high occupancy days. In March, when the resort began circulating outside air into the waterpark, the number of reported symptoms decreased markedly.

Trichloramine is a strong mucous membrane irritant (8) and has been associated with eye and respiratory tract irritation and asthma in swimmers and pool attendants (7). One study found that nonswimmers did not report symptoms until the trichloramine concentration reached 0.5 mg/m³, and all nonswimmers reported symptoms at 0.7 mg/m³ (1). The World Health Organization recommends an airborne trichloramine concentration of 0.5 mg/m³ as a provisional value (9). Currently, no NIOSH or Occupational Safety and Health Administration (OSHA) occupational exposure limits exist for airborne trichloramine.

The findings in this report are subject to at least three limitations. First, the chloramine analytical methods used by NIOSH are still in development, and limitations exist in quantifying trichloramine at low concentrations (2). Second, personal samplers for trichloramine could not be placed on lifeguards because the sampling equipment could interfere with rescue duties or get wet and malfunction. This limited the ability to evaluate the association between trichloramine concentrations and symptoms. Finally, ventilation measurements using standard airflow evaluation techniques, such as smoke visualization and tracer gas testing, were difficult given the large size of the waterpark. Instead, ventilation system designs were reviewed and compared with relevant standards and guidelines.

Indoor waterparks have extensive splash features that introduce potentially more risk for recreational water--related illness than typical indoor pools. These complex environments require a holistic approach to reduce symptoms caused by the aerosolization of water contaminants. Means of controlling contaminant production include increasing fresh water dilution, keeping combined chlorine levels as low as possible, and reducing activation time of splash features. In addition, proper ventilation design can provide adequate air movement and contaminant capture (10).

The first hotel indoor waterpark resort opened in the United States in 1994. By 2007, an estimated 184 facilities had been established. This industry is fast growing, and clinicians, public health officials, managers, and employees need to be aware of the risks and understand the importance of controlling contaminant production and proper ventilation design in reducing irritation symptoms.

Acknowledgments

This report is based, in part, on contributions by C Achutan, N Burton, G Burr, C Dowell, S Durgam, L Ewers, A Markey, J Ramsey, M Rodriguez, A Sussell, M Riggs, S Luckhaupt, A Warren, T Wise, and E Galloway, National Institute for Occupational Safety and Health, CDC, Cincinnati, Ohio; Aerotech P&K, Cherry Hill, New Jersey; and Microbiology Specialists, Inc., Houston, Texas.

References

1. Hery M, Hecht G, Gerber JM, Gendre JC, Hubert G, Rebuffaud J. Exposure to chloramines in the atmosphere of indoor swimming pools. *Ann Occup Hyg* 1995;39:427-39.
2. Chen L, Dang B, Mueller C, et al. Health hazard evaluation report: investigation of employee symptoms at an indoor waterpark. Cincinnati, OH: US Department of Health and Human Services, CDC, National Institute for Occupational Safety and Health: 2008. Report no.

HETA2007-0163-3062. Available at <http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0163-3062.pdf>.

3. Holzwarth G, Balmer RG, Soni L. The fate of chlorine and chloramines in cooling towers. *Water Res* 1984;18:1421--7.
4. Bowen AB, Kile JC, Otto C, et al. Outbreaks of short-incubation ocular and respiratory illness following exposure to indoor swimming pools. *Env Health Pers* 2007;115:267--71.
5. Kaydos-Daniels SC, Beach MJ, Shwe T, Magri J, Bixler D. Health effects associated with indoor swimming pools: a suspected toxic chloramine exposure. *Public Health* 2008;122:195--200.
6. Jacobs JH, Spaan S, van Rooy GB, et al. Exposure to trichloramine and respiratory symptoms in indoor swimming pool workers. *Eur Respir J* 2007;29:690--8.
7. Massin N, Bohadana AB, Wild P, Hery M, Toamain JP, Hubert G. Respiratory symptoms and bronchial responsiveness in lifeguards exposed to nitrogen trichloride in indoor swimming pools. *Occup Environ Med* 1998;55:258--63.
8. Barbee SJ, Thackara JW, Rinehart WE. Acute inhalation toxicology of nitrogen trichloride. *Am Ind Hyg Assoc J* 1983;44:145--6.
9. World Health Organization. Guidelines for safe recreational water environments. Volume 2: swimming pools and similar environments. Geneva, Switzerland: World Health Organization; 2006. Available at http://www.who.int/water_sanitation_health/bathing/srwe2full.pdf.
10. American Society of Heating, Refrigerating, and Air-Conditioning Engineers. Heating, ventilating, and air-conditioning applications. ASHRAE handbook. Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers; 2007.

Table 1

TABLE 1. Number and percentage of employees at a hotel indoor waterpark resort who reported work-related symptoms during the preceding month,* by symptom and exposure status — Ohio, 2007

Symptom	Exposed (i.e., lifeguards) [†]		Unexposed (i.e., hotel employees working outside the waterpark)		Prevalence ratio (95% CI) [§]
	No.	(%)	No.	(%)	
Sore throat	22/69	(32)	2/74	(3)	11.8 (2.9–48.3)
Cough	48/69	(70)	5/74	(7)	10.2 (4.3–24.2)**
Wheezing	20/69	(29)	2/74	(3)	9.7 (2.4–40.2)**
Eye irritation	51/70	(73)	6/74	(8)	9.0 (4.1–19.6)
Shortness of breath	26/68	(38)	4/74	(5)	6.7 (2.5–18.2)**
Chest tightness	19/68	(28)	3/74	(4)	6.7 (2.1–21.4)**
Nose irritation	33/69	(48)	10/74	(14)	3.5 (1.9–6.6)

* Symptoms experienced on any days or evenings that the employee worked during the month before filling out the initial questionnaire, and which improved on days off work; analysis restricted to questionnaires received during March 20–April 2, 2007.

[†] Denominator varies because of missing data for some symptoms reported.

[§] Confidence interval.

** Generalized linear models were used to compare respiratory symptoms for the exposure group while controlling for smoking status and asthma. Employees were defined as having asthma if they reported having asthma currently, it was diagnosed by a health professional, and it began before starting work at the waterpark.

[Return to top.](#)

Table 2

TABLE 2. Number and percentage of lifeguards at a hotel indoor waterpark resort who reported work-related symptoms,* by symptom and level of hotel occupancy† — Ohio, 2007

Symptom	High occupancy day 1 (n = 14)	High occupancy day 2 (n = 29)	Low occupancy day (n = 27)
	No. (%)	No. (%)	No. (%)
Cough [§]	9 (64)	16 (55)	6 (22)
Eye irritation	9 (64)	20 (69)	9 (33)
Nose irritation	4 (29)	10 (34)	4 (15)
Wheezing [§]	1 (7)	7 (24)	2 (7)
Shortness of breath [§]	2 (14)	6 (21)	4 (15)
Chest tightness [§]	3 (21)	5 (17)	0
Sore throat	6 (43)	2 (7)	4 (15)
Blurry or foggy vision	— [¶]	9 (31)	0
Blue-gray vision	— [¶]	3 (10)	1 (4)
Halo vision	— [¶]	3 (10)	0

* Symptoms experienced at work, starting at beginning, middle, or end of shift.

† High occupancy (more than 1,000 guests) versus low occupancy (fewer than 100 guests). Because no direct counting of bathers was possible, the number of persons booked at the hotel (i.e., hotel occupancy) was used as a proxy for bather load.

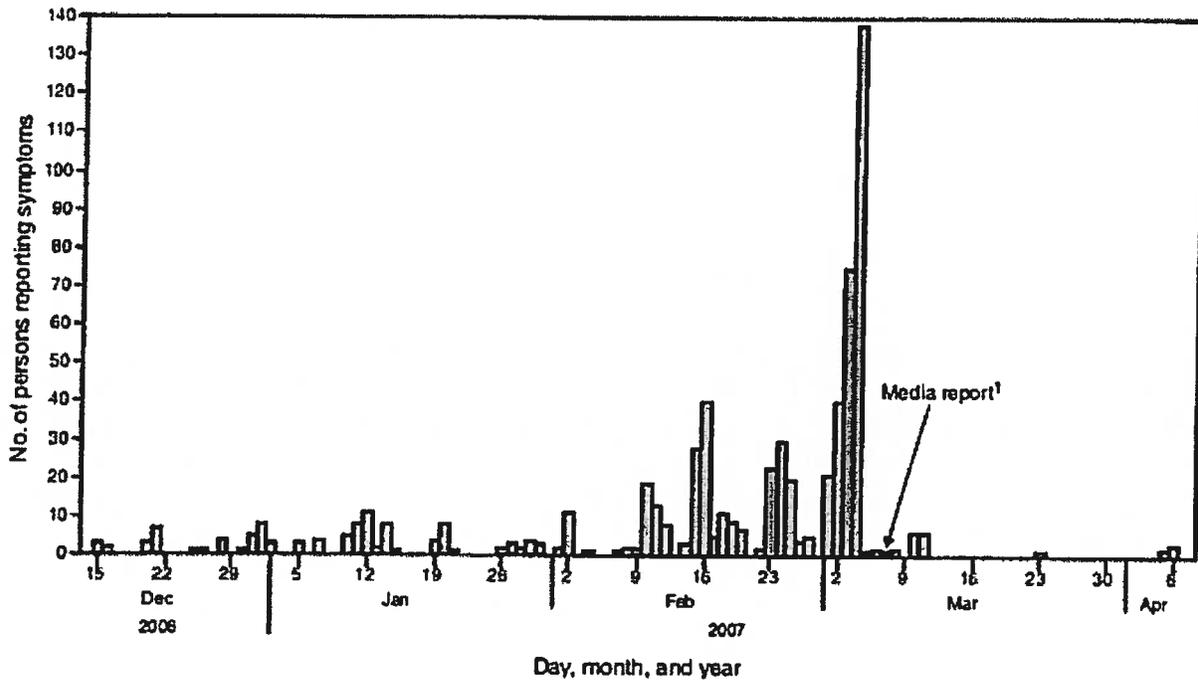
§ Adjusted for smoking status.

¶ This information was not collected on the initial version of the questionnaire and therefore is missing for this day.

[Return to top.](#)

Figure

FIGURE. Number of patrons and employees* reporting respiratory symptoms or irritation of eyes or skin at a hotel indoor waterpark resort, by date of symptom onset — Ohio, December 2006–April 2007



* N = 665

¹ The marked increase in reported symptoms with onset of March 4 might be attributed to media coverage; on March 7 a family reported symptoms to the local media, and the ensuing media coverage resulted in a marked increase in telephone calls to the local health department with reports of symptoms with earlier onset dates.

[Return to top.](#)

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of pages found at these sites. URL addresses listed in *MMWR* were current as of the date of publication.

All *MMWR* HTML versions of articles are electronic conversions from typeset documents. This conversion might result in character translation or format errors in the HTML version. Users are referred to the electronic PDF version (<http://www.cdc.gov/mmwr>) and/or the original *MMWR* paper copy for printable versions of official text, figures, and tables. An original paper copy of this issue can be obtained from the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, DC 20402-9371; telephone: (202) 512-1800. Contact GPO for current prices.

**Questions or messages regarding errors in formatting should be addressed to mmwrq@cdc.gov.

Date last reviewed: 2/4/2009

[HOME](#) | [ABOUT MMWR](#) | [MMWR SEARCH](#) | [DOWNLOADS](#) | [RSS](#) | [CONTACT](#)
[POLICY](#) | [DISCLAIMER](#) | [ACCESSIBILITY](#)

SAFER • HEALTHIER • PEOPLE™
 Morbidity and Mortality Weekly Report
 Centers for Disease Control and Prevention
 1600 Clifton Rd, MailStop E-90, Atlanta, GA
 30333, U.S.A



Department of Health
and Human Services



