



**Michigan Department of Environmental Quality
Water Division
Recreational Resources Unit**

**Suggested Practices For
Contingency and Emergency Response Plans
For Public Swimming Pools**

Purpose

The purpose of this suggested practice is to provide public swimming pool owners, pool operators, and local health department personnel with suggestions for implementing the requirements for contingency and emergency response plans. This information can also be accessed via the Michigan Department of Environmental Quality website at www.michigan.gov/deq.

Authority

Michigan's Public Health Code, 1978 PA 368, as amended (Act), and the administrative rules adopted pursuant to the Act, contains the statutory requirements for public swimming pools. The requirements for contingency and emergency response plans are set forth in Rule 325.2194a. This rule reads as follows:

- (1) The owner of a swimming pool shall prepare and implement a contingency and emergency response plan. The owner of a swimming pool shall have the contingency and emergency response plan available for review at the pool.
- (2) The contingency plan shall, at a minimum, outline a program for rapid mitigation of contamination or water quality deterioration according to R 325.2194.
- (3) The emergency response plan shall outline minimum topics including the following:
 - (a) Rescues and submersions.
 - (b) Equipment failure.
 - (c) Injury requiring medical attention
 - (d) Other conditions or events that create a hazard to the health and safety of persons using the pool.

Owner's Responsibilities

The swimming pool owner is responsible for the development of a contingency plan and emergency response plan. The pool owner's prime objective in developing these plans is to outline the steps necessary to protect the health and safety of those using or operating the pool

when the events or conditions noted in the rule occur. Further, these plans must be tailored to meet the specific needs and circumstances for each pool.

When completed, the owner is also responsible for implementing the plans. The Department of Environmental Quality would suggest the first step the owner should take is to provide the local health department representative with the plan and solicit their comments, but this is not a requirement. Next, the owner needs to ensure that all employees are informed of their role in the implementation of the plans and that copies of the plans are placed where they will be readily accessible for reference and use by key personnel.

The pool operator has specialized knowledge regarding pool operation and plays a vital role in the implementation of these plans. Thus, the owner should consult with the pool operator in the development of the plans. Further, the owner and pool operator need to treat these plans as working documents, review them periodically, and make changes as appropriate.

Local Health Department's Responsibilities

The local health department's involvement is limited to providing review comments, if requested to do so, as the rules do not provide any authority for approval or rejection of the plans. It is suggested that the local health department put their review comments in writing and maintain this correspondence with their pool file. If plans have been prepared, the local health department representative should also ensure copies of the plan are readily available to the operator and the facility manager, and offer suggestions for updating the plans when conditions warrant. If the owner fails to prepare a contingency plan or emergency response plan, the local health department representative should simply note this violation on the inspection report. The local health department should not issue a closing order, initiate any form of enforcement, or indicate the pool is not approved for operation if the owner fails to provide the required plans. However, it would be appropriate to suggest that the owner consult with an attorney regarding the legal ramifications of not preparing and implementing these plans.

List of Contacts

One of the most important parts of the contingency plan and the emergency response plan is a list of contacts, and this should be on the first page of each plan. The list should include the name and telephone number for emergency services such as emergency medical assistance, fire department, and police department. Another list should provide names and telephone numbers for pool resource personnel such as local health department representatives, personnel from pool service companies, equipment suppliers, and aquatics professionals. Another essential list is the chain-of-command for the pool owner and management. This list should not only indicate the names and telephone numbers of the personnel in the chain-of-command but also indicate who is responsible for notification of these individuals, i.e., the first person that should be informed regarding a pool contamination or emergency. These lists should be reviewed and updated periodically.

Contingency Plan

The purpose of the contingency plan is to address those situations where contamination has been introduced into the pool area from a fecal incident, vomit, blood, or the discharge of storm or sanitary sewage into the pool or on the pool deck. The plan needs to provide a procedure for dealing with both limited contamination and gross contamination. Limited contamination is defined as a contamination event where the amount of contamination is not sufficient to

consume the disinfectant residual present in the swimming pool. For example, a single fecal incident in a pool with a volume greater than 10,000 gallons would be considered limited contamination if the pH and free available residual concentration of the disinfectant meets or exceeds the requirements of R 325.2194 throughout the pool both before and after the contamination is noted. Gross contamination is defined as an event where all the available chlorine or bromine in the pool would be consumed by the contaminant. Generally, gross contamination is intended to apply to those situations where sanitary sewers or storm sewers overflow into the pool and large volumes are involved. However, it would also apply to a fecal incident in a spa or small pool with a volume less than 10,000 gallons. The suggested procedures for responding to gross contamination and limited contamination events are as follows:

A. Procedures for Responding to Gross Contamination of Public Swimming Pools.

1. The pool is to be closed immediately, everyone directed to leave the pool enclosure, and all access doors or gates to the pool enclosure are to be locked. If there is another pool within the enclosure that clearly has not been contaminated, the enclosure may remain open and use of the non-contaminated pool allowed provided warning signs are posted around the contaminated pool and personnel are available to ensure that the contaminated pool is not used. Do not allow anyone to enter the contaminated pool until all decontamination procedures are completed.
2. All solid contaminants should be removed from the pool using a net or scoop and disposed of in a sanitary manner. Clean and disinfect the net or scoop. Vacuuming the pool to remove the contaminant is not recommended.
3. The pool should be completely drained and all exposed and accessible surfaces scrubbed with a strong bleach solution (one cup of bleach per 3 gallons of water). Be sure the effluent from draining the pool is discharged directly to a sanitary sewer system or other approved wastewater disposal system.
4. Refill the pool with water.
5. The concentration of free available chlorine should be raised to 5 mg/L and the pH adjusted to 7.5 or less. The concentration of chlorine and the pH must be determined using a properly maintained and approved test kit, and the readings of automatic sensing equipment should not be used.
6. Pools with a sand filter should be backwashed, pools with DE filters should have the diatomaceous earth replaced, and a clean filter installed for pools served by cartridge filters. Clean and disinfect the cartridge filter in place when contamination occurred.
7. The pool recirculation pump and equipment should be operated for a contact time of 16 minutes with a pH of 7.5 or less and a free available chlorine concentration of 5 mg/L or more to obtain a CT¹ inactivation value of at least 80. Other contact times and free available chlorine concentrations required to obtain

¹ CT refers to concentration (C) of free available chlorine in mg/L or ppm multiplied by the contact time (T) in minutes.

a CT of 80 are given in Table 1, below.

8. Document the incident on the monthly operation report or a separate log sheet by recording:
 - a. date and time of the event,
 - b. type and amount of contaminant,
 - c. free available chlorine concentration and pH when the contamination was first noted,
 - d. free available chlorine concentration and pH at the beginning and end of the contact time,
 - e. free available chlorine concentration and pH when the pool is ready to be re-opened,
 - f. the procedures followed to respond to the incident (including the process used to increase free chlorine residual if necessary), and
 - g. the contact time.

Report the incident to the local health department and be sure to include these details in the discussions. If a contingency plan has not been prepared, obtain approval to re-open the pool from the local health department or the Department of Environmental Quality, Water Division, Recreational Resources Unit.

9. The pool may be re-opened and swimmers may be allowed into the pool after the required CT value has been achieved, the free available chlorine level has been returned to the normal operating range of 1 to 5 mg/L, and the pH is adjusted to the normal operating range of 7.2 to 7.5. If necessary, consult the local health department, Department of Environmental Quality, or an aquatics professional for recommendations on bringing the free available chlorine levels back to an acceptable operating range.

B. Procedures for Responding to Limited Contamination of Public Swimming Pools Involving Formed Stool (Solid, Nonliquid), Vomit, or Blood.

1. Follow steps A.1 and A.2, above.
2. Raise the free available chlorine concentration to 2 mg/L if it is less than 2.0 mg/L, and adjust the pH within a range of 7.2 to 7.5. Ensure this concentration is found throughout the pool by sampling at least three widely spaced locations away from return water outlets. This free available chlorine concentration was selected to keep the pool closure time to approximately 40 minutes. Other concentrations or closure times can be used as long as the CT inactivation value is maintained at 80 as shown in Table 1.
3. Maintain the free available chlorine concentration at 2.0 mg/L, pH in the range of 7.2 to 7.5, for at least 40 minutes before re-opening the pool. The free available chlorine levels in the presence of chlorine stabilizers such as chlorinated isocyanurates² should be maintained at 4.0 mg/L. Ensure that the filtration

² The impact of chlorine stabilizers (e.g., chlorinated isocyanurates such as tri-chlor and di-chlor) on pathogen inactivation and disinfectant measurement is unclear and requires further investigation. The

system is operating while the pool reaches and maintains the proper free available chlorine concentration during the disinfection process.

4. Follow steps A.8. and A.9, above.

C. Procedures for Responding to Limited Contamination of Public Swimming Pools from Diarrhea (Liquid Stool).

1. Follow steps A.1. and A.2, above.
2. Raise the free available chlorine concentration to 20 mg/L³ and maintain the pH between 7.2 and 7.5. Ensure this concentration is found throughout the pool by sampling at least three widely spaced locations away from return water outlets. The concentration of chlorine and the pH must be determined using a properly maintained and approved test kit⁴, and the readings of automatic sensing equipment should not be used. The chlorine and pH level should be sufficient to inactivate *Cryptosporidium* and should be maintained for at least 12 hours, equivalent to a CT inactivation value of 14,400. A higher or lower free available chlorine level/inactivation time can be used as long as a CT inactivation value equaling 14,400 is maintained for *Cryptosporidium* inactivation. Table 2 (below) provides other times and free available chlorine concentrations correlating to a CT value of 14,400⁵.
3. Ensure that the filtration system is operating while the pool reaches and maintains the proper free available chlorine concentration during disinfection.
4. Backwash the filter thoroughly after reaching the CT value. Be sure the effluent is discharged directly to waste and into a sanitary sewer or other approved wastewater disposal system. Do not return the backwash through the filter. Where appropriate, replace the filter media.

Michigan standards on chlorinated isocyanurates indicate the free available chlorine concentration needs to be doubled in their presence to accomplish an equivalent disinfection.

³ If necessary, consult an aquatics professional to determine and identify the feasibility, practical methods, and safety considerations before attempting the hyper-chlorination of any pool. Hyper-chlorination of a pool may be accomplished by direct application of the disinfectant, in appropriate form, to the water surface in the pool.

⁴ Most conventional test kits using colorimetric methods cannot measure free available chlorine levels this high. Use chlorine test strips, such as those used in the food industry, which can measure free available chlorine in a range that includes 20mg/L. Another option is to use an approved titration test kit such as the Taylor model 2006. For skilled operators that have a current certification as a CPO or AFO, still another option is to calculate the amount of disinfectant required to obtain the desired concentration.

⁵ The Department of Environmental Quality may approve the use of a CT inactivation value of less than 14,400 for those pool establishments with a skilled pool operator as evidenced by certification as a CPO or AFO, where automatic sensing and chemical feed equipment is provided to maintain pH and chlorine concentration, where the pool volume is greater than 100,000 gallons, and where continuous poolside supervision is provided. Contact the Recreational Resources Unit, Water Division, Department of Environmental Quality if interested in obtaining such approval.

5. After the CT value has been reached, adjust the free available chlorine level to the normal operating range of 2 to 5 mg/L and adjust the pH to a level of 7.2 to 7.5. If necessary, consult an aquatics professional, a local health department representative, or a representative of the Recreational Resources Unit, Water Division, Department of Environmental Quality for recommendations on bringing the free available chlorine levels back to an acceptable operating range.
6. Follow steps A.8 and A.9, above.

D. Procedures for Responding to Contamination of the Deck or Restroom at a Public Swimming Pool.

1. If there is a diaper spill or discharge of bodily fluids on the pool deck, deck furniture, or in the restroom, prohibit access to the area by posting personnel or by placement of stanchions with appropriate signs. Do not allow anyone to enter the contaminated area until all decontamination procedures are completed. If the contamination is limited to the surface of deck furniture, it may be simpler to take the furniture to a secure area for decontamination.
2. All solid contaminants should be removed using a scoop or a mop and bucket. Dispose of the contaminants in a sanitary manner and disinfect the equipment. A hose or pressure washer should not be used to remove the contaminants as this may only spread the contamination to nearby areas or accidentally contaminate the pool.
3. Scrub the affected area with a strong bleach solution (one cup of bleach per 3 gallons of water) and let the chlorinated water remain for a period of 30 minutes. Rinse this area with water ensuring that the rinse-water does not go into the pool. Let the area completely dry or keep it closed overnight before allowing usage.

These recommendations for responding to contamination do not address the use of non-chlorine disinfectants because there is limited pathogen inactivation data for many of these compounds. Because improper handling of chlorinated disinfectants could cause injury, appropriate occupational safety and health requirements should be followed.

Emergency Response Plan

Rule 325.2194a requires a public swimming pool owner to develop an emergency response plan for rescues and submersions, equipment failure, injury requiring medical attention, and other conditions or events that create a hazard to the health and safety of persons using the pool. Suggestions for the basic elements of the plan in each of the first three categories follows:

A. Rescues and Submersions.

1. The first step is to assist the victim in leaving⁶ the pool, if possible, through the use of a reach pole, ring buoy and line, spineboard, or other appropriate means.

⁶ Where personnel have not been trained in first aid, it may be appropriate not to remove the victim from the water and only assist the victim in reaching the side of the pool and in keeping their head above water

2. Summon emergency medical assistance, if appropriate, and have qualified personnel administer cardiopulmonary resuscitation (CPR) or artificial resuscitation, if needed. The emergency response plan should contain telephone numbers for obtaining emergency medical assistance.
3. The pool should be cleared of all bathers, closed, and carefully searched for other potential victims. The victim's name and a description of the incident should be obtained from the victim or witnesses along with the names of witnesses.
4. The pH and concentration of free disinfectant residual in the pool water should be checked along with water clarity, and this information entered into the swimming pool operation report form.
5. Treatment of the pool deck or water in the pool is the next priority when there is a discharge of bodily fluids. The discharge of bodily fluids is to be assumed if the victim is unconscious. The treatment of the pool should follow the appropriate section in the contingency plan.
6. An important part of the process is to conduct a critical review of procedures and conditions at the time of the incident and note where changes or improvements could be made that might have prevented the incident. Make any necessary changes in the plan⁷.
7. Finally, the information should be placed on an incident report form and copies submitted to the local health department and the Department of Environmental Quality.

B. Equipment Failure.

1. The pool is to be closed should there be a failure in any of the pool piping or treatment equipment (pump, filter, chemical feeder). Should other equipment fail, there may be a need to close the pool depending on whether the failure of the equipment poses a safety hazard. For example, if one of the main drain covers were to fail, a safety hazard would exist without a cover over the main drain, the failure would thus constitute a safety hazard, and the pool would need to be closed.
2. Repair or replace the failed equipment with the same size, make, and model number as shown on the pool plans approved by the Department of Environmental Quality. Contact the Department of Environmental Quality and obtain approval before installing any equipment that is not on the approved plans.

until trained medical personnel arrive. This would be especially appropriate where a head, neck, or spinal injury may have occurred.

⁷ Training of facility personnel in first aid and CPR is encouraged prior to an emergency occurring. Further, training of all personnel in the location of pool safety equipment, and the proper use of such equipment is likewise encouraged.

3. Before re-opening the pool for usage, the water quality must be checked and returned to state standards, if appropriate.
4. The equipment failure and corrective action taken should be noted on the swimming pool operation report along with the time the problem was first noted, the corrective action taken, and the time the pool was re-opened.

C. Injury Requiring Medical Attention.

1. The first step is to assist the victim in leaving the pool, if possible, through the use of the reach pole, ring buoy and line, spineboard, or other appropriate means (footnote 6).
2. Obtain the appropriate assistance and medical treatment for the victim.
3. The victim's name and a description of the incident should be obtained from the victim or witnesses along with the names of witnesses.
4. The pool should be closed and treated for contamination if there were a discharge of bodily fluids into the pool. The time and action taken should be noted on the pool monthly operation report.
5. All of the information should be placed on an incident report form. If emergency medical assistance were required, copies of the report should be submitted to the local health department and the Department of Environmental Quality.

Rule 325.2194a also requires an emergency response plan for other conditions or events that create a hazard to the health and safety of persons using the pool. This plan needs to be tailored to fit the specific pool, but there are a few conditions or events that might apply to most pools. These would include severe weather warnings (high winds for outdoor pools, lightning, tornadoes, intense rain or snow for outdoor pools), fire, bomb threat, power outages, and contamination of the pool water by some substance or chemical other than bodily fluids or sewage. For all of these situations, the plan should indicate the pool will be immediately closed, and, if appropriate, the patrons advised of a safe location where they can go. Further, the plan should indicate, for each condition or event, when the pool can be re-opened, the treatment protocol and times of pool closure, and any other appropriate steps to be taken. Finally, the nature of the event or condition, time and date, and the response taken should be documented on the swimming pool operation report.

Table 1

Table 1. Free available chlorine concentrations and contact time required to obtain a CT inactivation value of 80. This table applies to disinfection of pools after a formed fecal accident or after gross contamination.

Concentration of Free Available Chlorine (mg/L or ppm)	Concentration of Free Available Chlorine When Chlorine Stabilizers are Used. (mg/L or ppm)	Contact Time (minutes)
2.0	4.0	40
2.5	5.0	32
3.0	6.0	27
3.5	7.0	23
4.0	8.0	20
4.5	9.0	18
5.0	10.0	16

Table 2

Table 2. Pool closure times and disinfectant concentrations necessary to obtain a CT inactivation value of 14,400. This table is to be used for pools following a limited contamination event from diarrhea.

Concentration of Free Available Chlorine, mg/L (See footnote 4)	Pool Closure Times/Contact Times	
	Time in Minutes	= Time in Hours
10	1440 minutes	24 hours
11	1320 minutes	22 hours
12	1200 minutes	20 hours
13	1080 minutes	18 hours
15	960 minutes	16 hours
17	840 minutes	14 hours
20	720 minutes	12 hours
24	600 minutes	10 hours
30	480 minutes	8 hours
40	360 minutes	6 hours
60	240 minutes	4 hours