

New York State Department of Health

Contamination Response Recommendations for Pool and Spray Ground Staff

June 2023

Consistent with CDC's Healthy Swimming Recommendations; see www.cdc.gov/healthywater/swimming

Table of Contents:

- Procedure 1. Formed Fecal Matter or Vomit Contamination in Pool Water or on a Spray Pad
- Procedure 2. Diarrheal Incident in Pool Water or on a Spray Pad
- Procedure 3. Alternative Remediation Options for a Diarrheal Incident
- Procedure 4. Vomit or Blood on Pool or Spray Ground Surfaces Excluding the Spray Pad
- Additional Information

Why Contamination Incident Response is Needed: Exposures and Health Risks

The germs that cause recreational water illnesses (RWIs) can be spread when swallowing water contaminated with fecal matter (poop) or vomit. While most types of germs are inactivated within minutes in a properly maintained pool or spray ground, some germs, such as *Cryptosporidium* (or Crypto) can live in properly treated water for days. This means that even the most well-maintained aquatic venues can spread germs (see **Additional Information**). If you become aware that someone with cryptosporidiosis recently used your aquatic venue, please contact your local health department (www.health.ny.gov/environmentalcontacts/).

The following recommendations are for responding to contamination incidents in chlorinated/brominated pools, spas, spray grounds, and other aquatic venues, and on associated decks and other surfaces.

Improper handling of disinfectants and other pool chemicals can cause injury. Follow the manufacturer's instructions for safety and health requirements when using these products. For more pool chemical safety information, visit: www.health.ny.gov/environmental/chemicals/pool_chems/

Communicating Pool and Spray Ground Closures to Patrons

Contamination incidents are a health concern and an inconvenience to both aquatic staff and patrons. Aquatic staff should carefully explain to patrons why the pool/spray ground needs to be closed in response to a fecal or vomit incident. Explaining the need for proper disinfection and protection of swimmer health is likely to promote patron understanding and minimize frustration. Closures allow chlorine to kill germs and help prevent RWIs.

Establish a Contamination Incident Log

Aquatic staff should document each fecal incident in an aquatic venue by recording date and time of the event, whether it involved formed fecal matter or diarrhea, and the free chlorine concentration and pH at the time of observation of the event. **Download CDC's sample response log.**

Procedure 1. Formed Fecal Matter or Vomit Contamination in Pool Water or on a Spray Pad

Section 6-1.11(c)(4) of Subpart 6-1 Swimming Pools of the New York State Sanitary Code prohibits the use of chlorine stabilizers, which include compounds such as cyanuric acid, dichlor, and trichlor.

1. Immediately close the pool/spray ground to patrons until the disinfection process is complete. If you have multiple venues using the same filtration system, all must be closed to bathers. Do not allow anyone to enter the venue(s) until the disinfection process is completed. For spray grounds, turn off spray features and divert drainage to send spray pad water to waste to limit contamination of the treatment tank.
2. Remove as much fecal matter or vomit as possible (e.g., using a net or bucket) and dispose of the waste in a sanitary manner. Clean and disinfect items used to remove the fecal matter or vomit (e.g., after cleaning, leave the net or bucket immersed in the water during disinfection). For spray grounds, turn the spray features back on and switch the drain flow back to the spray pad treatment tank after Step 2 is complete. **Vacuuming fecal matter from the pool/ spray ground is not recommended because it contaminates hoses and other equipment which cannot easily be cleaned.**
3. Using unstabilized chlorine (e.g., sodium hypochlorite), raise the water's free chlorine concentration to 2 parts per million (ppm), if less than 2 ppm. Maintain the free chlorine at 2 ppm and pH at 7.5 or less for 25-30 minutes. Ideally, the water temperature should be 77°F (25°C) or higher during the disinfection process. Other concentrations or disinfection times can be used (see Table 1).

If the water contains cyanuric acid, discontinue use of products containing cyanuric acid, contact your local health department, and double the disinfection time for the free chlorine concentration selected (e.g., 1 ppm for 90 minutes, 2 ppm for 50-60 minutes, 3 ppm for 38 minutes).

Free Chlorine Concentration (ppm)	Disinfection Time (minutes)
1.0	45
2.0	25-30
3.0	19

*These disinfection times are based on 99.9% kill or inactivation of *Giardia* cysts by chlorine at pH 7.5 or less and temperature of 77°F (25°C) or higher and were derived from the U.S. Environmental Protection Agency (EPA) Disinfection Profiling and Benchmarking Guidance Manual. These closure times do not consider "dead spots" and other areas of poor pool water mixing.

Note: At facilities that use bromine disinfection, chlorine-based disinfectant must be used to treat contamination. Bromine cannot be distinguished from chlorine in water by most test kits. When responding to contamination in brominated systems, the minimum disinfection level needed will be a combination of the current bromine level plus the minimum free chlorine level for the closure time selected.

4. Confirm that the filtration system is operating as the water achieves the proper free chlorine concentration and pH for disinfection.
5. Allow patrons back into the water only after the disinfection process is completed and the free chlorine or bromine concentration and pH are within the normal operating ranges below:
 - Pools: 0.6-5 ppm free chlorine or 1.5-6 ppm bromine; pH 7.2-7.8.
 - Spas: 1.5-5 ppm free chlorine or 3-6 ppm bromine; pH 7.2-7.8.
 - Spray Grounds: 2-10 ppm free chlorine, or at least 4.4 ppm bromine; pH 7.2-7.8.

Procedure 2. Diarrheal Incident in Pool Water or on a Spray Pad

1. Immediately close the pool/spray ground to patrons. If you have multiple venues using the same filtration system, all must be closed to bathers. Do not allow anyone to enter the venue(s) until the disinfection process is completed. For spray grounds, turn off spray features and divert drain to send spray pad water to waste to limit contamination of the treatment tank.
2. Remove as much fecal matter as possible (e.g., using a net or bucket) and dispose of the waste in a sanitary manner. Clean and disinfect items used to remove the fecal matter (e.g., after cleaning, leave the net or bucket immersed in the water during disinfection). For spray grounds, turn spray features back on and switch the drain flow back to the spray pad treatment tank after Step 2 is completed. **Vacuumping fecal matter from the pool/spray ground is not recommended because it contaminates hoses and other equipment which cannot easily be cleaned.**

Section 6-1.11(c)(4) of Subpart 6-1 Swimming Pools of the New York State Sanitary Code prohibits the use of chlorine stabilizers, which slow the rate at which free chlorine inactivates or kills germs. If the water contains cyanuric acid, discontinue use of products containing cyanuric acid, contact your local health department, and follow CDC's Diarrheal Incident Guidelines when Chlorine Stabilizer is in the Water: www.cdc.gov/healthywater/swimming/pdf/diarrheal-incident-guidelines-when-chlorine-stabilizer-is-in-the-water.pdf.

3. If necessary, consult an aquatic professional to determine the feasibility of these recommendations, the best methods, and needed safety considerations.
4. Using unstabilized chlorine (e.g., sodium hypochlorite) raise the water's free chlorine concentration to 20 parts per million (ppm) and maintain pH at 7.5 or less. Ideally, the water temperature should be 77°F (25°C) or higher during the disinfection process.

Note: At facilities that use bromine disinfection, chlorine-based disinfectant must be used to treat contamination. Bromine cannot be distinguished from chlorine in water by most test kits. In brominated systems, the minimum disinfection level needed is a combination of the current bromine level plus the minimum free chlorine level for the disinfection time selected.

5. Maintain the free chlorine at 20 ppm¹ and pH at 7.5 or less for at least 12.75 hours to achieve a concentration x time (CT) inactivation value² of 15,300 to inactivate or kill Crypto. Other free chlorine levels or disinfection times can be used as long as a CT inactivation value of 15,300 is achieved (see Table 2).

Table 2. Disinfection Time for a Diarrheal Fecal Incident (to achieve a CT inactivation value of 15,300)*

Free Chlorine Concentration (ppm)	Disinfection Time (hours and minutes)
20	12 hrs. and 45 min.
10	25 hrs. and 30 min.

* These disinfection times are based on inactivation of Crypto by chlorine: Shields JM, Hill VR, Arrowood MJ, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. *Journal of Water Health*. 2008;6(4):513–20.

6. Confirm that the filtration system is operating as the water reaches and is maintained at the proper free chlorine concentration and pH.
7. Backwash the filter thoroughly or replace cartridge or DE media after reaching the CT inactivation value. Be sure to discharge directly to waste and according to state or local regulations. For sand filters, restart the filter and direct filtered water to waste for 5 minutes before resuming normal filter operation.
8. Allow patrons back into the water only after the disinfection process is completed and the free chlorine or bromine concentration and pH are within the normal operating ranges below:
 - Pools: 0.6-5 ppm free chlorine or 1.5-6ppm bromine; pH 7.2-7.8.
 - Spas: 1.5-5 ppm free chlorine or 3-6 ppm bromine; pH 7.2-7.8.
 - Spray Grounds: 2-10 ppm free chlorine or at least 4.4 ppm bromine; pH 7.2-7.8.³

1. Many conventional test kits cannot measure free chlorine this high. Use chlorine test strips that can measure free chlorine that includes 20-40ppm (such as those used in the food industry) or make dilutions for a standard DPD test kit using chlorine-free water.
2. CT inactivation value refers to the concentration of free chlorine (ppm) multiplied by time (minutes) at a specific pH and temperature.
3. CDC does not recommended testing the water for Crypto after hyperchlorination because the test can detect inactivated oocysts that are no longer infective.

Procedure 3. Alternative Remediation Options for a Diarrheal Incident

The following options may be used instead of hyperchlorination in response to a diarrheal incident. Both are intended to reduce the number of Crypto oocysts in the water below 1 oocyst per 100mL.

- **Draining and cleaning** may be used for aquatic venues with small water volumes, such as spas and some spray grounds, that do not combine water with another aquatic venue. Standard precautions should be followed when draining any venue.
- **Ultraviolet (UV) light disinfection** may be used for spray grounds that do not combine water with another aquatic venue.

Step 1. Immediately close the pool/spray ground to patrons. Do not allow anyone to enter the venue until the disinfection process is completed. For spray grounds, turn off spray features and divert drainage to send spray pad water to waste to limit contamination of the treatment tank.

Step 2. Remove as much of the fecal matter as possible (e.g., using a net or bucket) and dispose of the fecal matter in a sanitary manner. Clean and disinfect items used to remove the fecal matter. For spray grounds, turn spray features back on and switch drain flow back to spray pad treatment tank after Step 2 is complete. **Vacuuming fecal matter from the pool/spray ground is not recommended. This can contaminate hoses and other equipment that cannot easily be cleaned.**

Draining & Cleaning Option

Step 3. Completely drain as much water as possible from the venue and associated plumbing. For DE filters, collect and discard used DE during the draining process, and discharge water to waste through a separation tank according to state or local regulations.

Step 4. Scrub and clean all surfaces in contact with contaminated water.

Step 5.

- **For cartridge filters:** Replace cartridge. Refill venue with water from an approved source (e.g., municipal water system).
- **For sand and DE filters:** Refill venue with water from an approved source (e.g., municipal water system), and:
 - For sand filters: Backwash sand filter thoroughly, discharging directly to waste and according to state or local regulations. Where possible, restart the filter and direct filtered water to waste for 5 minutes before resuming normal filter operation.
 - For DE filters: Replace DE media.

UV Light Disinfection Option

Step 3. Check the disinfectant residual and pH; to ensure minimum level of chlorine is 2.0 ppm (or bromine 4.4 ppm) and pH is 7.2 - 7.8.

Step 4. Confirm that the UV reactor is operating in accordance with the UV reactor validation approval letter for maximum flow rate and either minimum UV light intensity or a dose of at least 40 mJ/cm².

Step 5. Recirculate the water through the entire system, including spray features and spray pad treatment tank, for at least 30 minutes. Keep the spray ground closed to patrons during this time.

Step 6.¹ Allow patrons back into the water only after the remediation process has been completed and the free chlorine/bromine concentration and pH are within the normal operating ranges below:

- Pools: 0.6-5 ppm free chlorine or 1.5-6ppm bromine; pH 7.2-7.8.
- Spas: 1.5-5 ppm free chlorine or 3.0-6.0 ppm bromine; pH 7.2-7.8.
- Spray Grounds: 2-10 ppm free chlorine or at least 4.4 ppm bromine; pH 7.2-7.8.

1. It is not recommended to test the water for Crypto after these remediation options. Appropriate implementation of these alternative remediation options will reduce the number of viable Crypto oocysts in the water below an infective concentration. Although UV light disinfection destroys Crypto's infectivity, the test can detect remaining inactivated oocysts.

Procedure 4. Vomit and Blood on Pool or Spray Ground Surfaces Excluding the Spray Pad*

Clean and Disinfect with a Household Bleach Solution

1. Immediately block off the area from patrons until clean-up and disinfection is complete.
2. Wear disposable gloves to prevent contamination of hands.
3. Wipe up the blood or vomit using paper towels or absorbent material. Put the trash in a disposable plastic bag.
4. Mix a solution of 9-parts cool water and 1-part household bleach. Mix a fresh solution each time because the solution loses its strength quickly.
5. Gently pour bleach solution onto the contaminated surface(s) and let it sit there for 20 minutes.
6. After 20 minutes, wipe up the bleach solution using paper towels or other absorbent material. Dispose of all trash in a plastic trash bag.
7. Disinfect cleaning materials that cannot be thrown away (e.g., mops and scrub brushes), by fully wetting them with your mixed bleach solution and let them air dry.
8. Remove the gloves and place them in a plastic garbage bag.
9. Double bag and securely tie all plastic garbage bags and dispose of them with your trash.

**For feces or vomit on a spray pad (the area of the spray ground consisting of the play surface, spray features, and drains), see Procedure 1, 2, or 3 as appropriate for the type of contamination. If there is a blood spill on a spray pad where the blood has not yet washed into the drain, turn spray features off, then clean and disinfect the spray pad using Procedure 4.*

Additional Information

Contamination in Pool Water and on the Spray Pad

Diarrhea: A diarrheal incident is a high-risk event for contamination caused by *Cryptosporidium* (Crypto), an extremely chlorine-tolerant parasite. It is important that aquatic staff educate patrons not to swim when ill with diarrhea. The procedures to respond to a diarrheal incident are based on the measures necessary to kill, inactivate, or remove Crypto.

Formed Fecal Matter: A formed fecal incident is a lower-risk event than a diarrheal incident, but still poses a risk of spreading germs, including moderately chlorine tolerant *Giardia*. The steps to respond to a formed fecal incident are based on killing or inactivating *Giardia*.

With most diarrheal illnesses, the number of germs found in each bowel movement decreases as the diarrhea stops and the person's bowel movements return to normal. Therefore, a formed fecal incident is expected to be less of a risk than a diarrheal incident that you might not see. Formed fecal matter might contain no germs, a few, or many which can cause illness. You won't know. The germs that might be present are less likely to be released into the water because they are mostly contained within the formed fecal matter. However, formed fecal matter also protects germs inside from being exposed to the chlorine in the water, so prompt removal is necessary.

Why Don't You Treat a Formed Fecal Incident as if it Contains Crypto?

In 1999, aquatic staff volunteers from across the country collected almost 300 samples from formed

fecal incidents that occurred at aquatic venues.¹ CDC then tested these samples for Crypto and *Giardia*. None of the sampled feces tested positive for Crypto, but *Giardia* was found in 4.4% of the samples collected. These results suggest that formed fecal incidents pose only a very small Crypto risk but should be treated as a risk for spreading other germs (such as *Giardia*). Remember, a diarrheal incident is considered to be a higher-risk event than a formed fecal incident.

Vomit: People may vomit in pools from accidentally swallowing pool water while swimming. If a person vomits only pool water, it is unlikely to spread illness. However, if they vomit more than just pool water, like previously eaten food, aquatic staff must act immediately to clean it up. The germs most likely to be spread by vomit are noroviruses.

Blood: In a properly maintained pool, chlorine readily kills germs found in blood (e.g., hepatitis B and HIV). Although there is no public health reason to recommend closing the pool or spray ground after a blood spill, some aquatic staff may choose to do so temporarily.

Disinfection Times to Kill or Inactivate Germs: The closure times in this guidance are based on inactivation times to kill or inactivate Crypto and *Giardia*. As Table 3 demonstrates, unlike other germs, they are not quickly killed or inactivated by chlorine under normal operational conditions.

Table 3. Time to Kill or Inactivate Germs in Chlorinated Water*	
Germ	Time
<i>E. coli</i> O157:H7 Bacterium	Less than 1 minute
Hepatitis A Virus	About 16 minutes
<i>Giardia</i> Parasite	About 45 minutes
Crypto Parasite	About 15,300 minutes or 10.6 days**

*1 part per million (ppm) free chlorine at pH 7.5 or less and a temperature of 77° F (25°C) or higher.

**Shields JM, Hill VR, Arrowood MJ, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. J Water Health 2008;6(4):513–20.

1. CDC. Prevalence of parasites in fecal material from chlorinated swimming pools - United States, 1999. MMWR Morb Mortal Wkly Rep. 001;50(20):410-2.

Contamination on Pool and Spray Ground Surfaces

Vomit, Blood, and Other Body Fluids: Vomit and blood can spread germs at pools and spray grounds. When they end up on the deck or other surface, excluding the spray pad, the area should be cleaned and disinfected immediately using Procedure 4. However, if a body fluid spill occurs on the spray pad (the area of the spray ground consisting of the play surface, spray features, and drains), it is treated as contamination of the water because the water draining from the spray pad can carry the contamination into the treatment tank.

Questions?

Contact the local health department (www.health.ny.gov/environmentalcontacts/) with jurisdiction in the city or county where your pool or spray ground is located.

For general information, email or call the Bureau of Community Environmental Health and Food Protection: bcehfp@health.ny.gov; (518) 402-7600.