

Are You Prepared for a Body Fluid Release Incident?

Incident Response Plans

When a patron accidentally releases body fluid, such as fecal matter (diarrhea or formed stool), blood, or vomit, into the pool water or surrounding surfaces, it may leave disease-causing germs. Under the right conditions, these disease-causing germs can cause recreational waterborne illnesses (RWIs) in other swimmers. As part of a pool safety plan and good pool management, each operator must be ready to respond to these incidents.

Pool operators and patrons should understand

- pool closures are necessary to properly disinfect the facility, and to protect the health and safety of swimmers when a fecal or body fluid release takes place
- pool closures allow chlorine to do its job: to kill germs and help prevent RWIs
- why the pool needs to be closed in response to the incident

How long does it take to disinfect the pool after an incident?

This depends on what type of incident has taken place and the state of the pool water quality at the time of the incident. Due to the variation in risk to the bather between a formed stool release and a diarrheal release, the response needed is different.

Formed stool or vomit

A fecal release incident that is a formed stool or a vomit release incident can be treated the same. By deactivating (killing) the parasite *Giardia* (as indicated in Figure 1), any viruses potentially found in vomit will also be deactivated. Figure 1 provides the free available chlorine (FAC) levels and the required contact time at this level needed to inactivate (kill) *Giardia* and any viral concerns.

Figure 1: Chlorine Disinfection Timetable for Formed Stool and Vomit

Free Available Chlorine Level (ppm)	Disinfection Time *
1.0 ppm	45 minutes
2.0 ppm	25 minutes
3.0 ppm	19 minutes

Notes:

- These disinfectant times are only for pools that do not use chlorine stabilizers such as cyanuric acid. Disinfection times would be expected to be longer in the presence of a chlorine stabilizer.
- * These closure times are based on 99.9% inactivation of *Giardia* cysts by chlorine at pH 7.5 or less and a temperature of 77°F (25°C) or higher. These closure times do not take into account dead spots and other areas of poor pool water mixing.

Diarrhea

A fecal incident that is diarrhea increases the risk of disease-causing organisms being released into the pool water. The organism targeted when there is a diarrheal release is *Cryptosporidium*, which has a much higher tolerance level to chlorine. Figure 2 provides the free available chlorine levels and required time needed to inactivate Crypto.

Figure 2: Crypto Inactivation Timetable for a Diarrheal Fecal Incident

Free Available Chlorine Level (ppm)	Disinfection Time *
10	1530 minutes (25.5 hours)
20	765 minutes (12.75)
40	383 minutes (6.5 hours)

* *Disinfectant time*: The length of time the water is held in direct contact with FAC when water is at a temperature of 25c or higher and has a pH of 7.5

Diarrhea, Formed Stool, Vomit, and Blood Incidents Response Recommendations

1. Establish an incident response kit of scoops, nets, buckets, and personal protective equipment.
2. Close the pool to swimmers. If you have multiple pools that use the same filtration system, all pools and swim features will have to be closed to swimmers. Do not allow anyone to enter the pool(s) until the disinfection process is completed.
3. Remove as much of the material (diarrhea, formed poop, vomit) as possible (e.g., using a net or bucket) and dispose of it in a sanitary manner.

VACUUMING STOOL FROM THE POOL IS NOT RECOMMENDED.

4. Clean and disinfect the item used to remove the fecal material (e.g., after cleaning, leave the net or bucket immersed in the pool during disinfection).
5. If it is a low volume pool, such as a paddling pool, consider closing, draining, and cleaning the pool.
6. Spa pools (hot tubs) should be closed, drained, cleaned, and disinfected.
7. Confirm that the filtration system is operating while the chlorine reaches, and is maintained, at the proper level for disinfection for the required time.
8. Adjust the pH to 7.5 or less and the temperature at 77°F (25°C) or higher.

For Formed Stool or Vomit

1. Raise free chlorine concentration to 2 ppm, if less than 2ppm.
2. Maintain free available chlorine residual of 2ppm and pH 7.5 for at least 25 minutes before reopening the pool. **Continue to #9.**

For Diarrhea

1. If necessary, before attempting the hyperchlorination of any pool, consult a certified aquatics professional to determine the feasibility, the most optimal and practical methods, and needed safety considerations. Make sure all occupational health and safety precautions are considered.
2. Raise free available chlorine to 20 ppm and maintain this level for 12.75 hours to achieve a CT value of 15,300*, **. **Continue to #9.**

Caution: Do not use stabilized chlorine for hyperchlorination.

For Blood

There is no evidence of blood-borne diseases being transmitted to swimmers from a blood spill in a pool. Normal operating levels of chlorine present with the appropriate pH level will be adequate to inactivate the pathogens (germs). Operators may choose whether or not they want to close the pool and treat as a formed stool contamination.

9. Backwash the filter after reaching the CT inactivation value at the required time frame. Be sure the effluent is discharged directly to waste and in accordance with provincial or local codes. Do not return the backwash through the filter. Where appropriate, replace the filter media.
10. Allow swimmers back into the water only after the required CT*** inactivation value has been achieved and the free available chlorine and pH levels have been returned to the normal operating range.
11. Document each incident in an incident log by recording date, time of the event, whether it involved formed stool or diarrhea, and the free chlorine and pH levels at the time of the incident. (See sample incident log.)
12. Before reopening the pool, record the free available chlorine and pH levels, the procedures followed in response to the fecal incident (including the process used to increase chlorine levels if necessary), and the contact time.

* *Chlorine Stabilizer:* The presence of chlorine stabilizer in the pool and the use of chlorine stabilized chlorine products may effect the CT inactivation and therefore should not be used for hyperchlorination. Such products include compounds such as cyanuric acid, dichlor, and trichlor.

***Note:* Many conventional test kits cannot measure free chlorine levels this high. Use chlorine test strips that can measure FC in an range that includes 20-40ppm or make dilutions with chlorine free water when using a standard DPD test kit.

****Note:* CT inactivation value refers to concentration (C) of free chlorine in ppm (or mg/L) multiplied by time (T) in minutes at a specific pH and temperature.

Person Conducting Contamination Response

Supervisor on Duty

Date (mm/dd/yyyy) of Incident Response

Time of Incident Response

Water Feature or Area Contaminated

Number of People in Water

Type/Form of Contamination in Water:
Fecal Accident (Formed Stool or Diarrhea), Vomit, Blood

Time that Water Feature was Closed

Stabilizer Used in Water Feature (Yes/No)

Water Quality Measurements

	Level at Closure	1	2	3	4	Level Prior to Reopening
Free Chlorine Residual <i>(1-4 are measurements spread evenly through closure time)</i>						
pH <i>(1-4 are measurements spread evenly through closure time)</i>						

Date (mm/dd/yyyy) that Water Feature was Reopened

Time that Water Feature was Reopened

Total Contact Time
(Time from when disinfectant reached desired level to when disinfectant levels were reduced prior to opening)

Remediation Procedure(s) Used and Comments/Notes:
