



ENVIRONMENTAL HEALTH ADVISORY NOTICE

TO: Owners/Operators of Public Pools Located in the County of Orange
SUBJECT: Procedures Following a Contamination of a Public Pool by Feces, Vomitus or Dead Animals

Microorganisms, such as *Cryptosporidium*, *E. coli* 0157:H7, and *Giardia* have been linked to waterborne outbreaks at public pool facilities. The 1998 outbreak of *E. coli* 0157:H7 illness associated with a fecal contamination of a public pool at a waterpark in Georgia reinforces the seriousness of these situations. The strain of *E. coli* associated with the waterpark outbreak is the same one that was associated with contaminated hamburger patties at a chain of fast food restaurants. These diseases are caused by the consumption of water or food that has been contaminated with human or animal fecal matter or human vomitus that contains these microorganisms.

The effects of feces, vomitus or a dead animal in a public pool can be serious, if not life-threatening to pool users, especially children, the elderly and people with suppressed immune systems. Feces and vomitus material can contain large numbers of pathogenic (harmful) microorganisms. If an animal enters the pool and dies it voids its bowels into the pool water releasing pathogens.

The following are some requirements and recommendations that, when implemented, can reduce the possibility of contracting a waterborne illness from a pool:

1. Maintain the pool water chemistry in balance and proper levels of disinfectant and pH.
2. The pool should not be used unless the filtration system is in good working order.
3. Children wearing only diapers in the pool, changing of diapers at poolside or washing off soiled infants in the pool water should be prohibited.
4. Children who are not toilet trained or anyone who is incontinent should not use the pool. If incontinent individuals are allowed to use the pool, rubber pants, "swim diapers" or special swimsuits should be worn. These items have some ability to contain fecal material and do afford limited protection.
5. Pool users should wash their hands with soap and hot water after using the toilet.
6. Pool users should take a shower before entering the pool.

Pool users who are suffering from a communicable disease that can be transmitted through water or who have had diarrhea in the past two weeks should not use the pool.

If feces, vomitus or a dead animal is found in a pool, the following steps must be **immediately** implemented:

1. Instruct all pool users to exit the pool(s) immediately. Do not allow anyone to enter the contaminated pool until all the following steps are completed.
2. Remove as much of the fecal material as possible using a net or scoop and dispose of it in a sanitary manner. Clean and disinfect the net or scoop (e.g., after cleaning, leave the net or scoop immersed in the pool during the disinfection period). Vacuuming stool from the pool is not recommended. If the pool is vacuumed, waste should be directed to a sanitary sewer and not through the filtration system.

3. a. **If the fecal accident involves a formed stool (solid, not liquid) or vomitus is found in the pool** - raise the free available chlorine concentration to 2 parts per million (ppm) and maintain the pH between 7.2 - 7.5 for at least 25 minutes. If a free available chlorine concentration of 3 ppm is present, the time can be reduced to 19 minutes.
- b. **If the fecal accident involves diarrhea or a loose stool or if a dead animal is found in the pool** - raise the free available chlorine concentration to 20 ppm and maintain the pH between 7.2 and 7.5 for at least 8 hours. This is equivalent to a CT value of 9,600. The CT value is the concentration of chlorine in ppm multiplied by the time in minutes and is used to determine the point at which *Cryptosporidium* oocysts are inactivated. In this case, a 20 ppm concentration of chlorine maintained in a pool for 8 hours or 480 minutes will result in a CT value of 9,600 (480 minutes X 20 ppm). Any combination of chlorine concentration and time resulting in a CT value of 9,600 or greater can be used to achieve disinfection.

For fecal accidents involving diarrhea or loose stools, the filter should be thoroughly backwashed to a sanitary sewer after the CT value has been reached and before the pool is reopened.

4. During the entire treatment period, ensure that the pH is maintained between 7.2 and 7.5. The pH may be affected if additional chlorine is added to the pool.
5. Ensure that the filtration system is operating and the proper free available chlorine concentration is maintained throughout the treatment period. Ensure free available chlorine concentrations are found throughout all areas of the pool or co-circulating pools by sampling in at least three widely spaced locations away from return water inlets.
6. The pool may be reopened after the required time/concentration or CT value has been achieved and the free available chlorine residual is below 5.0 ppm.
7. If the pool is a low volume pool, such as a spa pool or wading pool, the pool can be drained. The pool should be refilled, the water balanced and the proper time/concentration or CT value achieved before being reopened.
8. Establish a fecal accident log. Document each fecal accident by recording the following information:
 - a. Date and time of the event
 - b. Formed stool or diarrhea
 - c. Free available chlorine concentration and pH at the time of observation of the event
 - d. Free available chlorine and pH before reopening the pool
 - e. Contact time
 - f. Procedures followed to respond to the fecal accident, including the process used to increase the free chlorine residual if necessary

Notes:

1. Fecal accident pool closure procedures are based on recommendations by the Centers for Disease Control and Prevention.
2. All contact times assume a water temperature of 25°C (77°F).
3. Theoretical Pool Closure Times for 99.9% Inactivation of *Giardia* Cysts by Free Available Chlorine, pH 7.5, 25°C derived from the EPA's Disinfection Profiling and Benchmarking Guidance Manual.
4. The short pool closure time is the chlorine concentration/contact time theoretically required to inactivate *Giardia* cysts. The long pool closure time is the chlorine concentration/contact time theoretically required to inactivate *Cryptosporidium* oocysts.
5. Non-chlorine disinfectants are not addressed and should not be used because there is limited pathogen inactivation data available for these compounds.
6. The impact of chlorine stabilizers such as chlorinated isocyanurates on pathogen inactivation and disinfection measurement is unclear and warrants further investigation. Increased contact time may be desirable.
7. Many conventional test kits cannot measure free available chlorine in a range that includes 20 ppm. In this case, use chlorine test strips, kits that can measure in this range or make dilutions using a standard DPD (N,N-diethyl-p-phenylenediamine) test kit and chlorine-free water.

High levels of chlorine may damage pool equipment. Exercise caution or consult with an experienced aquatic professional.