



Countywide Services Agency

Environmental Management
Department

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RECOMMENDED GUIDELINES AND PROCEDURES FOR DISINFECTING PUBLIC SWIMMING POOLS AND SPAS AFTER A FECAL ACCIDENT

Purpose	The purpose of this bulletin is to provide public pool operators with the recommended procedures and guidelines to follow in the event of a fecal accident. The recommended procedures are applicable to all types of public pools (i.e., swimming, wading, spas, and special use).
Background	Fecal accidents in public pools can lead to the transmission of serious illness from microorganisms such as <i>Giardia</i> , <i>Cryptosporidium</i> , <i>E. coli</i> O157:H7 and <i>Shigella</i> . Precautionary measures should be taken to help reduce the risk of illness to pool users.
Minimum Daily Requirements	The California Health and Safety Code (CHSC) Section 65529 addresses keeping pool water balanced and maintaining proper pH and disinfectant levels. It is recommended that the free chlorine residual be maintained at or above 1.5 ppm and the pH between 7.4 and 7.6 at all times the pool is open for use. The pool should not be open for use unless the filtration and automatic disinfection equipment are operating. If proper recirculation or disinfection cannot be maintained, the pool should be closed.
Close pool and remove material	<p>When a fecal accident occurs, close the pool(s) and instruct all pool users to exit the pool(s) immediately. Do not allow anyone to enter the contaminated pool(s) until all the following steps are completed.</p> <p>Immediately 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.</p>
Solid Stool or Diarrhea and chlorine level	<p>If the fecal accident involves a “formed stool” (solid, not liquid or loose), raise the free available chlorine residual to 2 ppm (parts per million) and maintain the pH between 7.2 – 7.5 with a temperature of about 77°F (25°C) for at least 25 minutes. If a free available chlorine residual of 3 ppm is present, the time can be reduced to 19 minutes.</p> <p>If the fecal accident involves “diarrhea or a loose stool,” raise the free available chlorine concentration to 20 ppm (mg/L) and maintain the pH between 7.2 and 7.5 with a temperature of about 77°F, for at least 12.75 hours to achieve the CT (contact time) value of 15,300. The CT value is the concentration of chlorine in ppm (mg/L) multiplied by the time in minutes. In this case, a 20 ppm (mg/L) concentration of chlorine maintained in a pool for 12.5 hours or 765 minutes will result in a CT value of 15,300 (765 minutes X 20 ppm [mg/L]). Any combination of chlorine concentration and time resulting in a CT value of 15,300 or greater can be used to achieve disinfection.</p> <p>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.</p>

Continued on next page

pH and reopening 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.

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.

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 (mg/L).

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.

Log Accidents Establish a fecal accident log which shall be kept at the pool site. Document each fecal accident by recording the following information:

- a. Date
- b. Time of the event
- c. Formed stool or diarrhea
- d. Free available chlorine concentration and pH at the time of observation of the event
- e. Free available chlorine and pH before reopening the pool
- f. Contact time
- g. Procedures followed to respond to the fecal accident, including the process used to increase the free chlorine residual if necessary.

Vomitus Accident In the event of contamination with vomitus in a pool, the procedures for a “formed stool” (3A above) should be followed.

Notes and References

- The above fecal accident pool closure procedures are based on recommendations by the Centers for Disease Control and Prevention (CDC) and Shields, JM; Arrowood, MJ; Hill, VR and Beach, MJ. (2007) Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. Journal of Water and Health. In Press.
- All contact times (CT) assume a water temperature of 25 C (77° F).
- Theoretical pool closure times for 99.9% inactivation of Giardia Cysts by free available chlorine, pH 7.5 25 C is derived from the EPA’s Disinfection Profiling and Benchmarking Guidance Manual.
- The “short pool closure time” is the chlorine concentration/contact time (CT) theoretically required to inactivate Giardia cysts. The “long pool closure time” is the chlorine concentration/contact time theoretically required to inactivate Cryptosporidium oocysts.
- Non-chlorine disinfectants are not addressed and should not be used because there is limited pathogen inactivation data available for these compounds.
- 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. **Unpublished laboratory study data from CDC indicates this level of crypto CT value cannot be reached in the presence of 50 ppm chlorine stabilizer (cyanuric acid), even after 24 hours at 40 ppm free chlorine, pH 6.5 at a temperature of about 77°F (25°C).** (Consult with an experienced aquatic professional).
- Many conventional test kits cannot measure free available chlorine in a range that includes 20 ppm (mg/L). 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.

Questions For further information or to report a fecal accident at a public swimming pool, please contact this office at (916) 875-8440.
