



# County of Santa Cruz

## Health Services Agency - Environmental Health

701 Ocean Street, Room 312, Santa Cruz, CA 95060  
(831) 454-2022 TDD/TTY - Call 711 <http://www.sceeh.org>  
[EnvironmentalHealth@santacruzcounty.us](mailto:EnvironmentalHealth@santacruzcounty.us)



### RECOMMENDED GUIDELINES AND PROCEDURES FOR THE DISINFECTION OF PUBLIC SWIMMING POOLS AND SPAS AFTER A FECAL ACCIDENT

#### **Purpose**

The purpose of this notice 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 Giardia, Cryptosporidium, E. coli O157:H7, and Shigella. 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 the pool water balanced and maintaining pH and disinfectant levels. Pool chemistry must be maintained at the following during general operation:

*Pools without Stabilizer (Cyanuric Acid)*  
*pH 7.2-7.8*  
*Free Chlorine 1.0-10.0PPM*

*Pools with Stabilizer (Cyanuric Acid)*  
*pH 7.2-7.8*  
Raise the free-chlorine concentration in the pool to 2.0 PPM but keep below 10PPM

Cyanuric acid should be no more than 100PPM. It is recommended that the free chlorine residual be maintained at or above 2.0 ppm, the pH be between 7.4 and 7.6, and cyanuric acid remain below 30PPM when 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**

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.

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.

### **Solid Stool or Diarrhea and Chlorine Level**

- If the fecal accident involves a “formed stool” (solid, not liquid or loose), raise the free available chlorine residual to 2.0 ppm (parts per million) and maintain the pH between 7.2 and 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.
- 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 – 7.5 with a temperature of about 77°F (25°C) for at least **12.75 hours to achieve the CT 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 12.75 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. Note: a higher chlorine residual and contact time is required for pools treated with stabilizer (Cyanuric Acid). See summary below:

#### **Formed fecal stool or vomit**

##### *Pools with Stabilizer (Cyanuric Acid)*

Raise the free-chlorine concentration in the pool to **4 ppm for at least 1 hour**.  
The **pH shall be lowered to 6.5**.

##### *Pools without Stabilizer*

Maintain the free-chlorine concentration in the pool at **2 ppm (mg/L) for at least 25 minutes**.

#### **Diarrhea or loose stool**

##### *Pools with Stabilizer (Cyanuric Acid)*

Raise the free-chlorine concentration in the pool to **40 ppm for at least 30 hours**.  
The **pH shall be lowered to 6.5**.

##### *Pools without Stabilizer*

Maintain the free-chlorine concentration in the pool at **20 ppm (mg/L) for at least 12.75 hours**.

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.

### **pH and Reopening**

- During the entire treatment period, ensure that the pH is maintained between 7.2 – 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 (3) widely spaced locations away from return inlets.
- **The pool may be reopened after the required time/concentration or CT value has been achieved and the free available chlorine residual is between 1.0–10.0 PPM (mg/L.) or 2.0–10.0 PPM when using stabilizer.**
- 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.

### **Vomitus Accident**

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

### **Near Drowning and Drowning Incidents**

If a near drowning or drowning incident occurred and confirmation of fecal, vomit, loose stool or blood contamination cannot be made, the pool operator shall disinfect the pool water according to the requirements for “Diarrhea or loose stool” provided above.

### **Accident Record Keeping**

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 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 a fecal accident, including the process used to increase the free chlorine residual if necessary.
- h. The number of pool users in the pool and length of time between occurrence, detection, and resolution of the incident.

## **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 77°F (25°C.)
- Theoretical pool closure times for 99.9% inactivation of Giardia Cysts by free available chlorine, pH 7.5, 77°F (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 activate Giardia cysts (CT = 45.) The "long pool closure time" is the chlorine concentration/contact time theoretically required to inactivate *Cryptosporidium* oocysts (CT = 15,300.)
- **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 (831) 454-2022.