County of San Diego

Department of Environmental Health

5500 Overland Ave. San Diego, CA 92123 ♦ (858) 505-6900 ♦ www.sdcdeh.org

RECOMMENDED RESPONSE TO FECAL ACCIDENTS IN PUBLIC SWIMMING POOLS

The purpose of this document is to provide public pool operators and technicians 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, special use, and spas).

CDC has recently (February 2008) revised the disinfection time required to inactive pathogens (Crypto) associated with diarrheal fecal accidents from 9600 minutes to 15,300 minutes with 1.0 ppm non-stabilized free chlorine. CDC further advises that non-stabilized free chlorine be used to disinfect fecal accident contaminated pool water.

When a fecal contamination of a public pool occurs, take the following action:

1. Instruct pool management to have all pool users exit the pool. The pool is to be closed from use while the sanitizing procedures are being followed.

2. Remove all visible fecal material. Vacuuming stool from the pool is not recommended. If a pool water-vacuuming device is used, the wasted water should discharge to the sewer, not back into the pool recirculation system. Equipment used to remove visible fecal material is to be thoroughly cleaned and sanitized prior to storage.

3. If the fecal accident involves a **formed stool** (solid, not liquid), raise the free available chlorine concentration to 2 mg/L (parts per million) and maintain the pH between 7.2 – 7.5 for at least 25 minutes before reopening the pool.

4. If the fecal accident involves **diarrhea** or a loose stool, raise the free available chlorine concentration to 20 ppm (mg/L) and maintain the water's pH between 7.2 – 7.5 for at least 12.75 hours to achieve a contact time (CT) value of **15,300**. The CT value is the concentration of chlorine in ppm (mg/L) by the time in minutes. **Only non-stabilized chlorine should be used to achieve inactivation of pathogens associated with the fecal contamination. CDC has determined that stabilized chlorine is less ineffective in inactivation of Crypto.**

15,300 = Free Chlorine Residual x Minutes

EXAMPLE: Free chlorine residual increased to 20ppm. This residual would need to be continuously maintained for 765 minutes (12.75 hours) in order to reach the "15,300 contact time" equivalent.

15,300 = 20ppm x 765 Minutes

EXAMPLE: Free chlorine residual increased to 40ppm. This residual would need to be continuously maintained for 383 minutes (6 hours) in order to reach the "15,300 contact time" equivalent.

15,300 = 40ppm x 383 Minutes

Since most commonly available pool water test kits cannot test for the elevated residuals needed in this procedure, serial dilutions of the tested pool water may need to be done.

Pool operators may use higher or lower free chlorine residuals if so desired. This will reduce or increase the amount of contact time required as shown in the previous examples.

5. The pH of the pool water should be between 7.2 and 7.6.

6. The recirculation/filtration system should be continuously operated during the sanitization-contact time period. The filters should be backwashed and filter material replenished as required, as the mid-point of contact time period, and again at the end of the period prior to placing the pool back into use. Disassembly of the filters for interior cleaning is no longer specifically recommended, as the filter interior and parts will be exposed to the "9600 contact time" equivalent.

7. Small volume public pools (spas and waders), as an alternative, may be completely drained of all water, provided it is discharged to the public sewer or approved disposal system. Sanitizing of all pool interior surfaces and recirculation equipment will be required which would expose the interior pool and pumping-filtration equipment surfaces to the "9600 contact time" equivalent. A solution of one part 12% sodium hypochlorite in 20 parts of clean water can be used to sanitize interior parts and surfaces (6000ppm free chlorine for one minute and thirty-six seconds).

8. When the sanitizing-contact time period is completed, the pool can be re-opened for bathing provided excess free chlorine levels are reduced to acceptable values, the pH balanced as needed, the filter(s) recharged, and the recirculation system is operating.

Dosages of non-stabilized chlorine compounds to treat 10,000 gallons of pool water

To raise free chlorine by:	1ppm	5ppm	10ppm
Calcium hypochlorite ("Cal-Hypo" – 65% granular or tablets. pH=11.8)	2 oz.	10 oz.	20 oz.
Sodium hypochlorite (bleach-pool strength - 12-15% - liquid pH=13.0)	13 fl.oz.	½ gal.	1 gal.
Lithium hypochlorite (35% - powder pH=10.7)	4 oz.	20 oz.	40 oz.

(Although gaseous chlorine is non-stabilized, direct injection into the pool water is not recommended.)

EXAMPLE: Pool volume is 100,000 gallons. Pool operator wants to use 20ppm free chlorine for contact. How much of the various chlorine-containing compounds will be needed to raise the free chlorine residual to 20ppm?

Solution (using sodium hypochlorite): One gallon of sodium hypochlorite will impart a 10ppm rise in 10,000 gallons of water. In 100,000 gallons of water, 10 gallons will then provide a 10ppm rise. Since 20ppm is the desired level, 2 x 10 gallons = 20 gallons.

Solution (using calcium hypochlorite): 20 oz. (1.25 lbs.) of calcium hypochlorite will impart a 10ppm rise in 10,000 gallons of water. In 100,000 gallons, 200 oz. (12.5 lbs.) will then provide a 10ppm rise. Since 20ppm is the desired level, 2 x 200 oz. = 400 oz. (25 lbs.).

Solution (using lithium hypochlorite): 40 oz. (2.5 lbs.) of lithium hypochlorite will impart a 10ppm rise in 10,000 gallons of water. In 100,000 gallons of water, 400 oz. (25 lbs.) will then provide a 10ppm rise. Since 20ppm is the desired level, 2 x 400 oz. = 800 oz. (50 lbs.).

The pool operator should be cautioned that the three chlorine compounds recommended in this procedure all have high pH's. Addition of these chemicals to the pool water will increase the pH. Chemical balancing of the water may be needed to maintain the optimal pH range of 7.2 – 7.6.