RECOMMENDED RESPONSE TO FECAL ACCIDENTS IN AQUATIC VENUES

The purpose of this document is to provide aquatic venue 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 aquatic venues (i.e., swimming, wading, special use, and spas).

CDC further advises that non-stabilized free chlorine be used to disinfect fecal accident contaminated aquatic venues.

When a fecal contamination of an aquatic venue occurs, take the following action:

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

2. Remove all visible fecal material. **Vacuuming stool from the aquatic venue is not recommended**. If a water-vacuuming device is used, the wasted water should discharge to the sewer, not back into the aquatic venue's 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 ppm (mg/L) and maintain the pH between 7.2 – 7.5 for at least 25 minutes before reopening the aquatic venue. **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 pathogens. If your aquatic venue uses stabilized chlorine products (i.e. trichlor or dichlor) for normal disinfection you must have a non-stabilized chlorine product available to use for fecal accident pathogen inactivation.**

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. Aquatic venue operators may use higher or lower free chlorine residuals if so desired. This will reduce or increase the amount of contact time required. **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 pathogens. If your aquatic venue uses stabilized chlorine products (i.e. trichlor or dichlor) for normal disinfection you must have a non-stabilized chlorine product available to use for fecal accident pathogen inactivation.**

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 aquatic venue water test kits cannot test for the elevated residuals needed in this procedure, serial dilutions of the tested aquatic venue water may need to be done.

Aquatic venue 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 aquatic venue 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 midpoint of contact time period, and again at the end of the period prior to placing the aquatic venue 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 “15,300 contact time” equivalent.

7. Small volume public aquatic venues (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 aquatic venue interior surfaces and recirculation equipment will be required which would expose the interior aquatic venue and pumping-filtration equipment surfaces to the “15,300 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 three minutes).

8. When the sanitizing-contact time period is completed, the aquatic venue 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 aquatic venue water

To raise free chlorine by:	1ppm	5 ppm	10 ppm
Calcium Hypochlorite(65%)	2 oz.	10 oz.	20 oz.
Lithium Hypochlorite(35%)	13 fl. oz.	½ gal	1 gal
Sodium Hypochlorite(10-12%)	4 oz.	20 oz.	40 oz.

EXAMPLE: Aquatic venue volume is 100,000 gallons. Aquatic venue 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 aquatic venue operators should be cautioned that the three chlorine compounds recommended in this procedure all have high pH's. Addition of these chemicals to the aquatic venue water will increase the pH. Chemical balancing of the water may be needed to maintain the optimal pH range of 7.2 – 7.6.