



Cryptosporidium Remediation

The worst fear of any commercial pool operator is what is commonly referred to as an accidental fecal release (AFR) or a "code brown."

These terms are more polite ways to express that someone pooped in the pool. According to the Centers for Disease Control and Prevention (CDC), there are two types of AFRs that can occur and the remediation process.

According to research by the CDC, the release of a solid stool does not pose the same contamination risk as a diarrheal release, which may contain Cryptosporidium, which dictates a specific remediation process.

Treatment Process of AFR with a Solid Stool

- Clear all swimmers from the pool
- Adjust the pH to 7.5 or lower
- Adjust free available chlorine (FAC) to 2 ppm
- Hold pH and FAC for 25 minutes

Treating Diarrheal AFR, no CYA in Pool*

This procedure requires more time due to the increased risk of Cryptosporidium being present and resistance to normal free available chlorine levels.

- Clear all swimmers from the pool
- Adjust pH to 7.5 or lower
- Adjust FAC to 20 ppm
- Hold pH and FAC for 12.75 hours

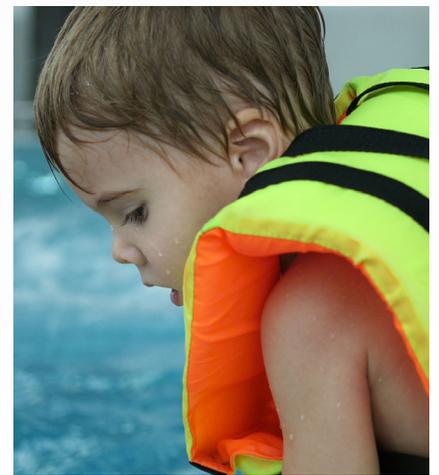
The Model Aquatic Health Code (MAHC) also recommends circulating pool water through a secondary disinfection system such as ozone or UV to help reduce the number of Crypto oocysts present in the pool water.

Treating Diarrheal AFR, with CYA in Pool*

For pools that have a level of CYA stabilizer or that use trichlor tablets or dichlor, the following recommendation must be followed.

- Lower or adjust CYA level to no more than 15 ppm
- Raise the FAC level to:
 - 20 ppm for at least 28 hours
 - or 30 ppm FAC for at least 18 hours
 - or 40 ppm for at least 8.5 hours
- Complete draining and sanitization of the pool serves as a replacement for the above procedures

*Diarrhea AFR Remediation for pools with and without CYA stabilizer as recommended in 2018 MAHC





TECH POINTS



Cryptosporidium Defined

Cryptosporidium (Crypto) is a parasitic protozoan microorganism that enters humans from tainted food or water. It is spread by orally consuming contaminated feces of diseased humans or animals. In swimming pools, Crypto is spread from swimmers who release diarrhea in the pool. Crypto is the number one cause of Recreational Water Illness (RWI) in public aquatic facilities. There are two key reasons why Crypto warrants so much attention.

There are millions of Crypto oocysts (infant parasites) released from one small diarrheal release in the pool. Second, due to the protective thick walls of the Crypto oocysts, they are resistant to inactivation for up to 10 days in normally chlorinated pools with an FAC of 1-3 ppm. Their relatively small size of 4-6 microns allows the organism to pass through most pool filters. One diarrheal AFR injects millions of chlorine resistant microorganisms that must be taken seriously. The MAHC recognizes that the presence of any measurable level of CYA above 15 ppm significantly reduces the effects of chlorine and will affect the expected remediation outcome.

Hyperchlorination Tables

No Stabilizer Present		With Cyanuric Acid Stabilizer Present	
FAC ppm	Time (hours)	FAC ppm	Time (hours)
20	12.75	20	28
10	25.5	30	18
		40	8.5

Graph courtesy of National Recreation and Parks Assoc. (NRPA). Recreational Water Disinfection June 2017 by Ellen Meyer

The Most Effective Type of Chlorine for Inactivation of Crypto

When dealing with an AFR event, it is obvious that chlorine sanitizing is needed immediately. Depending on the type of AFR, the amount of chlorine will vary considerably. In dealing with Crypto inactivation it is obvious that stabilized forms of chlorine such as dichlor or trichlor should not be used. Cal hypo shocks are available, but lead to increased levels of hardness from calcium. Storage of Cal hypo in large quantities can be hazardous.

Liquid sodium hypochlorite is a preferred means of shocking pool water to deal with any AFR type release. HASA Sani-Chlor® is a highly filtered pure strength form of bleach that is extremely effective at inactivating microorganisms. As a liquid, Sani-Chlor® is pre-dissolved and is immediately available to attack the Crypto in a contaminated pool. Sani-Chlor® does not leave any byproducts in the pool such as CYA stabilizer or calcium. It is also safe to store and does not present a fire or combustion threat.

References:

2018 Model Aquatic Health Code U.S. Department of Health and Human Services Centers for Disease Control and Prevention (CDC). Formed Stool MAHC 6.5.3.1A, Diarrheal 6.5.3.2A

*Aqua article CYA and Chlorine in Plain Language- Ellen Meyer July 2019



Crypto treatment - No CYA present:
20 ppm FAC
Maintain for 12.75 hours



Crypto treatment - CYA present
Lower CYA to max 15 ppm · 20 ppm FAC
Maintain for 28 hours

