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FECAL PROTOCOL

Issues

Primary:

- To disinfect the area surrounding the point of contamination and affected water
- To minimize the possibility of contamination from bacteria, viruses or parasites.

Secondary:

- To demonstrate to bathers that staff respond in a timely and responsible manner to fecal incidents.

Types of Fecal Contamination

Bacteria:

Fecal contamination from a 60-kilogram person can introduce about 2 billion bacteria into swimming pool water. Chlorine kills the bacteria; however,

- Chlorine can take up to 20 minutes to effectively destroy bacteria. During this time, bacteria, in sufficient concentrations, can infect a host.
- Solid fecal material, bacteria and other organic material can consume most free available chlorine in an area of fecal contamination. As a result, swimmers may be unprotected from other bacteria contamination.

Viruses:

Viruses can be introduced into swimming pool water through fecal contamination; however,

- it takes fewer viral organisms to infect a host
- viruses are destroyed at much lower levels of chlorine than bacteria.

Parasites:

Cryptosporidium and Giardia are two very durable parasites that are difficult to oxidize.. Both parasites manifest themselves in the digestive tract of wildlife such as cows, horses, dogs, cats, and beavers. They enter the environment through the fecal material of an animal. Once outside an animal, the parasite constructs a cyst or an oocyst, which acts as a protective shell during the dormant stage of the organism.

The resistant form of the parasite can be carried into a pool either through direct contamination of the water supply, or indirectly through a shoe or article of clothing. Generally, few oocysts are required to infect a host. Once ingested, an oocyst lodges itself in the digestive tract of the host and a parasite emerges. Upon emergence, the parasite propagates and spreads contamination in the intestinal tract.

Giardia cysts are relatively resistant to chlorine especially at higher pH and low temperatures, however may be eradicated through typical swimming pool procedures (725 mV ORP/2 ppm Free Chlorine). Due to their large size (10 to 15 microns), filtration, whether through

diatomaceous earth or sand filters, is also generally effective in removing the cysts of Giardia.

It is not as easy to deal with a Cryptosporidium oocyst. The oocyst is very small (4 to 6 microns) and difficult to remove through filtration. It is very resistant to chlorine. The Center for Disease Control in Atlanta recommends that Cryptosporidium oocyst be exposed to a Ct level of 9600 to destroy the oocyst. *(Ct is the relationship between concentration of the sanitizer and time.)*

The following formula represents a practical application.

C (Concentration in ppm) x t (time in minutes) = 9600

For example:

- 1 ppm free chlorine x 9600 min (160 hours) = 9600 Ct
- 10 ppm free chlorine x 960 min (16 hours) = 9600 Ct
- 40 ppm free chlorine x 240 min (4 hours) = 9600 Ct

Recommended Treatment for Fecal Contamination

Formed stool (solid, non-liquid), Vomit

Solid fecal material is an indicator of a healthy intestinal tract. The greatest health concern is contamination from bacteria.

Vomit is primarily an esophageal and/or stomach issue. It can be brought about by irritation, disease or condition. The main risk resulting from vomit is expelling of bacteria, which can easily be sanitized through the use of chlorine.

Procedures should include:

Direct everyone to leave all pools into which water containing the feces is circulated. Do not allow anyone to enter the contaminated pool(s) until all decontamination procedures are completed.

Remove the visible fecal material or vomit by using a net, scoop or vacuum and dispose the fecal material in a sanitary manner. Staff should wear appropriate personnel protective equipment. Clean and disinfect all equipment using a 20% solution of sodium hypochlorite.

Note: No uniform recommendations for disinfection of vacuum systems are available. If a vacuum system is used, the waste should be discharged directly to a sewer or other approved waste disposal system and not through the filtration system. The dilution effect of the pool water going through the hose may reduce the risk for high-level contamination of the vacuum system.

If necessary, clean and disinfect deck surfaces or equipment with a 20% sodium hypochlorite solution.

Test the pool water to ensure the Free Chorine concentration is no less than 2.0 ppm and the pH is no greater than 7.5. Water test samples should be taken from a variety of locations in the pool. If the swimming pool system uses a controller ensures the ORP level is no less than 725 mV.

Ensure the circulation system is operating. This provides proper and continuous filtration and disinfection of pool water.

Maintain the Free Chlorine and pH/ORP levels for a minimum of 30 minutes prior to permitting swimmers to enter the pool.

Document the fecal contamination by recording date, time, location, action taken and other relevant details.

Diarrhea Contamination (Liquid Stool)

Diarrhea contamination can be a sign of an intestinal disorder that may be parasitic. However in the majority of cases the operator will not know the cause of the diarrhea. The prudent course of action is to treat the pool for the most difficult contamination, Cryptosporidium.

Procedures should include:

Evacuate bathers from swimming pool, spa or hot pool. Direct all patrons in the pool to take a cleansing shower, particularly if they wish to transfer to another pool in the facility.

Remove fecal material. Staff should wear appropriate personal protective equipment. Vacuum fecal material to the sanitary sewer. Disinfect vacuum and other equipment used to remove fecal material before re-using.

Raise the Free Available Chlorine concentration to achieve a Ct inactivation value of 9600. Ensure pH levels are maintained between 7.2 and 7.5 during super chlorination. Chlorine concentration should be determined by water tests taken from at least three widely spaced locations away from return water outlets.

Ensure that the filtration system is operating while the pool reaches and maintains the proper free available chlorine concentration during disinfection.

Backwash the filter thoroughly after reaching the CT value. Be sure the effluent is discharged directly to waste (do not return the backwash through the filter).

If draining small pools and wading pools provides more practical option, ensure a minimum drying time of 4 hours to inactivate Cryptosporidium.

Bathers may re-enter pool, spa or hot tub once free chlorine has returned to normal operating level.

Ozone Supplement – Full Stream

The ozone Ct for Cryptosporidium oocyst is 10. As there is no residual ozone in the swimming pool, the operator must be confident that a Ct value of 10 can be achieved in the contact chamber.

Procedures should include:

Evacuate bathers from swimming pool, spa or hot pool

Remove fecal material. Staff should wear appropriate personal protective equipment. Vacuum fecal material to the sanitary sewer. Disinfect vacuum and other equipment used to remove fecal material before re-using.

Ensure ozone system is in full operation

Allow swimming pool, spa or hot pool water to circulate for a minimum of four turnovers to ensure 98% dilution

Bathers may then re-enter swimming pool, spa or hot pool.

Ozone Supplement – Slip Stream

If the ozone system is slipstream, follow procedure described in “Conventional Chlorine Disinfection Systems”.

Chlorine Dioxide Supplement

The chlorine dioxide Ct for Cryptosporidium oocyst is 78. The operator should test for chlorine dioxide levels in the swimming pool and apply the Ct formula.

Procedures should include:

Evacuate bathers from swimming pool, spa or hot pool

Remove fecal material. Staff should wear appropriate personal protective equipment. Vacuum fecal material to the sanitary sewer. Disinfect vacuum and other equipment used to remove fecal material before re-using.

Bathers may re-enter pool, spa or hot tub once the necessary Ct value has been achieved.

Notes

Do not use stabilized chlorine products to raise free chlorine levels in the swimming pool. The stabilizer will “lock-up” some of the chlorine and prohibit the sanitation impact of the Ct value.

Very high levels of chlorine may be hazardous to bathers and mechanical systems. Operators should consider using sodium sulphite to reduce the chlorine to safe levels once the Ct value has been achieved.

Always follow the direction of the local Health Authority when dealing with the health of your aquatic facility.

Operators should confirm the high chlorine levels with high chlorine test kit or test strip.

References

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Cleanup of a Community Swimming Pool After a Cryptosporidium Outbreak; BC Health and Disease Surveillance; Volume 1, Number 11, October 12, 1992

Communicable Disease Unit; Code of Practice for the Control of Cryptosporidium and Giardia in Swimming Pools, Leisure Pools, Spas and Hydrotherapy Pools; Queensland Health, December 1998

Notice to Readers: Responding to Fecal Accidents in Disinfected Swimming Venues; MMWR Weekly; 50(20); 416-417; May 25, 2001

Oregon Health Division; Fecal Accidents/Protocol/Pools & Spas; Policy and Interpretation Manual; July 1, 2000

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