



NAVY AND MARINE CORPS FORCE HEALTH PROTECTION COMMAND IMPROVING READINESS THROUGH PUBLIC HEALTH ACTION

Fecal Incident Response for Swimming Pool Staff

Formed Stools	Diarrhea
<p>Formed stools can act as a container for germs. If the fecal matter is solid, removing the feces from the pool without breaking it apart will limit the degree of pool contamination. Additionally, RWIs are more likely to be spread when someone who is ill with diarrhea has a fecal incident in the pool.</p>	<p>Those who swim when ill with diarrhea place other swimmers at significant risk for getting sick. Diarrheal incidents are much more likely than formed stool to contain germs. Therefore, it is important that all pool operators' stress to patrons that swimming when ill with diarrhea is an unhealthy behavior.</p>
<p style="text-align: center;">For both formed-stools and diarrheal fecal incidents:</p> <ol style="list-style-type: none">1. Close the pool to swimmers. If you have multiple pools that use the same filtration system, ALL pools must be closed to swimmers. Do <u>not</u> allow anyone to enter the pool(s) until the disinfection process is completed.2. Remove as much of the fecal material as possible (for example, using a net or bucket) and dispose of it in a sanitary manner. Clean and disinfect equipment used to remove the material.	
<p style="text-align: center;">VACUUMING STOOL FROM THE POOL IS NOT RECOMMENDED</p>	
<ol style="list-style-type: none">3. Raise the free chlorine to 2 parts per million (ppm), if less than 2 ppm, and ensure pH is 7.5 or less and a water temperature of 77°F (25°C) or higher. This chlorine concentration was selected to keep the pool closure time to approximately 30 minutes. Other concentrations or closure times can be used as long as the contact time (CT) inactivation value* is achieved.4. Maintain free chlorine concentration at 2 ppm and pH at 7.5 or less for at least 25 minutes before reopening the pool. Local regulators may require higher free chlorine levels in the presence of chlorine stabilizers† which are known to slow disinfection. Ensure that the filtration system is operating while the pool reaches and maintains the proper free chlorine concentration during the disinfection process.	<ol style="list-style-type: none">3. If necessary, before attempting hyper-chlorination of any pool, consult an aquatics professional to determine the feasibility, the most optimal and practical methods, and needed safety considerations.4. Raise the free chlorine concentration to 20 ppm[§] and maintain pH at 7.5 or less and temperature at 77°F (25°C) or higher. The free chlorine and pH should remain at these levels for at least 12.75 hours to achieve the CT activation value of 15,300** Crypto CT inactivation values are based on killing 99.9% of Crypto. This level of Crypto inactivation cannot be reached in the presence of 50 ppm chlorine stabilizer, even after 24 hours at 40 ppm free chlorine, pH 6.5 and a temperature of 77°F (25°C).†† Extrapolation of these data suggest it would take approximately 30 hours to kill 99.9% of Crypto in the presence of 50 ppm or less cyanuric acid, 40 ppm free chlorine, pH 6.6 and temperature of 77°F (25°C).5. Confirm that the filtration system is operating while the water reaches and is maintained at the proper chlorine level for disinfection.6. Backwash the filter after reaching the CT inactivation value. Be sure the effluent is discharged directly to waste in accordance with state or local regulations. Do not return the backwash through the filter. Where appropriate, replace the filter media.7. Allow swimmers back into the water only after the required CT inactivation value has been achieved and the free chlorine and pH levels have been returned to the normal operating range allowed by the state or regulatory authority.



Photo from : [CNIC/Naval Base San Diego Aquatics Page](#)

* CT inactivation value refers to concentration (C) of free chlorine in ppm (or mg/L) multiplied by time (T) in minutes at a specific pH and temperature.

† Chlorine stabilizers include compounds such as cyanuric acid, dichlor and trichlor.

‡ Many conventional test kits cannot measure free chlorine levels this high. Use chlorine test strips that can measure free chlorine in a range that includes 20-40 ppm, or make dilutions with chlorine-free water when using standard DPD test kits.

§ If pool operators want to use a different free chlorine concentration or inactivation time, they need to ensure that CT inactivation values always remain the same (refer to the Fecal Incident Response Guide).

** Shields JM, Hill VR, Arrowood MJ, Beach MJ. Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. J Water Health 2008;6(4):513-20.

†† Shields JM, Arrowood MJ, Hill VR, Beach MJ. The effect of cyanuric acid on the chlorine inactivation of *Cryptosporidium parvum*. J Water Health 2008; 6 (1): 109-14.

For more information, tools and resources on swimming pools, visit:

<https://www.med.navy.mil/Naval-Base-San-Diego-Aquatics-Page>
<https://www.med.navy.mil/Naval-and-Marine-Corps-Force-Health-Protection-Command/Preventive-Medicine/Program-and-Policy-Support/Swimming-pools-and-Bathing-Places/>