Minimising the risk of *Cryptosporidium* in public swimming pools and spa pools -for pool operators

What is *Cryptosporidiosis*?

Cryptosporidiosis is an infection of the bowel caused by the protozoan parasite *Cryptosporidium*. It occurs in humans and in a range of domestic and wild animals.

What are the symptoms?

The main symptom of cryptosporidiosis is gastroenteritis (gastro) accompanied by watery diarrhoea and stomach cramps. Vomiting, fever and loss of appetite can also occur. The incubation period (time between infection and symptoms occurring) is usually about 7 days (likely range 1-12 days). Most healthy people will recover within 3-7 days although symptoms can persist for up to 30 days. Infection may be life-threatening in severely immunocompromised individuals. While the infection itself cannot be effectively treated, the symptoms can be managed.

How is it spread?

Cryptosporidium is highly infectious and transmitted by the faecal oral route, including person to person, animal to person (particularly livestock), water and food borne transmission. It must be swallowed to cause infection. The risk of infection is greatest for person to person contact, particularly in the same household. People with cryptosporidiosis can pass it on to others as soon as symptoms develop and for up to two weeks after symptoms have ceased. Swimming pools are of significant concern because they represent a potential source of outbreaks affecting many people. *Cryptosporidium* can only grow inside humans and animals but can survive in the environment for a long period of time.

How can swimmers get sick from swimming in a pool?

Individuals who are infected with *Cryptosporidium* may contaminate pools by carrying the organism on their body into the water or by contaminating the water as a result of accidental excretion. It can be shed by infected individuals for up to 14 days after symptoms cease and swimmers can become infected by swallowing a very small amount of pool water that contains *Cryptosporidium*.

Very high levels of chlorine are needed to kill *Cryptosporidium*. It takes several days to kill *Cryptosporidium* with normal levels of chlorine. High levels of chlorine will kill it in a shorter time but render the water uncomfortable and unsuitable for swimmers.

How can the spread of *Cryptosporidiosis* be prevented in swimming pools?

The best way to stop Cryptosporidium from spreading is to prevent its introduction into the pool by having good bather hygiene.

For more information on the steps bathers, parents/carers, and pool staff can follow, refer to Appendix A – 'Steps to prevent *Cryptosporidium* contamination in public pools and spas'.

Pool operation and maintenance procedures

Public pool operators must ensure filtration, disinfection and water quality parameters are maintained as per the requirements of the Public and Environmental Health (General) Regulations 2006 (the Regulations).

Government
of South Australia

SA Health

Faecal incident response

A faecal release in public swimming pools can pose a risk to the health of swimmers. If a faecal incident occurs please refer to the public health fact sheet 'Faecal release incidents – public pool response strategies' located at http://www.dh.sa.gov.au/pehs/topics/water-swimming.htm

Cryptosporidium incident response

A *Cryptosporidium* incident response may be required if:

> *Cryptosporidium* is detected in a public pool

> an individual with cryptosporidiosis utilises a public pool during the infectious period

> a public pool is implicated in a case or cases of Cryptosporidiosis.

Under these circumstances the Department of Health and Ageing will notify local government and provide advice on the necessary course of action to be taken. This may result in the pool being closed immediately and decontaminated or drained, cleaned and disinfected.

There are varying levels of response to incidences of Cryptosporidiosis associated with public swimming pools and these are determined based on a number of factors. The procedures and responses are broadly defined in the following 3 tiers of response depending on the number of cases involved and whether persons with cryptosporidiosis have used the pool.

1. The pool equipment, environs, water quality, and maintenance records may be inspected by the authority to ensure compliance with the requirements of the Regulations and associated guidelines (normal response to a single case).

2. The pool may be required to be closed to the public to undergo the precautionary decontamination procedure outlined in Appendix B of this document (normal response when more than one case has used the pool during their incubation period or if a person with Cryptosporidiosis has used the pool during their infectious period).

3. An additional level of response may be required in some circumstances; this may require the pool to be closed to the public, drained, cleaned and disinfected. The appropriate level of response may vary based on individual conditions. Specific procedures will be advised by the environmental health section of your local council.

Note that the course of action may vary in response to individual circumstances. In some circumstances follow up microbiological water testing may be required to verify the absence of *Cryptosporidium*.

Routine water testing

Testing for *Cryptosporidium* involves large sample volumes, is expensive and does not determine whether any *Cryptosporidium* found is alive or able to cause infections. It does not provide the necessary information for making operating decisions and as a consequence, routine pool water sampling is not recommended.

Testing is generally only performed in association with outbreaks of illness for the purposes of confirming the presence of *Cryptosporidium* or the effectiveness of remedial measures.

For more information

Health Protection Programs
SA Health
Telephone: 08 8226 7100
Fax: 08 8226 7102
Email: healthprotectionprograms@health.sa.gov.au
www.sahealth.sa.gov.au

Government
of South Australia

SA Health

APPENDIX A – Steps to prevent *Cryptosporidium* contamination in public pools and spas

Pool operators should:

> ensure the pool is operated as per the requirements of the Regulations

> not use untreated water to fill or top up pools

> provide signage at conspicuous locations such as at the pool entrance and in toilet facilities (a *Cryptosporidium* poster is available from your local council or the Department of Health and Ageing)

> provide safe, clean and easily accessible nappy changing facilities and prohibit nappy changing poolside

> inspect the facility frequently

> promote the hygienic principles outlined below to swimmers, staff, clubs, schools and groups using the pool.

All bathers using public pools should:

> not use the pool if suffering from diarrhoea and until 14 days after symptoms have ceased

> use the toilet regularly

> shower themselves and their children with soap and rinse well with water before entering the pool and after defecating

> avoid drinking or deliberately putting pool water in the mouth

> wash hands thoroughly with soap and running water

> not use pool water to wash hands

> not enter the pool if bathers are visibly soiled.

Parents / carers of infants and toddlers should:

> change babies nappies in a bathroom (not poolside) and wash hands thoroughly afterwards

> minimise accidents by assisting young children to make frequent visits to the toilet

> ensure infants who are not toilet trained wear waterproof tight fitting pants over swimmers or nappies to better contain faecal matter.

Persons with incontinence should:

> visit the toilet prior to entering the pool and periodically whilst using the pool

> wear incontinence pads and water-proof undergarments with bathing costumes.

Pool staff should:

> report illnesses to management and not swim until fourteen days after symptoms have ceased if they have diarrhoea

> prepare and implement a faecal incident policy for your pool refer to the public health fact sheet: 'Faecal Release Incidents – Public Pool Response Strategies') and teach this policy to all relevant employees. Ensure staff enforce the policy

> monitor the area for faecal incidents and other behaviours that may put others at risk (e.g. changing nappies at poolside).

APPENDIX B - Precautionary decontamination

When it is suspected that a swimming pool or spa pool may be contaminated with *Cryptosporidium* the following procedure can be used to ensure a CT value (free chlorine concentration (mg/L)* x time (minutes)) of at least 15,300 is achieved. This will inactivate 99.9% of *Cryptosporidium* in the water. Different combinations of concentration and time that achive a CT value of 15,300 are illustrated in the table below.

*mg/L = ppm

Note:

As there is no inactivation data for the use of bromine on *Giardia* or *Cryptosporidium*, pools using bromine as the primary disinfectant must use chlorine in response to a faecal incident.

Free chlorine concentration (mg/L)	x	Time (minutes)	=	CT (15,300)
30	x	510	=	15,300
25	x	612	=	15,300
20	x	765	=	15,300
15	x	1020	=	15,300
10	x	1530	=	15,300
5	x	3060	=	15,300

Procedure:

1. Close the pool to swimmers.

2. Raise the free chlorine concentration (see above) and maintain pH at 7.5 or less.

3. Continue to operate the pumps and filtration systems whilst super chlorinating to ensure disinfection of the entire system.

4. The concentration of free chlorine will need to be checked manually at the beginning, during (at least hourly, but ideally every 30 minutes), and at completion of super chlorination to ensure the minimum CT value is achieved, and to ensure the accuracy of automatic dosing equipment.

5. The filter should be backwashed thoroughly after reaching the CT inactivation value.

6. Before the pool is reopened for use, test the water to ensure that the total concentration of chlorine in the pool is below 10mg/L (ideally below 5mg/L). Sodium thiosulphate may be added to neutralise the excess chlorine.

7. Record the incident, action taken and test results in the template provided (Appendix C) and in the pool log book. The local authority may request a copy of the completed template to verify that the CT value has been achieved.

Government
of South Australia

SA Health

APPENDIX C – Precautionary decontamination recoding template

The following template should be used to document the decontamination procedure. Completed templates should be provided to the local authority upon request and inserted into the pool log book.

Name of facility:			
Address of facility:			
Name of pool(s) undertaking the decontamination:			
Name of operator undertaking the decontamination:			
Date:			
Time	Free chlorine (mg/L)	pH	Notes

CT value =