

Water quality guidelines for public aquatic facilities

Daniel Field

Senior Environmental Health Officer

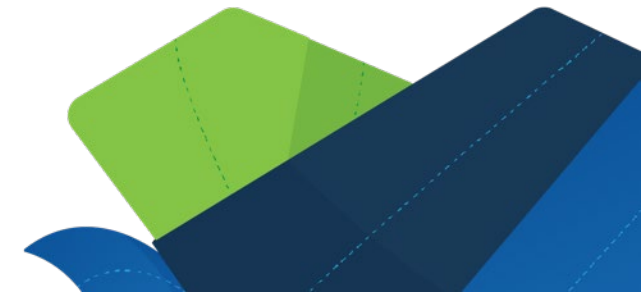
Department of Health



Queensland
Government

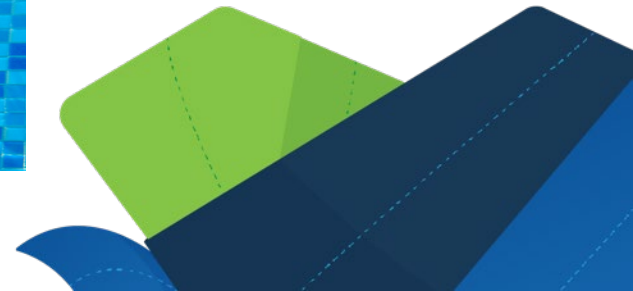
Why do we need guidelines?

- To minimise public health risk
- To promote best practice
- To guide safe operation
- To guide design and upgrade
- To guide regulatory agencies



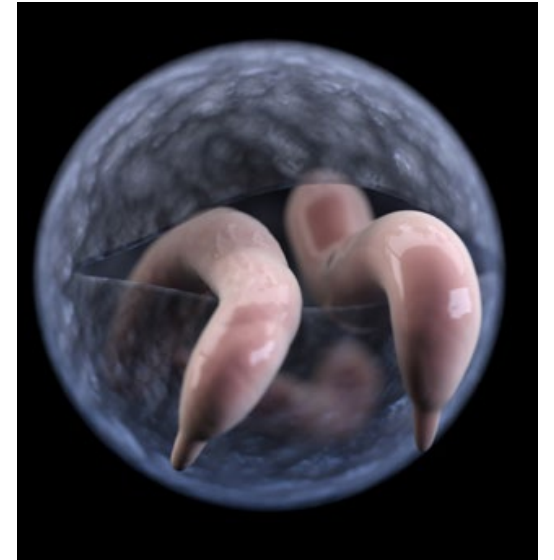
What lies beneath?

- Bacteria – Viruses – Protozoa
- *Cryptosporidium* and *Giardia* the leading causes of pool-related gastro in Australia and world-wide
- Poorly maintained spas can be breeding grounds of *Legionella*
- *Pseudomonas* can accumulate in biofilms and on poorly-maintained surfaces

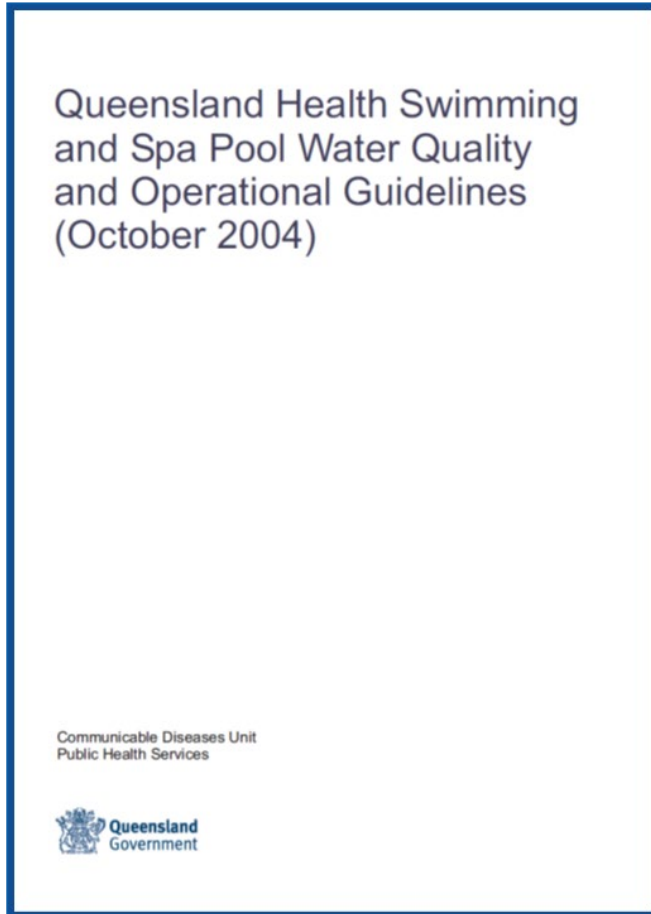


Aquatic facilities and outbreaks of illness

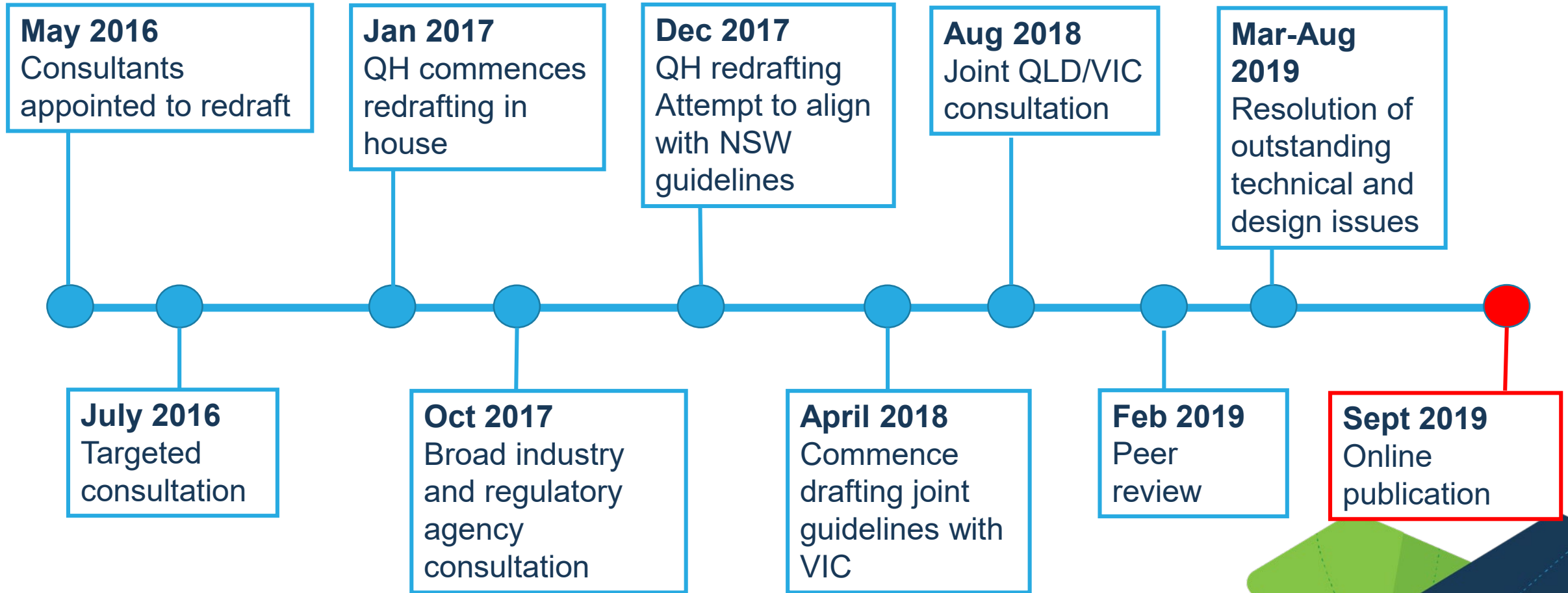
- NSW *Cryptosporidiosis* outbreak 1998 (>1,000 cases)
- Brisbane *Cryptosporidiosis* outbreak 1998 (52 cases, 1 large facility)
- NSW *Cryptosporidiosis* outbreak 2005 (254 cases, 33 pools)
- Victoria *Cryptosporidiosis* outbreak 2006 (134 cases)
- Victoria *Cryptosporidiosis* outbreak 2013 (960 cases, 42 facilities, >20 councils)
- WA *Pseudomonas aeruginosa* at Elizabeth Quay water park



Out with the old, in with the new

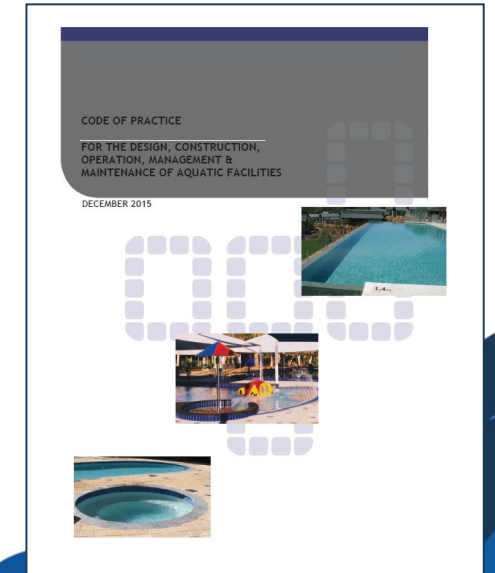
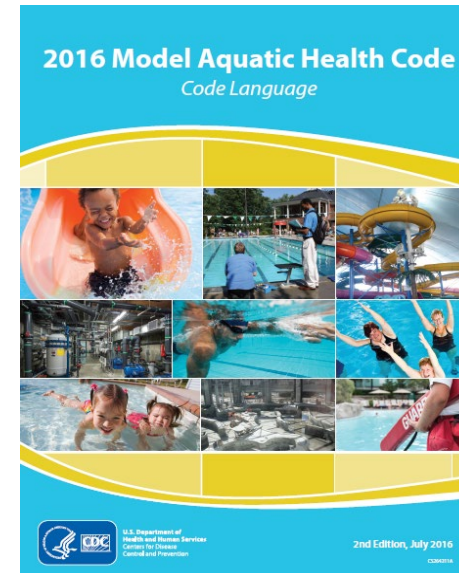
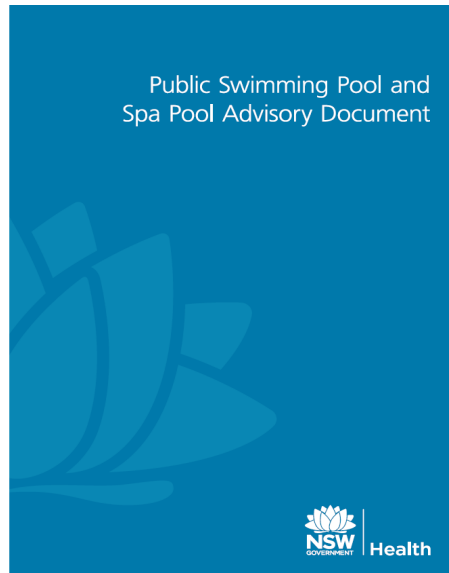


The revision process



Approach of the new guidelines

- Intended audience - operators of public aquatic facilities and the regulators of these facilities
- ‘User-friendly’ guideline - no intention to reproduce highly technical advice available in other documents



Approach of the new guidelines

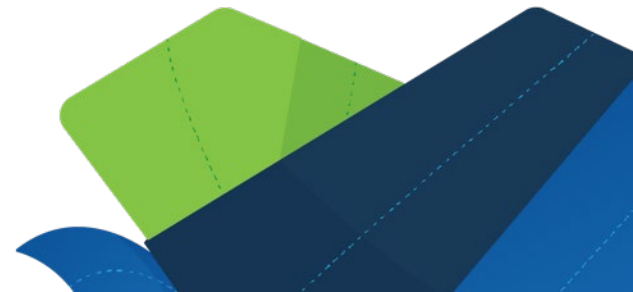


- Not legislation
- Best practice
- Some elements will not be applicable/achievable in some facilities
- Where facilities can not comply with the guidelines, **site-specific risk management plans** are recommended to minimise potential public health risk



Scope of relevant facilities

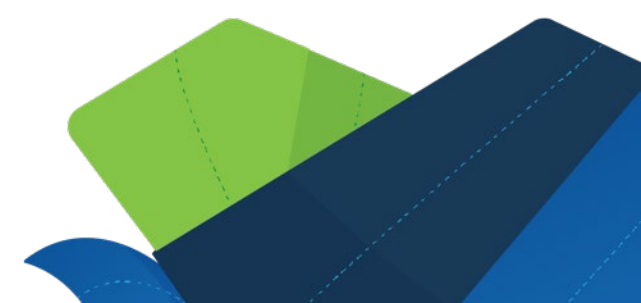
- Public swimming pools and spas
- Learn to swim facilities
- School pools
- Facilities at gyms and fitness centres
- Some facilities associated with apartment blocks, retirement complexes, strata title and body corporate developments
- Holiday accommodation – hotels, motels, holiday parks, holiday apartment complexes
- Water theme parks (waterslides, wave simulators, lazy rivers)
- Splash pads
- Hydrotherapy pools
- Domestic pools used for commercial purposes



Content



- Public health hazards associated with public aquatic facilities
- Regulatory framework
- Treatment processes
- Bather numbers, water circulation, and turnover times
- Managing water balance
- Monitoring
- Healthy swimming
- Incident response
- Operator training



Changes to water quality criteria

Chemical criteria for facilities using chlorine based primary disinfectants

| | Parameter | Situation | Criteria |
|---|---------------------------------|---|-----------------------------------|
| Simplified Previously different levels for indoor pools, indoor pools above 26°C, outdoor pools, outdoor pools with cyanuric acid, outdoor pools above 26°C, outdoor pools with cyanuric acid above 26°C, and spas No increase in levels, some decreases New insertion for interactive water features | Free chlorine | Any pool without cyanuric acid, other than a spa pool | Min. 1.0 mg/L |
| | | Outdoor pool with cyanuric acid | Min. 2.0 mg/L |
| | | Spa pool | Min. 3.0 mg/L |
| | | Interactive water feature | Min. 1.0 mg/L |
| Previously must not exceed half total chlorine with a Max of 1.0 mg/L | Combined chlorine (chloramines) | Any pool or interactive water feature | Max. 1.0 mg/L, ideally < 0.2 mg/L |
| Previously expressed as Free chlorine + 1 with Max of 10 mg/L | Total chlorine | Any pool or interactive water feature | Max. 10 mg/L |
| New criterion | Turbidity (pool water) | Any pool or interactive water feature | Max. 1 NTU, ideally < 0.5 NTU |
| No change | pH | Any pool or interactive water feature | 7.2–7.8 |
| No change | Total alkalinity | Any pool or interactive water feature | 80–200 mg/L |
| Previously expressed as range 30-50mg/L | Cyanuric acid | Outdoor pool only | Max. 50 mg/L, ideally ≤ 30 mg/L |
| No change | Ozone | Any pool or interactive water feature | Not detectable |

Changes to water quality criteria

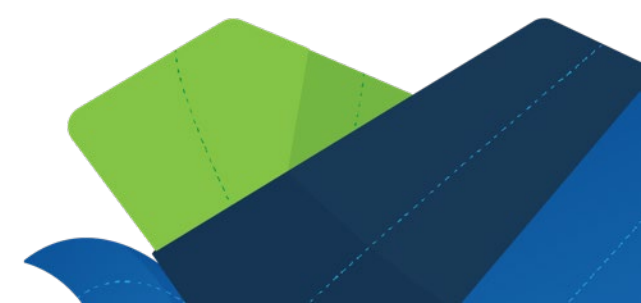
Chemical criteria for facilities using bromine based primary disinfectants

| | Parameter | Situation | Criteria |
|---|------------------------|---------------------------------|------------------------------|
| Simplified Previously only minimum specified. Previously different levels for indoor pools, indoor pools above 26°C, outdoor pools, outdoor pools above 26°C, and spas No increase in levels, some decreases | Bromine | Any pool, other than a spa pool | Min. 2.0 mg/L |
| | | Spa pool | Min. 6.0 mg/L |
| | | Any pool | Max. 8.0 mg/L |
| Increase in upper range from 7.8 to 8.0 | pH | Any pool | 7.2–8.0 |
| New criterion | Sodium bromide | Bromine bank system | Max. 8.0 mg/L |
| | | Ozone/bromide system | Max. 15 mg/L |
| New criterion | Turbidity (pool water) | Any pool | Max. 1 NTU, ideally <0.5 NTU |
| No change | Total alkalinity | Any pool | 80–200 mg/L |
| No change | Cyanuric acid | Any pool | None – no benefit |

Changes to water quality criteria

Microbiological criteria for all facilities

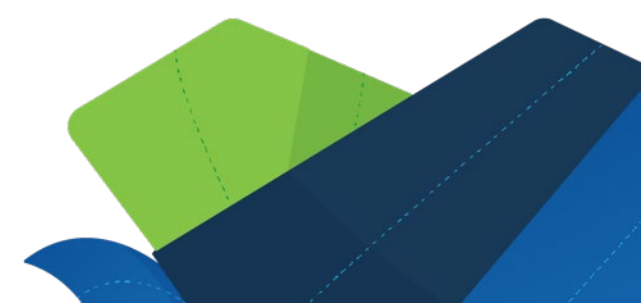
| | Parameter | Guidelines value |
|---|---|--|
| Previous wording – not detected in 100 mL | <i>Escherichia coli</i> (or thermotolerant coliforms) | Less than 1 CFU ⁶ /100 mL or less than 1 MPN ⁷ /100 mL |
| Previous wording – not detected in 100 mL | <i>Pseudomonas aeruginosa</i> | Less than 1 CFU/100 mL or less than 1 MPN/100 mL |
| Previous wording <100/mL | Heterotrophic colony count (HCC) | Less than 100 CFU/mL |



Changes to monitoring recommendations

| Low risk facilities | Medium risk facilities | High risk facilities |
|---|---|---|
| <ul style="list-style-type: none">• Retirement village pools (not used for organised exercise activities e.g. private learn to swim classes)• Residential apartment pools• Diving pools | <ul style="list-style-type: none">• 25 m and 50 m pools• Hydrotherapy pools• School pools• Gym pools• Resort pools• Holiday park pools• Motel pools• Theme park wave pools | <ul style="list-style-type: none">• Spas• Interactive water features• Wading pools• Learn-to-swim pools• Program pools• Water slides• Shallow-depth interactive play pools• Pools used by incontinent people• Artificial lagoons with unrestricted access |

The new guidelines continue to make monitoring requirement recommendations based on risk categorisation of facilities



Changes to monitoring recommendations

Recommended minimum operational monitoring frequency

Reduced requirements for all categories where automated monitoring is in place

No change in requirements for high risk and medium risk facilities where no automated monitoring is in place

Reduction from 2 samples to 1 sample for low-risk facilities where no automated monitoring is in place

| Parameter | Low-risk facilities | Medium-risk facilities | High-risk facilities |
|---|---|------------------------|----------------------|
| Free chlorine and combined chlorine; or bromine | For facilities with automated monitoring* | | |
| | 1 daily sample | 1 daily sample | 1 daily sample |
| | For facilities without automated monitoring | | |
| | 1 daily sample | 3 daily samples | 5 daily samples |
| pH | Tested at the same time as for disinfectant residual (all facilities) | | |
| Water balance (includes calcium hardness, total alkalinity TDS and temperature) | Weekly (all facilities) | | |
| Turbidity | Daily (all facilities) | | |
| Cyanuric acid (if used) | Weekly (all facilities) | | |

*When automated monitoring is in place, the daily sample refers to a sample that is taken by hand and is analysed manually.

Changes to monitoring recommendations

Recommended microbiological verification monitoring frequency

No change to frequency for low-risk and high risk facilities for all parameters

Frequency reduced from every 2 months to quarterly for medium risk facilities

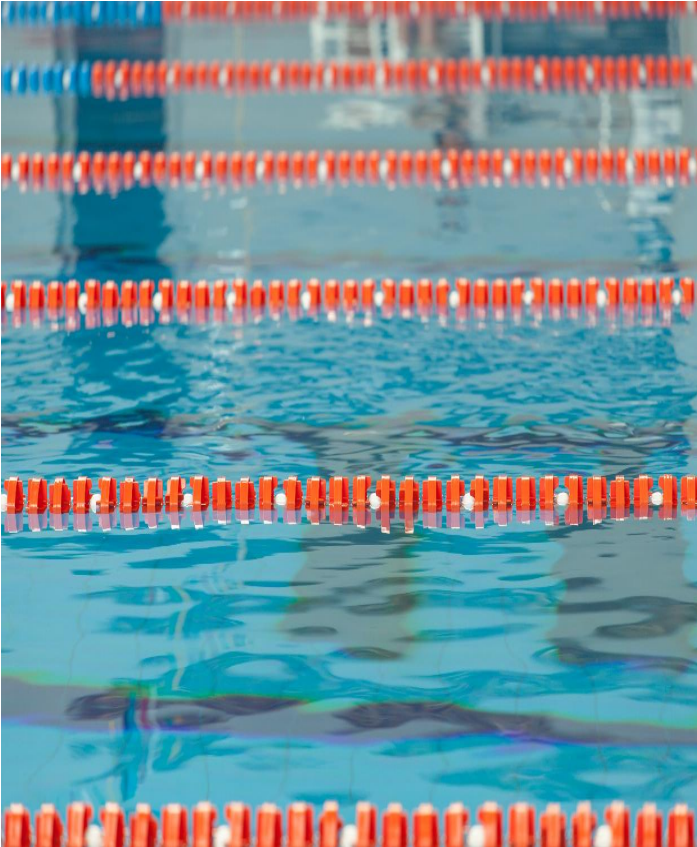
| Parameter | Low-risk facilities | Medium-risk facilities | High-risk facilities |
|--|---------------------|------------------------|----------------------|
| <i>Escherichia coli</i> (or thermotolerant coliforms) | Quarterly | Quarterly | Monthly |
| <i>Pseudomonas aeruginosa</i> | Quarterly | Quarterly | Monthly |
| Heterotrophic colony count (HCC) | Quarterly | Quarterly | Monthly |

Recommended chemical verification monitoring frequency

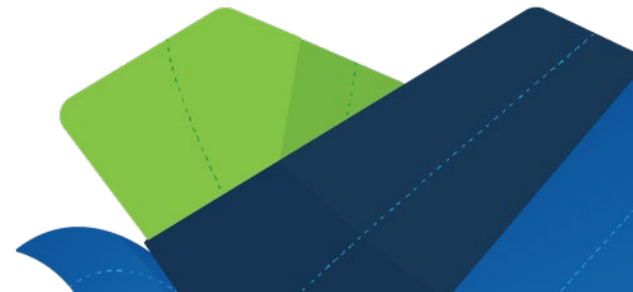
New requirements

| Parameter | Low-risk facilities | Medium-risk facilities | High-risk facilities |
|---------------------------------|---------------------|------------------------|----------------------|
| Chloramines (combined chlorine) | Quarterly | Quarterly | Monthly |
| Ozone (if used) | Quarterly | Quarterly | Monthly |

Advice on treatment processes



- Multi-barrier approach provides greatest benefits
- Minimum standard – filtration combined with primary (chlorine or bromine-based) disinfection
- Secondary disinfection strongly recommended for high risk facilities (UV or ozone)
- Chlorine dioxide may be used as a supplementary shock treatment for managing chloramine concentrations or in response to faecal contamination where manufacturer has validated treatment efficacy
- Automated dosing recommended



Advice on bather numbers, water circulation, turnover times and water balance

- Balance between the number of bathers and the capacity of the facility and treatment plant
- Effective water circulation ensures treated water reaches all areas of the facility and that polluted water is removed efficiently
- Short turnover times, combined with adequate treatment provide the highest level of protection
- Appropriately balanced water is essential for effective disinfection, bather comfort and protecting infrastructure



Healthy swimming

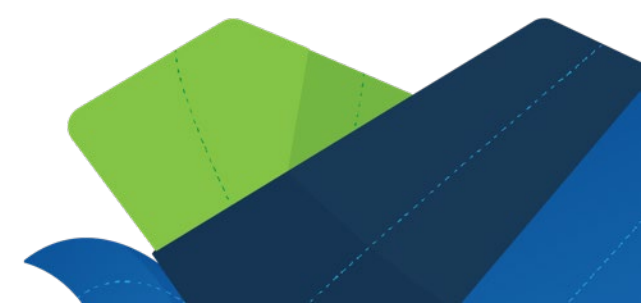


Free to reproduce promotional materials:

- www.health.qld.gov.au/public-health/industry-environment/environment-land-water/water/quality/pool-spa-recreation
- www2.health.vic.gov.au/public-health/water/aquatic-facilities/healthy-swimming
- www.cdc.gov/healthywater/swimming/materials/index.html

Healthy Swimming – key messages

- Swimming while you are or have been sick can contaminate the water and make other people sick
- Do not swim if you have diarrhoea and for 14 days after having a case of diarrhoea
- Shower and wash with soap, especially your bottom, before swimming
- Wash your hands with soap after going to the toilet
- Change nappies in nappy change areas only
- Avoid swallowing pool water



Incident response

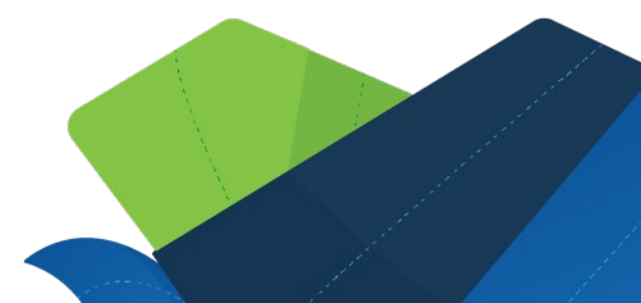


Incident response procedures:

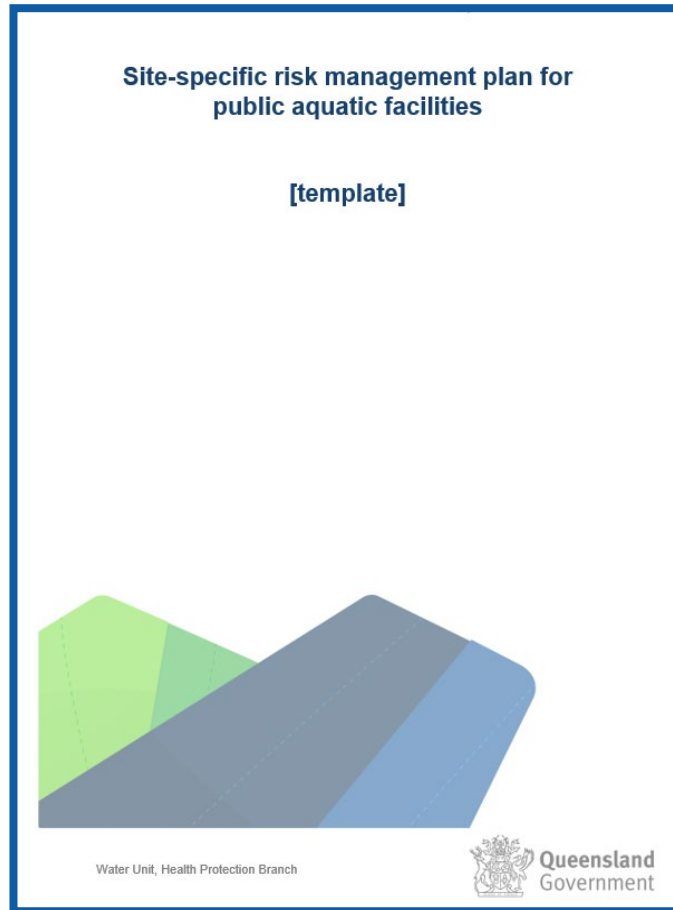
- Diarrhoeal incident – PAF that use chlorine without cyanuric acid
- Diarrhoeal incident – PAF that use chlorine with cyanuric acid
- Formed stool and vomit contamination – PAF facilities that use chlorine with or without cyanuric acid
- Failure to meet micro parameters – PAF other than spas
- Failure to meet micro parameters – Spas
- Contamination of surfaces

Operator training

- The level of training should be proportionate to the risk of the facility being operated
- Strongly recommended that operators of high-risk facilities complete a Cert III or Cert IV in Swimming Pool and Spa Service
- Minimum recommendation is the water quality-oriented competencies of the Cert III and Cert IV
- Recommend having at least one staff member with qualification on-site at all times
- Recommended that managers of facilities, particularly larger facilities, consider self-accrediting or obtaining formation accreditation under an industry-let accreditation framework for facility managers



Site-specific risk management plan template



- For operators of high risk public aquatic facilities and/or public aquatic facilities unable to meet elements of the guidelines
- Focused on addressing hazards associated with water quality and public health risk
- Could be used to assess other risks relevant to the facility (e.g. drowning or slips and trips)

Where to access the guidelines and risk management template



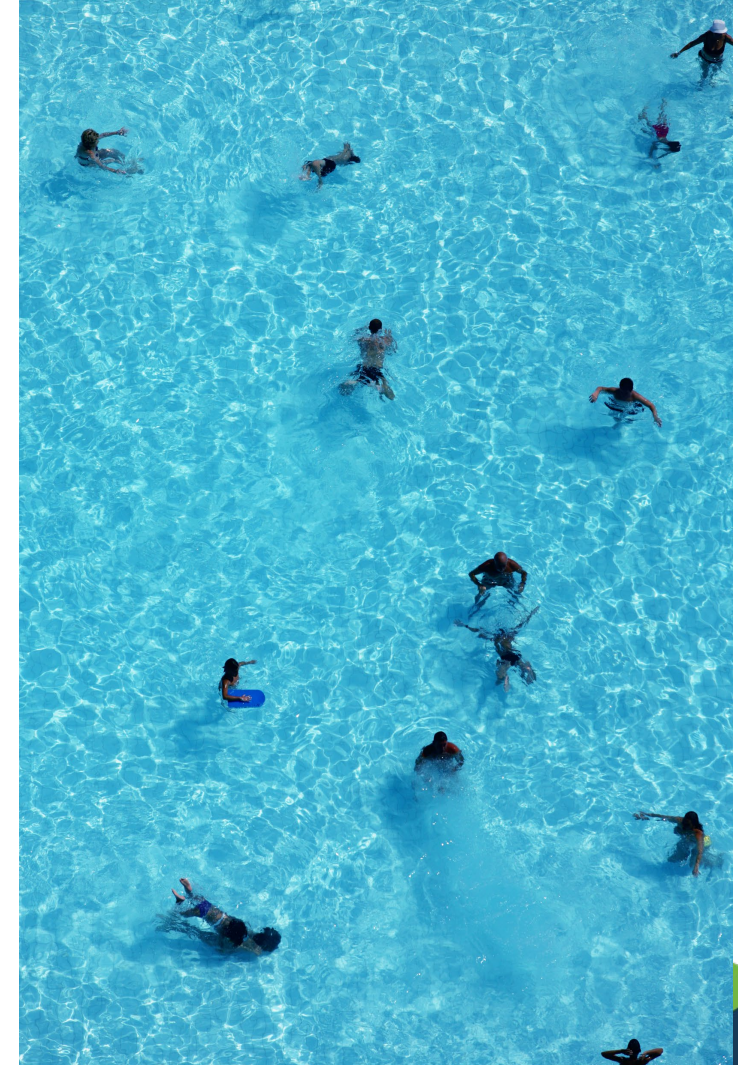
- Go to www.health.qld.gov.au and search for 'public aquatic facilities'
- Always use the most up-to-date version
- Questions relating to content or matters not covered:

Queensland Health Public Health Units
or

Water Unit – Department of Health
waterquality@health.qld.gov.au

Existing facilities

- Changing things like circulation systems, turnover rates and installing secondary disinfection systems can be cost-prohibitive
- Optimise the performance of existing systems
- Consider employing alternative risk management strategies in the context of a site-specific risk management plan
- Adopt best practice when refitting or upgrading water treatment plant or in the design of new facilities



Still to come

- Healthy swimming social media campaign targeting the public
- Information sessions for industry
- Academic research with industry involvement



Questions?

