Alberta Health

Pool Standards

July 2014

Alberta Government

Department	Alberta Health
Title	*Pool Standards, July 2014*
Author	Health System Accountability and Performance
Authority	Section 66(4) of the *Public Health Act*, and Section 2 of the *Public Swimming Pools Regulation* A.R. 204/2014 as amended.
Effective Date	November 30, 2014
Superseded Documents	*Pool Standards, 2006*
Contact	The *Pool Standards, July 2014* are on the Alberta Health website: www.health.alberta.ca/about/health-legislation.html#Standards For general information, call Alberta Health Central Reception at 780-427-7164 and your call will be directed to the appropriate personnel.

Table of Contents

Table of Contents 3
Part 1 Purpose and Application 5
Part 2 Definitions 6
Part 3 Operation and Maintenance of Pools 8
1.0 Pool Operator 8
1.1 Certificate 8
1.2 Qualifications obtained prior to November 30, 2014 8
1.3 Additional Training 8
2.0 Pool Maintenance 8
2.1 Shower water temperature range 8
2.2 Public swimming pool maximum water temperature 8
2.3 Sauna and steam room maximum temperature 9
2.4 Ventilation 9
2.5 Wall clocks 9
2.6 Soap in washrooms and showers 9
2.7 Designated food handling and consumption area 9
3.0 Filtration, Circulation and Disinfection 9
3.1 Recirculation 9
3.2 Collection of water from public swimming pool surface 10
3.3 Maximum rate of filtration 10
3.4 Treatment for recirculating water spray parks 10
4.0 Chlorine, pH and Other Chemical Parameters 10
4.1 Free chlorine residual 11
4.2 Oxidation reduction potential (ORP) 11
4.3 Combined chlorine residual 11
4.4 pH range 11
4.5 Total alkalinity 11
4.6 Cyanuric acid 11
4.7 Non-chlorinated oxidizing products 12
5.0 Testing, Monitoring and Recordkeeping 12
5.1 Operating records 12
5.2 Manual tests 12
5.3 Automated controller results 13
6.0 Microbiological Requirements 13
6.1 Heterotrophic plate count / Total coliforms 13
6.2 *Pseudomonas aeruginosa* 13
7.0 Microbiological Sampling 13
7.1 Water sampling procedure 13
7.2 Collection of water samples 14
8.0 Water Quality and Water Clarity 14
8.1 Bather load 14
8.2 Clarity problems 14

9.0 Anti-Entrapment Devices 14
9.1 Anti-entrapment Plan 15
9.2 Installation of anti-entrapment devices 15
9.3 Main submerged suction outlet 15
9.4 Single or interconnected submerged suction outlet 15
9.5 Other submerged suction outlets 16
9.6 Damaged submerged suction outlets 16
Part 4 Written Policies and Plans 17
10.0 Pool Safety and Supervision 17
10.1 Pool Safety and Supervision Plan 17
11.0 Patron Education and Notification 18
11.1 Education of patrons 18
11.2 Signs posting rules and safety information 18
12.0 Water Quality Incident Response Plan 19
12.1 Water Quality Incident Response Plan 19
12.2 Requirements 20
13.0 General Sanitation Plan 20
13.1 General Sanitation Plan 20
Part 5 Schedules 21
Schedule A 21
Contamination Management for Public Swimming Pools 21
Public Swimming Pool Water Contamination Response 22
Schedule B 24
Calculation for the Maximum Bather Load 24
Schedule C 25
Calculation of Velocity Through Suction Outlets 25

Part 1 Purpose and Application

Introduction

The *Pool Standards, July 2014* (*Pool Standards*) are established under the authority of the *Public Health Act*, RSA 2000, c P-37 (Act) and the *Public Swimming Pools Regulation* (*Regulation*) (AR 204/2014). They have been developed in consultation with the pool industry, pool operators and public health officials from Alberta Health Services. The *Pool Standards, July 2014* replace the *Pool Standards 2006*.

Purpose

The primary objective of the *Pool Standards* is to set specific technical standards pertaining to water quality and facility operations required in the *Regulation*.

The *Pool Standards* set requirements for operator education, recirculation, water chemistry and microbiology, water quality monitoring, anti-entrapment, policies and plans related to pool safety and supervision, public education, water quality incident response and general sanitation.

The *Pool Standards* also include a protocol for management of contaminated public swimming pool water and the calculations for maximum bather load and flow rates through anti-entrapment suction outlets.

The *Regulation* and the *Pool Standards* together govern the operation and maintenance of pools to ensure safe water quality and a safe and sanitary swimming environment for Albertans.

Application

The *Pool Standards* apply to all pools as defined in the *Regulation*.

Pursuant to Section 3 of the *Regulation*, the *Pool Standards* do not apply to:

- a structure containing water constructed for the sole use by owners of a single family dwelling and their families and guests;
- a natural pool; or
- a pool of water that is drained, cleaned and filled after each use by each individual.

Part 2 Definitions

The following terms are defined in the *Regulation* and are repeated here for ease of reference.

a) bed and breakfast	means a bed and breakfast as defined in the *Food Regulation* (AR 31/2006);
b) executive officer	means an executive officer as defined in the *Public Health Act*;
c) natural pool	means an artificially created ecosystem that reproduces the conditions of a natural body of water where water is purified by biological and physical treatment;
d) owner	means the owner of a pool;
e) owner's agent	means the person designated under section 5 as an owner's agent;
f) patron	means an individual who enters the public swimming pool premises and might or might not enter or use the public swimming pool;
g) pool	means a public swimming pool and the public swimming pool's premises;
h) pool operator	means an individual who operates and maintains a pool on a day-to-day basis and meets the qualifications set out in the *Pool Standards* in order to do so;
i) *Pool Standards*	means the *Pool Standards, July 2014* declared in force by section 2;
j) public swimming pool	means a structure that contains water that is used for recreational, therapeutic or other similar purposes and includes a swimming pool, wading pool, water spray park, whirlpool and any fountain or other artificially created pool of water;
k) public swimming pool premises	means the buildings and equipment used in connection with a public swimming pool;
l) suction outlet	means a fitting or fitting assembly and related components, including a cover or grate and sump, that provide a localized low pressure area for the transfer of water from a public swimming pool;
m) swimming pool	Means a structure containing water that is deeper than 60 centimetres at its deepest point

n) wading pool — means a structure containing water the depth of which is 60 centimetres or less throughout the structure;

o) water spray park — means a structure on which water is sprayed or released but does not accumulate;

p) whirlpool — means a structure containing water at a temperature above 30°C and that:

(i) is not drained, cleaned and refilled before use by each individual, and

(ii) utilizes hydro-jet circulation or air induction bubbles or both.

For the purposes of the *Pool Standards*, the following term is defined.

Bather — means a patron who enters or uses the public swimming pool.

Part 3 Operation and Maintenance of Pools

1.0 Pool Operator

For the purposes of section 4 of the *Regulation*, the following pool operator training and certification qualifications apply.

1.1 Certificate

The pool operator must

a) be certified by an organization that is on the List of Approved Pool Operator Education Organizations approved by the Minister, and

b) upon request, provide proof of successful completion of the course in the form of a certificate issued by the approved organization.

1.2 Qualifications obtained prior to November 30, 2014

A pool operator is considered certified if, prior to November 30, 2014, the pool operator

a) has successfully completed a pool operator course through the Alberta Association of Recreation Facility Personnel, the National Swimming Pool Foundation, or a regional health authority in Alberta; and

b) is operating a pool or teaching a pool course.

1.3 Additional Training

An executive officer may require a pool operator to obtain additional training in water treatment, disinfection, facility operation and safety where required.

2.0 Pool Maintenance

For the purposes of section 11 of the *Regulation*, the following pool maintenance standards apply.

2.1 Shower water temperature range

Every shower must provide water at a temperature of not less than 35 degrees Celsius and not greater than 45 degrees Celsius.

2.2 Public swimming pool maximum water temperature

2.2.1 The water in a public swimming pool, when in use, must not be greater than 40 degrees Celsius.

2.2.2 A whirlpool must be fitted with a temperature regulator that is in good working order.

2.3 Sauna and steam room maximum temperature

2.3.1 The ambient air temperature in a dry sauna must not be greater than 85 degrees Celsius.

2.3.2 The ambient air temperature in a steam room must not be greater than 60 degrees Celsius.

2.3.3 The ambient air temperature in a sauna or a steam room must be measured and recorded at least once every 24 hours, when in use.

2.4 Ventilation

The ventilation in a public swimming pool premises must be able to maintain safe air quality and must protect against the buildup of chlorine gas or disinfection by-products.

2.5 Wall clocks

A wall clock must be

a) clearly visible from a whirlpool, sauna or steam room to assist patrons in monitoring their length of stay, and

b) maintained in good working order.

2.6 Soap in washrooms and showers

An adequate supply of soap must be provided in suitable dispensers in all washrooms and showers.

2.7 Designated food handling and consumption area

Any food handling and consumption must occur in a clearly designated area which is set aside for that purpose.

3.0 Filtration, Circulation and Disinfection

For the purposes of sections 10, 12 and 13 of the *Regulation*, the following filtration, circulation, disinfection and operational standards apply.

3.1 Recirculation

3.1.1 A recirculation rate shall be maintained so that an amount of water equivalent to 100 percent of the water volume passes through treatment and is recirculated within:

i. 4 hours, for a swimming pool constructed after November 2006,

ii. 6 hours, for a swimming pool constructed before November 2006,

iii. 8 hours, for a swimming pool constructed before November 2006, where it can be demonstrated that the water quality can be maintained in accordance with the Pool Standards.

iv. 1.5 hours for a water slide receiving pool used solely for that purpose.

v. 2 hours for a stand-alone wading pool or recirculating water spray park.

vi. 15 minutes for a whirlpool with a volume of less than four cubic metres.

vii. 20 minutes for a whirlpool with a volume of four or more cubic metres.

3.1.2 If a wading pool or recirculating water spray park is connected to a swimming pool, the turnover time for the swimming pool shall apply to the wading pool or water spray park.

3.2 Collection of water from public swimming pool surface

When a public swimming pool is in use, it must be operated to maximize the flow of the water through the skimming devices.

3.3 Maximum rate of filtration

3.3.1 The maximum rate of filtration for a high rate sand filter must not be:

a) greater than 10 litres per second per square meter (15 gallons per minute per square foot) for swimming pools or wading pools, and

b) greater than 8.5 litres per second per square meter (12.5 gallons per minute per square foot) for a whirlpool.

3.3.2 The rate of filtration for other types of filters must comply with the manufacturer's specifications.

3.4 Treatment for recirculating water spray parks

Any stand-alone recirculating water spray park constructed after November 30, 2014 shall provide 100 per cent filtered water with 2.0 milligrams per litre free chlorine residual at the point of contact with the bather.

4.0 Chlorine, pH and Other Chemical Parameters

For the purposes of sections 13 and 14 of the *Regulation*, the following chlorine, pH and other chemical parameter standards apply.

4.1 Free chlorine residual

The minimum free chlorine residual in a public swimming pool must be maintained as follows:

4.1.1 1.0 milligram per litre in a public swimming pool with an operating water temperature of not greater than 30 degrees Celsius.

4.1.2 2.0 milligrams per litre in a public swimming pool with an operating water temperature of greater than 30 degrees Celsius.

4.1.3 2.0 milligrams per litre in a recirculating, stand-alone water spray park or stand-alone wading pool regardless of the operating water temperature.

4.2 Oxidation reduction potential (ORP)

Notwithstanding standard 4.1, a public swimming pool, except for a recirculating water spray park, may operate with a free chlorine residual of no less than:

a) 0.5 milligrams per litre if able to consistently maintain an ORP value of no less than 700 millivolt (mV), and

b) 0.3 milligrams per litre if able to consistently maintain an ORP value of no less than 770 mV, a pH of no more than 7.3 and when supplemental disinfection is used.

4.3 Combined chlorine residual

The combined chlorine residual in a public swimming pool must be maintained at the lowest level possible to maximize bather comfort.

4.4 pH range

The pH of the water in a public swimming pool must be maintained at no less than 6.8 and no greater than 7.6.

4.5 Total alkalinity

4.5.1 To assist in maintaining pH, the total alkalinity of the public swimming pool water must be maintained at no less than 80 and no greater than 180 milligrams per litre, unless an executive officer permits otherwise.

4.5.2 Total alkalinity must be measured and recorded at least once per week.

4.6 Cyanuric acid

Where cyanuric acid is used in an outdoor public swimming pool, the concentration:

a) must not be greater than 50 milligrams per litre, and

b) must be measured and recorded at least once a week.

4.7 Non-chlorinated oxidizing products

Non-chlorinated oxidizing products used in a public swimming pool must be used in accordance with the manufacturer's instructions.

5.0 Testing, Monitoring and Recordkeeping

For the purposes of section 15 and 17 of the *Regulation*, the following monitoring and recordkeeping standards apply.

5.1 Operating records

Operating records must be maintained to provide information regarding:

a) time of and observations and readings for pH, and the free, total and combined chlorine residual;

b) time and results of total alkalinity tests;

c) automated controller set points and readings for ORP, chlorine and pH;

d) temperature of the public swimming pool water;

e) clarity of the water;

f) results of microbiological analyses as provided by the regional health authority;

g) any other water quality tests;

h) quantities and dates of all chemicals used;

i) equipment maintenance;

j) ambient air temperature in a sauna or steam room;

k) make and model, purchase and expiry date of suction outlet covers, and manufacturers' recommended flow rate.

l) incident records with respect to patron injury; and

m) contamination events including the date of the event and the response.

5.2 Manual tests

5.2.1 The free chlorine, combined chlorine and pH must be tested manually at least once per day:

5.2.2 The automated readings and associated setpoints shall be monitored and recorded at least once per day.

5.2.3 Dip and read strips must not be used to measure chlorine, pH or alkalinity.

5.3 Automated controller results

Automated controller readings must be consistent with any manual tests.

6.0 Microbiological Requirements

For the purposes of section 18 of the *Regulation*, the following microbiological requirements apply.

6.1 Heterotrophic plate count / Total coliforms

The quality of water in a public swimming pool must be maintained so that the water does not:

a) have a heterotrophic plate count greater than 100 colony forming units per milliliter in a 100 millilitre sample, or

b) show the presence of total coliforms in a 100 millilitre sample.

6.2 *Pseudomonas aeruginosa*

In addition to 6.1, the quality of water in a public swimming pool operating at greater than 30 degrees Celsius must be maintained so that samples of the water do not show the presence of *Pseudomonas aeruginosa*.

7.0 Microbiological Sampling

For the purposes of section 19 of the *Regulation*, the following microbiological sampling requirements apply.

7.1 Water sampling procedure

7.1.1 A water sample for heterotrophic plate count and total coliforms must be taken weekly from a public swimming pool.

7.1.2 A water sample for *Pseudomonas aeruginosa* must be taken weekly for public swimming pools operating at 30 degrees Celsius or greater.

7.1.3 Samples required under Section 7.1.1 and 7.1.2 must be taken:

a) from a point near an outlet or from any other location that is necessary to give an accurate representation of the water quality in the public swimming pool, and

b) between 200 to 400 millimeters below the surface of the water.

7.2 Collection of water samples

Public swimming pool water samples for microbiological testing must be collected in sample bottles supplied by the Provincial Laboratory of Public Health.

8.0 Water Quality and Water Clarity

For the purposes of sections 10 and 20 of the *Regulation*, the following public swimming pool water quality and clarity standards apply.

8.1 Bather load

8.1.1 When in use, the maximum design bather load of the public swimming pool must not be exceeded.

8.1.2 Where the maximum design bather load for a public swimming pool is not available, the owner or owners' agent, if any, must calculate and apply a maximum bather load value in accordance with Schedule B.

8.1.3 Notwithstanding 8.1.1 and 8.1.2, the public swimming pool may be operated to exceed the maximum design bather load or the calculated maximum bather load if chlorine, pH, clarity, ORP and bacteriological requirements are met.

8.2 Clarity problems

Where water clarity problems persist, the executive officer may require monitoring of the clarity using a nephelometer until the turbidity is no greater than 0.5 Nephelometric Turbidity Units (NTU).

9.0 Anti-Entrapment Devices

For the purposes of section 23 of the *Regulation*, the following standards apply.

ANSI/APSP-16 2011 means the Standard 16 *American National Standard for Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs* published by the American National Standards Institute/ Association of Pool and Spa Professionals.

ASTM F2387 means the *Standard Specification for Manufactured Safety Vacuum Release Systems (SVRS) for Swimming Pools, Spas and Hot Tubs* published by the American Society for Testing and Materials.

ASME/ANSI A112.19.17-2010, means the *Manufactured Safety Vacuum Release Systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub, and Wading Pool Suction Systems* published by the American Society of Mechanical Engineers/American National Standards Institute.

9.1 Anti-entrapment Plan

Every owner or owner's agent, if any, must assess anti-entrapment risks, develop and implement an appropriate anti-entrapment plan to meet the requirements of this section.

9.2 Installation of anti-entrapment devices

An anti-entrapment device must be installed in accordance with the manufacturer's specifications and be maintained in good working order when the public swimming pool is in use.

9.3 Main submerged suction outlet

9.3.1 On or after November 30, 2017, a submerged suction outlet, including a gravity fed outlet, in a public swimming pool, must have a cover that is:

a) compliant with the ANSI/APSP-16 2011 performance standards, or

b) custom fabricated and certified by a professional engineer, in accordance with ANSI/APSP-16 2011, and installed and maintained according to the engineer's instructions.

9.3.2 Every suction outlet shall have a water velocity through the opening of the cover that is not greater than 0.5 meters/second (1.5 feet per second) as calculated in Schedule C.

9.4 Single or interconnected submerged suction outlet

On or after November 30, 2017, a public swimming pool that has a single submerged suction outlet other than an unblockable sump and cover (greater than 18 x 23 inches, 45.7 x 58.4 centimetres), or has interconnected submerged suction outlets which are less than 900 millimetres apart, centre to centre, must employ at least one of the following additional systems:

a) multiple suction outlet system with at least two fully submerged suction outlets per pump at least 900 millimeters (3 feet) apart;

b) a safety vacuum release system (commonly referred to as SVRS) that relieves suction when a blockage is detected and that is installed to meet the performance standards of the ASTM F2387 or ASME/ANSI A112.19.17-2010,

c) a properly designed and tested suction-limiting vent system which meets ASME-A112.19.17-2010,

d) an automatic pump shut-off system which meets ASME-A112.19.17-2010,

e) permanent disablement of the submerged suction outlet either by reversing the flow through the outlet or completely sealing the existing

outlet if the skimmers are capable of providing for 100 percent flow through, or

f) an equivalent system approved by a professional engineer.

9.5 Other submerged suction outlets

Every equalizer line outlet or submerged suction outlet used for vacuuming must have a cover to reduce risk of entrapment and be used in a manner to protect patrons from entrapment or be permanently disabled.

9.6 Damaged submerged suction outlets

9.6.1 The covers of each submerged suction outlet shall be routinely inspected prior to opening each day and throughout the day when the public swimming pool is in use. If upon visual inspection the cover of a submerged suction outlet is cracked, broken, improperly secured or missing, the pump shall be immediately shut down and the public swimming pool closed, until the cover is replaced.

9.6.2 An anti-entrapment system installed in accordance with Section 9.4 must be routinely inspected in accordance with manufacturers' instructions. A pool shall be closed if the anti-entrapment system is not operating in accordance with the manufacturer's instructions.

Part 4 Written Policies and Plans

For the purposes of section 24 of the *Regulation*, the following standards for written policies and plans apply.

10.0 Pool Safety and Supervision

10.1 Pool Safety and Supervision Plan

A Pool Safety and Supervision Plan shall be developed based on the current best practices developed by the Lifesaving Society of Canada. The plan must include:

a) a pool admission standard based on the bather's age, swimming competency and adult oversight if the bather is a minor or when there is a question of swimmer competency;

b) rules for bather use and supervision of pool mats, inflatable toys and life jackets;

c) a list of all of the facility-appropriate lifesaving equipment to be provided on-site;

d) a list of the required emergency equipment and procedures including telephone access and emergency telephone numbers;

e) a facility safety check procedure;

f) supervision protocols including lifeguard scanning and supervision protocols for each public swimming pool when in use, including those not offering lifeguarding;

g) Information and procedures for use of a public swimming pool where no lifeguard is on duty;

h) a procedure to monitor patrons using special areas such as the steam room and sauna;

i) procedures to respond to medical emergencies such as entrapped patrons, overheated steam room or sauna users;

j) measures to ensure the safety of patrons using a steam room or sauna in order to protect against burns and overheating which may include, but are not limited to:

- thermostatic control of air temperature,
- a working thermometer in each unit,
- doors that open outwards with little resistance,
- a signaling device or process for emergencies;

k) information on the safe handling and storage of pool treatment chemicals and other related chemicals; and

l) any other measure that may be applicable to the pool.

11.0 Patron Education and Notification

For the purposes of Section 24 of the *Regulation*, the following education and signage standards apply.

11.1 Education of patrons

11.1.1 The patron education policy and plan shall include a strategy to provide information to:

a) those bathers who should wear protective, water-resistant swimwear including

i) children, 35 months and under, and

ii) anyone who is or may be incontinent.

b) those patrons who should consult with a physician prior to using the whirlpool, steam room and sauna, including

i) pregnant women,

ii) individuals with medical conditions including but not limited to heart disease, hypertension, seizures, diabetes or obesity,

iii) individuals greater than 65 years of age; and

iv) individuals with a medical condition requiring the ongoing care of a physician.

c) those patrons with diarrhea or a history of diarrhea over the previous two weeks who should not use the public swimming pool.

11.1.2 The plan must address:

a) the location of signage and notices,

b) the use of different languages, other than English, as well as the use of pictoral information, and

c) other education methods.

11.2 Signs posting rules and safety information

An owner or owner's agent, if any, must post one or more signs in a size, type and location that may be easily seen and understood by all patrons, which includes the following rules and safety information for the use of the pool.

Rules for use of the pool

11.2.1 Bathers must take a shower using soap prior to entering the public swimming pool.

11.2.2 Patrons must wash their hands using soap after using the washroom or changing diapers.

11.2.3 Glass is not allowed on the pool deck or in other barefoot areas.

11.2.4 Street shoes must not be worn in wet traffic areas.

11.2.5 Patrons who are intoxicated will not be allowed to use the pool.

Pool safety information

11.2.6 The maximum bather load for the public swimming pool.

11.2.7 The public swimming pool depths and identification of those areas of the public swimming pool where diving is not allowed.

11.2.8 The permitted temperature range of the whirlpool, steam room and sauna.

11.2.9 Location of the fire alarm, telephone or other emergency devices, where applicable.

11.2.10 Where there is no lifeguard on duty, signage stating

- No lifeguard is on duty,
- Children under 13 years of age should be supervised, and
- Patrons should not swim alone.

11.2.11 Any other information that the owner or owner's agent determines is necessary to maintain the health and safety of the patrons using the pool facility.

12.0 Water Quality Incident Response Plan

For purposes of section 24 of the *Regulation*, the following water quality response standards apply.

12.1 Water Quality Incident Response Plan

A Water Quality Incident Response Plan that is appropriate to the type of public swimming pool must include the following:

a) the steps to be taken when any of the following occur:

i) standards for microbiology, ORP, free chlorine, cyanuric acid, pH and clarity in the public swimming pool are not being met,

ii) blood, food or chemicals foul the water, or

iii) fecal material or vomit foul the water, and

b) the name of the appropriate contact person and emergency contact numbers.

12.2 Requirements

A Water Quality Incident Response Plan must adhere to the requirements in Schedule A: "Contamination Management for Public Swimming Pools".

13.0 General Sanitation Plan

For purposes of section 24 of the *Regulation*, the following standards for the general sanitation plan apply.

13.1 General Sanitation Plan

A General Sanitation Plan for a public swimming pool premises must list the chemicals to be used for cleaning and disinfection, and specify a routine schedule for adequate cleaning and disinfecting of:

a) walls, floors, and decks;

b) washrooms and change rooms;

c) showers;

d) steam rooms and saunas; and

e) any other area or equipment in contact with patrons of the pool.

Part 5 Schedules

Schedule A

Contamination Management for Public Swimming Pools

Every owner or owner's agent is required to develop, maintain, and implement a written policy which outlines a response plan for managing blood, vomit, and fecal contamination in public swimming pools. This schedule was first developed in 2006, and has been modified to reflect the United States Centers for Disease Control and Prevention *Recommendations for Aquatic Operators of Treated Venues* March 2012.

1. In the event of blood, vomit, or fecal contamination, the pool operator shall immediately close the public swimming pool until remediation procedures are complete. This includes the affected water feature (e.g. water slide) and other features that share the same recirculation system.
2. To avoid cross contamination, a bather must take a shower, using soap, prior to re-entering any public swimming pool.
3. Contaminating material must be removed (e.g. using a net, scoop, or bucket) and disposed of in a sanitary manner.
4. The net, scoop or container used to remove the fecal or vomit contamination must be thoroughly cleaned and disinfected.
5. Aquatic vacuum cleaners must not be used for removal of contaminants from the water or adjacent surfaces unless vacuumed waste is discharged to a sanitary sewer and the vacuum equipment can be adequately cleaned and disinfected.
6. A contamination response log must be maintained and must include at a minimum:
   - the date and time of the event,
   - type of incident,
   - the concentration of chlorine, pH and ORP at the time of the incident,
   - the procedures followed, and
   - the name of the person(s) conducting the procedures.

Public Swimming Pool Water Contamination Response

For purposes of this section, CT means concentration in milligrams per litre multiplied by time in minutes. CT= C (mg/L) x T (min)

1. A public swimming pool that has been contaminated by blood, vomit or feces shall be treated as follows:
   a) Check to ensure that the pH of the water is 7.5 or lower and adjust if necessary;
   b) Verify and maintain water temperature at 25 degrees Celsius or higher;
   c) Operate the filtration/recirculation system while the water reaches and maintains the proper free chlorine concentration during the remediation process; and
   d) Test the chlorine residual at multiple sampling points to ensure the proper free chlorine concentration is achieved throughout the water for the entire disinfection time.
2. In addition to the above measures, the specific treatment of the water depends upon the type of contamination. The water should be treated as follows:

   Blood-contaminated water

   If the public swimming pool is operating at required chlorine residual and pH, it may remain open. If the free chlorine residual is below the required minimum residual level, the operator shall immediately close the public swimming pool until the free chlorine is verified to be at or above the required minimum.

   Vomit-contaminated water

   Raise the free chlorine residual to 2.0 mg/L (if less than 2.0 mg/L), and maintain for at least 25 minutes, or meet an equivalent CT value as shown in the table below.

   Formed-fecal contaminated water

   Raise the free chlorine residual to 2.0 mg/L and maintain for at least 25 minutes, or meet an equivalent CT value as shown in the table below.

CT for Response to Formed-Fecal Incident

Chlorine Concentration (ppm)	Disinfection Time	Equivalent CT Values
1.0	50 minutes	50
2.0	25 minutes	50
3.0	17 minutes	50

The above table is based on the minimum CT of 45, maximum pH of 7.5, minimum temperature of 25 degrees Celsius and 99.9% inactivation of *Giardia* cysts by chlorine taken from *United States Centers for Disease Control. Responding to Fecal Accidents in Disinfected Swimming Pool Venues. MMWR 2001:50(20):416-7.*

Diarrhea contaminated water

For purposes of this section, diarrhea means stool that is too liquid to form a constant shape, and stool, that due to its consistency, cannot be captured in a standard net.

a) Raise the free chlorine residual to 20.0 mg/L, and maintain for at least 12.75 hours or

b) Meet an equivalent CT value as shown in the table below.

CT for Response to Diarrhea Incident

Chlorine Concentration (ppm)	Disinfection Time	Equivalent Ct
1.0	15,300 minutes (255 hours)	15,300
10.0	1,530 minutes (25.5 hours)	15,300
20.0	765 minutes (12.75 hours)	15,300

The above table is based on a minimum Ct of 15,300*, maximum pH of 7.5, minimum temperature of 25 degrees Celsius and 99.9% inactivation of Cryptosporidium cysts taken from Shields, JM et al (2008) Inactivation of Cryptosporidium parvum under chlorinated recreational water conditions, published by Journal of Water and Health. 06.4:513-520.

c) In water that contains chlorine stabilizer such as cyanuric acid, the pH shall be lowered to 6.5 and the free chlorine residual shall be raised to 40 mg/L and maintained for at least 30 hours or an equivalent CT value.

3. The owner or owner's agent, if any, of a public swimming pool may use a combination of chlorine and other supplemental disinfection treatments to respond to a contamination event. Pursuant to section 8(1) of the *Regulation*, the regional health authority must review and approve any supplemental disinfection prior to its use in order to ensure that an equivalent CT value will be achieved.

Schedule B

Calculation for the Maximum Bather Load

Maximum bather load is the maximum number of bathers in any 24 hour period based on the capacity of the filtration system. It can be determined based on the required two cubic meters of treated water set by the 1995 *Alberta Building Code* for every bather in each 24 hour period, and the turnover rate.

To determine the volume of treated water produced by the public swimming pool treatment system:

1. Determine the amount of treated water per minute:

$$\frac{\textbf{Volume of Public swimming pool (cubic metres)}}{\textbf{Turnover period (minutes)}} = \textbf{Volume of treated water per minute}$$

2. Determine amount of treated water per hour:

$$\textbf{Volume of treated water per minute X 60 minutes} = \textbf{Volume of treated water per hour}$$

3. Determine the amount of treated water for each day

$$\textbf{Volume of treated water per hour X 24 hours} = \textbf{Volume of treated water per day (24 hours)}$$

Determine bather load:

Two cubic meters treated water is required for every bather in each 24 hours:

4. Number of bathers over a 24 hour period =

$$\frac{\textbf{Volume of treated water per day (24 hours)}}{\textbf{Two cubic metres per 24 hours}}$$

Note: This is equivalent to the total number of bathers allowed when the public swimming pool is in use.

5. If the public swimming pool operates for less than 24 hours then, the number of bathers per hour =

$$\frac{\textbf{Number of bathers per 24 hours}}{\textbf{Number of hours of operation}}$$

Schedule C

Calculation of Velocity Through Suction Outlets

For purposes of Section 9.3 in the *Pool Standards*, the velocity through the suction outlets (drain covers) may be calculated based on the flow and the open area of a cover as outlined below.

The calculation is based on the following assumptions:

1. The flowmeter for the recirculating pump is operational and has been installed according to the manufacturer's instructions.
2. Where a flowmeter is not available for pumps (other than the recirculating pump), a Total Dynamic Head and pump curve may be used to calculate the flow.
3. For existing public swimming pools with dual suction outlets, the total maximum flow may be split evenly between the two outlets. It is recommended that the cover be capable of 100% of the flow.
4. For public swimming pools constructed after November 30, 2014 with multiple suction outlets, refer to the table below (Flow Capacity Requirement for Each Unblocked Suction Outlet).

Where there are features or jet pumps, the velocity must be calculated based on all pumps pulling water through the same suction outlets.

1. Determine Flow (Q)
   - Convert the flow rate in gallons per minute to cubic feet per second by dividing the flow rate by 448.8.
   - Multiply the total flow rate by 50% for existing public swimming pools with 2 suction outlets, or
   - Multiply the total flow rate by the value listed in the table below which applies to public swimming pools constructed after November 30, 2014.
2. Determine Open Area (A) of Cover
   - Convert square inches of open area of suction outlets cover (provided by the manufacturer) to square feet by dividing by 144 to determine area (A) (square feet).
3. Calculate the velocity (V):

$$\text{Velocity (feet per second)} = \frac{\text{Q (flow in cubic feet per second)}}{\text{Area (square feet)}}$$

$$V = \frac{Q}{A}$$

Flow Capacity Requirement for Each Unblocked Suction Outlet

(Public Swimming Pools Constructed after November 30, 2014)

This table outlines the percent of flow that must be provided through each suction outlet. This is based on the assumption that one of the outlets is blocked. For example, if a pool had 4 outlets, the flow must be engineered so that each of outlets is able to take 33% of the flow if one is blocked.

	2 outlets in total	**3 outlets in total**	**4 outlets in total**	**5 outlets in total**	**6 outlets in total**	**>6 outlets in total**
Percent of flow through each unblocked outlet.	100%	50%	33%	25%	20%	100% / (# of open suction outlets)

CPSC Interpretation at http://www.poolsafely.gov/faqs/#31.