AQUATIC FACILITY OPERATIONAL STANDARDS

Public Health
Prevent. Promote. Protect.
Fargo Cass Public Health

Fargo Cass Public Health
401 3rd Ave N

Fargo, North Dakota 58102

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FORWARD

This manual has been prepared to aid aquatic facility operators, design engineers and other interested persons in the operation of a swimming pool following good public health practices. Proper swimming pool design and operation protects the bather against:

1. Infections transmitted through the water and facility equipment.
2. Infections transmitted through the bathhouse facilities.
3. Physical injury within and about the recreational aquatic facility.

Definite epidemiological evidence has been recorded to show transmission of infectious diseases through recreational waters. Definite proof of the transmission of eye infections, impetigo, etc, through the common bathroom is also known. Dermatitis, such as athlete's foot, is commonly transmitted in bath facilities.

The primary responsibility of the aquatic facility manger is to provide clean, healthful recreation. Rules must be understood and followed. Only safe equipment should be brought into the facility environment.

Another responsibility of the facility operator or owner is that of protection against physical injury within and about the pool area. The attendant should have full charge of the bathing facilities and have the authority to enforce rules of safety and sanitation.

We believe that if the operational practices outlined in this manual are observed, your recreational aquatic facility can serve as a healthy source of recreation.

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1. **Definitions** –

1. "**Air gap**" is defined as:
   (a) Shall mean the unobstructed vertical distance through atmosphere between the water supply inlet and the flood level rim of the receiving unit; and
   (b) Is at least two (2) times the diameter of the water supply outlet or pipe or six (6) inches, whichever is the smaller distance.

2. "**Bather load**" shall mean the total number of bathers within the pool enclosure.

3. "**Breakpoint Chlorination**" shall mean the point in raising chlorine residual at which the concentration of available chlorine becomes great enough to completely oxidize all organic matter and ammonia compounds (combined chlorine) in a pool.

4. "**Competition pool**" shall mean any pool intended for use for accredited competitive aquatic events. Competition pools may also be used for recreation and instruction.

5. "**CT inactivation value**" shall mean the concentration (C) of free chlorine in ppm (or mg/L) multiplied by time (T) in minutes at a specific pH and temperature. CT shall mean contact time.

6. "**Deep areas**" shall mean areas of the pool exceeding five (5) feet in depth.

7. "**Department**" shall mean the health department of the city of Fargo.

8. "**Diving pool**" shall mean any pool that is designed and constructed primarily for diving and does not have a shallow end.

9. "**Full stomach vomit**" for the purpose of this rule shall mean the emptying of all the stomach's contents as a result of an illness as opposed to vomit from swallowing too much water, overexertion, or play.

10. "**Maximum bather load**" shall mean the maximum usage of the pool calculated based on the depth, type and surface area.

11. "**Trained Operator**" Means an individual who meets the requirements of part 7.

12. **"Person**" shall mean: any individual, LLC, firm, partnership, association, corporation, company, society, government agency, club, or organization of any kind.

13. "**Plunge Pool**" shall mean a pool located at the exit end of a waterslide flume and is intended and designed to receive sliders emerging the flume.

14. "**Pool**" shall mean a structure, basin, chamber, or treatment tank containing an artificial body of water for swimming, diving, relaxation, use and also include special purpose pools and wading pools.

15. "**Pools with wading areas**" shall mean any pool that has a portion of the shallow end with a maximum depth of twenty-four (24) inches.

16. "**ppm**" shall mean parts per million and is equivalent to milligrams per liter when the medium is water.

17. "**Private residential pool**" shall mean a pool, greater than 2 feet in depth with a circulation system, that is connected with a single family residence or owner occupied duplex located on private property and under the control of the homeowner. The use of which is limited to family members or the family's invited guests. A private residential pool is not a pool used as part of a business.

18. "**Public sewer**" shall mean a sewage disposal facility provided by a utility, municipality, conservancy district, or regional sewer district.

19. "**Public water supply**" shall mean water supplied by a utility, municipality, conservancy district, regional water district, or water corporation.

20. "**Recreational aquatic facility**" shall mean a water play area used for bathing, swimming or barefooted activities to include but not limited to: public pools, semi-public pools, wading pools, spray pads, spray grounds, spas, lazy rivers, special purpose pools, plunge pools, water slides, flumes, speed slides wave pools, sand bottom pools, vortex pools and zero entry pools.

21. "**Recreational Water Illness**" or "RWI", both microbial and chemical are caused by swallowing, inhalation of aerosols or contact with contaminated water or air in swimming pools, hot tubs, water parks, water play areas, interactive fountains, lakes, rivers, or oceans.. RWIs can be a wide variety of infections, including gastrointestinal, skin, ear, respiratory, eye, neurologic and wound infections. The most commonly reported RWI Manifestation is diarrhea. Diarrheal illnesses can be caused by germs such as Crypto (short for *Cryptosporidium*), *Giardia*, *Shigella*, norovirus and *E. coli* O157:H7.

22. "**Sanitary facilities**" shall mean flush toilets, hand washing lavatories, and showers.

23. "**Shallow areas**" shall mean those portions of a pool ranging in water depth from two (2) to five (5) feet.

24. "**Spa**" shall mean a pool designed for recreational bathing and/or therapeutic use which is not drained, cleaned or refilled for each use with a water agitation system in addition to the recirculation system. Spa pool is synonymous with the term hot tub/whirlpool.

25. **"Special purpose pool"** shall mean any pool used for purposes other than recreational to include but not limited to competition, therapy and treatment.

26. **"Spray grounds"** shall mean the buildings and appurtenances used in conjunction with a splash pad in which sprayed water is continually drained and collected in a treatment and recirculation system or drained into a sanitary sewer.

27. **"Standard Methods**" shall me**a**n Standard Methods for the Examination of Water and Wastewater, twenty-first edition, published by the American Public Health Association, Inc., 2005, specifically Part 9000, Microbiological Examination of Water; or the most recent version.

28. "**Swimming pool slide**" shall mean any device used to enter a pool by sliding down an inclined plane or equipment similar to a playground slide.

29. "**Treatment tank**" shall mean the enclosed pool, not intended for bathing, used at spray grounds to treat the water prior to recirculation it through the features at the facility.

30. "**Turnover rate**" shall mean the period of time, expressed in hours, required to circulate a volume of water equal to the maximum pool-water capacity through the pool-water treatment system.

31. "**Wading pool**" shall mean a pool with a maximum depth of twenty four (24) inches.

32. "**Waterslide**" shall mean a recreational ride that is a sloped trough-like or tubular structure using water as a lubricant and method of regulating rider velocity and terminated in a plunge pool, swimming pool, or a specifically designed deceleration structure.

33. "**Wave pool**" shall mean any pool having a bottom sloped upward from the deep end to the surface at the shallow end with equipment installed at the deep end to create wave motions in the water.

34. "**Zero depth pool**" shall mean any pool with a bottom sloped upward from the deep end to the surface level at the shallow end.

2. **Regulation by health department** –

The health department, and agents and employees thereof, shall have authority to regulate the public health and safety in the city of Fargo concerning use, design, operation, and maintenance of aquatic recreational facilities and shall have such authority to adopt regulations, rules, standards and practices. Such regulations, rules, standards, and practices shall be approved by the board of city commissioners, are hereby adopted by reference and fully incorporated herein, including any amendments hereinafter adopted, and shall be controlling within the jurisdiction of the health department.

3. **Health department approval of construction plans** –

Before work is commenced on the construction of a recreational aquatic facility, or on any alteration, addition, remodeling or other improvement to a recreational aquatic facility, the plans and specification shall have been approved by the health department. Residential swimming pools are exempt from this requirement, but must meet fencing requirements and other design standards adopted by the health department and approved by the board of city commissioners.

4 **Right of entry** –

The department or its agents may enter public or private property at reasonable times upon presentation of credentials to do any of the following:

(a) Inspect facilities, equipment, or records.
(b) Investigate complaints.
(c) Conduct tests.
(d) Collect samples.
(e) Determine whether any person is subject to, or in violation of, this rule.

5. **Enforcement** –

The department may commence an action against a pool operator who:

(a) Fails to comply with applicable ordinances; or
(b) Interferes with or obstructs the department or its designated agent in the performance of duties.
(c) Fails to hold a current permit for operation from the health department.

6. **License for operation** –

(a) No municipality, school district, person, group of persons, firm, corporation, association, organization or institution shall operate or maintain or license for the use of any recreational aquatic facility and other related facilities without a license from the department. The license shall be available upon inspection and maintained at the facility.
(b) Application for a license shall be made to the licensing-issuing official prior to the opening of any recreational aquatic facility. Such licenses applications shall be reviewed, facility inspected and application approved prior to opening. Applicable building permits shall be sought from the city of Fargo building inspections department as well as all building codes adhered to will the facility is in operation.

7 **Certified Operator** –

Every facility must designate at least one certified operator on staff to operate or to help operate the facility. The trained operator shall be trained in the operation of the pool, sanitation, chemical safety and function of the pools. Based on the risks of RWI inherent to aquatic

facilities, during inspections the person in charge shall demonstrate knowledge of RWI prevention, appropriate operation standards and the requirements of this code. Acceptable training courses are provided by the National Swimming Pool Foundation CPO course, National Spa and Pool Institute Tech I and Tech II courses (both required) and through the National Recreation and Park Association Aquatic Facility Operator course.

8. **Fence/barrier and gate requirements** –

A fence or other barrier at least five (5) feet in height shall completely encircle all pools, and private residential outdoor permanent pools. Any fence gate or door shall be equipped such that it is self closing and latching and opens away from the pool to prevent access when the pool is unattended. All openings must be lockable. Barriers should be less than 4 inches off the grade and constructed in a manner that reduces any efforts to be traversed. Guidance on proper and acceptable fence/barrier methods should be sought from the health department.

9. **General facility and basin** –

(a) The general condition of the facility shall be in good repair and free from objects that can create slips, trips and falls.
(b) Decking shall be free from cracks, holes and protruding objects.
(c) There shall be at least 5 feet of unobstructed decking from the edge of the basin and pad.
(d) Water shall not be ponding on the deck and shall drain away from the basin to drains that are not hocked up to the recirculation system. Spray grounds shall not have ponding water on the pad and water shall drain to the treatment system or to the sanitary sewer.
(e) All designed equipment shall be in good repair.
(f) Ladders and handrails shall be secure and free from sharp edges or damage.
(g) The basin shall be free from debris and all painted surfaces shall not be cracked, chipped, missing/broken tiles or have holes in the basin. The basin shall be in good repair.
(h) Overhead objects shall be secured and not hanging as a hazard to the pool or decking.
(i) All electrical outlets and wiring shall be secured.
(j) All underwater ledges and changes in basin slope shall be clearly and distinctly marked and in good repair.

10. **Water supply** –

(a) An adequate and convenient supply of potable water that meets the drinking water standards shall be provided at all aquatic facilities.
(b) A public water supply shall be exclusively used if available within a reasonable distance. A water supply, properly located and constructed, shall be provided if a public water supply is not available.
(c) All portions of the water distribution system serving pools, and auxiliary facilities, shall be protected against backflow and backsiphonage. Water introduced into the pool, either directly or through the recirculation system, shall be supplied through an air gap or with health department approval.

11. **Sewage disposal** –

(a) The sewage disposal system shall be adequate to serve the facility, including the bathhouse, locker room, pool water treatment equipment, deck drains, and related accommodations.
(b) Pool water and filter backwash may not be discharged to a ditch, stream, or lake

(c) All pool gutters, recirculation systems, and overflows shall discharge through an air gap to preclude the possibility of a backup of sewage or waste into the pool or pool piping system.
(d) All pool sumps, deck drainage systems, and other drainage fixtures that discharge to a sewer shall be properly trapped and vented to prevent sewer gasses and odors from reaching the pool area.
(e) All sewage shall be disposed of via a connection to a public sewer.

12. **Sanitary facilities** –
(a) The ratio and location of sanitary facilities for recreational aquatic facilities shall be in accordance with the local building code.
(b) Sanitary facilities are not required poolside at recreational aquatic facility if sanitary facilities are available to pool patrons within three hundred (300) feet of the pool enclosure.
(c) Toilet paper and covered waste receptacles shall be provided for toilet facilities.
(d) Soap, covered waste receptacles, and paper towels or electrical hand drying units shall be provided at the lavatories.
(e) Hot and cold water shall be provided through a mixing faucet. Hot water temperature shall not exceed one hundred twenty (120) degrees Fahrenheit.
(f) When showers are provided, the hot water temperature shall not exceed one hundred twenty (120) degrees Fahrenheit.
(g) Soap shall be provided at any shower.
(h) All sanitary facilities shall be maintained in a safe and sanitary condition.
(i) A bathhouse with dressing rooms, shower and toilet facility must be located within 300 feet of the pool, except that shower and dressing facility may not be required when bathers have access to such facilities in adjacent living quarters. Toilet facilities must be provided for users. These facilities shall be maintained in good sanitary condition and disinfected regularly.
(j) Diaper changing areas are required at each recreational aquatic facility

13. **Water chemistry** –
(a) All pools, when open for use, shall be continuously disinfected with a chemical that imparts an easily measured, free residual. *Spray grounds that do not capture the sprayed water in a collection and recirculation system are exempt from this provision as long as they are using a departmentally approved potable water source*.
(b) A free residual of the disinfectant chemical shall be checked twice daily and shall be maintained throughout the pool at concentrations in accordance with the following:

	CHLORINE (ppm)		**BROMINE (ppm)**	
POOL TYPE	*Minimum*	*Maximum*	*Minimum*	*Maximum*
Wading pools	3.0	10.0	4.0	20.0
Spa pools	2.0	10.0	4.0	20.0
Waterslide plunge pools	2.0	10.0	3.0	20.0
Wave pools	1.0	5.0	3.0	20.0
All other pools	1.0	10.0	3.0	20.0

(c) Whenever the residual disinfectant:

1. Falls below the minimum concentration required; or
2. Exceeds the maximum concentration allowed;
   the pool shall be cleared and kept free of bathers until disinfectant residuals are within the acceptable range.

(d) The department may accept other disinfecting materials or methods when the materials or methods have been demonstrated:
   1. To provide a residual effect equivalent to halogens or a source supplemental to halogens
   2. To be easily measured under conditions of use
   3. Not to be dangerous to public health
   4. Not to create objectionable physiological effects or
   5. Not to impart toxic properties to the water.

(e) The pool water shall be superchlorinated to breakpoint or superoxidized with a nonchlorine oxidizer when the pool test kit reveals a combined chlorine (chloramine) concentration of five-tenths (0.5) parts per million (ppm) or greater.

(f) Chlorinated isocyanurates or stabilized chlorine shall not be used for breakpoint chlorination.

(g) The pool shall be closed and remain closed during breakpoint chlorination until the chlorine concentration drops below the maximum level referenced in subsection (b).

(h) If a nonchlorine oxidizer is used to superoxidize, the pool shall be closed and shall remain closed in accordance with the specifications on the product label.

(i) A test kit shall be readily available for use by the pool operator, with reagents replaced according to manufacturer's requirements, and meet the following:
   1. For recreational aquatic facilities that use chlorine as a disinfectant, a test kit shall be used that covers a minimum range of zero (0.0) ppm to ten (10.0) or higher. The test kit must be capable of measuring total chlorine or be deduced from a measurement of free and combined.
   2. Orthotolidine (OTO) may not be used as the disinfectant testing reagent.
   3. For recreational aquatic facilities that use a disinfectant other than chlorine, the test kit shall have the range and accuracy proportionate to the range required for adequately identifying up to the maximum allowable limits.
   4. A pH test kit covering a minimum range of 6.5 – 8.5 pH units shall be used.
   5. When a cyanurate is used as a chlorine stabilizer, the test kit shall be capable of measuring cyanuric acid concentrations.
   6. A test kit capable of measuring total alkalinity shall be used.

(j) Chlorinated isocyanurates and cyanuric stabilizers are not allowed to be used in any indoor pool.

(k) If chlorinated isocyanurate or cyanuric acid stabilizers are used in an outdoor recreational aquatic facility, the concentration shall not exceed fifity (50) ppm. When the maximum allowable cyanuric acid concentration is exceeded, that area of the recreational aquatic facility must be closed until appropriate measures are taken to lower the concentrations to below the maximum allowable level

(l) Only in pools where chlorine is used as the disinfectant can cyanuric acid be used as a stabilizer.

(m) The water in a pool shall have a pH of not less than six and eight tenths (6.8) and not more than eight (8). Ideally pH for pools should be kept between 7.2 and 7.8

(n) The alkalinity of the water in pools shall be at least eighty (80) ppm and no more than one hundred twenty (120) ppm unless it can be shown that another level of total alkalinity produces chemically balanced water based on calculations approved by the department.
(o) Total hardness should be monitored periodically. The total hardness should not fall below 100 ppm and not exceed 1000 ppm.
(p) Pool water shall be tested for the following:
1. pH and disinfectant residuals daily before the pool is open for use and at least one (1) other time during the hours of pool use.
2. Combined chlorine should be periodically determined to insure levels don't regularly exceed 0.5ppm.
3. Total alkalinity at least once a week.
4. Total hardness at least once a month
5. Cyanuric acid shall be tested weekly if used

(q) All results shall be recorded and maintained for up to one year.
(r) If electronic monitoring devices are used, the accuracy of the device must be checked as required by the manufacturer or compared for accuracy at least once per week with a test kit. Use of oxidation reduction potential (ORP) controllers does not negate the manual daily testing requirement for disinfectant residuals.
(s) The pool shall be closed for at least one (1) hour following the manual addition of any chemical directly to the pool water.
(t) Any chemical used to treat the water in a pool must be used in accordance with the product label directions.

14. **Water quality standards** –
(a) Water samples will be collected at intervals as determined by the health department.
(b) At all times, the water in a pool shall have sufficient clarity so that the main drain or a black disc, six (6) inches in diameter placed at the deepest part of the pool, is readily visible from the deck.
(c) The water temperature in spas may not exceed one hundred four (104) degrees Fahrenheit.
(d) Weekly or monthly samples shall be collected from each pool for bacterial examination. Samples may not be collected from any portion of the recirculation system.
(e) Sampling shall start at least one (1) week prior to the opening or reopening of any pool. Closures due to adjustments of chemistry or additions of chemicals to water do not have to submit samples. Closures that substantially increase the risk of pathogenic growth and substantially reduce the safety of the water e.g. due to prolonged shut-down of feeders or pumps, must receive a negative report before reopening. Examples of closures would be but limited to, circulation inactivation for more than 24 hours, draining a pool, lack of disinfection for more than 24 hours or repairs to the system or basins.
(f) Bacteriological examinations performed on each sample shall include the heterotrophic plate count, and total coliform test.
(g) Tests shall be performed by a state-approved laboratory in accordance with the procedures outlined in Standard Methods.
(h) The pool must be closed immediately upon notification of an unsatisfactory E. coli or coliform sample report. Appropriate actions must be taken to correctly eliminate any potential health hazards. The pool may not be reopened until the completion of the actions and water quality is back within allowable limits. When the pool receives an

unsatisfactory HPC report the pool must close and take appropriate actions and cannot reopen until those actions are completed and water quality is within allowable limits.

(i) Prior to opening of any pool, all water quality and chemistry parameters must be met.

15. **Recirculation** –

The recirculation system shall be operating as designed, continuously and maintained in accordance with the following:

(a) For pools the turnover rate shall be the following times:

POOL TYPE	TURNOVER RATE
Wading pools	1 hour
Spa	1/2 hour
Wave pools	2 hours
Zero depth pools	2 hours
Pools with wading areas	2 hours
Competition pools	6 hours
Diving pools	12 hours
All other pools	6 hours

(b) A suitable means shall be provided to measure the flow of water through the pool water recirculation system.

(c) Strainers shall be cleaned regularly and kept free from debris.

(d) Skimmers shall be cleaned regularly and kept free from debris.

(e) Filters shall be maintained and operating according to manufactures design and backflushed/exchanged/cleaned regularly.

(f) Adequate valving for all skimmers, drains, filters and pumps.

(g) Complete system shall be free of leakage.

(h) All recreational aquatic facilities must comply with the Virginia Graeme Baker Pool and Spa Safety Act, 15 U.S.C. 8001-8008.

(i) All equalizers and entrapment points shall be properly grated or disconnected and in good repair.

16. **Chemical storage** –

(a) All chemicals and items in the lockable chemical storage room shall be stored in a manner that does not allow any contamination to the pools or adverse chemical reactions. They should be stored at least six (6) inches above the floor to allow for flushing the area in the case of a spill.

(b) All chemicals shall be stored in accordance with manufacturer recommendations.

(c) All MSDS shall be on site.

17. **Lifesaving and safety equipment** –

(a) At least one (1) unit of lifesaving equipment shall be provided at each pool and shall consist of the following:

1. A life pole, or shepherd's crook type of pole, with blunted ends and a minimum length allowing it to reach over half the distance of the width of the pool. The pole may not be telescoping and cannot exceed 20 feet in length.
2. A United States Coast Guard approved ring buoy, having a minimum outside diameter of twenty (20) inches, with one-fourth (1/4) inch diameter rope equal in

length to the width of the pool and not to exceed forty-five (45) feet in length. A rescue tube is a permitted alternative to the ring buoy at locations where lifeguards are on duty during operational hours.

(b) For pools with a surface area of two thousand (2,000) square feet or more, a rescue tube or ring buoy shall be provided for each lifeguard on duty.

(c) A twenty-four (24) unit first aid kit that meets American National Standards Institute (ANSI) standard Z308.1-2003 or 2009 and two (2) blankets shall be provided. The first aid kit shall be kept filled and ready for use whenever the pool is open for use.

(d) A telephone shall be located within two hundred (200) feet of the pool enclosure and must be available for emergency use whenever the pool is open for use,

(e) Depth marking shall be conspicuously placed inside the pool, where possible, at or above the water level. Depth markers shall also be placed on the deck in a manner that can be read if standing at the pool side looking at the pool. All markers must be four inches in height and contrasting in color. Depth markers shall be placed at the deepest end as well as the shallowest end and at any point where the slope changes and at distances not greater than 25 feet.

(f) A removable buoyed transition line, anchored at each end, shall separate the shallow area from the deeper pool area, except when the pool is being used for organized activities or during operation as a wave pool or if lifeguarded. Diving areas shall also be separated with a buoy line from any other portion of the pool if not physically separated.

(g) Lifesaving equipment shall be:

1. In good repair;
2. Ready for use; and
3. Stored within twenty (20) feet of the pool, visible and accessible to all bathers; shall be provided for each two thousand (2,000) square feet of pool water surface,

18. **Lifeguards** –

(a) At anytime lifeguards are in use they should be trained and qualified under an acceptable national or local standard.

19. **Signage** –

(a) Warning signs shall be provided in legible letters at least four (4) inches high as follows:

1. A sign warning "DANGER-HAZARDOUS CHEMICALS" shall be posted on or adjacent to the entrance to the pool chemical feed and chemical storage rooms.
2. Whenever the pool area is open for use and no lifeguard service is provided, warning signs shall be placed in plain view at the entrances and inside the pool area that state "Warning-No Lifeguard on Duty." In addition, the signs shall also state in clear legible letters at least two (2) inches high, "No Swimming Alone If Under 14 Years Old. Children Under 14 Years of Age and Nonswimmers Shall Not Use the Pool Unless Accompanied by a Responsible Adult."
3. When the pool is not open for use, a sign shall be posted stating "POOL CLOSED".
4. A sign stating "No Diving" shall be posted at nondiving areas and at portions of the pool that are five (5) feet deep or less. "No Diving" signs are not required at spas or wading pools.

(b) The following user sanitation and safety rules or some reiteration meaning the same shall be posted on signs with letters at least one (1) inch high and within the pool enclosure:

1. Anyone who has or has had diarrhea in the past two (2) weeks shall not use the pool.

2. Anyone who has an area of exposed subepidermal tissue, open blisters, cuts, etc, is advised not to use the pool.
3. All persons shall take a cleansing shower before using the pool. A bather leaving the pool to use the toilet shall take another cleansing shower before returning to the pool enclosure.
4. Spitting, spouting of water, blowing the nose, or similar behavior in the pool is prohibited.
5. No running or rough play is permitted in the pool, on the runways, on diving boards, on floats, on platforms, in dressing rooms, or in showers.
6. In general street clothes are not allowed in the pool.
7. All diaper aged children shall use plastic pants with tight fitting elastic at the legs and waist, or swim diapers.
8. Do not change diapers at poolside.
9. Only drinks in unbreakable containers shall be permitted.

(c) In addition to the requirements of subsection (b), spa pools shall have the following posted:
1. Pregnant women, small children, or persons with heart disease, diabetes, high blood pressure, or low blood pressure should not enter the spa except under advice of a physician.
2. Avoid use while under the influence of alcohol, tranquilizers, or other drugs that cause drowsiness or raise or lower blood pressure.
3. Exposure greater than fifteen (15) minutes may result in drowsiness, nausea, or fainting.

(d) The following shall be posted near the entrance of swimming pool slides:
1. One (1) rider at a time. Wait until the landing area is clear before entering the slide.
2. Slide in a sitting position or on the back only.
3. Do not attempt to stop on the slide.
4. Leave the plunge area immediately.
5. Warning: Water depth is _____ feet.

(e) The following shall be posted near the entrance of the water slide:
1. Only one (1) rider at a time.
2. Follow the instructions of the attendant and/or lifeguard.
3. No running, standing, kneeling, rotating, tumbling, or stopping in the flumes.
4. No diving from a flume.
5. Leave the plunge pool promptly after entering.

(f) Pools shall have a sign with letters at least one (1) inch high stating the maximum bather load posted within the pool enclosure.

20. **Cleaning** –

(a) Visible dirt on the bottom and walls of the pool shall be removed at least every twenty-four (24) hours or as often as necessary.

(b) Scum, oils, or floating matter on the water surface or walls of a pool shall be removed continuously by skimming, flushing, or other effective means when the pool is open for use. The pool shall be cleansed regularly by the use of such disinfecting agents or cleansing materials as may be required by the health department to maintain good sanitary conditions.

21. **Ventilation** –
   (a) Ventilation should be designed and maintained to support the health and safety of the buildings patrons.
   (b) Bathhouse, mechanical equipment rooms, storage areas and indoor recreational aquatic facilities shall be temperature controlled and ventilated continuously.
   (c) Indoor air quality standards shall comply with the current standards under ASHREA.

22. **Lighting** –
   (a) Lighting shall be adequate to allow for the ability to monitor the bottom of the pool.
   (b) Where natural lighting cannot be provided artificial lighting shall be provided.
   (c) Glare should be reduced to allow for the ability to see objects on the bottom of the pool.
   (d) All lighting should be shielded in the facility.

23. **Records of operation** –
   (a) Operating records shall be logged daily, kept for a minimum of three (3) years, and be available upon request by the department. The operating records must contain the following:
      1. Disinfectant residuals (2x daily) and combined chlorine concentrations (weekly).
      2. pH readings (2x daily).
      3. Clarity (1x daily)
      4. Flow and temp (1x daily)
      5. Alkalinity, Total hardness and disinfection stabilizer (weekly)
      6. Volume of fresh water added.
      7. Amounts of chemicals used.
      8. Maintenance and malfunctioning of equipment.
      9. Backwashing of sand filters, cleaning of filter cartridges or DE filters.
      10. The date and time of any fecal event occurring in the pool, whether it involved formed stool or diarrhea, free chlorine and pH levels at the time of observation of the event.
   (b) Before reopening the pool, the:
      1. Free chlorine and pH levels must be recorded and within limits;
      2. Procedures followed in response to the fecal accident, including the process used to increase chlorine levels (if necessary), shall be documented as well as contact time (CT).

24. **Bather load** –

The capacity of the pool shall be clearly marked and monitored by the operators to ensure maximum bather load is not exceeded. Bather load shall be based on the following:

Spa	Shallow/wading	Special purpose pools	Deep	Plunge pools, slides	Diving area
One bather per 3 linear feet of spa seating *	15 sq ft of pool per bather	10 sq ft of pool per bather	20 sq ft of pool per bather	100 sq ft of pool per bather	300 sq ft of pool per bather **

* measured along the front edge of the seat.
** ten patrons shall be included per diving board when diving board use is closed and diving area is not a separate pool.
See appendix for assistance in calculations

25. **Garbage and refuse disposal** –
Garbage and refuse shall be collected, stored, and disposed so that the aquatic facility is kept clean, litter free and in a sanitary manner.

26. **Reasons for closure** –
A pool shall be closed when any of the following occurs:
(a) Failure to meet the minimums for:
1. Bacteriological requirements;
2. Disinfectant concentrations; or
3. The water clarity requirements.
(b) The grate on the main drain is missing or broken, or failure to meet the requirements.
(c) Adverse weather impacting outdoor facilities.
(d) A pump, filter, or disinfectant chemical feeder is not operational.
(e) A fecal or vomit incident.
(f) The spa water temperature exceeds one hundred four (104) degrees Fahrenheit.
(g) pH values less than 6.5 or equal to or greater than 8.0.
(h) If the department determines a condition, situation, or installation is created, installed or maintained that may:
1. cause or result in a health or safety hazard; or
2. cause or transmit disease.

27. **Fecal and Full Stomach Vomit Incident** –
(a) In the event that a solid stool or full stomach vomit is identified in the pool or spa water, the following steps are required:
1. The pool shall be cleared of all patrons and close all affected pools or spas operating a common filtration system and keep closed during the sanitation procedure.
2. The solid fecal material or vomit shall be removed using a net or scoop. The pool vacuum shall not be used for this purpose. All equipment used to remove the fecal material or vomit shall be sanitized in a fresh solution of twenty (20) parts per million (ppm) chlorine or immersed for the full duration of disinfection within the pool .
3. The free chlorine/bromine level shall be tested.
4. pH shall be maintained 7.5 or less.
5. Ensure water temperature of seventy-seven (77) degrees Fahrenheit or higher.

6. If chlorine stabilizers are not present in the pool water;
    a. The pool shall be closed until a minimum of two (2) ppm of free disinfectant has been present in pool water for a minimum of twenty-five (25) minutes as measured at poolside or the length of time necessary to attain a CT inactivation value of forty-five (45).
    b. When chlorine stabilizers are present in pool water, the pool shall be closed until four (4) ppm of free disinfectant must be present in the pool water for a minimum of twenty-five (25) minutes as measured at poolside or the length of time necessary to attain a CT inactivation value of one hundred (100).
7. When the required level of disinfectant concentration is met, the pool may reopen.

(b) In the event that a nonsolid stool is identified in the pool or spa water, the following steps are required:

1. Immediately clear the pool of all patrons and close all affected pools or spas operating on a common filtration system and keep closed during the sanitization procedure.
2. The fecal matter should be removed as much as possible using a net or scoop. The pool vacuum shall not be used for this purpose. All equipment used to remove the fecal material shall be sanitized with a fresh solution of twenty (20) ppm chlorine or immersed in the pool during disinfection.
3. pH shall be maintained at 7.5 or less.
4. Ensure that water temperature shall be seventy-seven (77) degrees Fahrenheit or higher.
5. If chlorine stabilizers are not present in the pool water:
    a. Raise the free chlorine residual in the pool water to twenty (20) ppm, chlorine minimum, and maintain it at that level for a minimum of seven hundred sixty-five (765) minutes (twelve (12.75) hours, or the length of time necessary to attain a CT inactivation value of 15,300 or completely drain the pool to a public sewer. Spas only may be completely drained to an approved sewage disposal system other than a public sewer. Stabilized chlorine cannot be used to raise the free chlorine residual.
    b. When chlorine stabilizers are present in the pool water, the pool shall be closed, the pH lowered to 6.5, and a forty (40) ppm of free disinfectant must be present in the pool water for a minimum of thirty (30) hours as measured at poolside.
6. When the pool is drained, sanitize all surfaces with a chlorine solution of at least twenty (20) ppm.
7. When the pool is disinfected without draining, continuously operate the recirculation/filtration system during the sanitization/contact period time.
8. Filters shall be backwashed to waste and filter material replenished as necessary.
9. When the sanitizing contact period is completed, the pool may be reopened if the:
    a. Excess free chlorine levels are reduced to the maximum allowed in section 13.1008 (b) of this rule;
    b. pH is balanced as needed;
    c. Filter is recharged as needed; and
    d. Circulation system is operating.

28. **New Innovative Equipment and Procedures** –

The use of any new and innovative equipment or disinfection methods other than those described herein is prohibited unless approved in writing by the department.

29. **Design Requirements** –
New construction and renovations that materially alter the configuration of the pool basin, piping systems, or treatment characteristics, including addition of a play feature or a change of disinfection systems, of a pool must be designed and constructed according to the most current version of "The Model Aquatic Health Code (MAHC), Section 4 - Facility Design Standards and Construction" published by the U.S. Department of Health and Human Services Centers for Disease Control and Prevention (CDC).

Existing facilities operating within the Fargo Cass Public Health jurisdiction that meet the local code requirements in effect at the time they were constructed are not required to meet the MAHC standard unless a renovation or material alteration is undertaken.

Appendix A-1

SUPERCHLORINATION

Superchlorination (e.g. shocking) is the process of adding enough free chlorine to break all the molecular bonds specifically the combined chlorine molecules, ammonia or nitrogen compounds. Incomplete "shocking" will only result in higher combined chlorine and a point of no return where removal of the water becomes the best means to reduce combined chlorine. It is important to raise the free chlorine levels to ten times the combined since it takes at least a ratio of 7.6 ppm free to combined plus 2.4 ppm to oxidize other contaminants such as algae that are present.

Simply, to superchlorinate a pool you must:

1) Figure with some accuracy the combined chlorine level. This can be done through your DPD test kit or by simply subtracting your free chlorine from you total chlorine level.
2) Take the combined chlorine and times it by 10. This value will be the breakpoint chlorination amount (BPC)
3) Determine the desired change needed by taking the BPC and subtracting out the existing free chlorine level.
4) know what type of chlorine you are using and the percent of active chlorine in the product. See chart below for assistance and check product labels to accurately figure the amounts you need. *Note: some products will tell you that, the addition of one bag will bring 10,000 gallons of water to 7.5 ppm free chlorine.*
5) To calculate the needed amount you will also need your pool volume (total to include what is held in any filters and piping approximately). See Appendix for this calculation.

Example 1: Calculate the chemical change to achieve Breakpoint Chlorination in 55,000 gallon pool with FC of 1.5 ppm and TC of 2.3 ppm. Using 67% Calcium Hypochlorite where the label states that 2.0 oz will produce a chemical change of 1ppm in 10,000 gallons of water:

STEP 1: Determine Combined Chlorine (CC)
Total Chlorine (TC) – Free Chlorine (FC) = (CC)
2.3 ppm – 1.5 ppm = **0.8 ppm**

STEP 2: Calculate the breakpoint Chlorination (BPC) amount
Breakpoint (BPC) = CC × 10
0.8 × 10 = **8.0 ppm**

STEP 3: Determine the desired change amount
Desired Change = BPC – FC
8.0 ppm – 1.5 ppm = **6.5 ppm**

Amount of chemical from product label	Actual Pool Volume	Desired Chemical Change	Total
	55,000	6.5	
	÷ 10,000 from product label	÷ 10 ppm from product label	
2.0 oz.	× 5.5	× 6.5	= 71.5 oz
Convert answer to pounds: 71.5 ÷ 16 = 4.468 lbs; rounded to 4.5 pounds.			

STEP 4: Determine the amount of chemical to add by referring to the water adjustment table**:**
Always round up, never down
Steps 1 must be done using a DPD test, using the test kit instructions.

Example 2:

18,000 gallon pool
Free Chlorine (FC) = 2.0ppm, Total Chlorine (TC) = 5.0ppm, Combined Chlorine (CC) = 3.0ppm

3.0ppm CC x 10 = 30ppm is the breakpoint chlorination value (BPC value).
Lower the value by 2ppm FC, 30 – 2 = 28ppm to achieve BPC.

From the chart on Appendix A-3 for calcium hypochlorite we get the following equation:

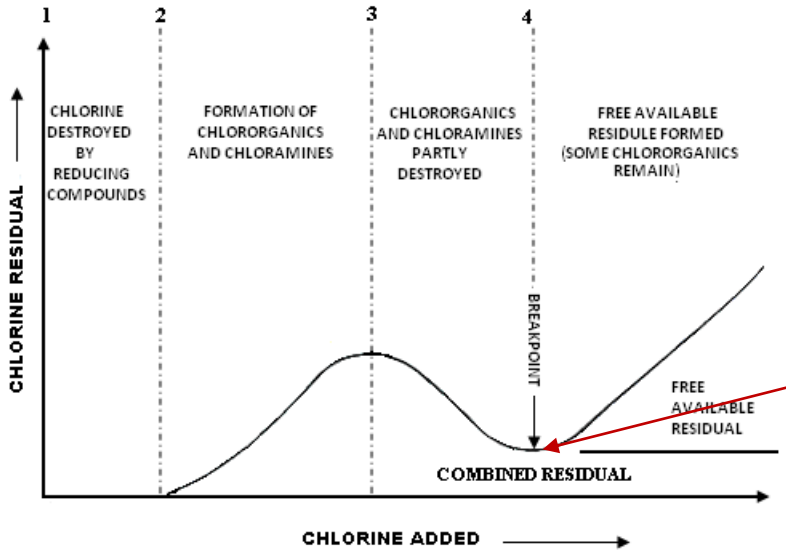
$$\frac{\text{18,000 gallons}}{\text{10,000 (chart)}} \times \frac{\text{28ppm change}}{\text{10ppm (chart)}} \times \text{1.3 lb (chart)} = \text{amount of Cal hypo needed}$$

1.8 x 2.8 x 1.3 = 6.55lbs of calcium hypochlorite

Note: *When shocking a pool, the chlorine-based chemical used for shocking the water must be added all at once so that the concentration throughout the pool reaches breakpoint chlorination.*

Appendix A-2

Breakpoint Chlorination Graph



At this point we achieve breakpoint chlorination. It is your goal to add enough chlorine to be beyond this point. Not all reactions are exact and thus we suggest 5 - 10% increase over to ensure breakpoint.

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Appendix A-3

Water Chemistry Adjustment Table

Dosages to Treat 10,000 Gallons *Chemical* *Desired Change*			
Increase Chlorine	***1 ppm***	***5 ppm***	***10 ppm***
Chlorine Gas	1.3 oz	6.7 oz	13 oz
Calcium Hypochlorite (67%)*	2 oz	10 oz	1.3 lb
Sodium Hypochlorite (12%)	10.7 fl.oz.	1.7 qts	3.3 qts
Lithium Hypochlorite	3.8 oz.	1.2 lbs	2.4 lbs
Dichlor (62%)	2.1 oz	10.75 oz	1.3 lbs
Dichlor (56%)	2.4 oz	12 oz	1.4 lbs
Trichlor	1.5 oz	7.5 oz	14 oz
Increase Total Alkalinity	***10 ppm***	***30 ppm***	***50 ppm***
Sodium Bicarbonate	1.4 lbs	4.2 lbs	7.0 lbs
Sodium Carbonate	14 oz	2.6 lbs	4.4 lbs
Sodium Sesquicarbonate	1.25 lbs	3.75 lbs	6.25 lbs
Decrease Total Alkalinity	***10 ppm***	***30 ppm***	***50 ppm***
Muriatic Acid (31.4%)	26 fl.oz.	2.4 qts	1 gal
Sodium Bisulfate	2.1 lbs	6.4 lbs	10.5 lbs
Increase Calcium Hardness*	***10 ppm***	***30 ppm***	***50 ppm***
Calcium Chloride (100%)	0.9 lbs	2.8 lbs	4.6 lbs
Calcium Chloride (77%)	1.2 lbs	3.6 lbs	6.0 lbs
Increase Stabilizer	***10 ppm***	***30 ppm***	***50 ppm***
Cyanuric Acid***	13 oz	2.5 lbs	4.1 lbs
Neutralize Chlorine	***1 ppm***	***5 ppm***	***10 ppm***
Sodium Thiosulfate	2.6 oz	13 oz	26 oz
Sodium Sulfite	2.4 oz	12 oz	1.5 lbs

Source: National Swimming Pool Foundation 2014. Chemical amounts have been rounded off. Always follow instructions on the manufacturer's label for exact dosage amounts. This table was adapted from the National Swimming Pool Foundation© Pool & Spa Operator TM Handbook.

*Other calcium hypochlorite products are available from 47% to 78%. Follow the label directions for dosage amounts or calculate the dosage using example 2 in the no product label chemical adjustment section.

** The only way to reduce calcium hardness is to remove some of the pool water.

** *The only way to reduce the level of cyanuric acid in the water is to drain and refill the pool with fresh water. Studies have shown that cyanuric acid residual remains in the plaster, filter elements and media, and scale in heaters and pipes.

Changes to pH can be achieved by a pH down product such as muriatic acid or Sodium bisulfate. As well pH can be raised by Sodium Carbonate (soda ash). In all cases you should follow the product guidelines. Note: Sodium Bicarbonate should only be used for alkalinity adjustments not for pH adjustments.

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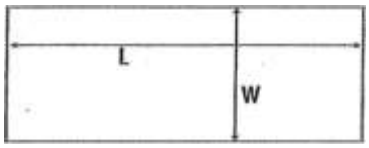
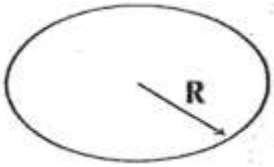
Appendix A-4

Pool volume calculations

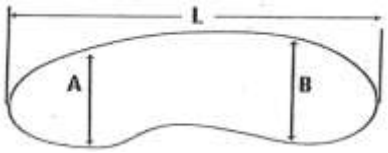
Rectangular Pool
Length x width x average depth x 7.5 = Gallons



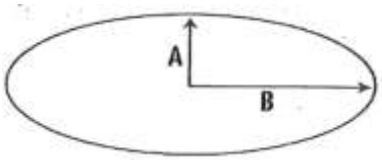
Round Pool
Radius x Radius x 3.14 = Area
Area x average depth x 7.5 = Gallons



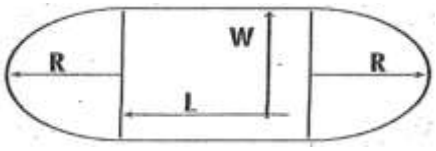
Jelly Bean Pool variations
(a + b) x length x 0.45 = Area (approx)
Area x average depth x 7.5 = Gallons



Oval
A x B X 3.14 = Area
Area x average depth x 7.5 = Gallons



Oblong
R x R x 3.14 + (L x W) = Area
Area x Average depth x 7.5 = Gallons



For other sizes and shapes of pools use a combination of the formulas to additively calculate the total volume of the basin.

I cubic foot of volume is equal to 7.5 gallons of water. 1 cu ft = 7.5 gallons

Average depth of a constant slope or a pool that has two portions with two depths approximately 50/50 split can be calculated by taking the deepest depth plus the shallowest depth and dividing by two. Other pools with more challenging shapes and depths can be split up into several areas and then added together for a total volume.

Note: *Make sure you include an extra volume for the circulation system, filters, and return and inlet lines for the total volume of water needed to be treated*.

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Appendix A-5

QUICK REFERNCE SHEET

Parameter	Min/Max	Ideal	Notes
Free Chlorine	1-10	1-3	pools
	2-10	2-4	spas
	3-10	3-5	wading
Combined Chlorine	0-1	0-0.5	
Total Bromine	3-20	3-10	pools
	4-20	4-10	spas
	4-20	4-10	wading
pH	6.8-8.0	7.2-7.8	all
Alkalinity	80-120	80-120	
Calcium Hardness	100-1000	150-800	
Bacteria (cfu)	absent	absent	e. coli
	Absent	absent	coliform
	Absent – 500	absent	HPC
Cyanuric acid	0-50	30	
Temperature	104 ^{0}F (max)	84 ^{0}F*	pools**
	104 ^{0}F (max)	-	spas
TDS	0-1500 above start up	NA	

** depending on use, typical pool temp would be 84 ^{0}F, however competition pools should be lower so users don't overheat during competition, training and events.*
***spa temp needs to be recorded daily, however pools do not but, should be monitored periodically.*
Cfu means colony forming units.
HPC means the heterotrophic plate count (HPC).
TDS means total dissolved solids.

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Aquatic Facility Log Sheet

Facility name:_____ POOL

Month:_____ Year:_____ Size of pool (gallons): _____ Flow rate required:_____ SPA

Type of disinfection:_____

	Daily test								Weekly test			Notes and Maintenance Chemicals added, backwashing, contamination episodes, closures, etc
Date	Clarity	Disinfection PPM (Free Chlorine)			Combined chlorine	pH	Flow	Temp	ALK	CYA	Total hardness	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

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	Daily test								Weekly test			Notes and Maintenance Chemicals added, backwashing, contamination episodes, closures, etc
Date	Clarity	Disinfection PPM			Combined chlorine	pH	Flow	Temp	Alkalinity	CYA	Total hardness	
16												
17												
18												
19												
20												
21												
22												
23												
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