Appendix A

Sample Checklists & Logs

These checklists contain suggestions and are provided as reference only. Not all items apply for every facility. Some locales may require items that are not listed in these checklists. The checklists may be customized to meet the specific needs of a facility. Please follow all applicable laws and regulations and comply with all manufacturer's directions.

- A-1 Daily Opening & Closing Checklist
- A-2 Daily Pool Chemical Log
- A-3 Daily Locker Room Maintenance Checklist
- A-4 Aquatic Incident Report
- A-5 Seasonal Opening Checklist
- A-6 Seasonal Closing Checklist
- A-7 Preventative Maintenance Checklist
- A-8 New Plaster Surface Start-Up Procedures
- A-9 Pool/Spa Inspection Checklist

A-1 Daily Opening & Closing Checklist

Pool _____

Date _____

The person completing the maintenance job should initial the log.

Opening

_____ 1. Enter the pool area, and lock the gate or door behind you to prevent unauthorized entry. Turn off the pool and deck lights and security alarms. Turn on the bathhouse and office lights.

_____ 2. Inspect the grounds, barriers and gates, safety equipment, handrails, ladders, deck, bathhouse, office area, pump and chemical rooms, and auxiliary areas for broken or malfunctioning equipment, minor maintenance needs, or vandalism which may have occurred since the previous day.

_____ 3. Remove the pool cover. Make sure there are no people or items in the pool. Check for pool wall stains and algae.

_____ 4. Make sure main drain cover is visibly attached and fully intact. (See Appendix C-1)

_____ 5. Inspect all inlets and outlet fittings.

_____ 6. Perform the tests on the Daily Pool Chemical Log sheet and record. Adjust disinfectant and pH if needed. Check readout of controller if used.

_____ 7. Vacuum the pool. Clean the vacuum.

_____ 8. Scrub off the scum line.

_____ 9. Empty and clean the skimmer baskets or gutters.

_____ 10. Sweep, rinse, and disinfect the decks. Clean the deck drains.

_____ 11. Clean the hair and lint strainer.

_____ 12. Check the Flow Rate and backwash the filters if needed.

_____ 13. Check disinfectant reservoir level.

_____ 14. Record pressure and vacuum gauge readings.

_____ 15. Check the pool water level for proper skimming.

_____ 16. Wash down and arrange the deck furniture.

_____ 17. Place program equipment in needed locations.

_____ 18. Check to see that safety equipment is in place.

_____ 19. Check water temperature.

_____ 20. Insert new garbage bags, and put the garbage cans back out on the deck.

_____ 21. List all maintenance jobs that need to be done during the day. Report any repair needs to the proper supervisor.

_____ 22. Clean up the guard room, pool office, first aid room, pump room, chemical room, storage rooms, and bathhouse.

_____ 23. Unlock the entrance doors to the pool immediately before opening to the public.

Closing

_____ 1. Pick up the refuse and debris on the deck.

_____ 2. Empty towel bins.

_____ 3. Straighten or put away deck furniture.

_____ 4. Empty the garbage cans, rinse and store off the deck.

_____ 5. Take the final chemical readings. Make water balance adjustments. Add chemicals if necessary.

_____ 6. Check the pool water level for proper skimming.

_____ 7. Make sure main drain is visibly attached and fully intact.

_____ 8. Secure the program equipment.

_____ 9. Check to see that safety equipment is in place.

_____ 10. Record pressure and vacuum gauge readings.

_____ 11. Check disinfectant reservoir level.

_____ 12. Clean the locker rooms or bathhouse.

_____ 13. Make sure that all running water (hose bibs) on deck and in the bath house is turned off.

_____ 14. Compile a list of maintenance jobs or repairs that need to be done prior to reopening.

_____ 15. Check all areas of the facility to make sure all patrons have left the premises.

_____ 16. Make sure there are no people or items in the pool. Place cover on pool.

_____ 17. Turn on/off deck, security, and pool lights.

_____ 18. Lock all doors and gates.

_____ 19. Turn on the security alarm system to warn of unauthorized entry onto the premises overnight.

All maintenance duties have been satisfactorily completed as indicated.

_____

Maintenance Supervisor

A-2 Daily Pool/Spa Chemical Log

Pool _____ Date _____

Initialed by _____ Notes _____

_____

Item	1st	2nd	3rd	4th	Standard (Min | Max | Ideal)
Time					
FAC					1 | 5 | 2-4 ppm (mg/L)
CAC					0 | 0.2 pools (0.5 spas) | 0
pH					7.2 | 7.8 | 7.4-7.6
ORP					650 or code compliance
Total Alkalinity					60 | 180 | 80-120
Cyanuric Acid					30-50, 150 ppm (mg/L)
Calcium Hardness					150 | 1000 ppm (mg/L) | 200-400
Water Temperature °F					NA | 104°F | 78-82°F
Water Temperature °C					NA | 40°C | 25.5-27.8°C
TDS					1,500 ppm (mg/L) over starting
Saturation Index					-0.3 to +0.3
Water Clarity					Main drain clearly visible
Water Level					1/8-1/4" (3-6mm) above gutter
User Load					
Flow Rate					
Turnover					
Influent Pressure					
Effluent Pressure					
Pressure Differential					
Air Temperature					
Certified Operator ID(s)					

Chemicals Added (Check local codes to see which tests must be conducted and testing frequency.)

Opening _____

_____

Closing _____

_____

A-3 Daily Locker Room Maintenance Checklist

Pool _____

Date _____

The person completing the maintenance job should initial the log.

_____ 1. Trash containers emptied

_____ 2. Litter, debris, clothes, or misplaced articles picked up

_____ 3. Area checked for unpleasant odors, algae, mold, or mildew

_____ 4. Mirrors cleaned

_____ 5. Toilet bowls and urinals cleaned and disinfected

_____ 6. Sink basins cleaned and disinfected

_____ 7. Toilet paper and disposable hand towels available

_____ 8. Soap and other amenities available and containers filled

_____ 9. Suit dryer operational and in good repair

_____ 10. Hair dryers operational

_____ 11. Diaper changing area clean and disinfected; sanitary bed liners available

_____ 12. Markings and graffiti removed

_____ 13. All lights operational; burnt out light bulbs replaced

_____ 14. Floor drains cleaned

_____ 15. Floors swept, rinsed and disinfected

_____ 16. Walls and ceilings cleaned

_____ 17. Non-slip flooring and removable mats rinsed and disinfected

_____ 18. Lockers opened and checked for items left behind by users

_____ 19. Interior and exterior of lockers cleaned and disinfected

_____ 20. Showers, faucets, and toilets working and in good repair

_____ 21. Plumbing checked for dripping water or leaks

_____ 22. Benches or seating secure and in good repair

All maintenance duties have been satisfactorily completed as indicated.

_____

Maintenance Supervisor

A-4 Aquatic Incident Report

Pool _____

Date _____

Record factual information. Do not judge, or state opinions from witnesses or yourself, or admit fault. Take digital images of incident location for clarification. Do not photograph individuals without their signed consent.

Injured person's name: _____

Address: _____

Phone number (home): _____ (work): _____

Sex: _____ Age: _____ Where did the accident occur? _____

What was the injured party doing when he/she was injured? _____

What piece of equipment, if any, was involved? _____

Name and location of supervisor(s), lifeguards, other personnel at the time of the accident:

_____

_____

_____

What part of the body was injured? _____

Type of injury sustained: _____

Type of first aid administered: _____

Did the injured party seek medical assistance? _____

Was EMS called? _____

Describe what happened: _____

_____

_____

Witness 1

_____

Signature

_____

Name

_____

Address

Witness 2

_____

Signature

_____

Name

_____

Address

Witness 3

_____

Signature

_____

Name

_____

Address

Witness 4

_____

Signature

_____

Name

_____

Address

Report filled by (name): _____

Signature: _____

Position: Date: _____

A-5 Seasonal Opening Checklist

Review current local health codes to identify any changes since the facility was closed. If a pre-season inspection is required by the health department, or if you are outsourcing any opening tasks to a vendor, contact them months in advance to schedule and to allow sufficient time to correct issues prior to the opening date.

Date Initiated:_____

_____ 1. Start seasonal opening procedures at least one month prior to the scheduled opening day.

_____ 2. Hire the pool staff. Plan pre-season training programs.

_____ 3. Conduct a complete inventory.

_____ 4. Check for winter damage and vandalism.

_____ 5. Make sure that chemical and maintenance contracts are in effect.

_____ 6. Check to see that repairs and/or renovations scheduled during the off-season were completed.

_____ 7. Order staff uniforms. Purchase sunscreen products and personal protective gear.

_____ 8. Replace worn or missing rescue equipment.

_____ 9. Restock the first aid kit.

_____ 10. Prepare all record forms and logs. Revise the staff, policy and operating manuals.

_____ 11. Pump any accumulated water and debris off the top of the winterizing pool cover.

_____ 12. Remove the winter pool cover. Clean and store it away for the season.

_____ 13. Turn the water supply back on.

_____ 14. Have the phone company restart service.

_____ 15. Empty all debris from the pool. Don't try to pump out dead or decaying leaves and animals.

_____ 16. Check for proper operation of the hydrostatic relief valve.

_____ 17. Drain the pool with a trash pump, after verifying hydrostatic relief valve operations.

_____ 18. Pump remaining liquid from the pool using a sump pump with an auto shut-off.

_____ 19. Rinse down the pool using a high pressure nozzle and hose. Flush out the gutters or skimmers.

_____ 20. Sandblast, acid wash, chlorine wash, recoat, repaint, replaster, fiberglass, and/or patch liner tears, or otherwise prepare the pool surface.

_____ 21. Paint or touch-up depth markings, drop-off lines, lane lines and targets, step edges, and graphics before refilling the pool.

_____ 22. Clean all pool and deck equipment.

_____ 23. Remove the winterizing plugs and expansion blocks. Uncap the inlets.

_____ 24. Lubricate all metal parts and hardware.

_____ 25. Replace gutter drain grates, bolts, gaskets, inlets, and plugs.

_____ 26. Verify main drain grates and sumps are VGB Act compliant, not expired, and installed in accordance with the manufacturer's instructions. Confirm proper operation of any secondary suction safety systems.

_____ 27. Clean and replace skimmer baskets, weirs, and lids.

_____ 28. Reassemble circulation pipes, the pump, and the motor. Drain anti-freeze from all piping and flush with fresh water.

_____ 29. Pressure test all circulation lines to make sure the pipes have not broken during the off-season. Repair broken pipes to prevent leaks from developing.

_____ 30. Service and reinstall flow meters, pressure and vacuum gauges, thermometers, and humidity meters.

_____ 31. Reinstall the hair and lint skimmer basket. Replace gaskets or o-rings. Make sure the lid seals tightly.

_____ 32. Replace cracked or chipped tile.

_____ 33. Replace broken or burnt out pool lights, lenses and seals. Lubricate and tighten bolts and reinsert in the pool wall.

_____ 34. Check that all ground wires are connected.

_____ 35. Service the heater, replace elements, turn on the gas and relight the pilot, or check electrical connections.

_____ 36. Clean the filter media or elements. Repair or replace filter elements or cartridges if necessary. Close and re-plug the filter tank.

_____ 37. Test the manual air pressure relief valves on pressurized filter tanks.

_____ 38. Drain and clean the surge chamber. Check that valves, overflow, and water level devices are in operating order.

_____ 39. Obtain the maintenance and start-up chemicals.

_____ 40. Reinstall the chemical feeders, controllers, probes, and other feed pumps.

_____ 41. Begin filling the pool with water at least seven to ten days prior to the anticipated opening day.

_____ 42. Start circulating and filtering the water as soon as possible after the water level covers the inlets. \Remember to temporarily shut off the skimmer lines to prevent air from entering the system.

_____ 43. Adjust the pressure inlets to maximize circulation. Perform a dye test if needed.

_____ 44. Treat the water to prevent the growth of algae or bacteria.

_____ 45. Add chemicals to achieve water balance, obtain acceptable water clarity, prevent damage (sequestering agents or chelating agents), or prevent chlorine loss (stabilizer).

_____ 46. Restock the test kit with fresh reagents. Calibrate testing instruments.

_____ 47. Vacuum the pool and backwash as needed until the water clears.

_____ 48. Turn on the water heater and begin to raise the water temperature to desired levels.

_____ 49. Cover the pool with a solar or insulating pool blanket to help prevent heat loss and reduce energy costs.

_____ 50. Reinstall ladders, rails, guard chairs, backstroke flags, and stanchions.

_____ 51. Replace handles on hose bibs and fill spouts.

_____ 52. Clean and disinfect the decks. Inspect for cracks or deterioration. Resurface if necessary.

_____ 53. Clean and arrange the deck furniture.

_____ 54. Repaint, spruce up, and clean the pool building, locker rooms, and auxiliary areas.

_____ 55. Replace vandalized or missing signs. Check that all signage required by code is posted.

_____ 56. Stock supplies.

_____ 57. Continue regular grounds maintenance.

_____ 58. Conduct a pre-opening inspection and facility safety audit.

_____ 59. Run mandatory pre-season training for the facility staff.

A-6 Seasonal Closing Checklist

_____ 1. Adjust the chemical balance of the pool water to recommended levels.

_____ 2. Treat facility water with appropriate products to minimize algae, bacteria, or damage to surfaces.

_____ 3. Clean and vacuum the pool.

_____ 4. Empty and store skimmer baskets and hair and lint traps for the winter.

_____ 5. Backwash the filter thoroughly and clean the filter media or elements.

_____ 6. Drain sand filters. Remove cartridges or D.E. filter elements, inspect for tears or excessive wear, and store.

_____ 7. Lower the water level to below the skimmers and return lines for plaster pools. If needed, remove the remaining water from the circulation lines using an air compressor or industrial type tank vacuum cleaner.

_____ 8. Open all pump room valves and loosen the lid from the hair and lint skimmer. However, if the filter is below pool water level, close the valves leading from the pool to the filter.

_____ 9. Grease all plugs and threads.

_____ 10. Add antifreeze formulated specifically for recreational water applications to the pipes to prevent bursting. Do not use automotive antifreeze.

_____ 11. Plug the skimmer or gutter lines. Winterize with antifreeze and expansion blocks. Secure the skimmer lids to the deck to prevent their loss. Plug vacuum and wall return lines and the main drain

_____ 12. Make sure the hydrostatic relief valve is operational.

_____ 13. Drain and protect pumps. If a pump and motor will be exposed to severe weather, disconnect, lubricate, perform seasonal maintenance of the pump, and store. Add antifreeze to help protect pumps and seals from any residual water left after draining.

_____ 14. Clean surge pits or balancing tanks.

_____ 15. Disconnect all fuses and open circuit breakers.

_____ 16. If underwater wet niche lights are exposed to the elements, remove them from their niches and lower them to the bottom of the pool.

_____ 17. Drain the pool water heater. Grease the drain plugs and store for the winter.

_____ 18. Turn off the heater gas supply, gas valves, and pilot lights.

_____ 19. Install the winter safety cover.

_____ 20. Properly store any unused chemicals as described on their labels to prevent containers from breaking and the mixing of potentially incompatible chemicals. Dispose of test reagents, disinfectants, and other chemicals that will lose their potency over the winter.

_____ 21. Disconnect, clean and store the chemical feeder, controllers, and other chemical feed pumps. Store controller electrodes in liquid.

_____ 22. Clean and protect pressure gauges, flow meters, thermometers and humidity meters.

_____ 23. Store all deck furniture (chairs, lounges, tables, umbrellas, etc.). Identify and separate all furniture in need of repair.

_____ 24. Remove deck equipment, hardware, and non-permanent objects such as ladders, rails, slides, guard chairs, starting blocks, drinking fountains, handicapped lifts, portable ramps, clocks, weirs, and safety equipment to prevent vandalism. Store in a clearly-marked, identifiable, weather-protected location. Cap all exposed deck sockets.

_____ 25. Remove the diving boards. Store the boards indoors, upside down and flat so they will not warp.

_____ 26. Turn off the water supply to restroom showers, sinks, and toilets. Drain the pipes and add antifreeze. Remove shower heads and drinking fountain handles. Open hose bibs and fill spouts.

_____ 27. Have the phone company disconnect the pool telephone and discontinue service for the winter.

_____ 28. Install a pool deck alarm system.

_____ 29. Inventory all supplies and equipment. Make suggestions for preventative maintenance and repair, upgrading, and needed equipment purchases.

_____ 30. Confirm security of facility to prevent unauthorized access.

_____ 31. Agree to a periodic facility inspection procedure during the offseason.

_____ 32. Store ADA compliant pool lift.

A-7 Preventative Maintenance Checklist

There are many items for which preventative maintenance can help prevent costly and untimely equipment failures. This list includes many items that may be included in maintenance checklists.

- ❑1. Air pressure relief valve
- ❑2. Automatic chemical controller
- ❑3. Automatic fill valve
- ❑4. Backboard
- ❑5. Backstroke flags
- ❑6. Buoyed life lines
- ❑7. Centrifugal force circulation pump
- ❑8. Chemical containment dikes
- ❑9. Chemical metering pumps, chemical injection
- ❑10. Chemical room storage cabinets and shelving
- ❑11. Chemical spill clean-up equipment
- ❑12. Chemical storage barrels and containers
- ❑13. Color coding and labeling of pump room
- ❑14. Competitive timing equipment
- ❑15. Coping
- ❑16. Coven wall bases
- ❑17. D.E. separation tanks
- ❑18. Deck
- ❑19. Deck chairs, kickboards, exercise equipment, etc.
- ❑20. Deck drains
- ❑21. Dehumidification system
- ❑22. Depth markings
- ❑23. Diaper changing stations
- ❑24. Diving boards, towers, rails, and hardware
- ❑25. Diving well bubbler
- ❑26. Drinking fountain
- ❑27. Emergency alarms
- ❑28. Emergency exit doors, crash bars
- ❑29. Emergency eye wash and drench shower station
- ❑30. Emergency telephone
- ❑31. Extension poles
- ❑32. Eye bolts for lane lines and lifelines
- ❑33. Fencing, gates, latches, locks
- ❑34. Fill spout
- ❑35. Filter
- ❑36. First aid kit
- ❑37. Floating lane lines, reels, and covers
- ❑38. Flow meter
- ❑39. Grab rails, safety rails, handrails
- ❑40. Gutters
- ❑41. Hair and lint trap
- ❑42. Hair dryers
- ❑43. Handicap accessibility lift
- ❑44. Heaving lines
- ❑45. HVAC system
- ❑46. Humidity meter
- ❑47. Inlets and outlet covers
- ❑48. Ladders
- ❑49. Lights: deck, security, under water
- ❑50. Locker room benches, components, and flooring
- ❑51. Lockers
- ❑52. Main drains and suction outlets
- ❑53. Motor
- ❑54. Moveable bulkhead
- ❑55. Personal protective gear
- ❑56. Pipes, circulation lines
- ❑57. Pool blankets
- ❑58. Pool finish or coating
- ❑59. Pressure gauges: filter and pump discharge
- ❑60. Ramps
- ❑61. Rescue tubes
- ❑62. Ring buoys
- ❑63. Safety Data Sheet station
- ❑64. Sauna equipment
- ❑65. Shepherd's crook
- ❑66. Showers
- ❑67. Sight glass
- ❑68. Signage: pool rules, warning signs - code compliant
- ❑69. Skimmers
- ❑70. Spa aerators
- ❑71. Spectator bleachers
- ❑72. Stanchions, anchors, caps
- ❑73. Starting blocks
- ❑74. Storage rooms
- ❑75. Suit dryers
- ❑76. Sump pit, backwash holding tank
- ❑77. Surge chamber
- ❑78. Test kits and reagents
- ❑79. Thermometers
- ❑80. Toilets, urinals, and sinks
- ❑81. Towel and equipment hooks
- ❑82. Underwater sound system
- ❑83. Vacuum
- ❑84. Vacuum gauges
- ❑85. Valves
- ❑86. Water heater (domestic water supply)
- ❑87. Water heater (pool)
- ❑88. Water polo goals
- ❑89. Windows and skylights

A-8 New Plaster Start-Up Procedures

The pool finish will start to hydrate immediately after mixing, with the majority of hydration taking place within the first 28 days. This critical time period is when a finish is most susceptible to staining, scaling and discoloration. Proper start-up procedures including timely brushing and constant monitoring and adjusting of the pool water are mandatory. The following recommended start-up method is based on procedures shown to produce the best aesthetic results. Due to unique local water conditions and environmental factors, parts of these recommended start-up procedures may need to be modified to protect the pool finish. For example: filling the pool with water that exhibits extremely low calcium hardness, low pH or low total alkalinity levels may necessitate changes to these procedures. Brushing and monitored chemical adjustments will be mandatory by the homeowner or a trained pool technician during the service life of any pool surface. It is best to dilute or dissolve any chemical before adding to the pool water. **ALWAYS ADD A CHEMICAL TO WATER, NEVER WATER TO THE CHEMICAL. Use appropriate personal protective equipment.**

Pool Filling Day

- Step 1: Make sure the filtration equipment is operational.
- Step 2: Remove all floor return heads and directional eyeballs (if appropriate and recommended in your geographical area).
- Step 3: Based on temperature and type of finish, fill the pool to the middle of the skimmer or specified water level without interruption as rapidly as possible with clean potable water to help prevent a bowl ring. Place a clean rag on the end of the hose, always placed in the deepest area, to prevent damage to the surface material. If a water truck is required, 24 inches (60 cm) of water should be placed at the deepest area for a water cushion. Wheeled devices should not be used in the pool until after 28 days.
- Step 4: At no time should any person or pets be allowed in the pool during the fill. Do not allow any external sources of water to enter the pool to help prevent streaking. It is recommended that you do not swim in the pool until the water is properly balanced.
- Step 5: Test fill water for pH, alkalinity, calcium hardness and metals. Record test results.
- Step 6: Start the filtration system immediately when the pool is full to the middle of the skimmer or specified water level.

1st Day, Following Pool Filling Day (It is vital to follow these steps in order.)

- Step 1: Test pH, alkalinity, calcium hardness and metals. Record test results.
- Step 2: High alkalinity should be adjusted to 80 ppm (mg/L) using pre-diluted muriatic acid (31-33% hydrochloric acid). Always pre-dilute the acid by adding it to a five gallon (19 liter) bucket of pool water.
- Step 3: Low alkalinity should be adjusted to 80 ppm (mg/L) using sodium bicarbonate (baking soda).
- Step 4: pH should be reduced to 7.2 to 7.6 adding pre-diluted muriatic acid if the alkalinity is already 80-100 ppm (mg/L).
- Step 5: Once the alkalinity is adjusted to 80 ppm (mg/L) and the pH is adjusted to 7.2 to 7.6, then adjust calcium hardness levels to a minimum of 150 ppm (mg/L).
- Step 6: Brush the entire pool surface thoroughly at least twice daily to remove all plaster dust.
- Step 7: Although optional, it is highly recommended to pre-dilute and add a quality sequestering agent using the recommended initial start-up dosage and then the recommended maintenance dosage per the sequestering agent's manufacturer.
- Step 8: Operate filtration system continuously for a minimum of 72 hours.
- Step 9: DO NOT add chlorine for 48 hours. DO NOT turn on pool heater until there is no plaster dust in the pool.

A-8 New Plaster Start-Up Procedures (Continued)

2nd Day

- Follow steps of 1st Day

3rd Day

- Step 1: Test pH, alkalinity and calcium hardness and repeat 1st Day Steps 1 through 6.
- Step 2: Pre-diluted chlorine may now be added to achieve 1.5 to 3 ppm (mg/L). NO SALT SHOULD BE ADDED FOR 28 DAYS.
- Step 3: Brush the entire pool surface thoroughly at least twice daily to remove all plaster dust.

4th Through the 28th Day

- Step 1: Test pH, carbonate alkalinity and calcium hardness and repeat 1st Day Steps 1 through 5 every day for 14 days to help prevent the scaling of the pool surface.
- Step 2: On the 7th day, if there is any plaster dust remaining - remove it using a brush pool vacuum.
- Step 3: After the 4th Day - calcium levels should be adjusted slowly over the 28 day period not to exceed 200 ppm (mg/L).
- Step 4: After the 4th Day - adjust cyanuric acid levels to 30 to 50 ppm (mg/L) based on the primary disinfectant of the pool (pre-dissolve and add through the skimmer).

For more information contact the National Plasterers Council **npconline.org** or call **(847) 416-7272**

A-9 Pool & Spa Inspection Checklist

This pool & spa inspection checklist is an example of a guideline that can be used to audit or evaluate a facility. All items do not apply to every facility. Many items do not fall under the direct responsibility of a pool operator. Additional training and resources for conducting self-audits and inspections are available through the Certified Pool & Spa Inspector certification course and the Aquatic Facility Audits course from PHTA.

Pool _____
Date _____

Address _____
City / State / Zip: _____
Phone: (____)_____ Year Built: _____
Maintenance Director / Manager / Supervisor _____

❑1. Main drain grates are bolted securely to the pool bottom.

❑2. A six-inch black disk or the main drain grates are clearly visible from any point on the deck.

❑3. Drain covers are VGB Act certified, not expired, and installed according to manufacturer's instructions; and the suction system has a flow rating equal to or greater than 100% of circulation system flow rate.

❑4. The circulation system is properly plumbed to provide uniform distribution of water throughout the pool and prevent hazards.
Inlet type_____
Inlet number and spacing _____
Inlet location _____

❑5. The pool is vacuumed daily or as needed. No settled debris is visible.
Vacuum type _____

❑6. A hydrostatic relief valve has been installed on in-ground pools in areas where the ground freezes or where high ground water tables may pose a problem.

❑7. Algae growth is not visible in the pool. The water is not discolored from an algae bloom.

❑8. Coping stones and tile lines are not chipped, cracked, or loose.

❑9. The pool shell is finished in a smooth but slip resistant, easily cleaned, and water tight surface material, white or off-white in color. There are no cracks in the shell except structural expansion joints. Pool construction material _____
Surface type _____

❑10. The presence of minerals or dissolved metals has not caused surface staining or water discoloration.

❑11. Correct water level is maintained to allow for the removal of floating debris and for the continuous overflow of water into the pool gutters or skimmers.

❑12. Type of perimeter overflow system:
___Skimmers: Number _____
___Gutters
___Prefabricated
___Water-to-waste
___Fully recessed
___Partially recessed
___Rim flow
___Roll-out

❑13. Skimmer weirs, equalizer lines, skimmer baskets, deck covers, and flow adjustment or anti-entrapment drain covers are all present and in good repair.

❑14. A current license or permit to operate a public pool is posted in a conspicuous place in the facility.

A-9 Pool/Spa Inspection Checklist (Continued)

❑15. Certified operator certifications are conspicuously posted.

❑16. Adequate storage space has been provided for wet, dry and secure storage of equipment. Decks are uncluttered. They are not used for storage of teaching or maintenance equipment.

❑17. The pool is covered with an insulating or safety pool cover when not in use.

❑18. Pool equipment is not being improperly used or misused.

❑19. Emergency exit doors are unlocked, and crash bars are operational. An alarm sounds when an emergency door is opened.

❑20. All lights are operational and installed in compliance with National Electrical Code Article 680.

❑21. The pool area is well lit and sufficient overhead and/or pool lighting is provided.
Type of deck lighting _____
Number of deck lights _____
Wattage of each light _____
Type of underwater lighting _____
Number of underwater lights _____
Wattage of each light _____
Illumination level _____
Footcandles (day) _____
Footcandles (night) _____

❑22. A security lighting system is installed in indoor facilities that require light for patrons to exit safely. Lights are tested on a regular basis.

❑23. Glare from natural lighting does not interfere with the ability to see below the surface of the water.

❑24. Glare from artificial lighting does not interfere with the ability to see below the surface of the water.

❑25. Ground fault circuit interrupters (GFCI) have been installed on all electrical outlets in the pool, locker rooms, and other wet areas of the facility.

❑26. The deck and all floors leading to the pool are slip resistant.
Deck surface material
_____

❑27. Deck mats, raised grid interlocking tiles, or anti-bactericide runners, if used, are removed for cleaning and disinfection.

❑28. Decks are clean and disinfected.
Number of hose bibs _____
Hose bib location _____
Backflow prevention

❑29. Decks on all four sides of the pool must meet the minimum regulations regarding unobstructed clearance. The minimum required unobstructed deck space is provided where diving boards or starting blocks are installed. The required deck space separates the swimming pool from the wading pool, spa, or other pools.

❑30. Decks are sloped properly to drain and do not collect pools of standing water.
Number of deck drains _____
Max. distance between drains _____
Coven wall bases present _____

❑31. All ladders, backstroke flag stanchions, guard chairs, rails and treads, deck plates, and other deck equipment are tightly secured in place.

❑32. When stanchions, starting blocks or other pieces of deck equipment are removed, anchor sockets are capped.

❑33. The fresh water fill spout is located so as not to be a tripping hazard. An air gap of at least 6 inches (14.25 cm) has been provided between the spout and the pool as a means of backflow protection.
Water supply source _____
Drought restrictions _____

A-9 Pool/Spa Inspection Checklist (Continued)

❑34. A drinking fountain has been provided within the pool enclosure.

❑35. Backstroke flags and support stanchions are placed 15 feet (4.57 m) (USS short course, NCAA, NFSHSA) or 16'5" (5 m) (USS long course, FINA) from each pool edge.

❑36. Underwater observation windows are mounted flush with the pool wall. Hardware securing the window frame to the pool wall does not protrude or otherwise pose a hazard to users.

❑37. Spectator seating areas are physically separated from the pool deck.

❑38. Electrical wiring does not pass directly over the pool.

❑39. Towel and equipment hooks are installed on the walls in a way that does not present a hazard to users.

❑40. Swim lanes are a minimum of seven and preferably ten feet wide.

❑41. Targets have been provided and are in alignment with swim lanes.

❑42. Floating lane lines are secured to the pool with recessed hooks. Lines are stored on a reel when not in use, and the lane line reel is covered and stored off deck.

❑43. An adequate means of egress from the pool is provided.

❑44. The pool is handicapped accessible and in compliance with the ADA and barrier-free design requirements.

❑45. Rescue equipment, including rescue tubes, ring buoys, extension poles, and shepherd's crooks are all in good repair and immediately available for use.

❑46. Elevated lifeguard chairs are placed at appropriate locations around the pool deck.

❑47. The first aid kit is well stocked and instantly accessible. (Minimum: 24-unit first aid kit) A first aid room is provided.

❑48. A backboard, rigid cervical collars, head immobilizer, and straps are in good repair and immediately available for use. Guards are trained and practiced in current spinal management techniques.

❑49. An emergency telephone is located on the pool deck.

❑50. Emergency phone numbers are posted. Directions to the facility and other pertinent information to be conveyed to the 911 operator is posted next to the phone.

❑51. An established procedure is in place to ensure that employees who make direct contact with minors do not have a criminal record as sex offenders.

❑52. Pool rules, methods of enforcement, safety literature, and meaningful warning signs are posted.

❑53. Pool capacity (user load) signs are posted. Capacity limits are not exceeded. Method of determining user load _____
Maximum user load _____

❑54. Depth markings are plainly and conspicuously marked at or above the water surface on the vertical wall of the pool and on the edge of the deck. Markings conform to local and state code as to size, color, and spacing. Depth is marked to indicate feet and inches. Numbers other than those indicating depth have been removed.

❑55. Depth or drop-off lines and/or buoyed life lines are correctly positioned in the pool to indicate sudden changes in slope.

❑56. A contour depth chart is posted next to the pool to help users judge the depth and shape of the pool. Slope ratio (shallow) _____

❑57. Steps, treads, ramps, ledges or any other protrusion into the pool are marked with a contrasting color coating or tile on both the top and vertical rise.

A-9 Pool/Spa Inspection Checklist

❑58. Diving board is in compliance with manufacturer specifications regarding installation, structural features, and pool water depth configuration.

❑59. Starting blocks are located in a depth of water that meets the minimum requirement of state or local regulations or the standards established by the sanctioning competitive body(s). Warning labels are affixed. Blocks are removed from the deck except during competition or training for competition. Use of starting blocks is prohibited unless swimmers are under the direct supervision of an instructor or coach.

❑60. Adequate fencing, gates, barriers, alarms or other protective devices are installed to prevent entry, or alert staff to the unauthorized entry of a trespasser into the pool area.

❑61. The pool manager or operator is certified by the PHTA Certified Pool & Spa Operator certification Program, and is knowledgeable in all aspects of pool operation, water chemistry and maintenance.

❑62. Pool water is tested at the frequency required by the code or at a frequency to ensure the water is disinfected and balanced.

❑63. Test kits are properly stored and reagents fresh. Brand(s) of test kits _____

_____

❑64. A system of regular testing, recording of findings, and chemical adjustment of pool water has been implemented. A daily pool water analysis log is posted. Capability of testing or calculating:

___FAC
___TAC
___CAC
___Cyanuric acid
___pH
___Acid/base demand
___Total alkalinity
___Calcium hardness
___TDS
___Sodium chloride
___Water temperature
___Air temperature
___Relative humidity
___Saturation index
___ORP

❑65. All water quality and chemicals levels are within acceptable ranges.

❑66. Detailed maintenance checklists for daily opening and closing procedures and seasonal and long term maintenance are maintained, completed daily and available for inspection.

___Daily checklists
___Preventative maintenance checklists

❑67. Trash containers are covered and emptied as needed.

❑68. Markings and graffiti have been removed.

❑69. Water temperature is maintained within acceptable levels and is appropriate for the primary activities being conducted in the pool.

Water temperature _____ °F (°C)

❑70. Air quality is monitored. No unpleasant odors or irritating fumes are discernible.

Air temperature _____ °F (°C)

❑71. Fresh air is introduced into the pool area consistent with ASHRAE standards.

Type of air handling system _____

Humidity level (pool) _____ %

❑72. Upon visual inspection, the ceiling over the pool does not show any obvious signs of deterioration.

❑73. Lifeguards have suitable training and certification.

❑74. The doors leading to the equipment and chemical rooms are locked and only accessible to authorized personnel.

❑75. Appropriate signage and warnings are affixed to the outside of the equipment and chemical room doors.

❑76. The pool chemical room has at least two exits, and does not open out on to the pool deck or to other heavily traveled areas.

A-9 Pool/Spa Inspection Checklist (Continued)

❑77. The surge chamber is properly sized.
Surge tank volume_____gal (liters)
Type:
___Surge chamber
___Balancing tank
___Surge trench
___In-pool surge capacity
___Vacuum filter tank

❑78. The flow meter is operational, accurate and properly located on a return line at operator eye level.
Meter type:
___Digital
___Mercury manometer
___Analog
___Variable area
Straight length of pipe prior to the flow meter
___ inches (cm)
Straight length of pipe after the flow meter
___ inches (cm)
Pipe diameter ___ inches (cm)

❑79. Rate of circulation is appropriate to meet minimum turnover requirements and to accommodate peak user loads.
Volume = ___ gallons (liters)
Flow rate = ___ gpm (lpm)
Required flow rate = ___ gpm (lpm) for
___ hour turnover
Turnover = ___ hours

❑80. The hair and lint strainer basket is clean of debris. Additional baskets and gaskets or o-rings are available.

❑81. The centrifugal force pump is properly secured to its base, located so as to avoid cavitation, and is operating quietly.

❑82. The pump is self-priming or located so as to eliminate the need for priming.

❑83. The circulation pump is properly sized according to the manufacturer's pump curve.
Influent pressure
___(psi) x 2.31 = ___ feet of head
Vacuum reading
___(in. Hg) x 1.13 = ___ feet of water
Feet of head + feet of water = ___TDH
Minimum flow rate = ___ gpm (lpm)
Pump horsepower = ___ hp

❑84. Pipes are not leaking, are properly supported, and do not show obvious external signs of calcification, corrosion or deterioration.
Pipe type:
___PVC 40
___Copper
___CPVC 80
___Stainless steel
___Cast iron
___Galvanized steel

❑85. Air pressure relief valves have been installed on all pressure filter tanks.
___ Manual ___ Automatic

❑86. Valves and piping have been provided on multi-filter systems to isolate individual filter tanks for maintenance or repair.

❑87. The filter tanks are positioned to allow for accessibility and proper air circulation.

❑88. Total filter surface area is adequate to meet recommended design flow rates.
Filter type:
___ Rapid sand
___ Pressure D.E.
___ Vacuum sand
___ Vacuum D.E.
___ High rate sand
___ Regenerative D.E.
___ Pressure cartridge
___ Vacuum cartridge
Filter brand _____
Design flow rate =___ gpm/ft² (m³/m²/hr)
Required filter size = ___ft² (m²)
Number of filter tanks (elements) ___ x ft² (m²) of filter surface area = ___ ft² (m²)
Actual filter size = ___ft² (m²)

❑89. Diatomaceous earth, chemicals or discharged pool water are neutralized, separated, settled or otherwise properly disposed of.

❑90. A clean sight glass or visual outfall of at least three feet has been provided.

A-9 Pool/Spa Inspection Checklist (Continued)

❑91. A sump pit or backwash holding tank has been installed and has been properly sized to prevent water discharged during the backwash process from flooding the filter room.

❑92. Adequate drainage has been provided in the pump room.

❑93. Filter media or elements are clean. No channeling, mud ball formation or bridging is evident.

❑94. Pressurized filter tanks and hair and lint traps are properly sealed.

❑95. All influent and effluent pressure gauges and vacuum gauges are operational and accurate.
Vacuum ___ Hg
Influent pressure ___ psi (kPa)
Effluent pressure ___ psi (kPa)

❑96. The pool auxiliary rooms are clean, maintained in a safe and acceptable manner, well lit and ventilated.

❑97. Diagrams and operating instructions are posted in the pump rooms. Operating manuals have been obtained from the manufacturers.

❑98. Chemical feed pumps are interlocked to the circulation pump to ensure chemicals are not fed if circulation is off.

❑99. All piping, filters, and components which are part of the mechanical operating system are labeled, tagged, or color coded.

❑100. The heater is properly sized and maintained.
Type of heater _____
Fossil fuel _____
Efficiency rating _____%
Variables reducing heater efficiency
_____

❑101. Pool chemicals and other flammable materials are stored a safe distance from the heater or in a flammable storage cabinet.

❑102. Adequate clearances have been established between the heater and the equipment room walls.

❑103. The heater is installed on a level, non-combustible base.

❑104. Safety devices have been installed on the heater to prevent improper operation and to eliminate the possibility of patrons being accidentally burned by excessively high water temperatures.
___High temperature limit switch
___Thermostat
___Low voltage fireman's switch (if a timer is installed)
___Check valves between the filter and heater
___Check valves between the heater and chemical injection equipment
___Bonded and grounded
___Flow or pressure switch
___Gas pressure regulator

❑105. The heater is installed downstream of the pump and filter and upstream of chemical injection equipment.

❑106. A copper, stainless steel, or CPVC heat sink has been installed between the heater and piping.

❑107. Compensation has been made for variables which reduce heater efficiency.
___Altitude
___Wind breaks erected near outdoor installations
___Properly vented to insure combustion and adequate exhaustion
___Heater is installed close to the pool to minimize heat loss

❑108. An active solar heating system has been installed and is operating effectively.
Solar Heating Type:
___ Open loop (water)
___ Closed loop (antifreeze)
Panels:
___Flat plate ___Flexible plastic
___Glazed ___Unglazed
Collector location _____

❑109. SDS are posted for all chemicals stored on the premises. SDS stations and a master file have been created.

❑110. Chemicals are properly stored, contained, labeled, transported, and handled in

A-9 Pool/Spa Inspection Checklist (Continued)

compliance with safe chemical storage practices.

___Primary disinfectant
___Supplemental chemicals
___pH adjustment chemical
Chemical inventory:

_____

_____

_____

❑111. Chemicals are correctly dispensed into the pool.
Injection:
___ Peristaltic pump
___ Gas chlorinator
___ Piston pump
___ Brominator
___ Diaphragm pump
___ Erosion feeder
___ Slurry pot
___ Hand feeding

❑112. Automated chemical controllers are calibrated and operating properly.
Controller brand _____
Paper print-out or remote read-out

_____

Automatic probe cleaner _____
Frequency of probe cleaning _____
Chemical spills _____

❑113. Empty or used chemical storage containers are rinsed and disposed of in accordance with manufacturers' recommendations.

❑114. Equipment for containing and cleaning up chemical spills is available. Containment dikes, overpacks, and chemical clean-up gear have been provided.

❑115. Emergency fresh water drench showers and eye washes are available for use by all persons required to handle chemicals.

❑116. Personal protective equipment, such as goggles, full-face shields, splash guard aprons, neoprene gloves, boots, respirators, gas masks, SCBAs, disposable latex gloves, and 1-way CPR pocket masks, are available and staff members have been instructed in their proper use.

❑117. The facility is in compliance with all bathing codes. (Contact your department of health for a copy of the health and safety, building, general industry safety, and administrative codes that pertain to the design, construction, maintenance and operation of pools in your state.)

❑118. The facility is in compliance with all applicable codes, such as the Uniform Fire Code, Emergency Planning and Community Right-to-Know Act, Hazard Communication Standard, Safe Drinking Water and Toxic Enforcement Act, and Occupational Exposure to Bloodborne Pathogens.

❑119. Fire extinguishers are charged and are located throughout the facility.
___Type A
___Type B
___Type BC

❑120. Locker rooms are adequately sized to provide patrons with a desired level of privacy.
Locker rooms:
___Men
___Women
___Boys
___Girls
___Staff
___Family or transgender changing room

❑121. Lockers are provided in adequate numbers.

❑122. The locker rooms are adequately illuminated and ventilated.

❑123. Locker room maintenance is completed as needed. Sink basins, floors, mirrors, toilet bowls and urinals are cleaned and disinfected.

❑124. The locker room plumbing has been checked for dripping water or leaks. Showers, faucets and toilets are working and in good repair.
Showers:
___ Group
___ Private
___ Handicap

A-9 Pool/Spa Inspection Checklist (Continued)

❑125. Toilet paper, paper hand-towels, soap and other amenities are available and containers filled.

Amenities:

___ Toilet paper
___ Paper towels
___ Soap
___ Suit dryers
___ Hair dryers
___ Scales
___ Diaper changing
___ Baby seats in stalls
___ Other_____

❑126. The suit dryer is operational and in good repair.

❑127. A diaper changing area, sanitary bed liners, and a disposal can for soiled diapers has been provided.

❑128. Benches, chairs, and tables are secure and in good repair.

❑129. The locker rooms are aesthetically pleasing and provide a comfortable and pleasant environment.

❑130. The spa 15 minute timer is operational and suitably located so it cannot be reached by a user sitting in the spa.

❑131. An emergency spa pump shut-off switch is installed on the spa deck. The switch is clearly labeled.

❑132. Sauna timers are suitably located on the outside of the rooms and operational.

❑133. Steam room timers are suitably located on the outside of the rooms and operational.

❑134. Signs are posted instructing users on the proper use of saunas, steam rooms, and spas and warning users of the hazards associated with their use.

❑135. An adequate number of nearby parking spaces have been provided in anticipation of maximum user loads.

❑136. Measures are being taken to prevent infestation by roaches and other unwanted pests without contaminating pool water.

Appendix B

Water Chemistry Guidelines & Worksheets

- B-1 Water Chemistry Guidelines
- B-2 Water Chemistry Adjustment Guide
- B-3 Water Chemistry Adjustment Worksheets
- B-4 Conversion & Calculation Guide

B-1 Water Chemistry Guidelines

These commonly accepted chemical parameters do not supersede local or state codes and regulations.

Parameter	Min	Ideal	Max	Pool Type
Free Chlorine (ppm or mg/L)	1.0	2.0-4.0	5.0	Pools, Waterparks
	2.0	3.0-5.0	10.0	Spas
Combined Chlorine (ppm or mg/L)	0	0	0.4	Pools, Waterparks
	0	0	0.5	Spas
Total Bromine (ppm or mg/L)	2.0	4.0-6.0	10.0	All Types
PHMB (ppm or mg/L)	30	30-50	50	All Types
pH	7.2	7.4-7.6	7.8	All Types
Total Alkalinity as $CaCO_3$ (ppm or mg/L)	60	80-100* 100-120**	180	All Types
Total Dissolved Solids (ppm or mg/L)	NA	NA	1,500 over startup	All Types
Calcium Hardness as $CaCO_3$ (ppm or mg/L)	150	200-400	1,000	Pools, Waterparks
	100	150-250	800	Spas
Heavy Metals	None	None	None	All Types
Visible Algae	None	None	None	All Types
Bacteria	None	None	Local Code	All Types
Cyanuric Acid (ppm or mg/L)	****	30-50	****	All Types
Temperature °F/°C	78°F (25.5°C)	80.5°F (26.9°C)	82°F (27.8°C)	Competition Pools
	-	-	104°F	Spas
	-	Personal Preference	104°F	Other Pools
Ozone (ppm or mg/L)	-	-	0.1 over 8 hr time wtd. avg.	All Types
ORP	Calibrate to Disinfectant Level*****			All Types

* For calcium hypochlorite, lithium hypochlorite, or sodium hypochlorite

** For sodium dichlor, trichlor, chlorine, gas, BCDMH

*** Start-up includes the TDS contribution of salt found in chlorine generating systems

**** Dictated by local codes. Typically 100 ppm (mg/L). Some codes are higher, some are lower

***** Some local codes may dictate a minimum and maximum

Notes

B-2 Water Chemistry Adjustment Guide

These commonly accepted chemical parameteres do not supersede manufacturers' instructions. Smart phone apps can help calculate associated pool volume and dosage. Chemical amounts have been rounded off for convenience. Always follow the instructions on the manufacturer's label for exact dosage amounts.

Dosages to Treat	10,000 Gallons			40,000 Liters		
Chemical	Desired Change			Desired Change		
Increase Chlorine	1 ppm	5 ppm	10 ppm	1 mg/L	5 mg/L	10 mg/L
Chlorine Gas	1.3 oz	6.7 oz.	13 oz	40 g	200 g	390 g
Calcium Hypochlorite (67%)*	2 oz	10 oz	1.25 lbs	63 g	315 g	630 g
Sodium Hypochlorite (12%)	10.7 fl.oz.	1.7 qts	3.3 qts	330 mL	1.36 L	3.3 L
Lithium Hypochlorite	3.8 oz	1.2 lbs	2.4 lbs	110 g	570 g	1.1 kg
Dichlor (62%)	2.1 oz	10.75 oz	1.3 lbs	65 g	320 g	650 g
Dichlor (56%)	2.4 oz	12 oz	1.4 lbs	72 g	360 g	720 g
Trichlor	1.5 oz	7.5 oz	14 oz	44 g	220 g	440 g
Increase Total Alkalinity	10 ppm	30 ppm	50 ppm	10 mg/L	30 mg/L	50 mg/L
Sodium Bicarbonate	1.4 lbs	4.2 lbs	7.0 lbs	670 g	2.0 kg	3.4 kg
Sodium Carbonate	14 oz	2.6 lbs	4.4 lbs	400 g	1.2 kg	2.0 kg
Sodium Sesquicarbonate	1.25 lbs	3.75 lbs	6.25 lbs	600 g	1.8 kg	3.0 kg
Decrease Total Alkalinity	10 ppm	30 ppm	50 ppm	10 mg/L	30 mg/L	50 mg/L
Muriatic Acid (31.4%)	26 fl.oz.	2.4 qts	1 gal	800 mL	2.4 L	4.0 L
Sodium Bisulfate	2.1 lbs	6.4 lbs	10.5 lbs	1.03 kg	3.1 kg	5.15 kg
Increase/Decrease pH	For more information on pH adjustments, see the pH Adjustment Testing section in the Chemical Testing chapter.					
Increase Calcium Hardness	10 ppm	30 ppm	50 ppm	10 mg/L	30 mg/L	50 mg/L
Calcium Chloride (100%)	0.9 lbs	2.8 lbs	4.6 lbs	402 g	1.2 kg	2.0 kg
Calcium Chloride (77%)	1.2 lbs	3.6 lbs	6.0 lbs	575 g	1.7 kg	2.9 kg
Increase Stabilizer	10 ppm	30 ppm	50 ppm	10 mg/L	30 mg/L	50 mg/L
Cyanuric Acid	13 oz	2.5 lbs	4.1 lbs	400 g	1.2 kg	2.0 kg
Neutralize Chlorine	1 ppm	5 ppm	10 ppm	1 mg/L	5 mg/L	10 mg/L
Sodium Thiosulfate	2.6 oz	13 oz	26 oz	79 oz	395 g	790 g
Sodium Sulfite	2.4 oz	12 oz	1.5 lbs	71 g	356 g	711 g

* Other calcium hypochlorite products are available from 47% to 78%. Follow the label directions for dosage amounts.

B-3 Water Chemistry Adjustment Worksheets

Use the following blank chemical adjustment worksheets to perform your own calculations.

Amount of Chemical (from product label)	Actual Pool Volume	Desired Chemical Change	Total
	÷ 10,000 gal (from product label)*	÷ _____ ppm (from product label)*	
	x	x	=

* Or appendix B-2

Metric

Amount of Chemical (from product label)	Actual Pool Volume	Desired Chemical Change	Total
	÷ 40,000 L (from product label)*	÷ _____ mg/L (from product label)*	
	x	x	=

* Or appendix B-2

B-4 Conversion & Calculation Guide

Liquid Conversions							
	tsp.	TBS.	fl.oz.	c.	pt.	qt.	gal. (US)
Teaspoon (tsp.)	1.0	3.0	6.0	48	96	192	768
Tablespoon (TBS.)	0.33	1.0	2.0	16	32	64	256
Fluid Ounce (fl.oz.)	0.16	0.5	1.0	8.0	16	32	128
Cup (c.)	0.02	0.06	0.125	1.0	2.0	4.0	16
Pint (pt.)	0.01	0.03	0.06	0.5	1.0	2.0	8.0
Quart (qt.)	0.005	0.02	0.03	0.25	0.5	1.0	4.0
Gallon (gal.) (US)	0.001	0.004	0.008	0.06	0.15	0.25	1.0
Liter	0.005	0.015	0.0296	0.237	0.473	0.946	3.785

Formulas and Conversions					
Feet		Formula	Gallons	x 3.785 =	Liters
Yards	3	Yards x 3 = feet	Liters	x 0.264 =	Gallons
Meters	3.28	Meters x 3.28 = feet	Pounds	x 0.454 =	Kilograms
Pounds		Formula	Kilograms	x 2.205 =	Pounds
Ounces	16	Ounces ÷ 16 = Pounds	Ounces	x 28.35 =	Grams
Temperature		Conversion	Grams	x 0.0353 =	Ounces
°F to °C		°C = (°F - 32) x 0.555	U.S. Gallon	x 0.832 =	Imperial Gallons
°C to °F		°F = (°C x 1.8) + 32	Imperial Gallon	x 1.202 =	U.S. Gallons

Additional Calculations and Conversions	
BTU	= 8.33 x gallons x °F temperature rise
1 ppm	= 1 mg/L (milligram per liter)
1 Cubic Foot Water	= 7.5 gallons
1 Cubic Meter Water	= 1000 liters
1 Gallon Water	= 8.33 pounds
1 Square Foot	= 144 square inches
Area Circle	= 3.14 x r x r (r is the radius)
Area Rectangle	= Length (L) x Width (W) or L x W
Average Depth	= (Shallow Depth + Deep Depth) ÷ 2
Volume Rectangle (gallons)	= Length x Width x Avg. Depth x 7.5
Volume Circle (gallons)	= 3.14 x radius x radius x Avg. Depth x 7.5
Volume Oval (gallons)	= Short Radius x Long Radius x 3.14 x Avg. Depth x 7.5*
Volume Kidney (gallons)	= ($Width_A$ + $Width_B$) x Length x 0.45 x Avg. Depth x 7.5*

* See Figure 3-3 in the Essential Calculations chapter

Appendix C

Legislation & Regulation Information

- C-1 The Virginia Graeme Baker Pool & Spa Safety Act
- C-2 Revised Americans with Disability Act Regulations
- C-3 Model Aquatic Health Code Module Summary
- C-4 Float Tanks
- C-5 Listing of Pool Industry Regulations & Standards

C-1 The Virginia Graeme Baker Pool & Spa Safety Act

The Virginia Graeme Baker Pool & Spa Safety Act (VGB Act) was enacted by Congress and signed by President Bush on December 19, 2007, with the goal of preventing drownings in pools and spas. It addresses fencing, alarms, and the hazard of suction entrapment, by mandating all suction outlets (main drain covers, mounting hardware and sumps) to be 3rd party certified, and that the drain covers have not exceeded their installed service life. It also requires public pools and spas with single, blockable drains to be equipped with a secondary system designed to prevent suction entrapment. Compliance with the law was mandatory as of December 19, 2008.

The law addresses private and public pools. Residential drain covers must comply when they are replaced, and public pools require retroactive upgrades. The VGB Act provides financial incentives to jurisdictions that adopt and enforce VGB Act policies for all private pools and spas.

All drain covers, fasteners, and mounting assemblies must be tested and 3rd party certified to ASME/ANSI A112.19.8-2007. In mid-2008, the Association of Mechanical Engineers (ASME) requested the standard be transferred, and the name changed to ANSI/APSP 16-2011. During the transition, manufacturers were instructed to mark newly certified products with VGB-2008. As a result, compliant drain covers are identified by any of the following: ASME/ANSI A112.19.8-2007, VGB-2008, or ANSI/APSP 16-2011.

Not all drain covers require one of these marks, as the standard provides for a non-manufactured type of unblockable suction outlet called Field Fabricated Outlets. These are designed and certified by a Registered Design Professional (RDP) using conventional building materials, products, or custom fabrication (i.e., weldments). For any Field Fabricated Outlet, the RDP is the 3rd party certifier and VGB Act compliance is demonstrated through a written report that must be kept at the facility to show proof of full compliance.

Understanding the legal difference between between blockable and unblockable suction outlets is important for compliance, as blockable drains cannot be used alone. The difference is defined by the size of the sump, or opening, under/behind any drain cover. When used in new construction, both public and private, at least two are required; and existing single, blockable drain systems must be upgraded for VGB Act compliance. Several options are available: permanently disabling the single, blockable drain; adding a secondary system designed to prevent suction entrapment; or installing another suction outlet to convert the single suction outlet system into a multiple outlet system.

This important child safety law strives to:

- Enhance the safety of public and private pools and spas
- Reduce child drownings in pools and spas (each year nearly 300 children younger than five)
- Reduce the number of suction entrapment incidents, injuries and deaths
- Educate the public on the importance of

Photo C1-1: Visit www.poolsafely.gov for the latest updates and resources on the Virginia Graeme Baker Pool and Spa Safety Act.

C-1 The Virginia Graeme Baker Pool & Spa Safety Act (Cont'd)

constant supervision of children in and around water
- Encourage the use of multiple safety steps at all pools and spas

In its role as the lead agency implementing and enforcing the VGB Act, the U.S. Consumer Product Safety Commission (CPSC) is working with the pool and spa safety community to encourage the use of multiple safety steps, such as fencing around pools, constant supervision of children and a requirement for the installation of anti-entrapment drain covers and other safety devices as needed, on all public pools and spas.

Warning

Under the law, all public pools and spas must have ANSI/APSP-16 or subsequent compliant suction fittings installed. No pool or spa is safe if a drain cover is broken, missing, or cracked, and the pool should be closed until repairs can be made.

The VGB Act mandated the following changes in federal pool and spa regulations for public pools and spa:

- All pool drain covers manufactured, distributed or entered into commerce on or after December 19, 2008, must meet the ANSI/APSP 16-2011 standard
- All public pools and spas must be equipped with new ANSI/APSP 16-2011 compliant drain covers, with flow rating higher than the circulation system flow rate; which must be installed in accordance with the manufacturer's installation instructions; and which must not be expired

It is common to use the terms drain, main drain, outlets, and drain covers interchangeably. One important cautionary note: the ANSI/APSP 16-2011 standard referenced by the VGB Act has a very specific definition of suction fittings. They are defined as all components, including minimum sump size, pipe attachment fitting, mounting frame, cover/grate, and mounting hardware. In most cases, swapping covers will not assure compliance with the VGB Act.

Additional Requirements for Safety Devices or Systems

The VGB Act requires all public pools and spas with a single main drain, or multiple drains less than three feet apart, to add one or more additional anti-entrapment devices or systems. The CPSC ruled in September 2011 that even unblockable covers/grates installed over blockable sumps must also have one of the following devices or systems:

1. **Safety vacuum release system (SVRS)**—a safety vacuum release system ceases operation of the pump, reverses the circulation flow or otherwise provides a vacuum release at a suction outlet when a blockage is detected. The SVRS must conform to the ANSI/PSPS/ICC-7-2013 or ASTM F2387 standard.
2. **Suction-limiting vent system**—a suction-limiting vent system with a tamper-resistant atmospheric opening, also called an atmospheric vent, is a pipe teed to the suction side of the circulation system on one end and open to the atmosphere on the opposite end. When a blockage occurs at the main drain, air is introduced into the suction line causing the pump to lose prime and relieving the suction forces at the main drain.
3. **Gravity drainage system**—a gravity drainage system uses a collector tank and has a separate water storage vessel from which the pool circulation pump draws water. Water moves from the pool to the collector tank depending on atmospheric pressure, gravity

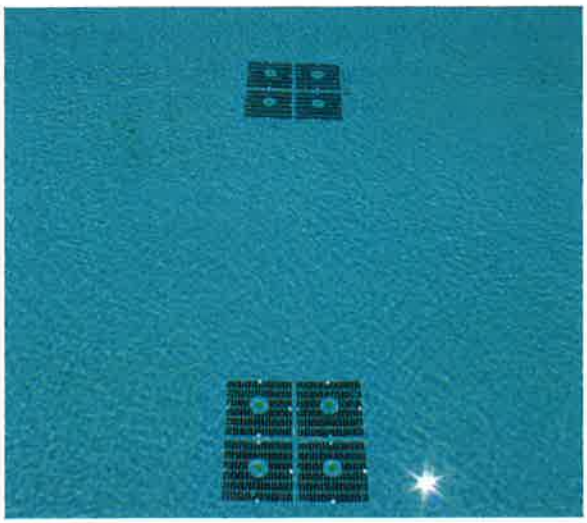

Photo C1-2: Dual main drains more than 3 feet apart

and the displacement of water by bathers, which removes the need for direct suction at the pool. This type of system is also referred to as a reservoir, surge tank or surge pit. Not all gravity drainage safety systems will serve as surge tanks. Some new systems are designed simply to eliminate direct suction.

4. **Automatic pump shut-off system**—an automatic pump shut-off system is a device that would sense a drain blockage and automatically shut off the pump system. There is no current standard for this category and the CPSC is requiring conformance to the ANSI/PSPS/ICC-7-2013 or ASTM F2387 standard.
5. **Drain disablement**—this is the only option that eliminates rather than mitigates the hazard. To satisfy the definition of drain disablement, the drain/outlet would need to be physically removed from the system by filling the sump with concrete, cutting and capping the piping in the equipment room or re-plumbing the suction line to create a return line and reverse flow.
6. **Other systems**—any other system that is determined by CPSC to be equally effective as, or better than, the safety systems listed here.

Note: States are permitted to limit these options or even specify which of the options are allowed as long as they do not make compliance with the act an impossibility.

Pools and spas that have more than one drain, or those with unblockable drains with covers that are properly sized for the maximum system flow rate and are installed in accordance with the manufacturer's instructions, do not need the additional measures or backup systems listed above.

Five Forms of Entrapment

The VGB Act is designed to reduce the risk of five forms of entrapment. The following entrapment categories are the result of analysis of all reported cases of entrapment to CPSC. It is important to note that not all entrapments are caused by suction. Excessive water flow through a cover (certified or not) can entangle and knot hair. Alternatively the entrapment can be the result of physically becoming stuck in an outlet or submerged pipe. In this case flow is not required, such as in the case of mechanical entrapment. The entrapment categories are:

1. **Body:** a body part, often the torso or bottom, covers a drain and is held down by the force of the suction.
2. **Hair:** long hair is caught or entangled in a cover with excessive flow.
3. **Limbs:** arms, legs, feet or fingers are lodged in a pipe, equalizer, vacuum port or uncovered sump.
4. **Mechanical:** jewelry, bathing suits or other materials are entangled in a drain cover.
5. **Evisceration/disembowelment:** when suction draws out the intestines and organs.

Turnover and Flow Rates

To understand entrapment and ways in which it can be minimized, flow rates must be studied. Approved drain covers have specific flow rates that must not be exceeded. The current industry standards of a six hour turnover rate for public swimming pools are based on sequential dilution studies. A faster turnover rate results in a greater flow rate measured in gallons per minute (gpm). Other, non-circulation suction outlets (e.g. for spa therapy jets) must also be properly sized to handle the full flow rate of the attached pump.

Approved drain covers are rated in gallons per

Relationship Betwen Flow Rate and Turnover Rate

Flow Rate
Pool volume ÷ turnover rate in hours ÷ 60 min/hr = flow rate in gpm

Turnover Rate
Pool volume ÷ flow rate ÷ 60 min/hr = turnover rate in hours

minute. Once the true flow rate of a pool system is known, the drain cover can be properly sized.

Flow rate can be determined by:

- Flow meters installed on the return line back to the pool
- Total dynamic head measurement and pump curve

Flow Meters

Flow meters must be installed correctly and also be calibrated. Flow meters come in a variety of types, digital or analog. It can be a device mounted on return line back to the pool with a metered reading on the side of the flow meter. This type of flow meter should be properly sized for the design flow rate and must be capable of measuring from ½ to at least 1½ times the design flow rate. The clearances upstream and downstream from the flow meter must comply with the manufacturer's installation specifications. Pipe fittings, such as tees, elbows, etc., can interfere with flow and result in inaccurate flow measurements. Because of this, flow meter manufacturers specify the flow meter be installed with a minimum amount of straight pipe before and after the meter. Typically the requirement is ten times the pipe diameter of equivalent straight pipe before the flow meter and four or five times the pipe diameter of equivalent straight pipe after the flow meter. Some flow meters do not have these straight pipe requirements.

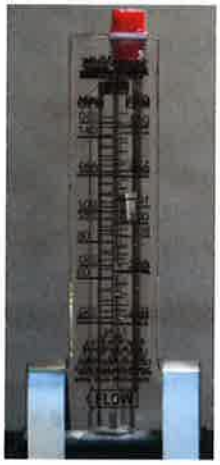

Photo C1-3: Flow meters must be installed correctly and calibrated regularly.

Health departments are accepting the use of magnetic flow meters to determine the maximum flow rate for the pumping system. With all circulation valves fully opened and with a clean filter, strainer and skimmer baskets, the maximum flow can be determined. If the maximum flow exceeds the flow rating on the drain cover, it may be possible to adjust valves that will limit flow through a pipe to a certain level. The flow rating of the cover must exceed the maximum achievable flow by the pump, as installed.

Total Dynamic Head

Total Dynamic Head (TDH) is a measure of a system's resistance to flow. Each pool will have its own unique flow rate based on the piping and fittings used. The same pump, on different pools, can produce significantly different flow rates. It is the resistance to flow in circulation systems that dictate the flow rate, not just the pump size. Particular caution should be used with pool codes that specify requirements in horse power ratings. Each circulation system is unique based on pipe length and diameter, number of fittings, filters, heaters, bypasses, and feeders. The resistance in the circulation system impacts the flow rate so measuring the TDH can prove valuable. The best time to measure the TDH is when the pool is filled with water and the filter media is clean.

Historically, TDH was used to properly size the circulation system's turnover. Many state health and building codes specify a TDH and the pump needs to meet turnover at that TDH. Today with the increased focus on energy efficiency, systems are being built with much lower TDH (less resistance). Lower TDH (as built) would result in more flow than the specified higher number. For this reason, specified TDH should never be used to size suction outlet covers. TDH can be measured directly with a gauge or using the

Cover Rating = 100 GPM

55 TDH → 80 GPM
30 TDH → 110 GPM

80 GPM < 100 GPM < 110 GPM
✔ Pass **✘ Fail**

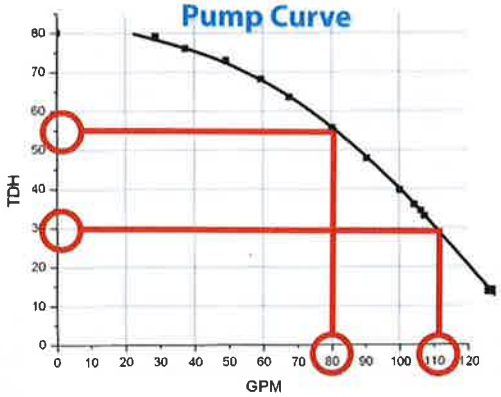

Illustration C1-1: Hypothetical pump performance curve. For illustration purposes only.

pressure and vacuum gauges on either side of the pump. The vacuum gauge is found on suction side of the pump and measures vacuum in inches of mercury (in. Hg). The pressure gauge is found on the discharge side of the pump and is measured in pounds per square inch (psi). Both of these measurements are converted to feet of head. Pressure head is calculated by multiplying psi by 2.31; pressure and vacuum head are calculated by multiplying Hg by 1.13. These two values are then added together to give total feet of head.

For example:

21 psi X 2.31 = 48.5 feet of head

6 Hg X 1.13 = 6.8 feet of head

Total TDH = 48.5 + 6.8 = 55 feet of head

The TDH value of 55 feet of head can now be used to determine flow rate. Feet of head can be converted to flow rate by going to the pump performance curve supplied by the manufacturer. As the resistance to flow increases, flow rate decreases.

Take your calculated TDH of 55 on the vertical scale of the graph and move horizontally across until it intersects with the pump curve. From there follow vertically down to the horizontal axis to determine the flow rate. In this example the flow rate is 80 gpm (see Illustration C1-1).

If the cover was rated at 100 GPM, then this flow rate of 80 GPM would be below the rating of the cover and compliant. If pressure was measured at 10 psi instead of 21 psi, this, for example, could be the difference between a clean and dirty filter. Now, when calculating TDH, using 10 psi in place of 21 psi, TDH has dropped to 30 feet of head. Using the same pump/pump curve, the flow rate is now 110 GPM and the cover would not be sufficiently rated. This example also serves to illustrate the difference between a health code specified TDH (55) and field verified TDH (30). Some newer systems can be even lower in measured TDH.

If flow rate is less than the flow rate specified on the suction drain cover, then the pool and cover would be in compliance with the VGB Act. However, if the measured TDH or flow rate gives you a higher flow rate than the cover specifies, then this would not be in compliance. In the design phase of a swimming pool the TDH estimated is based on pipe and fitting size and dimensions. The flow is typically underestimated so that you will still have enough flow to meet the desired turnover rate, which is typically six hours. If flow ends up being greater than desired, there is a faster turnover rate, or, the flow can be regulated by using the valves of the pool system. Because the design calculated TDH usually underestimates flow, it is not recommended that it be used to determine flow for cover sizing. The suction fitting should be sufficiently sized for the maximum flow rate and any valve position. Alternatively, a permanently installed flow restriction plate can be used to bring excessive flow into compliance with the installed suction fittings. The measured TDH, pump curve, and flow meter readings should all have comparable flow rates and should be used to size the drain cover.

Total Dynamic Head Measuring Meter

Gauges are now available on the market and can directly measure the pool or spa circulation system's exact TDH. Once the TDH is known, use the pump's performance curve to determine to flow rate.

VGB Act Compliance and Inspection

Compliance with the VGB Act, which references the ANSI/APSP 16-2011 standard, requires that suction fittings be tested and that they be installed in accordance to the standard, i.e. the manufacturer's instructions. The manufacturer's instructions should be retained per the ANSI/APSP 16-2011 standard.

Suction fitting labeling should include:

- Flow rate in gallons per minute (gpm)
- Lifespan or number of years
- Whether it is a wall and/or floor mount drain cover
- Whether it is designed to be used as a single or multiple drain cover
- Manufacturer's name
- Model number
- The drain cover can be certified, in writing, by a registered design professional
- ANSI/APSP 16-2011 or VGB 2008 label (drain covers manufactured after November 12, 2008, must have the VGB 2008 marking)

Proper installation: when inspecting any suction fittings, make sure they are installed correctly. This includes the drain covers (floor and wall), vacuum fittings, and skimmer equalizer line fittings. The CPSC has ruled that the skimmer equalizer lines, usually located beneath the skimmer openings, are submerged suction outlets and must be covered with covers or grates meeting ANSI/APSP 16-2011 standard.

Photo C1-4: Example of compliant drain cover markings

Unblockable Drains

An unblockable drain includes a suction outlet defined as all components, including the sump and/or body, cover/grate, and hardware, such that its perforated (open) area cannot be shadowed by the area of the 18" x 23" Body Blocking Element of ANSI/APSP 16-2011 and that the rated flow through the remaining open area (beyond the shadowed portion) cannot create a suction force in excess of the removal force values in Table 1 of the ANSI/APSP 16-2011 standard.

A drain cover that is larger than 18"x 23" may be placed over a smaller sump to replace a smaller cover of a blockable size, if allowed by the manufacturer. This replacement cover must be compliant with the ANSI/APSP 16-2011 standard and must be secured as directed by the manufacturer.

All suction outlet covers, manufactured or field-fabricated, shall be certified as meeting the applicable requirements of the ANSI/APSP 16-2011 standard. The cover manufacturer should be consulted to confirm 3rd party certification to the VGB Act, and to determine the maximum flow rating and the product specific sump depth requirements. Placing an unblockable cover over a blockable size sump will not render it unblockable. Single main drains of a blockable size need to be equipped with one of the six anti-entrapment devices or systems.

Sumps

CPSC recognizes and supports the technical requirement of the ANSI/APSP 16-2011 standard, which requires manufacturers to specify the sump onto which the cover/grate is to be attached. When manufacturers do not specify the sump, they must specify depth, when measured from the bottom of the cover to the top of the outlet piping, of 1.5 times the diameter of the piping. While the VGB Act does not require pool owners to replace existing sumps, the cover/grate must be compatible, including size, attachment method, and depth.

It is important to have the manufacturer's instructions when conducting an inspection to ensure that the installation was carried out as per the instructions. Instructions should also be retained by

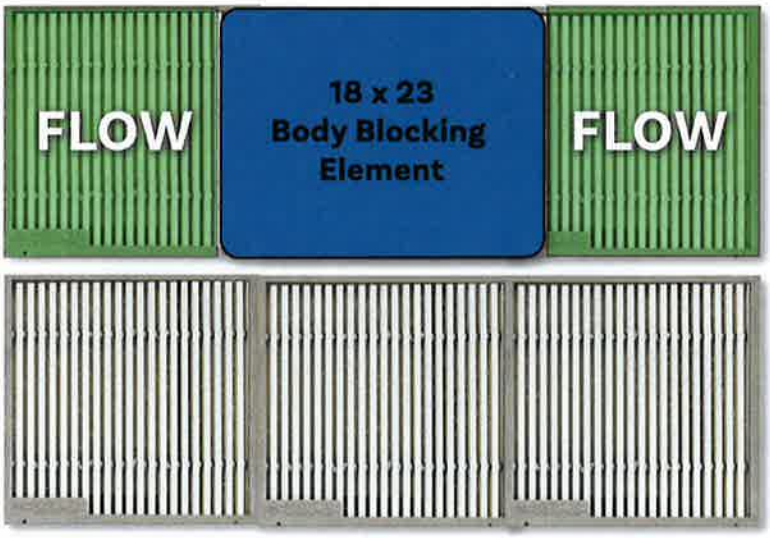

Illustration C1-2: This photo shows an unblockable drain with and without an 18 x 23 body blocking element. Flow through the remaining open area (beyond the shadowed portion) cannot create a suction force in excess of the removal force values in Table 1 of the ANSI/APSP 16-2011 standard.

the facility. The drain fasteners (screws) should be observed before each use of the facility. The inspector should also verify the separation between outermost drains in a multiple drain system to ensure they are at least three feet apart, center to center.

Retrofitting new covers on old sumps and frames that do not match means the facility is not in compliance. You must not drill new holes in the old frame to attach a new cover, unless it is part of a manufacturer's supplied kit. It may require that the old sump or mounting frame be removed and the new one for the new cover be cemented in place before the new cover can be installed. A proper inspection and installation requires verification of the cover, attachment hardware, and sump/frame.

Warning

Under the law, all public pools and spas must have ANSI/APSP 16-2011 or subsequent compliant drain covers installed. No pool or spa is safe if a drain cover is broken, missing, or cracked and should be closed until repairs can be made.

When inspecting a pool that is filled with water it may be very difficult to see the drain to verify that the drain covers and sump are both compliant. It may also be difficult to see that the drain cover is secured in place with the recommended fasteners. This is especially the case in deep pools. Getting a close up view of the underwater suction outlet is ideal, which would eliminate any glare and reflections. Diving down to inspect the drain cover and sump is certainly an option, but be certain that the pump has been turned off before any underwater inspection begins. Alternately, a waterproof video camera attached to the end of a pole can be used to record the outlet and for later viewing.

Enforcement of the VGB Act

The VGB Act also strengthened the CPSC's civil and criminal penalty authority, giving the agency the ability to shut down pools or spas that are not in compliance with the law. Visit www.poolsafely.gov/pool-spa-safety-act to download the entire Pool & Spa Safety Act.

Both CPSC and state attorneys general are empowered to enforce the VGB Act. The CPSC is looking to state health and building officials to assist in enforcing the VGB Act. State law can be more restrictive than the federal law as long as the state does not make compliance a physical impossibility.

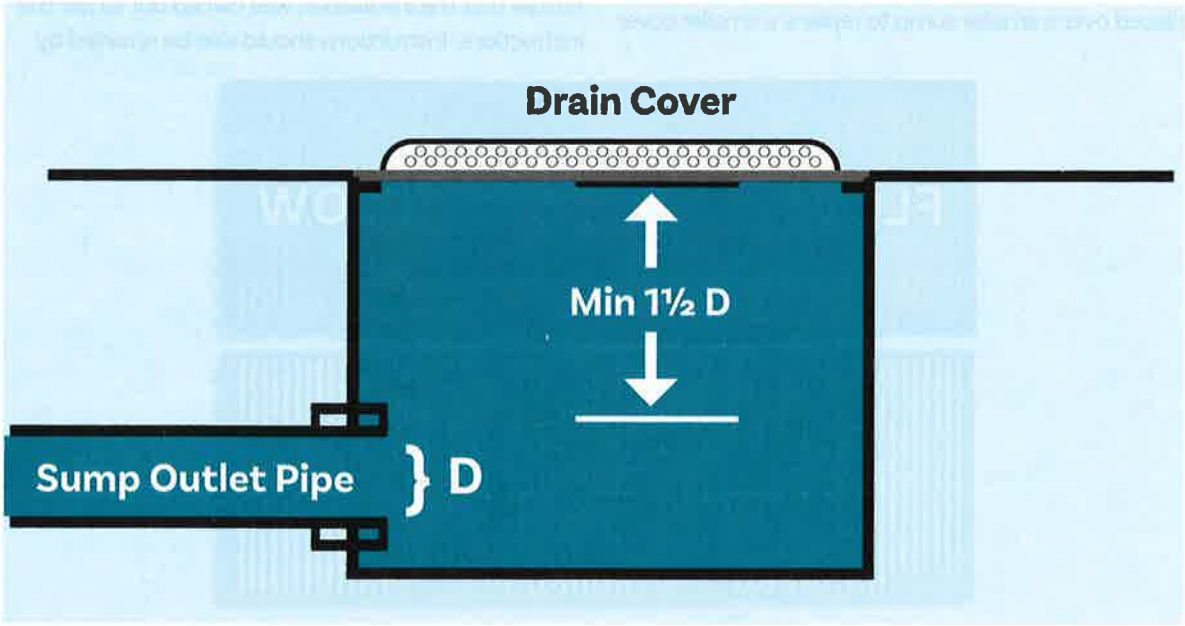

Illustration C1-3: Field-built sumps must have a depth, when measured from the bottom of the cover to the top of the outlet piping, a minimum of 1.5 times the diameter of the piping.

Virginia Graeme Baker Pool & Spa Safety Act Compliance Inspection Form

Part I: Pool Management Information

Inspector Name		Inspection Date
Facility Name		Pool License /Permit #
Address		Phone #
City	State	Zip Code
Contact Name	Title	
Contact Address		
City	State	Zip Code
Email Address	Fax #	

Part II: Pool / Spa Information

Pool Location	Indoor	Outdoor	Water Park	Other
Pool Type	Swimming Pool	Wading Pool	☐ Spa ☐ Hot Tub	Other
Water Features (if any)	Spray	Slide	Hydro-Jet	Other
Volume of pool (gallons)	MFGR, Make, Model Number, Horse Power of Pump			

Part III: Inspection Check List

Description	Data	Compliant	Non-Compliant	Comments
Determine if the pool has suction outlets (if it does not, the spection is complete)				
Measured TDH				
Drain sump measurements				
Drain cover data: Check the manufacturer's instructions and certification paperwork; look for markings such as the standard, lifespace, flowrate, wall or floor mount, etc.				
If there are suction outlets, main drains, vacuum fittings, etc., determine the total flow rate generated by all pumps in the system				

C-1 The Virginia Graeme Baker Pool & Spa Safety Act (Cont'd)

Part III: Inspection Check List (continued)

Description	Data	Compliant	Non-Compliant	Comments
If the suction outlets need a secondary anti-entrapment device and is one present?				
If there are multiple floor drains, are they at least three feet apart, center to center? If not, is there a secondary anti-entrapment device or system?				
Are the drain dover flor rate specifications equal to or greater than the flow rate of the system?				
Is the drain cover secure and attached to the sump according to the manufacturer's instructions?				
If there is a vacuum line present with a compliant cover, CPSC recommends that it be covered wherever the pool is in use.				
Do the skimmer equalizer fittings have compliant covers?				

Part IV: Comments

If pool is not in full compliance, provide a description of actions or steps needed to bring pool or spa into compliance with the Virginia Graeme Baker Pool and Spa Safety Act.

Inspector - Print Name	Inspector - Signature	Inspection Date

C-2 Revised Americans with Disabilities Act Regulations

On Friday, July 23, 2010, new Americans with Disability (ADA) regulations were signed into law, including its ADA Standards for Accessible Design. The official text was published in the Federal Register on September 15, 2010. The revised regulations amend the Department's Title II regulation, 28 C.F.R. Part 35, and the Title III regulation, 28 C.F.R. Part 36. These final rules will take effect March 15, 2011. Compliance with the 2010 Standards for Accessible Design was permitted as of September 15, 2010, but not required until March 15, 2012.

Introduction

The Americans with Disabilities Act (ADA) is a comprehensive civil rights law that prohibits discrimination on the basis of disability. The ADA requires that local government facilities, places of public accommodation, and commercial facilities be readily accessible to, and usable by, individuals with disabilities. The ADA Accessibility Guidelines (ADAAG) is the standard applied to buildings and facilities. Recreational facilities, including swimming pools, wading pools, and spas, are among the facilities required to comply with the ADA.

The Access Board issued accessibility guidelines for newly constructed and altered recreation facilities in 2003. These recreation facility guidelines are now a component of the revised ADA Regulaltions. All recreation facilities, including swimming pools, covered by the ADA were required to comply with these guidelines by March 15, 2012. To view the ADA Accessibility Guidelines, visit https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/background/adaag#15.8.

Summary of Swimming Pool and Spa Changes

ADA Standards Chapter 2, Section 242: Swimming Pools, Wading Pools, and Spas

242.1 General. Swimming pools, wading pools, and spas shall comply with 242.

242.2 Swimming Pools. At least two accessible means of entry shall be provided for swimming pools. Accessible means of entry shall be swimming pool lifts complying with 1009.2; sloped entries complying with 1009.3; transfer walls complying with 1009.4; transfer systems complying with 1009.5; and pool stairs complying with 1009.6. At least one accessible means of entry provided shall comply with 1009.2 or 1009.3.

Exceptions:

1. Where a swimming pool has less than 300 linear feet (91 m) of swimming pool wall,

Photo C2-1: A swimming pool with two accesible points of entry.

no more than one accessible means of entry shall be required provided that the accessible means of entry is a swimming pool lift complying with 1009.2 or sloped entry complying with 1009.3.

2. Wave action pools, leisure rivers, sand bottom pools, and other pools where user access is limited to one area shall not be required to provide more than one accessible means of entry provided that the accessible means of entry is a swimming pool lift complying with 1009.2, a sloped entry complying with 1009.3, or a transfer system complying with 1009.5.
3. Catch pools shall not be required to provide an accessible means of entry provided that the catch pool edge is on an accessible route.

Advisory 242.2 Swimming Pools. Where more than one means of access is provided into the water, it is recommended that the means be different. Providing different means of access will better serve the varying needs of people with disabilities in getting into and out of a swimming pool. It is also recommended that where two or more means of access are provided, they not be provided in the same location in the pool. Different locations will provide increased options for entry and exit, especially in larger pools.

Advisory 242.2 Swimming Pools Exception. Pool walls at diving areas and areas along pool walls where there is no pool entry because of landscaping or adjacent structures are to be counted when determining the number of accessible means of entry required.

242.3 Wading Pools. At least one accessible means of entry shall be provided for wading pools. Accessible means of entry shall comply with sloped entries complying with 1009.3.

Note: The ADAAG states that a wading pool is a pool designed for shallow depth and is used for wading. Each wading pool must provide at least one sloped entry into the deepest part. Other forms of entry may be provided as long as a sloped entry is provided. The sloped entries for wading pools are not required to have handrails.

242.4 Spas. At least one accessible means of entry shall be provided for spas. Accessible means of entry shall comply with swimming pool lifts complying with 1009.2; transfer walls complying with 1009.4; or transfer systems complying with 1009.5.

Exception: Where spas are provided in a cluster,

Photo C2-2. Each wading pool must provide at least one sloped entry into the deepest part.

C-2 Revised Americans with Disabilities Act Regulations

no more than 5%, but no fewer than one, spa in each cluster shall be required to comply with 242.4.

Where provided, pool lifts, sloped entries, transfer walls, transfer systems, and pool stairs shall comply with 1009.

To view the ADA Standards, visit https://www.access-board.gov/attachments/ article/983/ADAstandards.pdf.

Who is Affected by the ADA Law?

Entities affected by the revised regulations generally fall under either Title II or Title III of the Act. Title II outlines regulations for any public entity. A public entity is any activity, service, program or facility owned by any governmental agency. Title III regulates places of public accommodation, commercial facilities, and private companies that offer courses and examinations related to educational and occupational certification.

The ADA does not affect any type of residential dwelling, such as a private residence, an apartment complex, a condominium, or a home owner's association. However, if any of these residential facilities operate an element of public accommodation within their premises, these elements would be subject to ADA regulations.

Here are some examples of situations where a residential entity would fall under ADA regulations with respect to swimming pools:

- A private residential apartment complex sells memberships to their swimming facilities. This situation would be considered providing a public accommodation.
- A Home Owner's Association pool is used for swimming competitions that are open to competitors from outside the association. This situation would also be considered offering a public accommodation.
- A condominium actively rents out their units when owners are absent, including advertising, taking reservations over the phone, and providing either meals or housekeeping services. In this instance, the condominium would be considered a hotel.
- A vacation timeshare that operates as a hotel. This facility would be considered a hotel.

If any residential entity strictly limits use of their facilities to residents and their guests, they would not be subject to ADA regulations. Although residential facilities are not required to comply with ADA regulations for swimming pools, they must comply with the Fair Housing Act. Under this legislation, a privately owned residential community must provide a barrier free pathway up to the edge of a pool. In addition, they cannot prevent a resident from using their own apparatus to gain access to the pool, providing it does not provide a hazard for other residents. In other words, if a resident has a portable pool lift and keeps it in storage when not in use, the facility cannot prevent that resident from using the lift to gain access to the pool.

Private clubs are also excluded from ADA regulations in some cases. Final determination would be based on the control of operations, membership requirements, and the amount of fees involved. Operations that have limited or no membership requirements and minimal dues charges do not fall under the private club exclusion. If a private club limits use of their facilities strictly to members and their guests, then the club would not be subject to ADA regulations. However, if that club hosts swimming competitions or any other type of activity that opens the pool to nonmembers, the club would be required to follow ADA regulations for their pool.

For more information visit http://www.ada.gov. For additional information or to order copies of any documents, call the ADA Information Line (800) 514-0301 (voice) or (800) 514-0383 (TTY).

For technical assistance on the guidelines for swimming pools, wading pools, and spas is available from the Access Board at (800) 872-2253 (voice), (800) 993-2822 (TTY) or email ta@access-board.gov.

C-3 Model Aquatic Health Code Summary

The The Centers for Disease Control and Prevention (CDC) works with public health, academia, and aquatics industry representatives across the United States on guidance to prevent drowning, injuries, and the spread of recreational water illnesses at public swimming pools and spas. The MAHC 1st Edition Code and Annex were posted in 2014, followed by the 2nd Edition in 2016.

The Model Aquatic Health Code (MAHC) is voluntary guidance based on science and best practices that can help local and state authorities make swimming and other water activities healthier and safer. The MAHC serves as a voluntary model and guide for local and state agencies needing to update or implement swimming pool and spa code, rules, regulations, guidance, law, or standards governing the design, construction, operation, and maintenance of public swimming pools, spas, hot tubs, and other disinfected aquatic facilities.

Background

In the United States, there is no federal regulatory authority responsible for public disinfected aquatic facilities like pools, waterparks, and spas. As a result, the health and safety at public disinfected aquatic facilities is regulated by state and local jurisdictions. About 68% of local health departments have public pool inspection programs. All public pool codes are developed, reviewed, and approved by state and/or local public health officials or legislatures. Consequently, there is no uniform national guidance informing the design, construction, operation, and maintenance of public swimming pools and other disinfected aquatic facilities. As a result, the code requirements for preventing and responding to recreational water illnesses (RWIs), drowning, and injuries can vary significantly among local and state agencies. State and local jurisdictions spend a great deal of time, personnel, and resources creating and updating their individual codes on a periodic basis.

The effort to create the MAHC stems from a CDC-sponsored national workshop called "Recreational Water Illness Prevention at Disinfected Swimming Venues" that was convened on February 15-17, 2005, in Atlanta, Georgia. The workshop assembled persons from different disciplines working in state, local, and federal public health agencies, the aquatics industry, and academia to discuss ways to minimize the spread of recreational water illnesses at disinfected swimming venues. The major recommendation from this workshop was that CDC lead a national partnership to create an open-access model guidance document that helps local and state agencies incorporate science-based practices into their swimming pool codes and programs without having to reinvent the wheel each time they create or revise their pool codes. The attendees also recommended that this effort be all-encompassing so that it covered the spread of illness but also included drowning and injury prevention. Such an effort was intended to increase the evidence base for aquatic facility design, construction, and operation while reducing the time, personnel, and resources needed to create or improve pool codes across the country.

Beginning in 2007, CDC worked with public health, industry, and academic representatives from across the United States to create this guidance document called the Model Aquatic Health Code (MAHC). Although, the initial workshop was responding to the significant increases in disease outbreaks at swimming pools, the MAHC is a complete aquatic facility guidance document developed with the goal of reducing the spread of disease and occurrence of drowning and injuries at public disinfected aquatic facilities.

MAHC Vision, Mission, and Anticipated Health Outcomes

The Model Aquatic Health Code's (MAHC) vision is "Healthy and Safe Aquatic Experiences for Everyone." The MAHC's mission is to provide guidance on how state and local officials can transform a typical health department pool program into a data-driven, knowledge-based, risk reduction effort to prevent disease and injuries and promote healthy recreational water experiences. The MAHC provides local and state agencies with uniform guidelines and wording covering design and construction, operation and maintenance, and policies and management of swimming pools and other public disinfected aquatic facilities. The availability of the MAHC provides state and local agencies with the best available guidance for protecting public health so they can use it to create or update their swimming pool codes while conserving valuable time and resources previously used to write or update code language. The guidance will be regularly updated using input

C-3 Model Aquatic Health Code Summary (continued)

from a national stakeholder partnership called the **Council for the Model Aquatic Health Code (CMAHC)** to keep the MAHC up to date and current with the latest advances in the aquatics industry while also responding to public health reports of disease and injury.

Short-term Outcomes: use of the MAHC should help reduce the risk of diseases and injuries and promote healthy and safe swimming. It is anticipated that the practices promoted in the MAHC will initially lead to the following system improvements:

- Fewer pool and facility closures
- More-meaningful inspection and tracking/ surveillance data
- An established research agenda to drive future iterations of the MAHC
- Enhanced collaboration among stakeholders

Long-term Outcomes: by adopting the practices outlined in the MAHC, jurisdictions should also be able to improve the long-term health and safety of aquatic facilities. This should include a reduced risk of the following:

- Outbreaks of waterborne illnesses
- Drowning incidents
- Injuries from pool chemicals and disinfection by-products
- Swimming-related emergency department visits
- Redundant spending on separately updating numerous codes in various jurisdictions

C-4 Float Tanks

While there are many similarities between pool/spa operation and float tank operation, differences must be kept in mind in order to run a float tank safely and effectively.

Float Tank Equipment

Components used on float tanks are chosen to accommodate the high quantity of Epsom salt (usually about 800-1200 lbs) that is present in the water. The entire float system needs to be able to withstand this saline solution. As a result, metals are rarely used in a float system, with the exception of metals such as titanium and high-grade stainless steel.

Magnetically Driven Pumps

A float tank's filtration system commonly uses a magnetically driven pump, since salt crystallizes on the seals of traditional mechanically driven pumps. A magnetically driven pump is seal-less, relying on a magnet connected to the motor that spins another magnet connected to the impeller.

Cartridge and Bag Filters

Most float tanks are self-contained systems in regard to their plumbing; they do not plumb into the building. As a result, a filter that requires backwashing is not often seen on a float tank. The most commonly used filter is a cartridge filter, but some float tanks use a bag filter instead.

Float Tank Disinfection

Because of the way commercial float centers are operated, the level of contaminants that is introduced into a float tank differs from pools and spas in the following ways:

- Risk of cross-contamination is greatly reduced, since most float tanks are single user, with a filtration cycle between each user
- Users shower both before and after using the float tank
- Users float without a bathing suit, so much of the dirt and bacteria that are harbored in a suit are eliminated
- Users produce much less sweat than in a swimming pool, since floating requires no vigorous movement and the water is maintained at skin-temperature
- Children rarely use float tanks; children are ordinarily some of the highest contributors to bacteria in pools and spas
- Users float with their mouth, nose, and eyes above the water; this leads to much lower ingestion of the solution than is typical of pool/spa users

High Salt Effect

The amount of Epsom salt (25% or 250,000ppm) in a float tank can have an impact on how well certain bacteria can survive. A study done through NSF International shows that *Pseudomonas aeruginosa* placed in an Epsom salt solution with no additional chemicals or disinfectants added had a 5.54 $\log_{10}$ reduction after 24 hours, while the same dose of *Pseudomonas aeruginosa* in a control sample of distilled water showed a 0.96 $\log_{10}$ growth. Use of disinfectant is necessary in a float tank, however, as Epsom salt is not able to achieve a 3 $\log_{10}$ reduction in the 15-30 minute duration that most float centers schedule between users.

Types of Disinfectants Used

Due to the low level of airflow in float tank environments, leading to potentially high levels of disinfectant by-products, most commercial float centers avoid using chlorine or bromine as disinfectants. Float centers more commonly prefer a Hydrogen Peroxide / UV system or an Ozone / UV system.

Float Tank Water Testing

Testing float tank water proves challenging, as many test kits and devices that are designed for pool and spa water encounter interference with the high levels of Epsom salt. It is not certain whether most pH testers give accurate results in the float water, and very unlikely that most pool alkalinity test kits give accurate readings. Total Hardness tests reveal high levels of magnesium, ORP meters often give unpredictable readings, and even flow meters are generally calibrated for the density of regular water. In addition to the interference, many test kits that involve electronics are susceptible to damage from the high levels of salt.

C-4 Float Tanks (continued)

Float Tank Operation

Day to day operational considerations of running a commercial float tank are as follows:

Non-continuous filtration

In order to achieve the quiet and stillness that is essential to the float experience, the pump is not run while a user is in the float tank. Instead, the filtration system is turned on in between users, achieving 3-5 turnovers in the 15-30 minutes generally allotted between float sessions.

Cost of solution

Because of the high volume of Epsom salt in the water, the cost of the float tank solution is considerably higher than that of pool water. This can make chemistry-correcting methods such as draining and refilling much more cost-prohibitive.

Saltproofing

Salt in the float solution can be extremely corrosive and detrimental to the float tank surroundings and facility, often requiring the use of very specific construction materials to protect against salt damage.

Soundproofing

Careful consideration is taken to prohibit noise entering the float tank. Without adequate soundproofing, scheduling of activities in the vicinity of the float tank becomes important.

Float Tank Regulation

Lack of data surrounding float tank operation, and the differences between pool/spa and float tank operation, cause regulations to vary significantly. Some health departments may decide to leave float tanks unregulated, while others subscribe float tanks to pool/spa code, usually with a great number of variances. Some jurisdictions have created float tank-specific code. Operators should regularly reference jurisdictional codes, as float tank regulations are developing and changing very quickly.

C-5 Listing of Pool Industry Regulations and Standards

Below is a listing of pool & spa industry regulations and standards that were mentioned in this handbook with the web address for the agency or organization responsible.

Federal and State Regulation Setting Agencies

California Energy Commission

energy.ca.gov

- Title 20 California Code of Regulations and Rules of Practice and Procedure Relating to Power Plant Site Certification

Centers for Disease Control and Prevention (CDC)*

cdc.gov

- Model Aquatic Health Code **cmahc.org**
- National Center for Environmental Health, Vessel Sanitation Program Operations Manual, 2000

Consumer Product Safety Commission (CPSC)

cpsc.gov

- HR6-303 to 309 Title XIV Pool and Spa Safety-Virginia Graeme Baker Pool and Spa Safety Act (VGB Act)
- Safety Barrier Guidelines for Home Pools (Publication 362)
- Guidelines for Entrapment Hazards
- An Evaluation of Swimming Pool Alarms

Department of Justice

justice.gov

- Americans with Disabilities Act (ADA)
- 36 CFR Part 1191 Americans With Disabilities Act (ADA) Accessibility Guidelines For Buildings And Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines

Environmental Protection Agency (EPA)

epa.gov

- Federal Insecticide, Fungicide, Rodenticide Act (FIFRA)
- Emergency Planning & Community Right-to-Know Act (EPCRA)
- Superfund Amendments and Reauthorization Act of 1986 (SARA) (SARA Title III)
- Food Quality Protection Act of 1996 (FQPA)

Occupational Safety & Health Administration (OSHA)

osha.gov

- Hazard Communication Standard (HCS)
- 29 CFR 1910.134 Respiratory Protection
- OSHA Regulation 29 CFR 1910.147 The Control of Hazardous Energy

* The CDC, although a government agency, is not a regulatory agency, but rather sets standards.

C-5 Listing of Pool Industry Regulations and Standards

Standard Setting Agencies

American National Standards Institute (ANSI)

ansi.org

- ANSI/NSF Standard 14: Plastics Piping Components and Related Materials
- ANSI Z535: Safety Alerting Standards
- ANSI Standard 2223.1: National Fuel Gas Code

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

ashrae.org

- ANSI/ASHRAE Standard 62.1-2007: Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 55-1992: Thermal Environmental Conditions for Human Occupancy

American Society of Mechanical Engineers (ASME)

www.asme.org

- ASME/ANSI Standard A112.19.8M Suction Fittings for Use in Swimming Pools and Wading Pools, Spas, Hot Tubs and Whirlpool Bathtub Appliances
- ASME/ANSI A112.199.17-2002 Safety Vacuum Release Systems for Swimming Pool SuctionFittings and Drains

Association of Pool and Spa Professionals (APSP)

apsp.org

- ANSI/APSP-16 2011 Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs

ASTM International (ASTM)

stm.org

- F2049-03 Standard Guide for Fences/Barriers for Public, Commercial, and Multi-Family Residential Use Outdoor Play Areas
- F2409-10 Standard Guide for Fences for Non-Residential Outdoor Swimming Pools, Hot Tubs, and Spas
- F1346-91 (2003) Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs
- F2518-06 Standard Guide for Use of a Residential Swimming Pool, Spa, and Hot Tub Safety Audit to Prevent Unintentional Drowning
- F2208-08 Standard Safety Specification for Residential Pool Alarms
- F2387-04 Standard Specification for Manufactured Safety Vacuum Release Systems (SVRS) for Swimming Pools, Spas and Hot Tubs
- F2461-09 Standard Practice for Manufacture, Construction, Operation, and Maintenance of Aquatic Play Equipment

Chlorine Institute

chlorineinstitute.org

- Pamphlet 1 The Chlorine Manual
- Pamphlet 63 First Aid and Medical Management of Chlorine Exposures
- Pamphlet 82 Recommendations for Using 100 and 150-Pound Chlorine Cylinders at Swimming Pools
- Pamphlet 96 Sodium Hypochlorite Manual

International Code Council (ICC)

iccsafe.org

- International Swimming Pool & Spa Code (ISPSC)

National Fire Protection Association (NFPA)

nfpa.org

- NFPA 400 Hazardous Materials Code
- NFPA 704 Standard System For The Identification Of The Hazards Of Materials For Emergency Response
- NFPA 70 National Electrical Code (NEC)
- NFPA 780 Standard for the Installation of Lightning Protection Systems

C-5 Listing of Pool Industry Regulations and Standards

NSF International (NSF)

nsf.org

- NSF/ANSI Standard 50 Equipment for Swimming Pools, Spas, Hot Tubs, and Other Recreational Water Facilities (2010)

World Health Organization (WHO)

who.int

- Guidelines for Safe Recreational Waters Volume 2 Swimming Pools and Similar Recreational Water Environments