

Carson City Health and Human Services Environmental Health Division



POOL OPERATOR'S GUIDE

CARSON CITY POOL OPERATOR'S GUIDE

Carson City requires that every "public pool" must be maintained under the supervision of a qualified operator who is responsible for the sanitation and safety of the facility and the maintenance of its equipment and records. "Public pool" means any structure, basin, chamber, or tank containing an artificial body of water intended to be used collectively by numbers of persons for swimming or bathing operated by any person whether he be owner, lessee, operator, licensee, or concessionaire, regardless of whether a fee is charged for use. It does not include pools at private residences that are controlled by the homeowner, the use of which is limited to swimming or bathing by family members or their invited guests.

This guide is designed to provide basic information for the operators of public swimming pools, spas, hot tubs, and baths. The requirements for adequate maintenance and compliance with health laws are presented. For the purpose of this guide, the term 'pool' shall apply to all of the above, except where spas, hot tubs and baths are specifically mentioned.

Since this guide is an overview, the reader is encouraged to contact our office or your pool supply dealer if more specific information is needed or desired.



The regulations for public pools in Carson City consist of the Carson City Municipal Code (CCMC) Chapters 9.04.020 and 9.07, the Nevada Revised Statutes (NRS) 444.065–444.120, and the Nevada Administrative Code (NAC) 444.010– 444.546. *

*Additional information can be found at the National Swimming Pool Foundation website: www.nsf.com and the Centers for Disease Control Prevention website: www.cdc.gov/healthyswimming/.

Table of Contents

| | |
|--|----|
| I. Pool Operation | 4 |
| A. Regulations..... | 4 |
| B. Maintenance | 4 |
| C. Pool/Spa Profile | 5 |
| D. Surface Area and Volume..... | 5 |
| E. Filtration and Circulation | 6 |
| F. Water Testing and Record Keeping | 6 |
| II. Water Disinfection (Sanitation)..... | 7 |
| A. Water Quality..... | 7 |
| B. Chlorine..... | 8 |
| C. Bromine..... | 9 |
| D. Cyanuric Acid | 9 |
| E. Chemical Safety | 10 |
| III. Water Balance & Adjustment..... | 10 |
| A. pH | 11 |
| B. Total Alkalinity | 12 |
| C. Calcium Hardness | 12 |
| IV. Safety..... | 13 |
| A. Temperature..... | 13 |
| B. Lifeguards | 13 |
| C. Safety Equipment | 13 |
| D. Pool Rules..... | 14 |
| V. Inspections..... | 16 |
| VI. Frequently Asked Questions | 17 |
| VII. Pool/Spa Profile | 19 |
| VIII. Sample Daily Pool Operation Log..... | 20 |
| IX. Sample Test Questions | 21 |
| X. What you should know | 22 |

I. Pool Operation

A. Regulations

The regulations for public pools **enforced** by the Carson City Health and Human Services Department consist of the Carson City Municipal Code (CCMC) Chapters 9.04.020 and 9.07, the Nevada Revised Statutes (NRS) 444.065–444.120, and the Nevada Administrative Code (NAC) 444.010– 444.546.

The U.S. Consumer Product Safety Commission (CPSC) **enforces** the federal Virginia Graham Baker Pool and Spa Safety Act (VGA). This Federal Law requires all pools and spas to only use certified anti-entrapment drain covers and to have other layers of protection such as safety vacuum release systems.

The U.S. Department of Labor Occupational Safety & Health Administration (OSHA) **enforces** the Material Safety Data Sheet (MSDS) requirement. All employers with hazardous chemicals in their workplaces must have labels and MSDSs for their exposed workers, and train them to handle the chemicals appropriately.

B. Maintenance

A well-maintained pool is one that is clean, disinfected, and free from any irritation or hazards to swimmers. To adequately maintain a pool, several tasks must be performed on a daily basis. To ensure continuous care, including scheduled days off and holidays, provisions must be made to have qualified operators maintain the pool. This may be accomplished by training multiple personnel on pool maintenance. Proper pool maintenance will prevent deteriorating conditions that lead to unsafe pool operations.

Daily pool maintenance should include the following items:

- Testing pool water for disinfection materials, pH, and total alkalinity. (Test kits are required equipment and should be able to measure free chlorine and/or bromine as the DPD type. The OTO kit is not an approved test.)
- Pool temperature and water clarity checks.
- Pool cleanliness (Pool vacuuming should be done whenever necessary to remove any visible debris and dirt).
- The pool deck, lifesaving equipment, and access barriers must be in good condition.
- Pool equipment, skimmers, and filters should be checked to insure that they are functioning properly and should be cleaned or back-flushed as necessary. The pump, flow meter, heater and chlorinator should be checked.

A daily logbook must be kept with the following information:

- Chemical testing results
- List of chemicals and amounts added
- Water temperature and flow meter reading
- List of maintenance performed
- List of amount of water added
- Pool volume turnover time

Less frequent tests should include testing water for calcium hardness, total dissolved solids, and cyanuric acid.

C. Pool/Spa Profile

The pool operator should keep a Pool/Spa Profile (example on page 19) readily available. The profile is a description of the key components of the pool. This information is necessary in order to maintain and repair the pool. A notebook in the pump room or other location that contains the important information on the pool should be kept in order at all times. This notebook should contain the Pool Profile, daily log, and MSDS on each pool chemical. A separate equipment book should be kept with information on pool equipment, including data sheets and purchase dates.

D. Surface Area & Volume

Area is the size of the pool in square feet. Volume is the number of gallons of water a pool or spa contains. This information is usually listed on the pool plans, specification sheets, or Pool Profile. You need to know the area in order to determine the bather capacity. You need to know the water volume in order to be able to determine the correct amount of treatment chemicals you must add to balance and disinfect the water. You also need to know the volume to calculate the “turnover” time for the pool water recirculation.

To calculate the volume in gallons, you must determine the area in square feet, average pool depth, and pool volume in cubic feet. All measurements are in feet.

Rectangle area in square feet = [length in feet] X [width in feet]

Circle area in square feet = [radius in feet] X [radius in feet] X 3.14

Note: the radius is the distance from the center of the circle to its edge.

Average depth = [depth @ shallow end] + [depth @ deep end] divided by 2

Volume in cubic feet = [Average depth in feet] X [Area in square feet]

Volume in gallons = [volume in cubic feet] X 7.5 gallons/cubic foot

Note: for irregular shape or sloping sides, contact your pool dealer or manufacturer for assistance in determining area and volume.

E. Filtration and Circulation

Your pool or spa's circulation system contains a filter and pump. These components work together to provide uniform distribution of treatment chemicals and to remove algae, dirt, pollen, and bugs. A good recirculation system works in conjunction with treatment chemicals to keep your water clean.

To be efficient, the circulation system needs to be operated for the proper amount of time each day, and maintained in good condition. You can care for this system simply by following the filter and pump manufacturers' recommendations.

NAC 444 requires a minimum turnover time for pools and spas. *The "turnover time" is the time it takes for the recirculation system to move the total pool water volume through filtration, water conditioning, disinfection, and other accessory equipment.* The requirement for pools is every 6 hours or less and for spas every 30 minutes or less.

Flow rate is the rate of water flow through the circulation system and is expressed in gallons per minute (GPM). Flow rate is measured with a flow meter installed on the return line downstream from all equipment and just before the water is returned to the pool. There must be sufficient flow to achieve the required turnover time. The relationship between flow rate and turnover time is:

$$\text{Turnover time in hours} = \text{Pool volume divided by flow rate and divided by 60}$$

F. Water Testing and Record Keeping

The key to obtaining and maintaining water of acceptable quality is testing. With testing, you will be able to disinfect water, balance water, and maintain your pool or spa in good condition ... year after year. Setting up a testing schedule will ensure a good testing routine. Samples for testing should be obtained twelve to eighteen inches below the water surface.

You need an accurate, reliable thermometer and a chemical test kit. A basic chemical test kit should determine disinfectant levels, pH, and total alkalinity. A complete chemical test kit will test for disinfectant, pH, total alkalinity, calcium hardness, acid demand, base demand and cyanuric acid. It is also a good idea to take a water sample to your pool/spa dealer at the beginning and end of each pool season to test for total dissolved solids (TDS) and to determine the saturation index (SI). The TDS and SI values, along with the other measured chemical values, are used for determining if the water is balanced, corrosive, or scaling.

Chemical test kits should be stored in a cool, dark place away from heaters and pool or spa chemicals. Follow the test directions exactly:

- Take samples at same time of day.
- Rinse sample cells before and after each use.
- Hold the reagent bottle in a vertical position when dispensing drops.

NAC 444.148 requires pool water to be continuously disinfected by a chemical that leaves an *easily measurable residual effect, usually measured as parts per million (ppm)*. Adequate disinfection must be accomplished by one of the following:

- | | | |
|--|-------------|------------|
| 1. Normal chlorination | 1.0–5.0 ppm | 7.0–8.0 pH |
| 2. Chlorinated cyanurate chlorination | 1.0–5.0 ppm | 7.2–8.0 pH |
| 3. Normal bromination | 3.0–5.0 ppm | 7.0–8.0 pH |
| 4. Some other method approved by the health authority. | | |

In addition, NAC 444.148 requires that the maximum concentration of cyanuric acid is 100 ppm and that the total alkalinity be within 80–120 ppm. The water must not cause irritation to the eye or skin or have other objectionable physiological effects on the bathers.

A detailed written record must be kept showing **daily** chemical testing, temperature checks, adjustments, or any type of maintenance. Located on page 20 is an example of a “log form” used to track service performed; however, there is no required format.

II. **Water Disinfection (Sanitation)**

A. **Water Quality**

Preventing people from getting sick due to contact or ingestion with contaminated water is the primary reason why pools are treated with disinfectant. Because public pool water will contact and wash all body parts of bathers in the pool, the water is easily contaminated. However, most disease-causing germs (pathogens) are easily killed by chlorine or similar disinfecting chemicals.

Public pool water must not only be free of visible debris, but also free of invisible pathogens that are health hazards to swimmers. NAC 444.148.3(a) requires that pools be continuously disinfected by a chemical which imparts an easily measured, “free available” residual effect. A residual disinfecting chemical, which is easy to test for, provides assurance that disease-causing pathogens are minimized and under control. Typically, chlorine or bromine in various forms is used. The first item tested during a health inspection is the disinfectant level. If the level is too low or too high the facility is closed until the proper levels can be restored.

B. Chlorine

Chlorine is supplied as chlorine gas, or compounded hypochlorites, or compounded chlorinated cyanurates. The most common forms of compounded hypochlorites are sodium hypochlorite and calcium hypochlorite. Sodium hypochlorite is usually in a liquid form providing 12% chlorine, which is about twice as strong as household bleach. Calcium hypochlorite is usually used as a solid and called cal-hypo. Chlorinated cyanurates are a form of stabilized chlorine usually for outdoor use. There are two types of chlorinated cyanurates, commonly called trichlor and dichlor.

In a properly balanced pool, chlorine works as a potent disinfectant without causing swimmer discomfort. It is used to prevent the spread of disease from swimmer to swimmer and helps to prevent the growth of algae. The required concentration of chlorine in pool water is 1.0 – 5.0 ppm. Chlorination must be done by automatic chlorinators since they provide a continuous level of chlorine, which is impossible to maintain by hand chlorination.

Various factors affect the stability and effectiveness of chlorine. A high pH causes chlorine to be a less effective disinfectant. A low pH causes rapid loss of chlorine. Chlorine levels must be checked daily and more often if the pool receives heavy use. When chlorine levels are too low, there is an increased risk of disease and algae growth. When too high, it can cause irritation to the eyes and the skin, along with bleaching hair, swim suits and surfaces, and it is not economical.

Chlorine added to water is referred to as “free chlorine.” “Free chlorine” usually has no odor. As it destroys pathogens (disease-carrying germs) it is depleted and becomes “combined chlorine.” The “combined chlorine” is a less effective disinfectant. When too much accumulates it can irritate bathers’ eyes and mucous membranes, in addition to emitting strong odors.

Chloramines are a combined form of chlorine. Chloramines develop in conditions of low pH. Chloramines can also form when you have a high bather load combined with a low chlorine level. They are the major cause of strong chlorine smell and eye and skin irritation of bathers. They are less effective than free chlorine as disinfectants. Most good test kits can determine the presence of chloramines. If chloramines are present in a pool, they can be eliminated by adding more chlorine to the water.

Testing for free chlorine must be performed daily (or more often based on high bather load demands). Free chlorine levels are usually determined by a color comparison test. Reagents are added to a water sample and developed color is matched to color standards. Use a test that distinguishes between free and combined forms of chlorines such as “DPD.” Dip and read test strips are not approved for public pools in Carson City.

Chlorine levels can be raised by the addition of any approved chlorine product. Sometimes it is necessary to lower chlorine levels: for example, if the “chlorinator” is

accidentally left operating for an extended time. Sodium thiosulfate can be used to lower the levels (check the bottle label or contact your pool/spa dealer to determine the proper amount of sodium thiosulfate to use for dechlorination).

C. Bromine

Bromine is usually supplied compounded with an organic molecule. There are usually two types. The chemical names for these materials are usually shortened to BCDMH and DBDMH. These are available as sticks, tablets, or granules. The bromine is dissolved in water in an erosion-type feeder.

The bromine dissolved in water acts as a disinfectant similar to chlorine. As it destroys pathogens (disease-carrying germs), it is depleted and becomes “combined bromine.” Bromine is an effective and powerful disinfectant in both free and combined forms. The combined form of bromine does not have the objectionable odor associated with combined chlorine. Consequently, there is no need to distinguish between free and combined bromine levels. When the level of bromine is too low, the risk of disease and algae growth increases. NAC 444.148.3(a)(3) requires that pool water is continuously disinfected to provide normal bromination of 3.0–5.0 ppm at a pH of 7.0–8.0.

Bromine disinfectant works well for spas because of its stability at elevated temperatures. Bromine is less likely to be deactivated by the UV rays of the sun than chlorine. Bromine’s disinfecting ability (unlike chlorine) is not substantially reduced at the normal pH range of pool or spa water.

Testing for bromine must be performed daily (or more often based on high bather load demands). Bromine levels are usually determined by a color comparison the same way as the chlorine test. Reagents are added to a water sample and developed color is matched to color standards. Remember it is not necessary to distinguish between free and combined forms of bromine. Specific tests for bromine are available. Dip and read test strips are not approved for commercial applications in Carson City.

There are various types of bromine products, each with a unique method of introduction into pool systems. Follow the product manufacturer’s recommendations for adjustments or seek the advice of a pool/spa dealer.

D. Cyanuric Acid

Cyanuric acid is used as a chlorine stabilizer for outdoor pools. It helps hold chlorine in the water and releases it as it is needed. In pools using normal chlorination, the acid must be added to the water periodically. Outdoor pools using chlorinated cyanurates, such as dichlor or trichlor, do not need the addition of cyanuric acid. The cyanuric acid is already in the dichlor and trichlor.

Testing for cyanuric acid should be performed once a month. Test kits are available for cyanuric acid determination. The level should be between 25 and 50 ppm. Nevada law allows a maximum cyanuric acid level at 100 ppm. Levels higher than 100 ppm bind the chlorine and lowers its effectiveness to disinfect water. If the level of cyanuric acid exceeds 100 ppm, then water must be drained from the pool in order to reduce the amount of acid to the allowable level.

E. Chemical Safety

The pool operator must be familiar with the inherent dangers of each of the chemicals used and know the proper first aid measures for treating any accidental chemical contact. Federal OSHA (Occupational Safety and Health Administration) law requires you to have an MSDS (material safety data sheet) on each chemical stored at your site. The MSDS is a description of the chemical and its safe use, including first aid instructions. Your pool/spa dealer is the source for the MSDS and any other information on the safe handling of chemicals used for your pool.

The chemicals used for maintaining a pool can be extremely hazardous if handled incorrectly. Water can cause a hazardous reaction when added to pool chemicals. Always add the chemicals to water not water to the chemicals. Mixing of two or more chemicals can cause poisonous gas, fire or even explosions. Acid used to lower pH can cause severe burns on contact with skin. Alkalis such as soda ash can be very caustic. Chlorine gas is poisonous and solid chlorine and bromine are oxidizers and can explode, cause a fire, or emit poisonous gas if combined with other chemicals.

Whenever it is necessary to add more than one chemical to the pool, they must be added separately. Under no circumstances should you mix two chemicals together.

NAC 444.182.2 requires that pool chemicals must be stored in a dry, well-ventilated area in clean, dry containers and out of reach of bathers and children. Certain chemicals must be stored separately so they cannot accidentally contact each other.

III. WATER BALANCE and ADJUSTMENT

Balanced water is water that will neither corrode nor deposit scale on pool or spa surfaces and equipment. Balanced water ensures that pool or spa plaster will not etch and that metal pipes and heater elements will not corrode. Also, balanced water protects surfaces, pipes, and heater elements from unsightly scale deposits that reduce equipment efficiency.

Although the chemistry of a pool is complex, you can obtain balanced water by correctly adjusting a few specific chemical components in the water. Specifically, you will need to adjust pH, total alkalinity, and calcium hardness.

A. pH

The term pH refers to the acid-base condition of pool water. It comes from the Latin “protens hydrogen.” The pH is the most important factor for properly balanced water and comfort of bathers.

Measured on a scale that runs from 0 to 14, pH indicates whether water is neutral, acidic, or basic. A neutral condition is a pH of 7. Below 7 indicates an acid condition, and readings above 7 indicate a basic or alkaline condition. The ideal range is 7.4–7.6, which is similar to the human body.

Your water pH is important! If it is too high, it slows the disinfectant activity, deposits scale on surfaces and equipment, causes poor disinfectant efficiency, and can cause cloudy water. A low pH can cause corrosion of pool equipment and surfaces, wrinkles vinyl liners, stains walls, promotes chlorine loss, and causes irritation to swimmers’ skin and eyes.

Testing for pH must be done daily, along with the testing for the disinfectant level. Nevada requires normal disinfectant levels to be at specific pH ranges, usually 7.0–8.0. A pH test is usually done by color comparison. Simply fill a test cell with pool or spa water, add a pH indicator and compare the developed color to a color standard. Be sure to follow your test kit’s instructions and test pH daily. There are also pH meters available for determining pH. However, these devices require constant calibration to insure their accuracy.

If the pH is not within the desired range, you will have to perform an adjustment. To increase pH, add a base (alkaline) material, and to lower the pH, add an acid material.

Some test kits provide methods for determining the amount of base or acid needed. If you perform a “base demand test” and use a table provided with the test kit, you can determine the amount of a specific base needed. For example, soda ash (sodium carbonate) may be needed and the amount to add may be found on a table of information provided by the kit supplier. To lower pH, do an “acid demand test” and add either muriatic (hydrochloric) acid or sodium bisulfate, as the appropriate table indicates.

If your test kit doesn’t have tests for acid and base demand, you will have to add by estimation and then test for the result. Alternatively, some pool/spa dealers may test your water and determine the amount of acid or base for you.

Also note that adjusting pH can change your pool or spa water’s total alkalinity.

B. Total Alkalinity

There are alkaline minerals in your pool or spa water that act as buffering agents. *Buffering agents help prevent changes in pH, which could result in corrosion and staining. Total alkalinity (TA) is the measurement of these alkaline materials.* To protect the pool surface and equipment, and also save money on treatment chemicals, try to maintain the correct amount of total alkalinity in your water. This will keep the pH consistent, while allowing for economical pH adjustments when necessary. The ideal range for total alkalinity is 80–120 ppm.

Ideally, you should test for total alkalinity weekly. Testing for total alkalinity is done by a drop test. Fill the test cell to the mark with pool or spa water. Remove chlorine from the sample by adding thiosulfate. Add the total alkalinity indicator, which colors the water green. Then add drops of “titrant” from a dropper bottle one drop at a time, swirling the mixture after each drop. Count the number of drops needed to change the color from green to red. Finally, multiply the number of drops of “titrant” used by ten (10) to get total alkalinity (TA) as parts per million (ppm).

Total alkalinity can be raised with sodium bicarbonate or lowered with either muriatic acid or sodium bisulfate. Adjustment tables may be provided by your pool/spa dealer for your convenience. However, be cautioned that total alkalinity adjustments can alter your pool or spa water’s pH.

C. Calcium Hardness

Calcium hardness is the third and final component that needs to be considered to obtain balanced water. *Calcium hardness is the amount of dissolved calcium in your pool or spa water.* If the water is too low in calcium hardness, the water will etch surfaces of plaster, concrete and grout. If the water contains too much calcium, it will deposit the excess as scale on pool or spa surfaces and equipment and may contribute to cloudy water. The ideal range for calcium hardness is 200 – 400 ppm.

Testing is done by a drop test. A test cell is filled with pool or spa water followed with a buffer and indicator. A reagent is added, a drop at a time, until the color changes from red to blue. The number of drops of this reagent multiplied by ten (10) equals the ppm calcium hardness. This test should be done on a monthly basis.

Calcium hardness is easily raised by the addition of calcium chloride. Decreasing calcium hardness requires the pool or spa water to be drained and replaced with water containing lower calcium hardness levels.

Whenever it is necessary to add any chemicals to the pool, the instructions packaged with the product must be strictly followed, as these chemicals can be extremely dangerous if mishandled. If you are not familiar with the use of these chemicals, DON'T USE THEM until you consult with someone, such as a professional pool maintenance company, on their proper use.

IV. Safety

A. Temperature

For safety and comfort, pool water temperature should be between 70° and 83° Fahrenheit. Higher temperatures, such as 93°F., may be used for medical pools.

NAC 444.524 does not allow pools such as spas, hot tubs and baths to be artificially heated above 104°F. Signs must be posted which state that:

“EXTENDED EXPOSURE TO HOT WATER OR VAPORS MAY BE DETRIMENTAL TO THE HEALTH OF ELDERLY PERSONS AND PERSONS WITH HEART CONDITIONS, DIABETES OR HIGH OR LOW BLOOD PRESSURE.”

There must also be a sign with at least 4-inch letters on a contrasting background posted near the spa which indicates that children 12 years of age or younger must be supervised by an adult and that the maximum recommended time for such children to use the spa is 10 minutes.

B. Lifeguards

NAC 444.270 and 444.276 require any public bathing or swimming facility to have a lifeguard except when all of the following conditions are met:

- The pool surface area is less than 2,000 square feet.
- The pool is located at a motel, hotel, trailer park or apartment complex.
- No fee is charged for pool use.
- The use of the pool is restricted to registered guests, tenants or residents and their guests.
- A sign must be in plain view and state: “Warning – No Lifeguard on Duty.”

C. Safety Equipment

The minimum safety equipment required by NAC 444.266 and 444.268 is:

- A rescue tube or ring buoy attached to a rope at least 1½ times the width of the pool.
- A life pole or shepherds crook at least 12 feet long.
- A standard first aid kit.
- Two blankets.
- A telephone located near but not in the pool enclosure.
- An illustration of artificial respiration or CPR conspicuously posted.
- The location and phone number of the nearest ambulance, hospital, fire or police rescue service, physician and pool operator.

- A sign in the spa area stating extended exposure to hot water or vapors may be detrimental to the health of persons with heart conditions.

NAC 444.276 requires, if a lifeguard is not provided, the following signs are to be posted in plain view with at least 4-inch letters:

- “Warning – No lifeguard on Duty”
- “Children under 14 years old should not use pool without an adult in attendance”
- “Solo bathing is prohibited”

The maximum number of bathers (capacity) must also be posted. According to NAC 444.278, the maximum number of bathers is calculated with the following formula: (Pool operators may designate a smaller number but not greater than this requirement.)

$$\begin{array}{rcl} \text{Maximum} & & \text{Non-swimming Area sq ft} \\ \text{Bathing} & = & \\ \text{Load} & & 10 \end{array} + \begin{array}{rcl} \text{Swimming Area sq ft} & & \\ & & 24 \end{array}$$

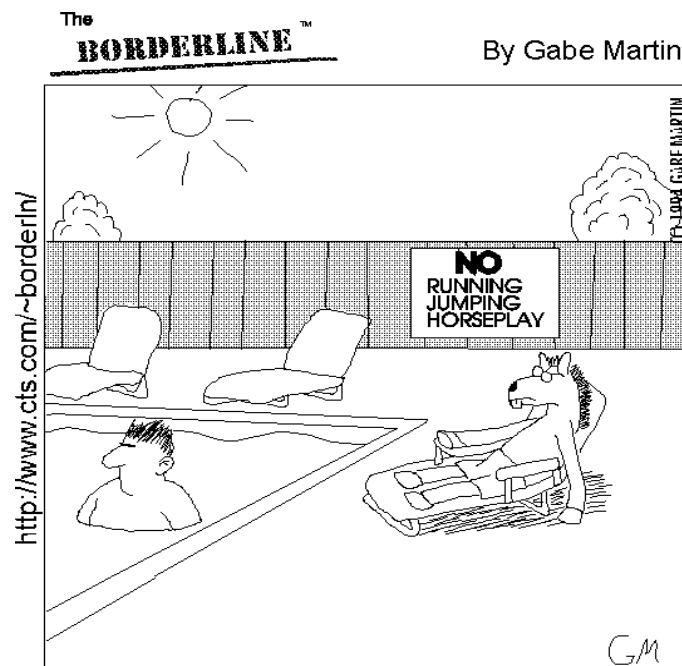
The number of persons allowed to enter a spa is limited to the number which allows 10 square feet of water surface area for each person using the spa.

D. Pool Rules

NAC 444.280 and 444.288 list minimum pool rules. A sign directing the behavior of pool users may be posted near the entrance to the pool.

- All bathers shall be required to take a cleansing shower using warm water and soap and shall thoroughly rinse off all soap suds before entering or re-entering the pool enclosure.
- Persons suffering from colds, fever, coughs, sore or inflamed eyes, any skin disease, or any communicable disease, or open sores or bandages shall be excluded from the pool.
- Spitting, soiling or in any way contaminating the pool water, walkways or dressing rooms is prohibited.
- Eating, drinking, and smoking within the pool enclosure is prohibited except in the visitor area.
- Bringing or throwing into the pool or onto the walkways any objects that may in any way carry contamination, endanger safety of bathers or produce unsightliness is prohibited.

- No boisterous or rough play shall be permitted in the pool or on the walkways, diving boards, floors, platforms or in the dressing rooms or showers.
- Persons under the influence of alcohol shall not be permitted in or about the pool facility.
- Any person who refuses to comply with pool regulations shall be excluded from the premises and the management shall promptly bring such action as may be necessary to prosecute or eject from the pool premises any person refusing to comply with these regulations or pool rules.
- Persons not dressed for bathing shall not be allowed in the pool.
- Pools are for the use of people only. Animals must be excluded from the pool and enclosure.



As a colt, Henry never had any fun at the pool.

V. Inspections

Inspections of pools are done by the Carson City Health and Human Services Department on a monthly basis during the season that the pool is open. Common items checked on an inspection include, but are not limited to, the following:

- **Operating Records**: Checked to see that an operating record (log) is being properly maintained on a daily basis.
- **Marked Water Depth**: Water depth must be marked on the pool wall at the **minimum and maximum depths** and at the **point of which the pool drops off sharply**. Numbers must be at least 4 inches high and easily visible from in or out of the pool and on both sides of the pool.
- **Walks**: Walks must be kept clean and free from hazards, at least 4 feet wide and drained away from the pool.
- **Barriers**: A barrier must be provided to exclude unauthorized persons from the pool. For most pools this means a fence at least 5 feet high, which will also assist in preventing small children from entering the pool area unattended. Entrances must be provided with self-closing and self-latching devices above the reach of small children and capable of being locked.
- **Water chemistry**: Disinfectant level, pH, total alkalinity, and temperature are checked at every inspection. Occasionally calcium hardness and cyanuric acid levels are checked.
- **Main Drain**: Checked to see if it is clearly visible and properly covered.
- **Make-up Water**: Must be supplied through at least a 6-inch air gap above the highest level of pool water to prevent possible back siphonage and contamination of the water supply.
- **Pump Room**: All pipes should be marked depicting connection and flow direction. Valves should also be marked to depict their function. Equipment should be well maintained and chemicals properly stored.
- **Back-flow Device**: To prevent possible contamination of the domestic water supply, an anti-backflow device is required on all connections to potable water.
- **Electrical**: All electrical equipment must be UL approved. No electrical equipment is permitted within reach of bathers, and no wiring is allowed lower than 10 feet above the pool. Adequate lighting must be provided for pools used at night. Underwater lights should have clear lenses so they may be readily checked.
- **Lifesaving Equipment**: Adequate equipment readily accessible.
- **Pool Supervision**: Either a lifeguard or attendant is present and/or adequate, required signs posted.
- **Pool Rules**: Pool rules must be posted and enforced.
- **Drinking Fountain**: Located near pool and supplied with fresh potable water. Pool water is not acceptable for drinking purposes.
- **Dressing Rooms**: Dressing rooms, showers and toilets must be clean and well maintained.

VI. Frequently Asked Questions

A. What Causes Loss of Disinfectant?

- Bather Load:** Oils, sweat, and other body excretions consume disinfectants. The greater the number of people using your pool, the more disinfectant you will need to use. It may be necessary to increase the disinfectant level on weekends and/or holidays when you anticipate a heavy bather load.
- Algae:** The presence of algae will consume a large amount of disinfectant. If you have an algae problem, an algaecide, in addition to the disinfectant, may be required.
- Improper pH:** A high pH (above 7.8) substantially reduces chlorine's disinfecting action. Try to keep pH between 7.4 and 7.6.
- Sunlight:** The sun's ultraviolet [UV] rays dissipate chlorine. If you are using chlorine in an outdoor pool, consider stabilizing the chlorine with cyanuric acid or using a stabilized form of chlorine.
- Temperature:** High temperatures accelerate the loss of disinfectant. You may have to use more disinfectant than normal at temperatures above 85°F.
- Weather:** Rain and wind can carry a significant amount of dust, leaves and other contaminants into pool or spa water. You may have to add disinfectant after rainstorms or windy conditions.

B. Should there be a solid fecal accident in your pool, what should be done?

The federal CDC (Centers for Disease Control) recommends minimum actions: Close the pool and remove as much solid material as possible. Raise the chlorine to at least 2.0 ppm and maintain the pH at 7.2–7.5. Keep pool/spa closed for at least 30 minutes. Note accident on your daily log.

C. Should there be a diarrhea accident in your pool, what should be done?

The CDC recommends these minimum actions: Close the pool and remove as much material as possible. Raise the chlorine to at least 20.0 ppm and maintain the pH at 7.2–7.5. Maintain the pool recirculation at this level of chlorine and pH for at least 8 hours. Backwash the filters thoroughly and make sure water is discharged to waste. The pool may open after the chlorine level is returned to normal. Note the fecal incident in your daily log.

D. If a main drain grate is broken or missing?

Close the pool and turn off the pumps until the grate is replaced or secured.

E. What is a Shock Treatment?

Adding chlorine to pool or spa water in amounts much larger than normal is called “shocking.” An occasional shock treatment destroys organic contaminants from bathers and the environment through the process of oxidation, leaving more free chlorine available for protection from waterborne disease and infection.

A special non-chlorine shock may also be used. When you shock, use the manufacturer’s recommended dosage. Close your facility to bathers until the chlorine levels have dropped to normal, or for the specified waiting period.

F. What Causes Cloudy Water?

Water Not Balanced: High pH, total alkalinity, and/or calcium hardness levels can solidify ions which cause cloudy water. Test each level and adjust as necessary.

G. What Causes Colored Water?

Metal Ions: If your pool or spa water is blue/green, red, brown, or black, it is likely that the water is corroding metal fixtures and needs to be balanced. Also, check make-up water to see if metals are present. Your pool/spa dealer can test for metals and provide solutions for this problem.

Algae: Green water may be caused by certain species of algae.

H. What Causes Stains?

Metal Ions/Algae: The same applies for colored water. Check make-up water for metals and balance water. Algae, if left untreated, can form on surfaces and give the appearance of green or black stains.

I. How Are Construction & Remodels Regulated?

Specific regulations apply to the construction of new pools or remodeling of existing pools. All plans for new pools or remodeling must be approved by the Carson City Health and Human Services Department before construction can begin. Anyone planning a pool project must contact the Carson City Health and Human Services office to be certain they comply with all regulations.

VII. Pool/Spa Profile

Pool/Spa Shell

Area and Volume: _____

Type of Finish: _____

Drains (VGA compliant): _____

Shape: _____

Make/Model: _____

Supplier/Installer: _____

Date Completed: _____

HEATER

Type: _____

Serial Number: _____

Make/Model: _____

FILTER

Type: _____

Make/Model: _____

Backwash Pressure: _____

Clean Start-up Pressure: _____

PUMP

Make/Model: _____

Motor Make/Model: _____

Hours of Operation: _____

Horsepower: _____

VGA Compliance: _____

VIII. Sample Daily Pool Operation Log

Facility Name: _____

Facility Volume: _____

Facility Location: _____

Date: ____/____/____

| Begin Operation / Operator: | | | | End Operation / Operator: | | | | |
|------------------------------|-------|-------|-------|---------------------------|-------|-------|-------|-------|
| Time Of Reading | | | | | | | | |
| Free Chlorine Residual | | | | | | | | |
| Chloramines | | | | | | | | |
| pH | | | | | | | | |
| Chlorine Feed Rate | | | | | | | | |
| Temperature (Pool) | | | | | | | | |
| Flow Rate ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| Turnover Time | | | | | | | | |
| Influent Pressure | | | | | | | | |
| Effluent Pressure | | | | | | | | |
| Vacuum | | | | | | | | |
| Water Clarity | | | | | | | | |
| Alkalinity | | | | | | | | |
| Hardness | | | | | | | | |
| Cyanuric Acid | | | | | | | | |
| Dissolved Solids | | | | | | | | |
| Bather Load | | | | | | | | |
| Operator Initials | | | | | | | | |
| Maintenance Procedures | | | | | | | | |
| (Use Reverse Side As Needed) | | | | | | | | |



IX. SAMPLE TEST QUESTIONS

1. A pool is 25 feet wide and 50 feet long. The depth in the shallow end is 3 feet and in the deep end is 5 feet. What is the area in square feet of the pool?
 - a. 25
 - b. 50
 - c. 1250
 - d. 5000
2. A pool is 25 feet wide and 50 feet long. The depth in the shallow end is 3 feet and in the deep end is 5 feet. What is the total volume in gallons of the pool?
 - a. 37,500
 - b. 35,700
 - c. 40,000
 - d. 30,000
3. Your pool contains 26,000 gallons. You want the turnover time to be 6 hours. What would the flow rate be with a 6 hour turnover?
 - a. 4333
 - b. 433
 - c. 72
 - d. 722
 - e. 60
4. Total alkalinity is a measure of the pH level of the water.
 - a. True
 - b. False

5. What are two common sanitizing chemicals used in pools?
 - a. chlorine and zerine
 - b. chlorine and stromine
 - c. chlorine and bromine
 - d. chlorine and boron

6. Your pool has a pH of greater than 8. You should:
 - a. Add acid until the pH is 7.2–7.8
 - b. Add base until the pH is 7.2–7.8
 - c. Add acid until the pH is 8–9
 - d. Add base until the pH is 8–9

X. What You Should Know

- Calculate the area, volume, and bather load of your pool or spa.
- Learn to operate and maintain the circulation and filtration system.
- Purchase an accurate, reliable test kit and know how to use it.
- Maintain your pool or spa water sanitation by adjusting the disinfectant.
- Balance your pool or spa water by adjusting: pH, total alkalinity, and calcium hardness
- Occasionally 'shock' the water.
- Solve common problems, including: Loss of disinfectant, cloudy or colored water, and stains.
- Test routinely.
- If you need assistance, contact your pool/spa dealer.
- Always follow directions on manufacturer's labeling for all chemicals and tests.

If at any time you should have a question regarding pool use, regulations or maintenance, please feel free to contact our office. We will do our best to help you with the problem or can refer you to someone else, if necessary.

Our office:

Carson City Health and Human Services Department
Environmental Health Services
900 East Long Street
Carson City, Nevada 89706
Phone (775) 887-2190 / Fax (775) 883-4701 or 887-2248