PART FOUR

Special Topics: Swimming Pool Operations and Management, Housekeeping in Other Venues, Safeguarding of Assets, In-House Laundries, and the Full Circle of Management

In Part Three, the management functions of direction and control were applied to the "Daily Routine of Housekeeping" and to various "subroutines" that may be encountered by members of a housekeeping team during daily operations. In this final part, the specific topics of swimming pool operations and management, housekeeping in other venues, concerns for the safeguarding of assets (security and safety), and on-premises laundries are covered. In conclusion, problem solving, management styles, and the future of housekeeping as a management profession are also discussed.

12

Swimming Pool Operations and Management

Responsibility

Some may wonder why it is necessary to have a discussion of swimming pools in a book on housekeeping. Shouldn't the pool be under the purview of the maintenance department? It should be remembered that the classical *matching principle* of accounting requires that expenses be related to the revenue being generated by a specific department. The maintenance department is normally responsible, and is budgeted for, the *repair* and *maintenance* of a facility, not the management of an operating department. Should there be a breakdown in the physical operation of the pool system, water leaks, mechanical breakdowns of the filtering or chlorinating systems, such repairs should be made by the maintenance department. Otherwise, the day-to-day *operation* of the pool should come under some operational subdepartment associated with rooms operations and revenue. Because the main task demanding most of the employee **wage dollar-hours** is generated by keeping the pool area clean and supplying guest services, operation and management of the pool and pool area will usually come under the domain of the housekeeping department.

It is possible, in very large pool systems, that an **operating engineer** might be assigned to nothing else but the mechanical systems of the swimming pool, but this is usually an exception. Most pool operating functions are organized under the overall responsibility of the executive housekeeper, assisted by a *senior lifeguard* or *pool supervisor* who will oversee the total operation of the pool and surroundings as further assisted by a staff of *lifeguards* or *pool attendants*. The difference between the

CHAPTER OBJECTIVES

After studying the chapter, students should be able to:

1. Identify terms and their definitions related to swimming pool and spa operations, including the components of a pool system.
2. Describe the process of pool water filtration, the different types of filters, and the tests for water purity and clarity.
3. Describe the various chemicals used to maintain swimming pools and spas.
4. Describe how to control algae growth in pools and spas.
5. Identify various pieces of extraneous equipment needed to maintain pools and spas.
6. Describe staffing concerns for pools, including selection and training criteria for pool attendants.
7. Describe the duties and responsibilities of pool attendants.

lifeguard and the **pool attendant** is explained later in this chapter.

Components of a Swimming Pool System

Although no two swimming pool systems are exactly alike, most are designed with certain generic operating requirements. The following 13 components are usually present in any system, and understanding their purpose and operation can help the reader visualize how the first three objectives mentioned earlier are attained. To do this, the components are named and their functions fully described.

The layout of the pool system is shown in Figure 12.1 (plan view) and Figure 12.2 (profile view). It includes the various components listed here:

Water Inlets—Plumbing jets where filtered water enters the pool. **Inlet jets** direct the water in a counterclockwise motion around the pool.

Skimmers—Water-level basket holders with plumbing leading water out of the pool into the **internal piping system** leading back to the filters. **Fill water** must be regulated to keep the pool water at the optimum level; otherwise, a low water level will cause air to be drawn into the *closed liquid loop* and the circulating system will cease to operate.

Skimmer Baskets—These are catch baskets (4 are shown) designed to fit into skimmers where surface debris can be caught and removed from water. The counterclockwise circulation of the surface water will cause most debris to pass into one or more of the skimmer baskets. Baskets holding the debris can be lifted out and emptied periodically.

Main Drain—Located at the bottom of the deepest point in the pool, drains debris off the bottom of the

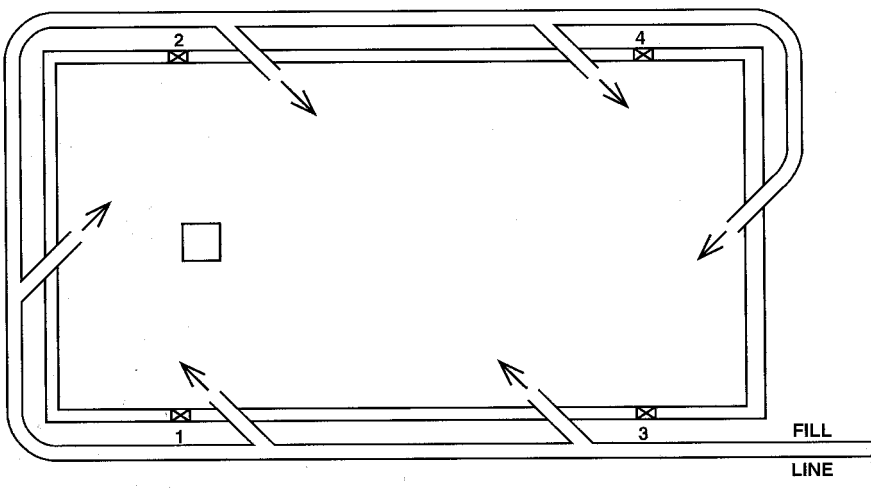

Figure 12-1 Plan view of pool and fill line with water jets directing the flow of water counterclockwise around the pool, allowing surface water to pass by four skimmers.

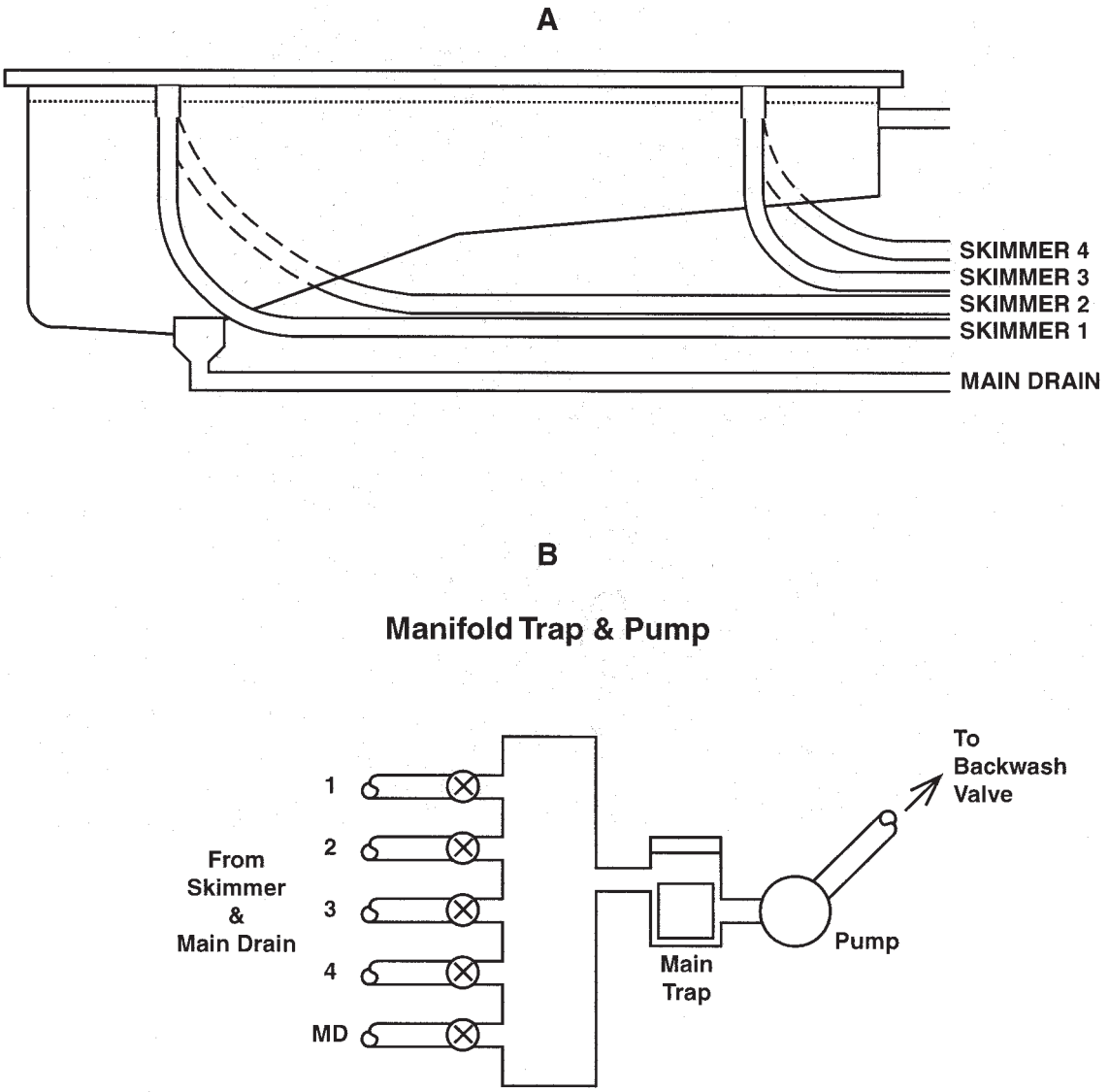

Figure 12-2 (A) Profile view of pool shows shallow and deep ends of pool with plumbing for *main drain* and 4 skimmer lines. (B) Water from these 5 lines is collected in a manifold with regulating valves on each line to control the flow of water. Water is then collected and sent through the *main trap*. This trap should be opened periodically, and the basket removed and emptied. Water is then drawn into the pump due to vacuum pressure from the pump when it is running.

pool, or can be used to drain the pool entirely, if necessary.

Drain Manifold—Collects water from all drain lines returning water from the pool to the filter. Manifold has a **regulating valve** on each line for controlling the volume of flow from each returning line. Valves are usually adjusted to regulate an even flow through each skimmer with a partial flow through the main drain.

Main Trap—May be opened and the **trap basket** emptied of any debris that was missed by the skimmer baskets (small rocks, etc.), before water enters the pump.

Pump—Creates the *positive* pressure that forces water through the filter and back through *return lines* to the pool. The pump also creates the *negative* (vacuum) pressure on the circulation system that brings water through the skimmers and drain from the pool. This **vacuum pressure** can also be used to facilitate vacuuming the pool, mentioned later.

Backwash Valve—This valve, operated by a push-pull handle, directs water under normal operations, into the top of the filter, forcing the water down through the filtering material from where the filtered water returns to the pool. When the position of the backwash valve is reversed, flow through the filter is

reversed and water levitates the filtering agents so that debris caught in the filter is moved to the top of the **filter tank** where it can be carried off into the sewer system.

Sight Glass—A tubular piece of glass or clear plastic pipe through which the clarity of the water being discharged from the filter can be observed. Water being backwashed usually appears brown until the filter is cleared, after which the backwash valve can be readjusted to the normal operating position.

Pressure Gauge—A combination pressure gauge and relief valve; sits on the top of the filter, which is the highest point in the **circulating system**. A pressure reading, taken at the time of installation when the system is clean, is identified as the **normal operating pressure**. As the filter continues to filter **particulate matter** from the water, the pressure will tend to increase, giving an indication that it is becoming harder to push water through the filter and that the system should be backwashed. (For example, if the normal operating pressure is 16 psi and the pressure rises to 20 psi, backwashing would be indicated. After the discarded water clears, as noted, through the sight glass, and the filter is returned to normal operation, pressure should return to a normal reading of 16 psi.)

The system should also be maintained as a **liquid loop** (free of air to prevent hydraulic loss of vacuum and pressure). Air trapped in the system will rise to the top of the filter. This trapped air can be removed by turning on the pump and opening the valve on the pressure gauge. This will cause the air to be forced from the system, making the circulation totally liquid again.

Pool Heater—Pools in the southern part of the country will not be comfortable enough to swim in (78°F) until after late May. Most pools will be provided with a heater to warm the water about 5–10° in order to gain usage of the pool earlier in the season. In the northern part of the country, outdoor pools are usually heated, except in July or August. Usually in smaller pools, the heater is a 100,000 **Btu** heater, capable of heating either the main pool or a spa if one is available. Water is heated just before it is returned to the pool.

Chlorinator—A controllable device used to feed a **chlorinating agent** (chlorine or similar product such as **bromine**) into the pool circulation prior to the water returning to the pool.

Pool Vacuum—A **vacuum foot** with two connections—one for a pole that gives the user access to the bottom of the pool in deep water, and the other that connects to a length of hose that can reach the surface of the water and fit into one of the skimmers. By adjusting the valves at the manifold, all vacuum pressure may be directed to only one skimmer to which the vacuum hose is connected. This provides a total vacuum capability to the location where the vacuum foot is directed at the bottom or side of the pool. This procedure should be done when needed or at least once a week. **CAUTION:** When attaching a vacuum hose to the skimmer inlet, the pump should be turned off. If the pump is running, the force of the vacuum in the skimmer is strong enough to capture and break fingers.

Pool Sizes and Shapes

Swimming pools can be found in all sizes and shapes. The average 300-room hotel will probably have a heated pool about 25′ × 60′, rectangular in shape, with a shallow

Figure 12-3 Mirage Resort main pool with hotel and waterfall in the background. The pool has a water surface area of 17,780 feet, 486,000 gallons of water, 1,033 feet of perimeter, 53 bottom returns, 35 inlet jets, 46 skimmers, and 6 drain covers that are 2 feet by 56 feet in length. There are also 555 feet of expansion joints built into the pool. Notice the three lap lines in the foreground. (*Photo taken with permission of MGM Mirage.*)

end at 3 feet and a deep end at 6 feet. It will hold about 30,000 gallons of water and will have a plumbing system as described earlier. Some have diving boards and some do not. In cold climates, pools are usually indoors. Most have *spa* hot tubs associated with the main pool.

The major resorts have much larger pools that can handle several thousand people at one time. Figure 12.3 shows the Mirage Resort in Las Vegas. There are two pools in the cabana area. The two pool decks have 1150 lounge chairs and can accommodate about 6000 guests per day. There are also two waterfalls that have about 7000 gallons of water running through them at the same time, and three water slides. On a busy day there are 12–14 lifeguards watching the water, and an additional 10 pool attendants seating people and handing out towels.

Water Clarity

Water clarity refers to a measure of the proper **degree of filtration.** Pool water must be properly filtered if it is to be as clear as it should be. Water will be clear if all **solid particulates** are removed and kept out of the water. This is more difficult for outdoor pools because the greatest source of particulates in the water are dust, leaves, and other debris.

Water that is free of particulates appears blue in color and completely transparent. Water that is green is not being properly filtered and is usually the product of **airborne spores** *blooming* into algae. This will not only appear green but will also make the water appear cloudy. Water can become so cloudy because of this type of problem that the pool bottom cannot be seen. If this happens, the pool should be considered unsafe to swim in, not because the water is chemically unsafe, but because you would not be able to see a swimmer on the bottom of the pool who might be in distress. Therefore, we believe that the correct test for the proper degree of filtration is as follows:

> Toss a dime into the deepest part of the pool, and after it reaches bottom, can it be seen well enough to determine whether it is "heads or tails?" If the answer is yes, then the water has the proper degree of clarity. If not, then filtration must be improved.

Types of Filters and How They Work

There are two basic types of filters found in hotel-type swimming pool installations. One is the *earth sand (ES) filter* and the other is called a *diatomaceous earth (DE) filter*. These two filters are usually distinguished by their size.

The ES filter (Figure 12.4) is the larger of the two and is filled with graduating sizes of sand to coarse aggregate

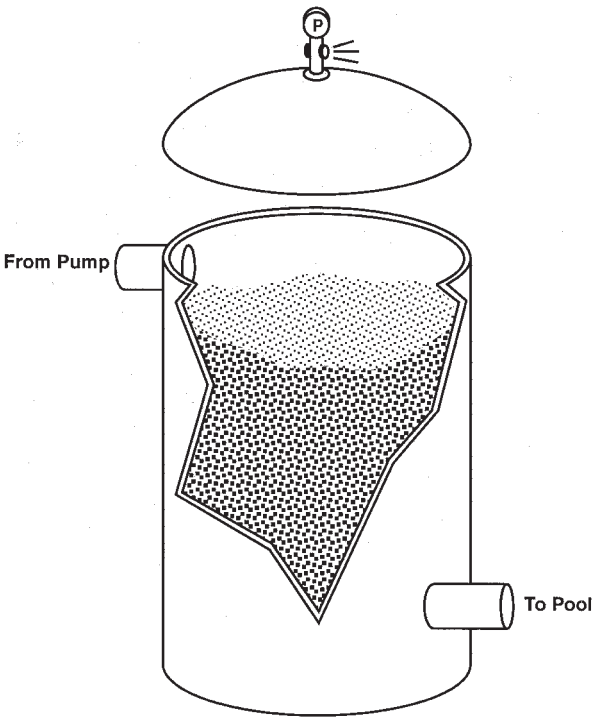

Figure 12-4 After passing the backwash valve, water enters the filter. The filter shown is an earth sand (ES) filter. Water enters the top and is forced down through the filter under pressure. Water is then returned through a heater (if present), a chlorinator, and finally to the pool under pressure.

rock, over which the pool water will be pumped under pressure. This filter must be periodically backwashed thoroughly; otherwise it will become *caked* with debris and require opening and replacement of all sand and earth. This is a tedious and labor-intensive procedure. Figure 12.5 is an example of the much smaller DE filter. Note the internal structure of the DE filter in which **filter vanes** are present. These several vanes are constructed of a microscopic-size nylon mesh screen, over which a coating of **diatomaceous earth** (a white powder made from the skeletal remains of microscopic sea creatures) is evenly distributed.

Over a period of time, particulate matter will also cause a pressure rise as it becomes harder to force water through the filter. A backwashing process must then take place. With this type of filter, the DE coating on the vanes will also be flushed out of the system and will require that fresh DE again be entered into the system when backwashing has been completed. This is done by mixing a **slurry** of water and DE and placing it into the system by pouring the slurry into one of the skimmers with the pump running. This slurry will eventually reach the filter vanes and coat them for proper operation. The amount of DE required is determined by the square foot

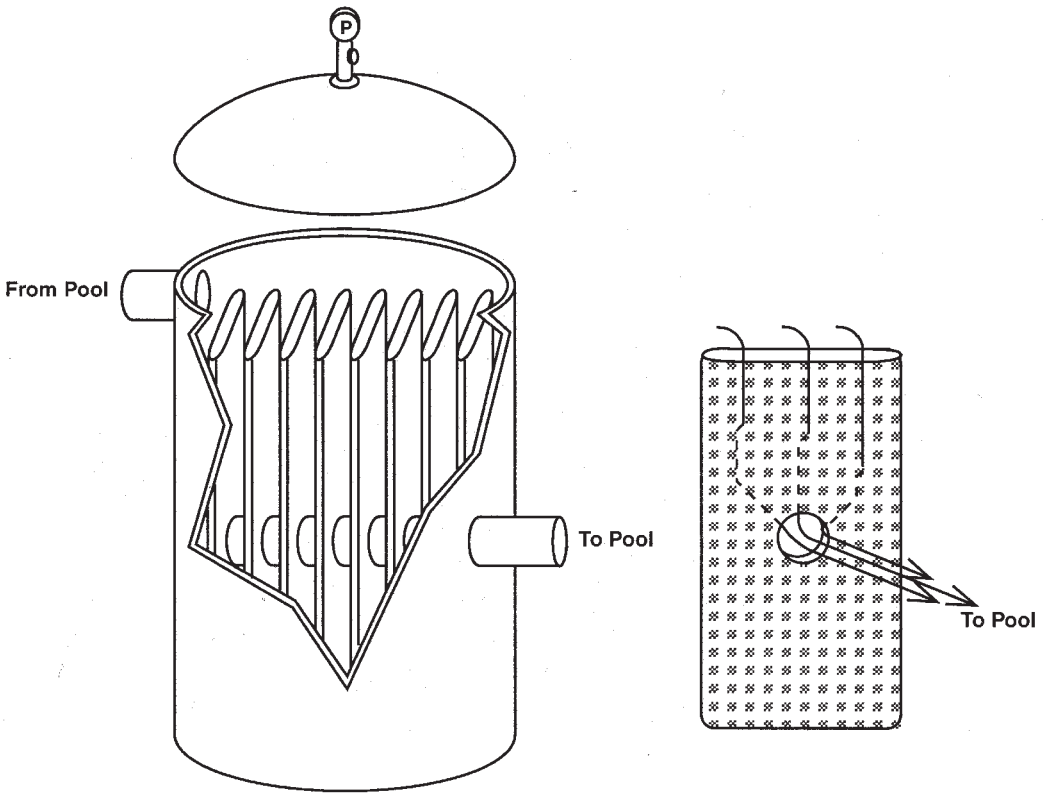

Figure 12-5 The filter shown is a DE filter. After DE has been added, it will coat all filter vanes with a slurry. Water enters at the top of the filter, surrounds the vanes, and is forced through the DE slurry and surface of each vane. Water is then collected from the center of each filter vane and returned to the pool.

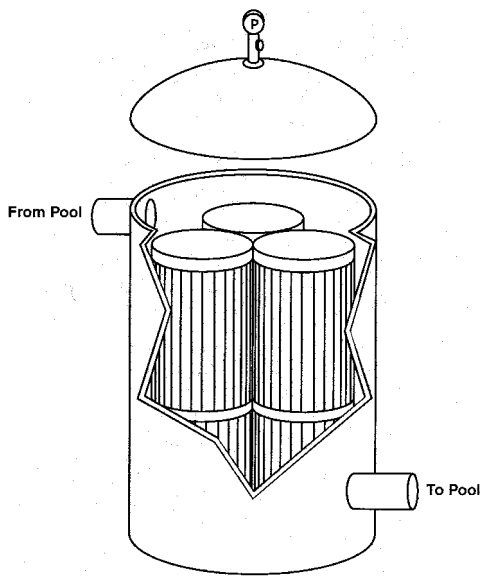

Figure 12-6 A cartridge filter usually contains 6 cartridges, as shown. The water surrounds each cartridge, made of heavy filter paper, and is forced through the filter to the inside. Water is then collected at the bottom of the filter and returned to the pool. The filters must be opened periodically and the cartridges removed, hosed off, and acid washed.

surface area of the filter vanes in the filter. This amount is usually posted on the filter case (e.g., "This filter contains 57 square feet of filter area and requires 4 pounds of DE for proper coating."). Failure to properly coat DE filters may cause improper operation and early breakdown of filter vanes.

A third type of filter available but seldom seen in hotels is the **cartridge filter**. This filter's construction is similar to that of the others, but it contains six or more paper cartridges that are stacked inside (see Figure 12.6). Although no backwashing is required, this filter must be opened periodically and each filter cartridge thoroughly cleaned and **acid washed**. (Replacing these filter cartridges can be very expensive).

The Backwashing Cycle

As indicated earlier, both the ES and the DE filters must be backwashed when system pressure indicates the need. Both systems have some form of backwashing valves (Figure 12.7) that indicate how a **reversed water flow** is created, which in turn forces the discharge of the residue into the sewer system. Figure 12.7 A and B show how this reversal is made to occur.

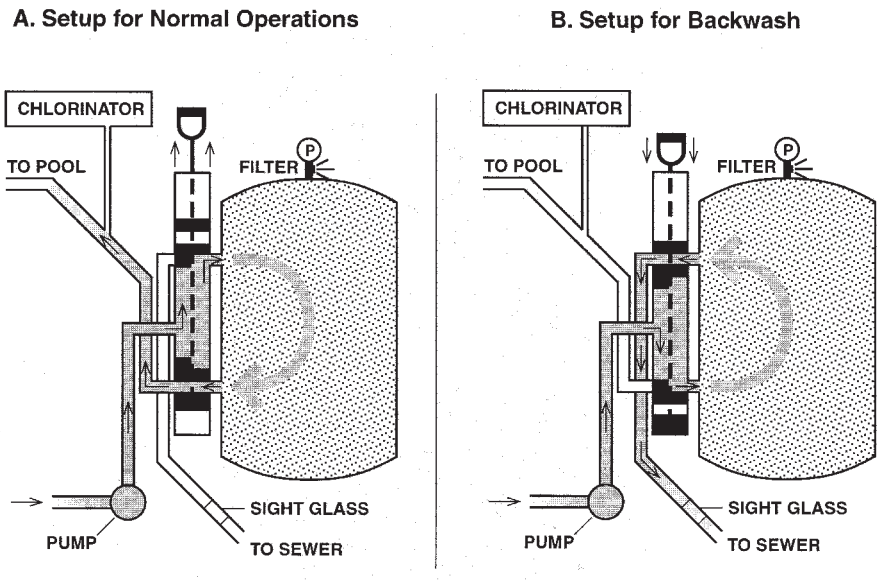

Figure 12-7 The backwash cycle. The backwash valve has the capability to reverse the flow of water through the filter. When backwashing is in operation, water does not return to the pool but is pumped to the sewer, passing the sight glass. Backwash continues until the water passing the sight glass is clear.

The Spa

A spa is nothing more than a small pool with no skimmer. Water usually flows over a **spa dam** into the main pool if they are connected. And if not, they have two separate plumbing systems. Otherwise, plumbing valves allow the main drain and the water inlet to be directed either at the main pool or the spa. Temperatures should not be allowed to exceed 103°F, and warning signs should be present, advising guests about overexposure to the heat and recommending that another person be present when someone is in the spa.

Water Chemistry

Although keeping the pool water clear and inviting is part of the challenge, water chemistry is quite another matter and certainly of equal importance. The chemical safety of water for swimming purposes requires the control of harmful bacteria that may be present in the water.

Chlorine is one of two agents that can be used for the purpose of sanitizing the water, and bromine is the other. Both agents do relatively the same thing, but chlorine is more apt to have a distinctive odor at times, which can annoy some bathers. Bromine has less odor but is considerably more expensive to use. Proportions of each may also be relatively different, therefore the rest of this discussion will relate to the use of chlorine. To be **bacterially safe**, pool water must contain at least two parts per million (2 ppm) of free (dissolved) chlorine (**by volume**) if harmful bacteria are to be rendered harmless.

The Good and Bad Effects of Chlorine

The solution of chlorine in water is not hard to attain, but it is extremely hard to maintain without close attention to detail. The good effects of chlorine cannot be attained without also assuming some of its bad effects.

The good effect gained by 2 ppm of **free chlorine** is easily lost as a result of *light, heat*, and *agitation*. Direct sunlight, air temperature of about 85°F, and people splashing around in the water can quickly lower the chlorine to an unacceptable level. Therefore, chlorine levels should be elevated to 6 ppm at the beginning of the day. The water should then be monitored throughout the day and more chlorine should be added to ensure a minimal level of 2 ppm at all times.

The Ups and Downs of the (pH) of Water

The neutral pH of water is 7. At less than 7, water is acidic; at greater than 7, the water is **alkaline** (a base). Adding a gallon of chlorine to the pool water has the effect of adding a pound of salt, which tends to raise its pH, making the water more alkaline. The bad effect of adding chlorine to water occurs when we continue to add chlorine and the pH continues to climb.

Table 12.1 shows the pH of **chemically pure water** with a value of 7, and indicates the ideal range at which the pH should be for chlorine to work its greatest good (7.4 to 7.6). As the pH increases above 7.6, and the optimum working range of chlorine is exceeded, acid must be added to reduce the pH. There are tables that indicate how much acid to add, based on the pH differential and the size of the pool in gallons of water. The significance of this balancing act is that the right 2 ppm of chlorine

TABLE 12.1 pH Levels

					Acidic			Neutral		Alkaline					
pH	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.8	8.0	8.2	8.4
										Best Range for Chlorine Function					

must be maintained along with the proper pH of 7.4 to 7.6. This is difficult to do when correction of one value throws off the other.

Maintaining Proper Records

The aforementioned difficulties with pool water chemistry indicate the need for measurements to be taken and recorded at several times of the day. At the end of the swim day (9:00 P.M.) the chlorine count will probably be low, and so will agitation and lighting. A measured amount of chlorine should be added through the night. At the 8:00 A.M. reading, the chlorine count should have recovered well above 2 ppm, but acid will probably now be required. This acid (**muriatic** or **hydrochloric**) should be added by pouring alongside the deep end of the pool. No one should be in the pool when acid is being added. This acid should become well dispersed in about 30 minutes and definitely before the pool opens at about 10:00 A.M.

Health inspectors normally inspect the records maintained by the personnel of the pool department. When they see that people are having trouble trying to maintain balance in their water chemistry, they will usually lend a hand in achieving the proper balance. Should such records not be found, your pool will probably be closed, which would be embarrassing.

Other telltale characteristics of the chemical condition of the water are:

Sides and bottom slimy (people slip and can't stand up in the pool)—water is too alkaline, and prone to form black algae.

Sides and bottom feel rough—water is too acidic; pool finish is being etched away. Look for possible pump damage because of acid action.

Pool Test Kits

These are small test kits than can be purchased in any supermarket or pool supply store, are self-explanatory as to their use, and provide the user with a small amount of **reagents** (**orthotolodine** and **phenol red**), which can test for chlorine content in the water and for proper pH. A test can also be made for the **total hardness** of the water. This test measures the increasing hardness of water as you continue to add chlorine. As total hardness approaches 1000 gm/mL, it may become necessary to drain the pool halfway, then refill the remaining half with fresh (less hardened water). High total hardness can herald the formation of "rock" in pipes and on corners and fixtures in the pool and a possible onset of black algae. High total hardness and black algae are the only two reasons that a pool should ever have to be drained.

About Algae

Algae is an **organic growth**, unpleasant to look at but not harmful to humans. Usually there are three types of algae that can attack the pool, commonly known as green, brown, and black algae. Conditions that must exist before algae can exist are: **spores** in the water, light, heat (temperature above 85°F), and pH (above 8.5). But where do the spores come from? They are in the air and are carried on the wind. If there is a rainshower, just consider that those raindrops have gathered spores and dumped them into your pool. They will remain there and never be seen until the mentioned conditions are right, at which point the spores will **bloom**. This is not a pretty sight and can occur before your eyes in a moment's time. Usually the water will **flash green** and become cloudy as you watch it happen. These algae will adhere to the sides of an alkaline pool and may later turn brown. This is prevented by using an **algicide** *before* it happens. If you did not prevent it, add an algicide immediately, stabilize your water chemistry, and commence brushing the sides of the pool. Green and brown algae are easily removed by brushing, but the residue must be filtered and vacuumed out of the pool. To quickly stabilize the water, you can **shock** the pool with a concentrated treatment of chlorine (65% **calcium hypochlorite**), but you must close the pool for several days after this treatment to allow the shock treatment to do its job. The water will cloud up heavily, then clear, after which you must vacuum the residue off the bottom of the pool.

Black algae is the worst enemy. It tends to form in cracks and small pits in the finish of the pool when everything else seems under control. It is extremely difficult to remove and keep out of the pool. It may require that you drain the pool and acid wash the sides, but in

the long run, this is detrimental to the pool finish. Early detection of black algae is a must, and concentrated localized shock treatment can keep it in check. Usually it must be *dug out* of its nesting place.

Chloramines

Sometimes guests may complain about the "amount of chlorine" in the water and that their eyes burn because it is so bad. In a clean pool, chlorine dissolves in water has no odor. What the guest is smelling is not free chlorine in the water, but chloramines. Chloramine is a chemical combination of chlorine and organic material. Leaves, skin oils, urine, and other organic material combine with chlorine to cause the heavy smell of chlorine. The solution, again, is the shock treatment—65 percent calcium hypochlorite. This will cause the closing of the pool until the level of chlorine recedes to no more than 6 ppm.

Pool Equipment

As opposed to pool components, the following is a list of *equipment* that should be available at poolside:

Brush (with pole)
Surface skimmer net (with pole)
Vacuum (with pole and hose)
Garden hose (for washing down pool decks)
Shepherd's hook (for safety)
Life ring (use caution if it is thrown)
Pool rules and regulations (usually a state requirement)
Fencing around pool (in accordance with state codes)

About Diving Boards

Most diving boards are being removed from small hotel pools because they are considered a hazard. Prudent operators studying the law can easily note negligence cases brought against hotel operators in which guests have been injured because of diving accidents. The depth of water at major resorts with sizable pools and attending lifeguards may be able to preclude this hazard, but in general the trend is increasingly toward the pool without the diving board.

Staffing (Using Lifeguards or Pool Attendants)

A lifeguard or pool attendant should be qualified as a **Senior Red Cross Life Saver** and/or **Water Safety Instructor**. There should be no person identified with the pool activity who is not qualified to save a life or perform **CPR**. As to the job title of this person, there is some concern. This writer believes that hotel swimming pools are for the relaxation of guests, who should not be led to believe that the swimming pool area is a place to abdicate responsibility for their own safety. Signage such as "Pool Open—No Lifeguard on Duty—Swim at Your Own Risk" is reasonable. If you announce that you have a lifeguard on duty, then you must have a person who does nothing but sit on the perch and wait for someone to get in trouble. If, however, you have no lifeguard on duty, but you do have one or more pool attendants, they can perform as lifesavers if necessary, but they can also be performing other duties such as keeping the pool deck neat, orderly, and free of glasses; providing towels and plastic containers where necessary; and being good hosts. An advertised lifeguard on duty increases the hotel's liability in the event of a drowning or severe accident.

Major resorts with large pools, diving activities, sliding boards, and other games have little choice but to provide lifeguards. It is generally expected, but not in small hotels.

Staffing of a pool should be sufficient to carry out morning pre-activities before the pool opens (water testing and adjusting) and to maintain the proper balance during the day, maintaining log entries on water chemistry. The log should also note any unusual circumstances or activities.

It should be remembered that swimming pools have been the basis of many accidental happenings for which the hotel has been found negligent in its operations. It is hoped that this caveat will be valuable in future pool operations.

Summary

On many occasions, swimming pools are brought under the purview of the executive housekeeper. When breakdowns occur, the maintenance department must repair or replace as necessary. However, the operation and management of the pool and recreation areas are usually part of the housekeeping operations because they primarily represent a cleaning and servicing type of operation.

The objectives of pool operation must include water clarity, water chemistry control, zero algae growth, and being properly equipped and properly staffed for safe operations. The pool nomenclature was discussed, as were the various components of the pool itself. Control of the safety of the water (chemistry) is considered an operational function and must be maintained and recorded several times daily to ensure that the water is

kept chemically safe to swim in and that the pH balance is maintained in a specified, limited range.

Algae must be foreseen and properly controlled, as should the condition of the pool areas in general. The use of diving boards at small hotel pools is questionable and should be considered a safety hazard.

Pools should be properly equipped for the work that must be done. Staffing should favor the use of pool attendants as opposed to lifeguards. Lifeguards are to be expected at major resort pools that are equipped with diving boards, slides, and other play equipment.

KEY TERMS AND CONCEPTS

Wage dollar hours
Operating engineer
Lifeguard
Pool attendant
Inlet jets
Internal piping system
Fill water
Surface debris
Regulating valve
Trap basket
Vacuum pressure
Filter tank
Circulating system
Normal operating pressure
Particulate matter
Liquid loop
Btu
Chlorinating agent
Bromine
Vacuum foot
Degree of filtration
Solid particulates
Airborne spores
Filter vanes
Diatomaceous earth
Slurry
Cartlidge filter
Acid washed
Reversed water flow
Spa dam
Bacterially safe
By volume
Free chlorine
Alkaline
Chemically pure water
Muriatic
Hydrochloric
Reagents
Orthotolodine
Phenol red
Total hardness
Organic growth
Spores
Bloom
Flash green
Algicide
Shock
Calcium hypochlorite
Black algae
Shepherd's hook
Senior Red Cross Life Saver
Water Safety Instructor
CPR

DISCUSSION AND REVIEW QUESTIONS

1. Diagram a pool operating system, naming all components.
2. Explain the need for, and the technique for, backwashing a pool. What is the purpose of the sight glass in the backwashing procedure?
3. Establish a step-by-step chronological procedure for recording daily measurements taken in the pool.
4. Pool water looks great, chlorine content is good, pH is balanced, but total hardness is exceeding 1000 g/mL. What is happening? What do you do about it?
5. Discuss the pros and cons of having lifeguards versus pool attendants on the pool staff.