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## SOUP'S ON! COMMERCIAL POOLS HAVE ALL THE INGREDIENTS FOR PEOPLE SOUP

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by Dallas Wall MS, P.E.

Ever since life emerged from the primordial swamp, mankind has been drawn to the “soup” from whence we came. Aquatic activities have become an increasingly popular pass time. After all, water mesmerizes our senses, challenges our stamina, cultivates a smile and soothes our spirits. We conserve it, we waste it, we consume it, we convey it, we harness it, and we enjoy it. Indeed . . . water is life. From the bath houses of the Romans to the water slides of today, pools will always attract people, and with those people comes a plethora of pollutants, bacteria and other unwelcome ingredients that comprise a “people soup”.

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### *Jump on in*

High bather loads are typical for commercial recreational pools of today. Perhaps the most extreme example of pool overload is the recent video of the Summerland Wave Pool in Tokyo, Japan that is posted on You Tube. Most local codes do not allow this type of extreme loading in the United States. Still, many facilities have pool water with pollutant loadings too high for public safety. Last year in Utah, outbreaks of cryptosporidium caused the state health department to mandate operational requirements that lasted until the end of the swimming season (Associated Press, 2007). The solutions proposed by government agencies, owners, operators, designers and equipment manufacturers seem to focus on only part of the problem. Not only do the owners, operators, and bathers contribute to concocting “people soup” but also the way pools are conceived, designed and built impact their success.

### *Soup Ingredients*

The ingredients for people soup come from four sources: Environmental, Social/Behavioral, Physical, and Chemical. Each pathway deals with a different responsible agent (owner, operator, and bather). Each of these issues is a reality of life that must be considered when designing a pool treatment facility.

#### *Environmental*

The location and surroundings of the pool can affect water quality. Indeed, many state codes mandate how the pool deck is allowed to interact with the pool. Drainage, deck obstructions, and allowable activities around the pool are part of all pool codes. However, environmental considerations should also include how the mechanical treatment system is designed. Is the facility accessible? Is the space adequate for equipment? Does the space insure proper equipment operation and performance? All of these issues will affect the quality of pool water.

Some environmental issues are simply a fact of life. Pool water temperatures are elevated to make bathing comfortable and pathogens on and within our bodies find pool water nicely suited for growth. The warmer the water, the faster these pathogens can grow. This is one reason why spas, with their higher water temperatures are required to have extreme filtration rates.

### ***Social/Behavioral***

Most pollutant sources pay their entry fee, walk through the front gates and settle nicely into the pool. As bathers steep in the refreshing water, not only do their troubles soak away but also their dead skin, loose hair, oils, greases, sweat, urine and even fecal pollutants. We all know that showering prior to entering a pool has an effect on water quality. However, most patrons utilize showers only after they leave the pool. It seems that the public do not realize that they are expected to shower BEFORE their bathing experience. Since changing social behavior is very difficult, many jurisdictions require designers to specify more shower heads, temper shower water, add soap dispensers, etc in an effort to encourage showering . Unfortunately, requiring more shower heads does not result in cleaner bathers in the pool. From a designer's standpoint, enhancing treatment systems seems to be the most viable solution.

### ***Physical – Body pollutants***

Despite how clean we keep ourselves, we always impart pollutants to the water. With these pollutants reside pathogens and viruses. Most illness outbreaks area caused by pathogens brought into the pool by infected bathers – as in, one rotten apple can spoil the whole bushel. Organisms congregate in colonies and often utilize larger structures like pool shells, decks, and equipment as harbors for colonies to grow. For this reason codes dictate the use of residual sanitizers that circulate throughout the pool system. This ensures that all parts of the pool are sanitized keeping our soup from becoming chowder. This underscores the need for proper circulation and proper turnover rates. To compound the problem, viruses are highly resistant to disinfectants and are too small to be filtered. Unfortunately, symptoms of waterborne illnesses may not be evident until days after a pool has been contaminated, especially in case of small children.

### **Chemicals – “Why seasoning is important”**

Everything that is added to pool water causes interactions. Pool supply companies have shelves of chemical additives to cure all that ales a commercial pool. Defoamers, coagulants, stabilizers and algaecides may address specific issues, but will interact negatively with disinfectants. Chemical disinfectants control the pathogen population by either oxidation of the cell structure or diffusion into the cell which disrupts the cellular process (James M. Montgomery Consulting Engineers, Inc., 1985, p. 263). Chlorine utilizes both of these methods.

When we add chlorine to pool water the effects are complex. First, the chlorine oxidizes by reducing the compounds within the water. Optimally, we would like the focus to be on the organic compounds not the chemical additives we purchased. Once the oxidation demand is met, the leftover chlorine compounds are then utilized to destroy pathogens through diffusion.



By minimizing other additives that act as reducing agents in the pool water, the effectiveness of your disinfectant is maximized.

### ***The Stove Top – “Too many cooks spoil the brew”***

Even the best soup can be contaminated by the organization of the kitchen. Indeed, commercial pools are whipped up in a whirlwind of planning, permitting, and construction. The permitting and construction process can set some pools on a dubious path.

#### ***Commercial Pool Code Process***

Commercial pools are regulated by local health and environmental experts. These pool codes protect public health more than any other organization. Furthermore, these regulations are often developed from experience and should be taken seriously. However, a developer should keep in mind the following issues:

First, pool codes form the MINIMUM design standards accepted for public use. Typically, these regulations are a standard for all pools and spas regardless of anticipated bather loads. Very few states dictate filtration rates based on anticipated bather load. Statements like, “the filtration system will be capable of filtering all pool water at least 4 times a day,” are common in local pool codes. While this may be fine for a small condo pool in a retirement community it is woefully inadequate for water parks or large resort destinations. These pools may accommodate thousands of people a day. If a pool is designed to meet all of the minimum standards allowed by code, the actual operation of the pool will become suspect. The MINIMUM standard becomes the MAXIMUM design target.

Secondly, if a pool is designed to surpass the minimum standard, there is seldom encouragement from the local jurisdiction. For example: head loss calculations are still required and corrected to the nearest gallon per minute despite the fact that the effective turnover time is less than half that required value. Oversized multiple bottom drains are still plumbed to specific local dictates or have anti-vortex covers. If plan reviewers are only focused on checklists, enhancing the design becomes burdensome.

If we design and construct a pool in an arena where minimizations are advantageous and overdesign is discouraged, the pool will be primed for failure during use.

#### ***Construction Process***

Commercial pool systems are designed and constructed using one of two basic methods: Design-Build or Design-Bid-Build.

In the Design-Build method a contractor is hired to design and construct a pool as one service. The contractor is familiar with local code requirements and produces a standard set of generic drawings for departmental review. The advantage of the Design-Build process is the ease it provides the owner. However, the selection of a Design-Build contractor is usually based on a



low-bid process. Low bid requires the contractor to minimize every aspect of the pool including local code requirements to stay competitive. This can result in pools without consideration of the loading rates, operational ease, and maintenance requirements. Some pools are literally pieced together from parts laying around the shop; leftovers from other projects.

In the Design-Bid-Build process, the owner hires a design professional to represent their pool interest. These professionals guide the owner in every aspect of the pool construction. This process generally results in higher expenses during the design phase but fewer coordination problems during construction and a higher quality finished pool. The pool design will not be based solely on the minimum standards dictated by local agencies, but on the operating conditions the pool will see during use. However, design professionals may not be completely familiar with local code interpretation and deviation from the minimum standard may require some additional time for permitting.

When utilizing the services of a design professional, some builders will want to make changes to the design to minimize their costs. Variations from a contractor's "typical" practices can become expensive as arrogance and pride from both sides can be apparent.

### ***So, which method is best for your project?***

The Design Build process can be risky unless you have some experience with existing pools. You must be able to talk the jargon and know the use and operation of your prospective pools. Owners can hire a pool design professional to establish a standard for pool design and be involved in bid comparison. This service is referred to as a design-build criteria package. It establishes the minimum design parameters acceptable to the owner. When implementing design-build criteria, the goal is to make all of the bids comparable NOT establish the final price. Once the bids are all offering the same product, an owner can select a contractor and enter into negotiations. This will allow the contractor to give input on cost saving measures. Keep in mind you typically get what you pay for.

The Design-Bid-Build process is ideal for owners with limited knowledge of pools, or little desire to deal with every design issue. However, all owners should be concerned about health and safety more than the final cost. The design-bid-build process is valuable when building non-typical pools, pools with special features, pools in buildings or on structures or projects where coordination of space and operational requirements are essential.

### ***The Importance of Operators – “A watched pot never boils”***

Pool operators are the cooks that can overcome design flaws or spoil the best pools. By monitoring the condition of the pool continually, operators can address issues before they become problems. Pool operators must to be supported by management to insure they have adequate supplies, equipment, manpower and training. Some duties that are often overlooked include: continuous system monitoring, recording of operational parameters, maintaining equipment and keeping the facility functioning properly. Operators should be trained through local agencies to insure that concepts of chemical use and troubleshooting methods are based



on sound principles. Facilities that have high employee turnover are more prone to developing problems that affect the public health.

The problems that we face with commercial pools spawn from many related issues. Besides ill bathers and overpopulated pools, the processes of planning, permitting, construction, and operation can also contribute to the failure of a pool. Amid all of these obstructions our love for water will remain the same. And remember, the next time you sit in a spa, "Soup, it's what's for dinner".

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Dallas Wall has been employed with **CLOWARD H<sub>2</sub>O** for more than 10 years as a Project Manager specializing in swimming pool treatment and hydraulic systems design. His experience with state government has aided in the interpretation and negotiations with local pool codes all over the country and establishing design standards for the company. Mr. Wall has a background in computer modeling for state and federal agencies analyzing dam failure scenarios and municipal water use projections. His educational background is in water treatment and hydraulics.