

# Chlorine Stability with Clear Comfort

**Commercial Pools** 

### Abstract

Fluctuation of chlorine is a danger to swimmers and a challenge for pool operators. While automation and continuous feed systems help, chlorine management is still a major concern for operator and patron safety alike. It is well known that chlorine in swimming pools will fluctuate greatly depending on equipment, bather load and water chemistry (cyanuric acid, pH, etc). With a Clear Comfort system, free chlorine operating ranges have proven to stabilize significantly, allowing the pool to run in a 60-90% tighter operating range.

## **Dangers of Fluctuating Chlorine in Commercial Pools**

Swimming can be one of the safest and healthiest activities available and an easy way to stay in shape, and at the same time, swimming pools can be potentially hazardous. Acute and longterm hyperexposure to chlorine to swimming patrons has been proven through academic and clinal research to be dangerous to the point of swimmer hospitalization. In 2012 alone, the Centers for Disease Control (CDC) reported up to 5,000 emergency room visits per year due to pool chemical-associated injuries,

most patients being under the age of 18. Frequent attendance to hyper-chlorinated swimming pools by young children is linked to an increase in lung tissue damage, asthma and epithelium permeability increasing the ability for disinfection byproducts and other toxins to enter through the lungs. Experientially, swimming in hyper chlorinated water will lead to dry skin, red eyes, 'swimmers itch' and unpleasant odors.

## Supplemental Oxidation with Clear Comfort

Supplemental oxidation from the Clear Comfort hydroxyl-based system addresses key points set forth in the Model Aquatic Health Code (MAHC) by removing disinfection byproducts and protecting swimmers against chlorine-resistant microorganisms (Cryptosporidium parvum) from pool environments. In addition, the Clear Comfort system has been documented to greatly reduce the instability of chlorine levels during or after high bather loads. Periodic oscillations in pool chlorine level will not only increase chlorine usage, but continually expose patrons and staff to higher than normal chlorine, chloramines and disinfection byproducts in both water and air.



#### **Chlorine Dynamics With Clear Comfort**

#### Case Study



#### **Data Summary**

The Clear Comfort system was installed in February of 2015 at a YMCA in Boulder, CO (80,000 gallon indoor pool, flow rate of 800 GPM, Sodium Hypochlorite fed by a Chemtrol 250 ORP/pH digital controller). Data was collected for 370 consecutive days, four times daily, including 150 days prior to the installation. Each data point in the chart above is an average of four daily readings by lifeguards measured on-site by a Taylor Technologies FAS- DPD titration chlorine test kit. Measurements were taken at identical pool-side locations using standard titration procedures. Pool bather-load is moderate and did not vary significantly throughout the study.

#### The study is broken into three parts:

- Before Clear Comfort: Chlorine maintained inbetween 0.5 and 5.0 mg/L.
- **Phase I:** Chlorine was maintained in-between 0.5 and 3.0 mg/L.
- **Phase II:** ORP set point was lowered to code minimum.

The chlorine concentration before the installation of the Clear Comfort system ranged between 0.5 mg/L to 5 mg/L with a standard deviation of 1.08mg/L. After installation, an immediate 60% decrease in the range of pool chlorine was observed. After day 111, a measured 88% reduction in the fluctuation of chlorine was observed with a standard deviation of 0.13mg/L.

#### The Clear Comfort Solution

Swimming pools of all sizes utilizing Clear Comfort's advanced oxidation technology are able to buffer large organic loading events, such as swim competitions, classes and environmental influxes (pollen, leaves, lotions, urea... etc) with greatly reduced chlorine. By injecting large quantities of highly potent, short lived and broad spectrum hydroxyl radicals derived from ambient oxygen into



pool piping, the Clear Comfort system will efficiently oxidize and remove organic material upstream of the chlorine injection site outside of the pool environment. See diagram for details. Clear Comfort would like extend a special thanks to the staff and volunteers for their participation in this study. For more technical information on Clear Comfort's LifeGuard Technology, please see www.clearcomfort.com/tech.

#### REFERENCES

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