

Chlorine Reduction for Commercial Pools

CLEAR COMFORT

Background

The Jewish Community Center (JCC) in West Orange, New Jersey serves as the local community swimming facility, and is shared by its local school district and community members. With the Clear Comfort system, the JCC MetroWest achieved a **41 percent reduction in the total cost of pool chlorine and carbon dioxide used** in three continuous quarters compared to the same time period one year prior.

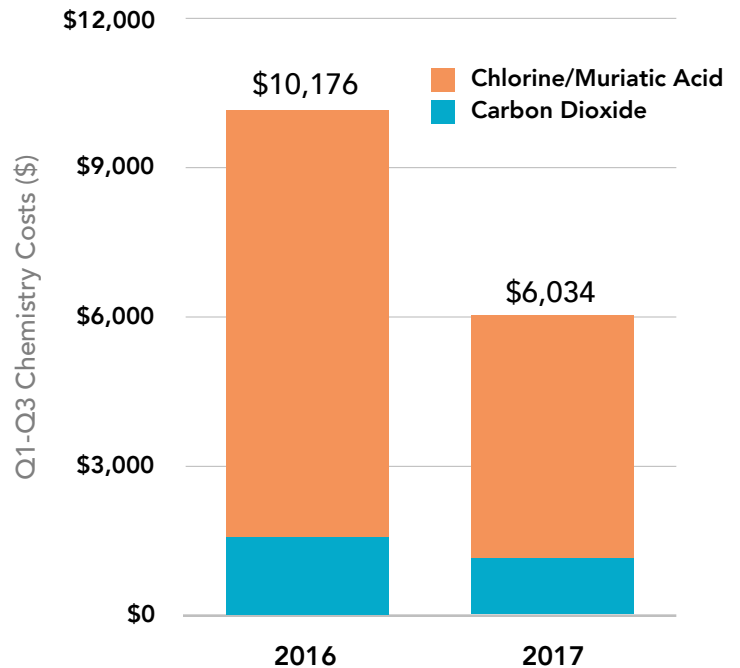
Quick Facts:

- **Pool Volume:** 110,000 Gallons (Indoor)
- **Flow Rate:** 235 GPM
- **Chlorine Type:** Sodium Hypochlorite
- **Chlorine Management:** Acu-Trol ORP/pH Controller
- **Chlorine Concentration:** 1.0 to 1.5 ppm
- **Start Date:** August 15, 2016
- **Chemical Reduction:** 41%

Chlorine Reduction Potential

The JCC MetroWest installed the Clear Comfort system in early August 2016 and measured chlorine usage until April 2017. The chlorine concentration in the pool started at 2.0 to 3.0 ppm and lowered to 1.0 to 1.5 ppm of free chlorine controlled by an Acu-Trol ORP/pH Controller chlorine feeder. Bather load in the pool was not significantly different between the first half of 2016 and the first half of 2017. Compared to the same time period between January to July 2016, the JCC MetroWest saved 57 percent of its chlorine use and 28 percent of its carbon dioxide equaling to a total annual chemical cost reduction (including acid) of \$4,142 in 2017. The following chart summarizes the overall comparison.

Total Chemical Expenses for the JCC MetroWest



Dangers of Unprotected Chlorination

Chlorine is a common sanitizer and oxidizer in public swimming pools to prevent contamination from microorganisms such as bacteria, protozoans and viruses. It is also used as an oxidant to remove contaminants such as saliva, sweat, lotions and other organic material introduced by pool patrons. Although hyper-chlorination of recreational water provides protection from most aquatic microorganisms, there is a growing concern about human exposure to chlorinated disinfection byproducts (DBPs) created from over chlorination in aquatic facilities. DBPs are created when free chlorine interacts with swimmer-induced compounds, such as urine, saliva, sweat and lotions. The frequent presence of young children in hyper-chlorinated swimming pools is linked to an



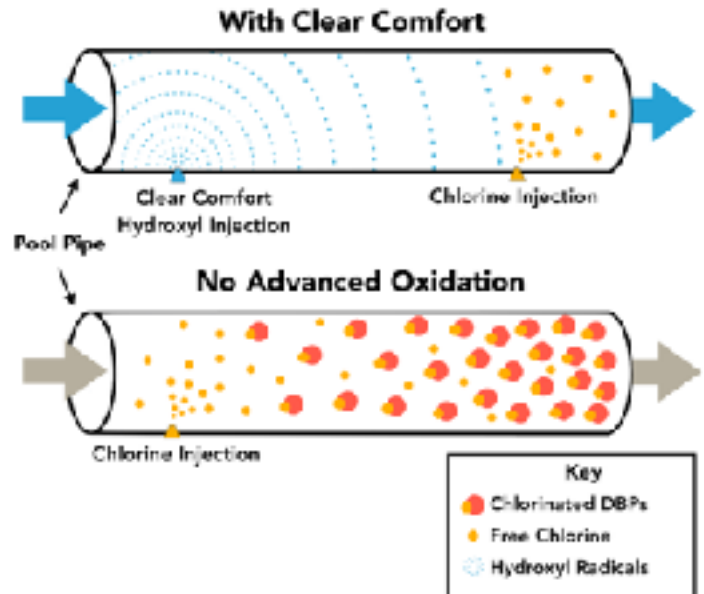
Source: jccmetrowest.org/fitness/facilities/

exposure-dependent increase of lung tissue damage, asthma and epithelium permeability that increases the ability for DBPs and other toxins to enter through the lungs. Current research also concludes that increased concentrations of swimming pool chlorine is linked to exercise-induced bronchoconstriction (EIB) and bladder cancer, which are caused by specific classes of DBPs found in swimming pools. In addition, swimming in hyper-chlorinated water causes dry skin, red eyes and unpleasant odors.

The Clear Comfort Solution

The Clear Comfort system creates and injects large quantities of highly potent, short lived, broad spectrum hydroxyl radicals (derived from ambient oxygen) into pool piping. Hydroxyls efficiently oxidize and remove organic material upstream of the chlorine injection site outside of the pool environment. By lowering pool organic loading via direct hydroxyl oxidation, chlorine is utilized more efficiently because it allows a larger percentage of free chlorine to enter the pool environment. See the following diagram for details. This added oxidation translates to substantial decreases of chlorine consumption in aquatic facilities.

With overall less chlorine use, swimming pools of all sizes that use Clear Comfort's advanced oxidation technology are able to buffer large organic loading events, including swim competitions, classes and



environmental influxes of elements such as pollen and leaves.

Chlorinated DBPs are controlled at the formation stage and are directly removed via hydroxyl oxidation - creating a safer, more economical and enjoyable aquatics facility.

Clear Comfort would like to extend a special thanks to the JCC MetroWest staff and volunteers for their participation in this study. For more information on the Clear Comfort systems, please visit clearcomfort.com.

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