

# HICKORY

Hickory, North Carolina Improves Disinfection Capabilities and Operator Safety with Modern On-Site Hypochlorite Generation

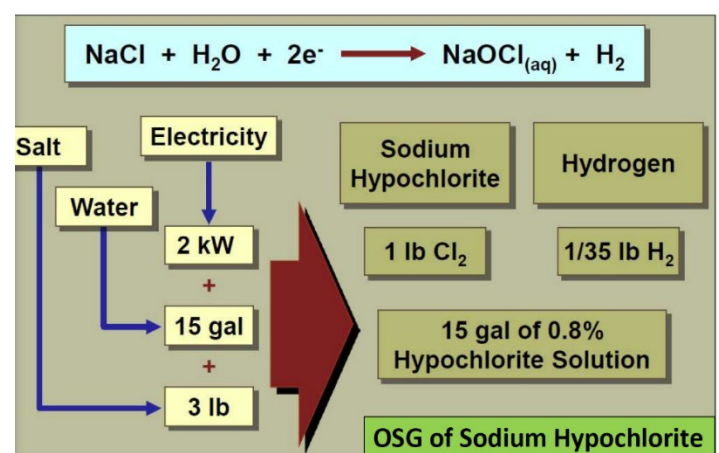


## OVERVIEW

Much has changed over the years in Hickory, North Carolina. Founded in 1863, the City of Hickory was ideally situated to capitalize on the booming furniture and textiles industry in the region. Nestled between major areas including Asheville, Charlotte, Winston-Salem, and Greensboro and located on the site of two intersecting railroads, the town became the main train stop for Catawba County as raw materials exports thrived. Eventually the resourceful residents developed the skills and facilities to produce their own finished goods, no longer an intermediary for the large producers up north, and “Craft City” was born.

Though textile mills and furniture factories have declined, they are still an important part of the local “hand-crafted” economy. In their place, Hickory has cultivated a vibrant food and arts culture, staying true to its history and moniker by converting mills into craft shops, restaurants, distilleries, and breweries as the town has evolved. As the town grew and adapted into modern-day Hickory, Craft City’s water treatment plant (WTP) that supplies water for these industries has done the same. Wes Boyd and his team at the plant oversee the production of an average 13 million gallons of water per day (MGD) to over 100,000 people in three counties and manage another three consecutive purchase water systems. The water treatment process is conventional and features nine basins and 14 filters feeding aluminum sulfate (alum), fluoride, and caustic for pH adjustment. The disinfection process, however, is anything but conventional. True to its pioneering history, the City of Hickory became the first water treatment plant in North Carolina to eliminate the use of hazardous chlorine gas as its disinfectant source in favor of on-site generated sodium hypochlorite. In 2002, the City evaluated its options and selected on-site sodium hypochlorite (bleach) generation (OSHG) over more dangerous chlorine-based systems, including more costly 12.5% concentrated liquid bleach alternatives. The City installed two horizontal cell OSHG skids, each capable of generating approximately 600 pounds-per-day (PPD) of chlorine equivalent. OSHG technology allows users to produce a safer chlorine disinfectant on-demand for a fraction of the cost of bulk delivered hypochlorite. OSHG utilizes an electrolytic process to convert a salt brine solution (table salt – sodium chloride) into a low-concentration sodium hypochlorite solution (0.8% or 8,000 ppm).

This investment allowed the WTP to generate its own disinfectant onsite at a much safer concentration of 0.8%, which is 20% below the hazardous material threshold. This choice also eliminated the need to transport hazardous chlorine gas or bulk bleach through the residential and industrial neighborhoods of Hickory. It made sense economically when compared to purchasing trucked-in, high-strength sodium hypochlorite as bulk bleach prices in the Carolinas can range from \$1.00 to \$1.25 per gallon. Running at 13 MGD, Hickory’s WTP could require over 300,000 gallons (more than 30 tank-truck loads) of bulk bleach per year. OSHG allows Hickory to meet its sodium hypochlorite needs for slightly over one-third the cost of trucked-in bleach while employing a much safer technology for operators and residents.



On-Site Sodium Hypochlorite Generation Process



**Wide angle view of softeners on the left, with one of the 800 PPD Microclor® OSHG units on the right**

As the horizontal cell OSHG equipment aged, it grew increasingly unreliable. Safety and reliability became serious issues. "I was standing beside the system a few times when it decided to crack," Wes Boyd (Superintendent) admitted, referencing the long tubular acrylic housing of the electrolyzers. "We'd have to sit here for hours to get it to run," added Shane Mayfield (Sr. Operator), a member of the operations staff who frequently works with the OSHG equipment. As the system approached end-of-life, Wes and his team faced the decision whether to continue sinking resources into the aging and dated equipment, replace the equipment with a new OSHG system, or switch back to gas or to high-strength bleach. They weighed their options and ultimately decided to maintain OSHG by upgrading to the PSI Water Technologies Microclor® OSHG system after learning about the many advancements in OSHG technology during the years since Hickory's initial purchase. The older, single-pass horizontal electrolyzers that entrained and pressurized hydrogen byproduct are being phased-out in favor of multi-cell loops that are open to the atmosphere, passively venting outside the facility the hydrogen generated by the process. The new smaller, vertically-oriented cells can be fully cleaned and drained in-place, resulting in a smaller installation footprint and only a fraction of the operator's time needed for maintenance cleanings.



**Fitting additional generation capacity in the tight quarters was an engineering feat**

Fitting the new Microclor® OSHG system into the existing sodium hypochlorite room was challenging because the new design included an increase in the overall chlorine generation capacity from 1,200 PPD to 1,600 PPD. Space was at a premium, with the existing system taking up most of the area as the older, horizontal cells required room for routine disassembly and cleaning of the cells. Older rectifier technology also consumed facility space. Complex piping needed to be re-routed to accommodate the new system. Additionally, record drawings of the site were inconsistent. The engineering team at KCI Technologies led by Matt Broderick, PE (Senior Project Manager), utilized advanced 3D modeling during the design phase and in coordination with the general contractor Harper Construction. "The City has been very pleased with the Microclor® installation," Matt Broderick recalled. "The finished product looks great, especially considering how small the space was we had to work with."

Wes and his team are thrilled with the new Microclor® OSHG system. Recently, UGSI personnel joined the local manufacturer's representative, Daparak, on a courtesy visit to the plant. "I'm sure the operators will have something to say," Wes chuckled as he led the way to the chlorine generation room. "They've hardly had to touch it." "It is a night-and-day comparison between the original OSHG system and the new Microclor® OSHG upgrade. We'd have to sit here for hours to get the older system to run," recalls Shane as he highlighted his favorite features of the new Microclor® OSHG system. "It pretty much maintains itself; we hardly have to do any adjustments at all. And the product is *consistent!*"



**Wes Boyd and Shane Mayfield**

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