

ClorTec™

On-site Disinfection Helps Ensure Safety at British Columbia Water Treatment Facility

Constructed in 1997, the District of Chetwynd Water Treatment Plant (British Columbia, Canada) treats nearly 2,500 cubic meters of water per day using gas chlorination as its primary form of drinking water disinfection. With recent concerns about the safety of chlorine gas, including potential eye, skin and respiratory irritation and the risk of death with high exposure, the district elected to switch to hypochlorite generation as its primary means of disinfection.



Al Tricker, chief operator at the facility, recognizing that the 12-15% concentration solution strength of potable grade bulk sodium hypochlorite is considered a hazardous material, recommended the use of an on-site generating system, which produces a hypochlorite solution concentration of 0.8%. The use of on-site sodium hypochlorite generation offers significant advantages over the use of gaseous chlorine for disinfection. The disinfectant is produced and stored in liquid form, so the danger of gas leaks from high pressure chlorine cylinders is not present. As a result, it is not necessary for on-site sodium hypochlorite generating system users to develop and maintain a Risk Management Plan. Utilities using on-site systems do not need to provide HAZMAT training or provide for the availability of self-contained breathing apparatuses.

Generating sodium hypochlorite on-site is a simple process that uses three common consumables: salt, water and electricity. The system operates by feeding softened water into a brine dissolver. The salt dissolves to form a brine solution, which is further diluted to the desired salt solution. The salt solution is then passed through the electrolytic cell(s), which apply a low voltage DC current to the brine to produce the sodium hypochlorite. The sodium hypochlorite is then safely stored in a 3,700 liter, five-day tank, and when it reaches the low-level set point the system automatically restarts to replenish its supply.

The Chetwynd plant operates at an average flow rate of 1.5 million liters per day, with seasonal fluctuations ranging to more than 3.5 million liters per day during the local sawmills' busy season. With a town population of just over 3,000, the plant required a 12 lb/day on-site generating system. In July 2005, Tricker oversaw the installation of a skid-mounted ClorTec™ 12 lb/day on-site generation system.

The ClorTec system in Chetwynd is preceded by two sand filtration beds and an ultraviolet disinfection system. When raw water enters the plant, chemicals are added before the water moves into an upflow filter, through which flocculated particles are transported into the granular media filter bed. The filter bed consists of anthracite on top



of silica sand supported by a layer of gravel. Upon media saturation, a backwash cycle per square inch is activated. To ensure more thorough cleaning of the media during the backwash cycle, raw water is used to flush the media with the assistance of an air scour. The wastewater generated from this backwash cycle is then directed over a backwash trough and run to waste. This backwash process continues until the filter bed is cleaned, at which point water then flows to the top of the filter section and is drawn through the filter media into an underdrain system.

An ultraviolet disinfection process is used to inactivate waterborne pathogens and viruses. UV does not affect the chemistry of the water and does not remove any beneficial minerals from the water. However, UV lacks a residual disinfection effect and the sodium hypochlorite generation system is then depended upon to provide residual protection.

The ClorTec system produces a week-long supply of equivalent chlorine disinfection, which is held in the storage tank, ready for distribution to the community. The District maintains a full stock of all spare parts associated with the on-site generating system in the event the duty system is not operational.

Labor and maintenance for the on-site system has been routine. Typical annual manufacturer recommendations for on-site system maintenance include acid washing of the electrolytic cells, cleaning the salt tanks, cleaning/changing filters, and cleaning the chlorine product tanks. The District of Chetwynd has extremely hard water which leads to an increase of deposit build up on the interior of the electrolytic cell and requires a more frequent cell cleaning schedule. In order to cut down on the amount of chemical used at the plant, Tricker opted to use vinegar to clean the electrolytic cells instead of acid washing. Cells are cleaned approximately every three months.

After more than one year of operation, Tricker proclaimed the on-site sodium hypochlorite generating system to have met and surpassed the District's expectations.

"Safety is a priority for the District," said Tricker, "and transporting bulk chlorine and storing it on-site carried risks for our facility and the community. Generating hypochlorite on-site not only eliminated that risk, but provided the disinfection level we needed at a much lower cost. After system start-up, the most significant cost has been the purchase of three 20 kg. bags of salt per week."

Tricker also points out another benefit of the hypochlorite generating system. "We get fewer customer complaints about the taste or smell of chlorine."

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