



environmental OLYMPICS

By Miles Sherman

Environmental sustainability was a major focus of the 2010 XXI Olympic Winter Games in Vancouver, BC, Canada. Among the 62 Games-related sustainability innovations, the conservation and reuse of water resources featured prominently.

Wastewater treatment and reuse make a difference at the Winter Olympics

A case in point was the International Broadcast Centre (IBC), which for the duration of the Games occupied the entire West Building of the Vancouver Convention Centre (VCC) on the city's waterfront. It not only served as the command center for some 7,000 accredited broadcasters and technicians who produced live television and radio coverage of the Games, it also housed a variety of technical and administrative facilities for the Olympics' own broadcast services unit. The building, with 338,000 sq ft of available space, also housed amenities and support services for the exclusive use of the international broadcast community, including a general store, banking services, food and beverage outlets, help desks and a lost and found.

The West Building is the culmination of a 2004 expansion of the original convention center. Because Vancouver is a popular world destination for major conventions and large gatherings, the building was designed to inspire guests with its design and sustainability features. About 40% of it is built over the water, and it features floor-to-ceiling glass throughout, treating guests to harbor and mountain views. It is the first convention center in the world to have earned U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) Platinum certification, the highest rating.

Some 3.5 billion people worldwide are estimated to have seen Olympic broadcasts from the IBC, but what they did not see were the facility's green technologies: a 6-acre "living" roof featuring 400,000 indigenous plants and four beehives; seawater heating and cooling; a fish habitat built into the foundation; a sophisticated drainage system that reuses rainwater for toilet flushing and landscape irrigation; and onsite water and wastewater treatment to limit the building's impact on the local environment.

Onsite MBR Facility at VCC

The VCC onsite wastewater reuse system is a packaged system incorporating ZeeWeed advanced membrane bioreactor (MBR) technology from GE Water for graywater and blackwater treatment. It combines an activated sludge process with ultrafiltration (UF) membranes, resulting in a compact design that does not require secondary clarification. The membrane system replaces conventional secondary and tertiary treatment steps and produces high-quality effluent.

Wastewater is first directed to an anoxic chamber for denitrification, then to a coated carbon steel aerobic bioreactor where active bacteria living in activated sludge (or mixed liquor) consume or digest the biodegradable matter.

From the aerobic zone, mixed liquor flows to a UF chamber, in which permeate pumps gently pull the wastewater through thousands of UF membrane fibers. Each fiber is filled with billions of microscopic pores that physically block suspended solids, bacteria and viruses from passing through, guaranteeing exceptional water quality and clarity on a continuous basis. The treated water then flows through an activated carbon filter and ultraviolet units for further disinfection.

In the VCC, the MBR system treats all of the wastewater produced in the West Building (excluding kitchen use). It is then recycled for use in flush fixtures and for irrigation of the living roof. What makes the reuse possible is the system's ability to treat wastewater to very high levels of quality, according to all relevant metrics for treated water: biochemical oxygen demand and total suspended solids are less than 5 mg/L; total nitrogen is less than 10 mg/L; and *E. coli* is as low as 2.2 cfu/100 mL.

Overall, the MBR system treats 20,000 gal per day

(gpd) on average—with a 40,000-gpd peak—enabling the building to achieve a 70% reduction in potable water use. Its small footprint (1,200 sq ft) allows it to be tucked away in the northeast corner of the building's lowest floor, next to the exhibit hall, where its reliability and low-odor/low-noise performance is paramount.

Olympics Achieve Sustainability at Whistler

The Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games, or VANOC, was the organizing entity for the XXI Winter Games. Its goal was to not only manage an economical Olympics, but also to ensure that they were environmentally and socially responsible.

GE is uniquely positioned to help the Olympic movement to achieve its long-term environmental goals. As a major sponsor, the company understands the need for sustainable development at Olympic Games host sites and is committed to working with government and private-sector entities responsible for building the massive infrastructure needed to support the world's largest sporting event every two years. For this reason, in addition to the wastewater treatment and reuse system at the IBC, GE provided VANOC with a Gift-in-Kind donation for the Whistler Olympic Park venue, site of the Nordic, biathlon and ski jumping competitions.

The donation consisted of a LEED-certified

Z-MOD MBR wastewater treatment plant and a ZeeWeed UF system for treating drinking water drawn from Madeley Creek, which is adjacent to the site. Previously, there were no existing water or wastewater treatment facilities at the site, a halfway point between Whistler and Squamish.

Built to accommodate both pre- and post-Games attendance, the drinking water system, which can treat up to 900 cu meters per day (m³/day) with 95% recovery, not only provides drinking water for visitors but also provides water for snow-making equipment and for fire protection. The wastewater treatment plant has a peak capacity of 71,280 gpd and a maximum daily flow of 234 m³/day. It discharges effluent to Madeley Creek. The small volume of waste sludge that is generated is pumped out and trucked off site.

The compact and discreet design of the water plants at the base of the Nordic ski jump was one reason the site's overall footprint was able to be reduced by 30% compared to the original design. This feature aligned with VANOC's key goals for the Whistler venue: to minimize its size and the disturbance caused to the local environment, especially to avoid disturbing old-growth forest and wetlands within the core competition venue, and to reduce stream crossings. **WWD**

Miles Sherman is western Canada regional manager, Water and Process Technologies, for GE Power & Water. Sherman can be reached at miles.sherman@ge.com.

For more information, write in 1105 on this issue's Reader Service Card or visit www.wwdmag.com/lm.cfm/091005.



VCC's onsite wastewater treatment system combines an activated sludge process with UF membranes.

The Constant Chlor® Plus Dry Calcium Hypochlorite Feeding Systems for Municipal Applications

water quality by design

Designed to prepare and automatically deliver precise doses of fresh available chlorine, the Constant Chlor® Plus feeding systems are the perfect solution for municipalities. By meeting the toughest regulatory and health standards around the world Arch Chemicals helps ensure the quality of the public water supply.

Dry briquettes with a scale inhibitor provides a less hazardous, easier to handle solution over liquid bleach or chlorine gas

THE RIGHT ANSWER FOR:

- Remote well sites
- Waste water
- Reclaimed Water
- Booster stations / downstream injection
- Surface Water Treatment Plants
- Ground Water Treatment Plants



MM-1S model

MC-2S model



CALL 1-800-478-5727
to find out more about
CONSTANT CHLOR® PLUS
or visit our website at
www.archwaterworks.com/municipal



Automatic. Accurate. Consistent.



Arch Chemicals, Inc.
5660 New Northside Drive NW Ste 1100
Atlanta GA 30328
1-800-478-5727

Write in 764