



Treating Troubled Water

Water treatment system successfully removes radium from drinking water

- By Ron Dollar

The U.S. Environmental Protection Agency (EPA) has long regulated radium in drinking water, but in December 2000 the EPA lowered the maximum allowable levels for radionuclides. As a result, water utilities across the country retested for radium. Those that found radium contamination exceeding new EPA standards faced a three-year deadline to comply—by either removing the radium to improve the quality of the existing water supply or finding alternative water sources.

Upon retesting, the city of Brookfield, Wis., found radium levels exceeded the maximum allowable in two of the city's 22 groundwater wells.

The radium-contaminated wells were located at Brookfield Square, a parcel of land near an upscale shopping mall. The combination of location, space constraints and a short timeline created special challenges for the installation of a water treatment system and the design and construction of a facility to house the system.

Brookfield's objectives for the project were:

- Remove the radium to meet or exceed EPA requirements;
- Install a water treatment system that fit within space constraints;
- Build a facility appropriate for the architectural surroundings; and
- Bring the water treatment system online by the extended compliance deadline of Dec. 8, 2006.

The Solution

Brookfield water utility engineers reviewed the new Z-88 radium-removal process developed by Water Remediation Technology, LLC (WRT), along with a number of other water treatment processes including hydrous manganese oxide, reverse osmosis and ion exchange.

WRT systems are proprietary technologies that remove radium, uranium, barium, nitrates, arsenic, ammonia and other select contaminants from water or wastewater.

The Brookfield analysis showed the radium removal process was able to meet the city's objectives and offer several advantages. The Z-88 radium-removal system is proven to remove radium to levels that meet EPA requirements and to levels typically well below the maximum allowed. Brookfield officials conducted independent tests on the contaminated wells to verify the system's capability.

The WRT system could be installed and operated reliably within the site's constraints. The dual-stage treatment vessel containing the two treatment media compartments is compact, yet the system has a total well-pumping capacity of 1,200 gal per minute—more than adequate for Brookfield's demand.

In addition, no systems are needed for chemical feed, handling or storage, minimizing space requirements so the aesthetics of the site would not be impacted. Because of the efficient design, the system is easy to operate.

"The other water treatment processes were more difficult to operate and resulted in either waste of water or waste streams we did not want to deal with," said Tom Grisa, director of public works for the city of Brookfield.

In fact, the treatment process produces no liquid waste—the removed radium is not deposited on the land or returned to the community in any way. Radium-contaminated water passes through a fluidized bed of mineral-based treatment media, and residuals are disposed of in a facility licensed and permitted for low-level radioactive waste.

The process ensures the local environment will not be adversely affected. In addition, WRT technicians exchange the treatment media as required and dispose of the residuals in a licensed facility. Ownership of the spent media is transferred to the disposal site. As a result, Brookfield would not need to hire additional specialized employees, nor would there be legal implications for the city over the life of the spent media.

Safe disposal is a key focus. The objective is to not only to clean water of contaminants so that it is safe to drink but also to keep the earth clean by using safe disposal methods in a licensed facility.

Following review, Brookfield officials chose the Z-88 radium-removal system. A 20-year contract was negotiated to safely remove radium from drinking water and dispose of residual media.

Compliance Deadline Ahead

After selection of the water treatment technology was completed, the facility needed to be designed and built and the treatment system needed to be installed and tested. One year remained before the compliance deadline.

Short Elliott Hendrickson, Inc. designed the site's building structure—a 650-sq-ft, three-story building with a removable roof—in three months. In early September 2006, ground-breaking was held and T.V. John and Son, Inc. began construction.

Once the building structure was in place, WRT installed the water treatment equipment and startup, and testing of the water treatment system was completed.

Brookfield's new water treatment system received approval from the Wisconsin Department of Natural Resources on Dec. 7, 2006, meeting the EPA compliance deadline with one day to spare.

Since completion, this groundwater well site has produced water that is well below the EPA's maximum allowable radium levels.

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