



## Denver Water Recycling Plant/Power Generation Reuse Project

Commerce City, Colorado, USA

Municipality: Denver Water and Metro Wastewater Reclamation District

Company: Xcel Energy

### Project Fast Facts

**Industry Maximum Flowrate:** 7,000 gpm  
(1,590 m<sup>3</sup>/hr)

**Industry:** Power

**Use:** Cooling Water

**Conveyance:** 1-mile (1.6-km) pipeline

In 1997, the Denver Water Board began planning the design and construction of a new 30 million gallons per day (mgd) water reuse plant to reclaim secondary effluent from the Metro Wastewater Reclamation District's wastewater treatment plant. The new \$78 million facility, which officially went online in 2004, is expandable to an ultimate build-out capacity of 45 mgd. Representing the largest reuse project in Colorado, the reclaimed water is used for industrial and irrigation purposes, including cooling water, ash wash down, and site fire protection at the local Xcel power plant.

When the project was in the early planning and design phases, Colorado had no recycled water regulations, so California Title 22 was adopted as a basis. Colorado ultimately established less-stringent regulations, thus enabling design and construction to continue without significant changes. Leveraging cutting-edge technology, the Denver Water Recycling Plant uses biological aerated filtration (BAF) for ammonia removal in reclaimed water. BAFs are used in conjunction with breakpoint chlorination and ferric phosphate coagulation and settling to meet the zero ammonia and low phosphorus requirements. This unique and innovative approach has captured the interest from technologists around the world.

CH2M HILL worked closely with Denver Water throughout conceptual planning, pilot testing, and final design of all water treatment processes. Pilot testing included in-line filtration, direct filtration, conventional filtration, and membrane filtration on the secondary effluent for process selection and to provide the appropriate design criteria for final design. The \$50,000 pilot study saved over \$3 million in construction costs.

Customers of the recycled water get a price break, which has generated significant interest in recycled water from industrial customers. Since February 2004, Xcel Energy has been using about 960 m<sup>3</sup>/hour to cool its Cherokee Power Plant and has not encountered any operational problems since the introduction of recycled water. Their cooling towers typically run between 4 to 5 cycles of concentration. Other users of the recycled water include Denver parks, the Denver Zoo, playgrounds at Denver Schools, and landscaping at area golf courses. Denver Water estimates recycling for industrial and municipal clients will save enough water to supply 40,000 households, or more than one-fifth of its residential customers. This is the same amount of water held by a small mountain dam and reservoir.



*In 2004, the Denver Water Recycling Plant received the National Grand Prize for design, awarded by the American Academy of Environmental Engineers.*

**Our motive is simple: to promote beneficial wastewater reuse around the world today.  
Join us and help make matches happen. Because no water should be wasted.**

