CASE STUDY: Lake D.O. Supplementation

- Marston Reservoir, Denver, CO -

Breathing New Life into Lakes & Rivers Through Super-Oxygenation

REDUCED ORGANICS,
NUTRIENTS,
IRON & MANGANESE,
HARMFUL ALGAL BLOOMS

ECO OXYGEN TECHNOLOGIES, LLC

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Marston Reservoir Receives Supplemental D.O. to Improve Drinking Water Quality

Denver Water supplies drinking water to over 1 million people using water from multiple locations including Marston Reservoir. The reservoir, constructed over 115 years ago, stores 250 million gallons of water diverted from the South Platte River. The water is piped 12 miles to the reservoir, followed by treatment at the Marston Water Treatment Plant (WTP).

The reservoir's 66 foot depth results in a thin 20 to 30 foot hypolimnion which becomes anoxic (depleted of dissolved oxygen, D.O.) for several months after stratification occurs each summer.

The reservoir has only one low level intake which results in anoxic water being piped to the Marston WTP during the peak summer water usage months. During those months, water quality issues included elevated organics, taste and odors, elevated manganese levels, and algal blooms.

Denver Water takes pride in the high-quality drinking water provided to their customers and began evaluating strategies to improve water quality and reduce nutrient loadings on the WTP. After studies conducted over a period of 15 years, oxygenation using ECO_2's Speece Cone was selected based on performance efficiencies, silent operations, and economic considerations.

Aerial View of Marston Reservoir, Denver, CO
(Photo Credit: Wikimapia.org)

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ECO_2 System Selection

Denver Water, working with Alex Horne Associates and CDM, conducted an analysis of hypolimnetic treatment options that would fit the specific conditions of the Marston Reservoir.

Oxygenation, using the Speece Cone, developed by ECO2, was selected based on the following:

- Produce and maintain high D.O.
- Little effect on temperature gradient in the hypolimnion
- Efficient oxygen transfer, even at the high Denver altitude
- Small footprint, few pipelines
- Silent Operations
- Ability to continue horizontal water flow over the sediments with a low turbulence method.

ECO_2 System before Installation

Results

The ECO_2 SuperOxygenation System is sized for a maximum oxygen feed rate of 2,000 lbs/day, and runs from May, prior to the first turnover, through the fall. The System is attached to a concrete pad, and set on a base of rock and gravel at the reservoir bottom.

The graph below shows the D.O. readings taken at the reservoir bottom. Note the difference between the Summer 2008, prior to oxygenation, and the Summer 2009 with the ECO_2 System in use.