

## Horsetooth water issues may trickle to pocketbooks

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Save for a bout of orange-tinged water in September 1989, dissolved oxygen issues at Horsetooth Reservoir have been largely invisible to Fort Collins water customers.

Continuing dissolved oxygen problems, however, could start to show up on city rate payers' bottom line, treatment managers say.

When the amount of oxygen dissolved in water gets too low, metals such as manganese can be released from nutrients in the lake.

That's what happened in 1989, when enough manganese was released to overrun the city's treatment and turn tap water brownish-orange. While the water was unsightly, the level of manganese wasn't enough to harm humans.

Fort Collins responded with a \$700,000 chlorine dioxide system that has cost the average customer 41 cents to 97 cents a year since 2001.

"That doesn't sound like a lot, but it does add to treatment costs," said Kevin Gertig, manager of the city's raw water treatment plant that draws water from Horsetooth.

The chlorine dioxide system produces byproducts - chlorite and chlorate - that are regulated by the U.S. Environmental Protection Agency.

"I don't think anyone wants to add another (treatment process) if they don't have to," Gertig said.

It's dark and inhospitable where Fort Collins and the Soldier Canyon Filter Plant - which treats water for three other water districts in Fort Collins and Northern Colorado - pull water from Horsetooth Reservoir.

Plants and other organic matter decompose, sucking oxygen from the deep water and prompting the release of manganese and other elements from reservoir sediment.

Colorado water-quality standards govern dissolved oxygen in the top two layers of the reservoir. But the standards don't apply to the bottom layer, called the hypolimnion. As with most other lakes, dissolved oxygen at Horsetooth is consistently lower at that level than at the top two levels.

State regulators say they might revisit the dissolved oxygen issue, in part because it's unclear whether the drinking water standards for the gas should apply to the lowest layer of state reservoirs.

"It's one of those that hasn't really been enforced before," said Phil Hegeman, who coordinates the state's 303d/TMDL program.

Horsetooth was placed on the state's list of dirty waters last week because dissolved oxygen in the upper layers of the reservoir didn't meet standards meant to protect fish and other aquatic life.

If the standard applied to the lowest layer, it would have violated the state drinking-water standard for dissolved oxygen 21 times in the past seven years, according to the U.S. Environmental Protection Agency.

High levels of nutrients, such as phosphorus and nitrogen, fuel algae growth. When algae dies, it sinks to the bottom of the lake and uses oxygen to decompose.

Algae growth also increases what's called total organic carbon, or TOC, which has been on a slow but steady rise in Horsetooth water, Gertig said. The city's treatment plant can't get rid of all the TOC, and what's left mixes with chlorine from the treatment process to create chloroform, a known carcinogen regulated by the EPA.

To date, however, city water has met all federal standards for drinking water.

Gertig declined to say whether there should be a dissolved oxygen standard for the bottom of Horsetooth, adding that the city depended on state and federal regulators to set those standards. But he said continued water-quality monitoring is critical at the reservoir.

"We really need to be scientists who study this with good data sets," Gertig said.