FACT SHEET

Des Moines Water Works
Water You Can Trust for Life

Nitrate Removal Facility

Why does Des Moines Water Works (DMWW) need a Nitrate Removal Facility?
Nitrate concentrations in the Raccoon and Des Moines Rivers, two of our water sources, are Des Moines Water Works' biggest water quality problem. Trending data shows that nitrate concentrations in the rivers has steadily increased in the past 25 years and indicates a continuation of this upward trend.

In 1989 and 1990, DMWW exceeded the Environmental Protection Agency's (EPA) maximum contaminant level (MCL) of 10 milligrams per liter (mg/L) for nitrate in drinking water. Public notices were issued to our customers. The nitrate removal facility was designed in 1989 and built during the winter of 1990-1991. Without the facility DMWW would have violated the MCL in subsequent years.

How much did it cost to build the Nitrate Removal Facility?
DMWW spent $4.1 million to design and build the facility.

Q: What is the size and capacity of the Nitrate Removal Facility?
Each of the eight removal vessels contain 450 cubic feet of ion exchange resin and 232 cubic feet of support gravel. Operating capacity is 10 million gallons of water per day (mgd).

How much does it cost to operate?
To treat 10 mgd, the operating and labor costs for the nitrate removal facility can add up to $10,000 a day. It is becoming increasing difficult for Des Moines Water Works to meet the water demand of our customers without regulation of pollutants in our source water. Record high nitrate concentrations will demand significant future capital investments to remove this pollutant and provide safe drinking water to a growing central Iowa.

How many days a year is the Nitrate Removal Facility in operation?
DMWW has operated the facility from 0 to 100+ days in a year. Recently, in 2015, DMWW has operated the nitrate removal facility a record-breaking 177 days, in order to deliver water to its 500,000 customers below the Safe Drinking Water standard for nitrate. River water nitrate levels continue to increase, as well as the length of high-nitrate episodes. Nitrate levels are also elevated in DMWW's shallow ground water systems.

How is the nitrate removed from the water?
A sodium chloride-coated resin material is in each of the removal vessels. As the nitrate-laden water passes through the resin, the nitrate ions are captured and chloride ions are released into the water in a process known as ion exchange. This ion exchange process is similar to a home water softener that removes calcium and magnesium ions from the water, exchanging them for sodium ions.

What happens to the Nitrate once DMWW removes it from the water?
For more than 25 years, Des Moines Water Works has been issued a permit to discharge the waste from its Nitrate Removal Facility back into the Raccoon River. Recently, Des Moines Water Works worked with regulators at Iowa DNR and staff at Des Moines Metropolitan Wastewater Reclamation Authority (WRA) on a process to divert Nitrate Removal Facility waste from entering the Raccoon River at the Fleur Drive plant, for treatment at the WRA.

Construction and testing for a $2.5 million pump station and pipe for the waste from the Nitrate Removal Facility to the WRA were complete in April 2019. Moving forward, when the Nitrate Removal Facility is in operation, the WRA will receive DMWW's nitrate removal waste where the nitrate will be treated through controlled biological environments within the WRA facility. In addition, a beneficial reuse product called biosolids is produced for land application on agricultural fields in the Des Moines River Watershed (Polk and Jasper Counties).

How can we prevent nitrate from getting into our source water?
The optimal solution is to prevent nitrate concentrations from entering our source water through watershed protection programs and good land management practices.

What are the health effects of nitrate?
In infants under six months of age, nitrate may transform into nitrite in the infant's body, reducing the ability of blood to carry oxygen. This may cause Blue Baby Syndrome, a life-threatening condition requiring immediate medical attention. Symptoms of Blue Baby Syndrome include the infant looking blue and having shortness of breath.

Blue Baby Syndrome is very seldom diagnosed today. But, on the horizon are other health concerns relating to Nitrates. Research supports a strong correlation between nitrates and certain types of cancer in adults. There is also emerging data implicating nitrate as an endocrine disruptor, meaning nitrate may act as a hormone in the body.

For more information, please contact your health care provider.

Why are babies under six months of age at risk?
The intestinal pH is higher in infants, enhancing the bacterial conversion of nitrate to nitrite. Infants require three times the fluid intake of adults, increasing the blood circulation and the nitrate absorption. The infant's immature kidneys reduce the excretion of the nitrate. The presence of the enzyme responsible for preventing Blue Baby Syndrome is lower than in adults and children over six months of age.

What is DMWW doing to help reduce or eliminate the nitrate problem?
DMWW is committed to providing safe drinking water by building coalitions, implementing cost effective technology and landscapes that will protect our water sources. DMWW has implemented environmentally friendly methods to remove nitrate from drinking water sources. Currently, these efforts are focused on a concept called off-river storage. River water is diverted into a reservoir where the tranquil water is conducive to the life-processes of microorganisms that can remove nitrate from the water. No chemicals and very little energy is used to remove nitrate in this manner, and no waste is discharged back to the river.

DMWW is committed to finding solutions to reduce nitrate in source waters used for drinking water. While the steps DMWW is taking to reduce nitrate in drinking water sources are worthy, they are minimal in the overall battle to reduce Iowa's nitrate concentrations impacting the Mississippi River and ultimately the Gulf of Mexico.