WATER TREATMENT PROCESS

Water Treatment is a vital step to ensuring a safe high quality product is delivered to Des Moines Water Works' customers. Des Moines Water Works has three treatment plants: Fleur Drive Treatment Plant, L.D. McMullen Treatment Plant at Maffitt Reservoir and Saylorville Water Treatment Plant.

The Fleur Drive plant has the capacity to pump 100 million gallons per day (MGD). The treatment plant at Maffitt Reservoir can pump 25 MGD. DMWW's newest treatment plant at Saylorville pumps 10 millon MGD and can be expanded in the future to pump 20 MGD.

The treatment plants at Fleur Drive and L.D. McMullen purify water in a similar fashion. A pretreatment step is completed at the Fleur Drive plant in which powdered carbon is used with the river water to reduce dissolved organic matter. This organic matter results from the natural decay of leaves and vegetation in addition to agricultural and municipal wastewater discharges. The L.D. McMullen Water Treatment Facility does not need this pretreatment step because shallow groundwater and Maffitt Lake have no sediment to remove

Lime softening is next on the agenda in the treatment process for both plants. Through lime softening, hardness, germs, and bacteria are removed. The water is then filtered through sand and gravel to remove all particles. When nitrate levels are unusually high at the Fleur plant, a fraction of water receives nitrate removal through an ion exchange process and is blended with the rest of the post-filtered water to stay safely below the health standard. The water at Maffitt does not require nitrate removal since the shallow groundwater source contains reduced levels of nitrate compared with the rivers. The Maffitt plant water can be easily blended with nitrate-free water from Maffitt Reservoir to remain below the health standard. The final step in the process is the addition of fluoride to help prevent dental cavities and chlorine to disinfect the water.

The Saylorville Water Treatment Plant uses technology different than the two other water treatment plants. Water is pumped from collector wells to a pre-treatment step to oxidize and remove iron and manganese. After pre-treatment, the water is passed through ultra filtration (UF). The ultra filtration removes any non dissolved particles larger than 0.01 micrometers (this includes virus, bacteria, and giardia). Next the water is sent through reverse osmosis (RO) filtration. RO filtration will remove particles as small as 0.001 microns (this includes hardness and nitrate ions). The final step in the process is the addition of fluoride to help prevent dental cavities, chlorine to disinfect the water, and sodium hydroxide to adjust the pH.

When the treatment process is completed at all three treatment plants, the water enters a storage tank and is eventually pumped into the distribution network. All treatment plants have a sufficient number of pumps to provide a reliable supply of water at all times and emergency power supplies to maintain plant and pumping operation when

electricity is interrupted. The distribution system consists of more than 1,360 miles of pipe, 8,900 fire hydrants, 9,700 valves, 10 water storage tanks and 10 booster pumping stations.

Throughout the treatment process, DMWW's laboratory staff performs 50 to 100 tests each day to ensure the highest quality water is produced. An additional series of 30 daily tests on the untreated water sources allows the laboratory staff to identify any necessary changes needed in the treatment process before the water enters the plant. The laboratory also carries out a progressive research program and performs several research projects and studies throughout the year.

The L.D. McMullen and Saylorville Water Treatment Plants' main water source is shallow groundwater collected from wells along the river. This utilizes the earth's natural filtering process through course sand and gravel which delivers water free from river sediment. The 1.3 billion gallon Maffitt Reservoir serves as an emergency supply for the the McMullen plant. The Fleur Drive plant has the flexibility to draw water from either the Raccoon River or the Des Moines River in addition to the infiltration gallery. Des Moines Water Works' plant operators, along with laboratory staff, select the river source that has the highest quality water. The gallery collects water from the same shallow groundwater as the L.D. McMullen plant. In an emergency situation, the Fleur plant can draw up to 6 billion gallons of water from the Saylorville Reservoir.