NORTH TEXAS MUNICIPAL WATER DISTRICT

The Journey of Water

FROM LAKE TO TAP: UNDERSTANDING THE WATER TREATMENT PROCESS

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North Texas Municipal Water District

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It takes a lot of work to deliver clean, safe drinking water to your homes and businesses every day. Most people take for granted that when they turn on the shower, flush the toilet, wash their clothes, or water their yard there will always be water.

Do you know what it takes to make that happen? Follow along through this journey of water and learn what it takes to bring clean, safe, reliable water service to your tap every day.

Primary Raw Water Sources

You may not have known that Texas only has one natural lake and the rest are man-made storage reservoirs to control flooding and collect surface water. Many of these "lakes" are operated in partnership with the US Army Corps of Engineers (USACE). We obtain the majority of our water from the following sources:

- **Lavon Lake**: Provides 1/3 of our water supply; Located along East Fork of Trinity River: Operated by USACE; NTMWD's first water source
- **Lake Texoma**: Provides up to 1/3 of our water supply; Located on Texas/Oklahoma border; Operated by USACE
- **Jim Chapman Lake (Cooper Lake)**: Located on South Sulpher River; Operated by USACE
- **Lake Tawakoni**: Located on Sabine River; Operated by Sabine River Authority
- **East Fork Water Reuse Project**: Wetlands water reuse project in Seagoville located on lower East Fork of the Trinity River

Pump Stations

It takes a lot of power and pipes to move millions of gallons of water every day from the lakes to our water treatment facilities:

- 14 pump stations system-wide
- 4 pump stations for Lavon Lake with 18 powerful 1500 HP engines
- Each pump capable of moving 35 to 85 million gallons per day

Rapid Mixing & Sedimentation

Once the lake water is pumped into the plant, it is rapidly mixed with ferric sulfate before it flows into sedimentation basins where the sediment and the majority of solid particles are removed by coagulation and flocculation.

- **Coagulation**: ferric sulfate attaches to the suspended solids (floating particles); particles begin to clump together.
- **Flocculation**: coagulated particles continue clumping together and sink to the bottom as sediment.

As the suspended solids settle to the bottom, the clarified water flows along the top of the basin and over weirs to the next step in the treatment process. The sediment and settled particles are pumped to storage lagoons. Once these lagoons are filled, the dried sediment is hauled off to be used as an iron-rich soil enhancer for farms.

Primary Disinfection - Ozone

The clarified water goes through a two-step disinfection process to prevent the spread of infectious diseases and ensure the water is safe to drink. Our four plants in Wylie combined make up the largest fully-ozonated water treatment facility in the world – capable of treating up to 770 million gallons per day. Ozone disinfection is:

- The fastest working and most powerful water disinfection process - 100 times more powerful than chlorine.
- The preferred standard for meeting federal regulations and reducing chlorine byproducts.
- The primary method for improving taste and odor issues.
- An intricately complex process where liquid oxygen is converted to a gas and then electrically charged to convert some of the gas into ozone before it is injected into the water, zapping bacteria and viruses.
- A costly investment - $130 million to convert our Wylie facilities to meet chlorine disinfection byproduct regulations.
- An energy load costing $2 million annually in electrical power.

More About Ozone

- Liquid oxygen is delivered on-site by delivery trucks.
- Liquid oxygen is converted into a gas and piped into a generator to receive an electrical charge; 10 to 12% of the oxygen gas is converted to ozone.
- The oxygen and ozone stream is piped to the ozone contact basin where it joins with water following a serpentine path to get adequate contact time for disinfection.
- Operators take samples every 4 hours to confirm adequate disinfection levels.

Secondary Disinfection - Chlorine/Chloramines

In Texas, all public water systems are required to maintain a disinfection residual throughout the distribution system within regulatory limits.

Chlorine and Chloramine (Chlorine + Ammonia) are used for secondary disinfection to maintain water quality and protect public health.

- One of the most common methods for disinfecting water and eliminating harmful bacteria.
- By adding ammonia to chlorine, NTMWD is better able to extend the life of the disinfectant residual to the furthest reaches of the distribution system.

Filtration

The last step in the process is to run the treated water through rapid gravity dual-media filters (anthracite over sand) to remove any remaining particles that may still be suspended in the water. The water passes through these filters at a controlled rate and remaining particles are captured in the filters and removed from the water.

- Last step of the treatment process.
- Water flows by gravity through anthracite (carbon) and sand filters to further remove any remaining particles.
- We are in the process of constructing improvements necessary to convert to Biologically Active Filtration which will remove even more organic matter from the water.

Distribution

The final treated water is delivered to our Member Cities and Customers to be distributed to their end users - residents and businesses.

- Treated water sent through hundreds of miles of pipelines to city and customer storage tanks.
- Cities/Customers take over delivering water through their distribution systems to consumers.
- Staff monitors levels of city tanks to ensure they are filled to correct levels to meet customer demands.

Operations

Our operations staff work hard every day to ensure reliable water delivery to all of our Member Cities and Customers:

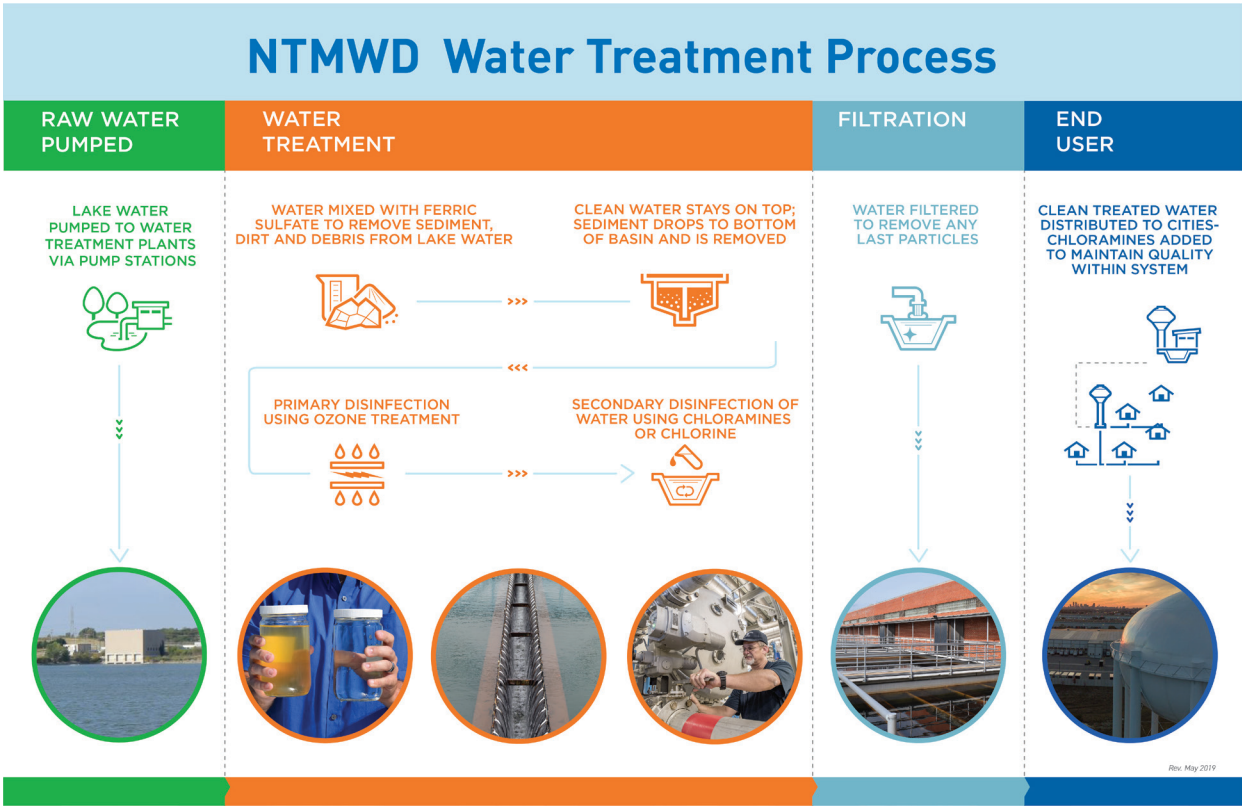
- Control room staffed with operators 24-7-365 to monitor activity of all four plants from one centralized location.
- Operators use SCADA computer systems to operate pumps, adjust valves, monitor pressure, and modify the treatment process.
- Electrical substation on-site provides point of entry for electrical power for the Wylie facilities.
- Staff works to lock in low power rates and pump during off-peak hours, when possible.

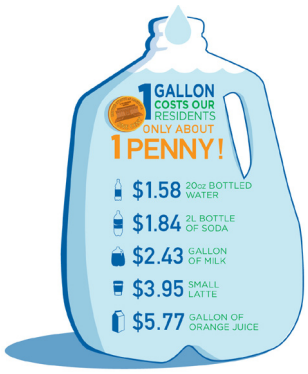
Environmental Services Lab – Water Quality

Environmental Services, treatment plants, and customer cities collect over 250,000 samples each year to be analyzed at the NTMWD Environmental Laboratory.

- The laboratory has been accredited since 2008 through the National Environmental Laboratory Accreditation Program (NELAP).
- Tests sample for bacteria, suspended solids, metals, nutrients, alkalinity, hardness, and much more.
- Helps with process control to ensure accurate numbers for optimizing treatment.
- Lab services helps cities by eliminating overhead costs of maintaining and operating their own laboratories.
- Ensures water is safe and meets all regulatory requirements.
- Monthly water quality reports available online at NTMWD.com.

NTMWD Water Treatment Process





**Estimated costs paid by consumers covering NTMWD and city rates. Actual rates vary by city.*

Water Rates Pay for #MoreThanWater

- Water is the one utility service no one can live without.
- NTMWD makes no profits and collects no property or sales taxes.
- Revenues collected from communities we serve allow us to fund the projects and programs required to ensure safe and reliable water.
- Aging infrastructure, changing regulatory requirements, and booming populations all contribute to rising water costs.
- Investments are vital for public health, safety and economic vitality of our fast-growing region.