

Water Treatment

Storage

Raw Water from Lakes Arrowhead and Kickapoo are pumped into the City limits and stored at a Secondary Reservoir. The Secondary Reservoir retains 75 Million gallons of water within the City limits. At the Secondary Reservoir the water is blended from the two lakes to make treatment more uniform and a small amount of presedimentation takes place. This is the feed water source for all the conventional treatment plants. Raw water from Lake Kemp (Lake Diversion) is pumped via an irrigation ditch to a reservoir northwest of Wichita Falls. This water is the feed source for the Micro-Filtration/Reverse Osmosis plant.

[The Texas American Water Works Association \(Texas AWWA\) video](#) explains how watersheds can effect our water storage systems.

Treatment with Chlorine Dioxide

The Raw Water is treated with Chlorine Dioxide in the transmission lines as it is taken to the plants. Chlorine dioxide is added to begin disinfection. It is one of the most powerful disinfectants available to eliminate waterborne pathogens. Chlorine Dioxide is also effective at removing Taste and Odors that may be present in the water.

Facilities

The water from the Secondary Reservoir is received at two Treatment Facilities.

- Jasper - The Jasper Water Treatment Facility was originally constructed in 1941 and expanded in 1951 and once again in 2005. The combined treatment of the 51 and -05 Plants is 25.8 Million Gallons of Water per Day (MGD).
- Cypress - The Cypress Water Treatment Facility was originally constructed in 1961 and expanded in 1987. The Micro-Filtration/Reverse Osmosis plant (MF/RO) plant was added in

2001. The combined treatment of the 61, 87 and 2010 Plants is 42 Million Gallons of Water per Day. The MF/RO plant increases the daily treatment to 54 MGD.

Pre-disinfection

Once the water reaches the plants, the first process that begins is the Disinfection process. This is the most important process in drinking water treatment. This process removes pathogens that could potentially cause disease. The City of Wichita Falls utilizes Chloramines as its primary disinfectant for the conventional plant. Chloramines are formed by the reaction of Chlorine and Ammonia.

Coagulation

Ferric Sulfate and Polymer is added to the water to begin the removal of particles, known as Turbidity. These two chemicals attract the Turbidity and begin to form larger particles that are removed later in the treatment process.

Softening

The City of Wichita Falls does Soften its drinking water. Carbonate Hardness is removed by the addition of Lime to the process stream.

Flocculation

This is a mechanical process where the water is gently stirred to cause the particles formed in the coagulation process to come into contact with one another and form even larger particles, making them heavy. These heavier particles are known as 'floc' particles.

Sedimentation

Sedimentation is a physical process where the water passes into a quiescent area of the process. Because there is no stirring action, the heavy floc particles settle out of the water by gravity.

Re-stabilization

The Lime Softening process is terminated by the addition of Carbon Dioxide. This chemical adjusts the pH down to a level that Softening process stops.

Fluoridation

The City of Wichita Falls Fluoridates its drinking water. This is not a required component of water treatment, but the City believes that it is necessary to help prevent dental cavities in the City's children's teeth.

Terminal Disinfection

Due to the disinfecting action of the chloramines, some of the disinfectant is lost. Therefore, the disinfectant level has to be raised before it can be discharged to the public. At this point in the process, additional Chlorine is added to the water.

Filtration

The water is now passed through sand filters to remove any remaining particles that were too light to have settled out in the sedimentation process. The filters also remove pathogenic protozoans, such as Cryptosporidium and Giardia, that are resistant to the disinfection process.

Micro-Filtration

Lake Kemp source water utilizes a different treatment technology all together. The water flows into a clarifier similar to the conventional plants, where it is subjected to a coagulant then the water flows into the Micro-filtration cell where a pump sucks the water through a fiber filled module. The pores in the fiber are so small that most of the impurities are too large to pass through. The water is collected and pumped into a holding tank that supplies the Reverse Osmosis plant.

Reverse Osmosis

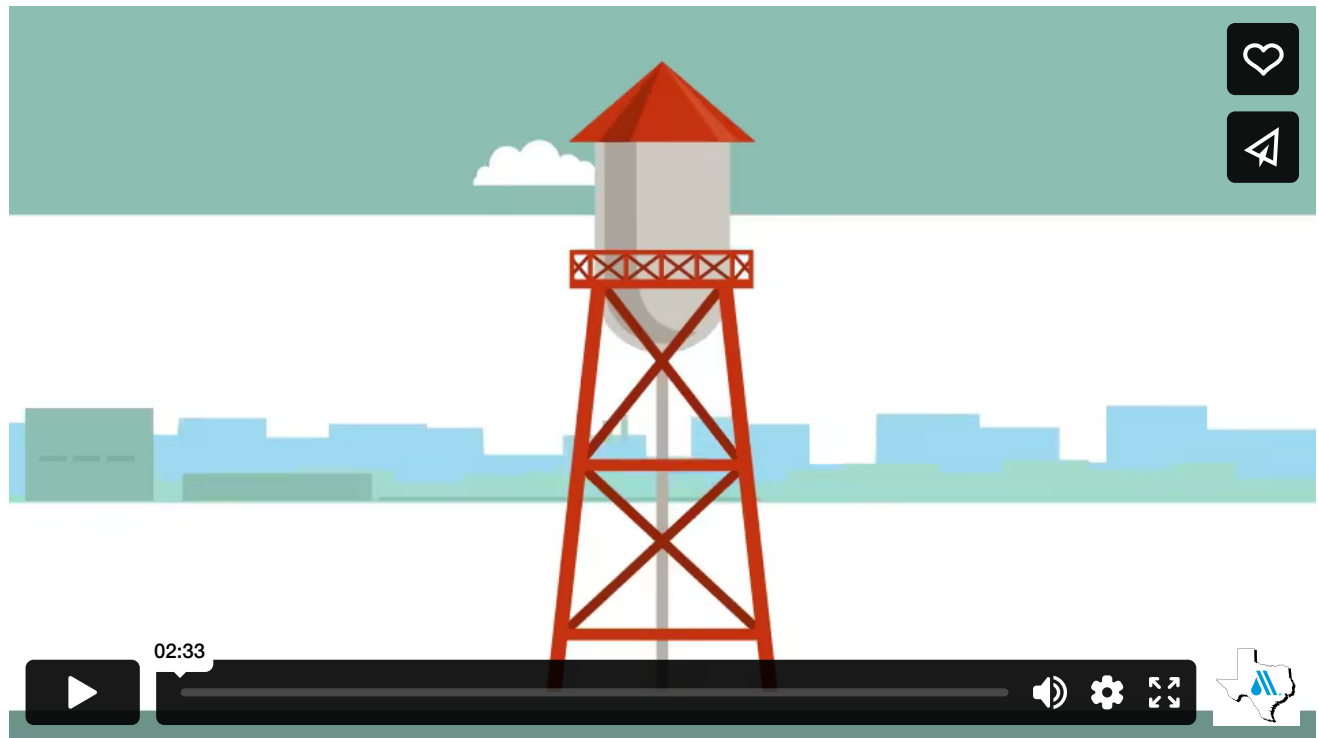
Due to the slightly brackish (salty) condition of the Lake Kemp water a Reverse Osmosis membrane plant is utilized to reduce the salts and other contaminants. This is the same technology that large deep sea ships use to treat sea water for human consumption. The process only allows the water molecule to pass through a 0.0001 micron semi-permeable membrane by water pressure, thus leaving most of the salts and other contaminants to be flushed away.

Blending

At this point the MF/RO water has been cleaned to the point that it needs to be blended with conventionally treated water. This gives it some flavor and character.

Storage

The final stage to the treatment process is storage of the water before it is pumped to the public. The storage is for many reasons. Most importantly, it is for additional contact time with the Chloramine disinfectant.



WATER TOWERS from Texas AWWA on Vimeo.

Waste Disposal

During the treatment process the material that is removed from the water forms a waste product commonly referred to as sludge. This sludge is removed from the Sedimentation Basins and the Filters and is collected into holding lagoons. After a period of 24 months the lagoon is taken out of service and all of the sludge removed. The sludge is transported to the City landfill and MF/RO wastes are neutralized and returned to the river.