

City Water Supply

The public water supply for the City of Chadron comes from three sources; surface water (Chadron Creek), infiltration water, and 5 wells located 18 miles outside of town. The stream flows about 9 miles south of the city and is fed from springs and surface runoff. The City of Chadron's water rights are as follows; Chadron Creek 1.00 sf, North Dam 4.50 sf, South Dam 143 sf. Contamination and or pollution in this stream assumed to be rather high because the entire water shed is inhabited not only with cattle, but with farms, and all sorts of wildlife. In addition, the stream flows through Chadron State Park which is a high-use recreation area.

Two earthen reservoirs, having a total capacity of about 100 million gallons store water during the fall and winter months when water consumption is low in town. These reservoirs are filled by diverting water from Chadron Creek. A properly designed, reinforced concrete diversion dam has been constructed to divert water and control the depth of water in the reservoirs. A concrete pipe 15 inches in diameter and approximately 1 mile long conveys the water from the reservoirs toward the city. The pipe is laid with open joints and acts as an infiltration gallery, collecting water from several springs and also collecting the seepage from the dam. It is estimated that approximately 30 percent of the total water used is collected in this pipe. An iron pipe 14 inches in diameter and approximately 4 miles long conveys water from the concrete pipe to the city. The latter pipe discharges into the treatment plant. Valves are placed at various points of the pipe line to regulate the flow to the plant.

With the exception of the water from the city's wells, the water travels through the conventionally designed treatment plant. This plant has a capacity of 4.5 million gallons a day. Upon entering the plant, the water is then discharged into a rapid-mix basin, mechanically agitated, and combined with chlorine gas and polymer. The detention period in this tank is 2.5 minutes based upon a 3 million gallon flow, before the water discharges into a flocculator for one hour. This is followed by sedimentation in two rectangular tanks, operated in series, each being equipped with properly designed inlet and overflow weirs to provide proper settling. These tanks have a combined capacity of 525,000 gallons. From these tanks the water is led into a small flocculator where additional chemicals may be

added. This flocculator has a retention period of about 9 minutes. This is followed by a 45 minute settling period in a rectangular tank from where the water is led on to the filters.

Filtration is accomplished by means of two Anthracite Filters, each 350 square feet in area. These filters are equipped with cast iron under-drains, 24 inches of Anthracite and 6 inches of filter sand. Proper operation of filters is insured by the installation of the necessary control devices, such as rate of flow controls, head loss, and operating valves all tied into a SCADA System which will call the Police Department Dispatch upon one of several alarms. A Clear well connects to a covered surface reservoir of 900,000 gallon capacity and is injected with Chlorine gas. From the reservoir water is supplied to the main distribution system to the City.

A 1,000,000 gallon steel reservoir located southeast of the college is filled by pumping water from the clear well at the plant through a 12" water line. This reservoir is connected to the City's water mains with a 12" line at Cedar St. and Parry Drive.

Two Gas Feed Chlorinators are installed and arranged to add chlorine to any part of the purification process. Residual chlorine tests are made daily to insure that the minimum of .20 part-per-million are maintained in the far end of the system.

The 5 wells are not sent through the treatment plant because the quality of the water is very good. The wells pump into the well field storage tank which is 100,000 gallons, from here the water is pumped to the hilltop storage tank via one of two transfer pumps. We have a 2000 gallons per minute and a 4000 gallons per minute transfer pump that are utilized at different times of the year. The 250,000 gallon hilltop tank holds the water until a control valve senses that the clear well at the treatment plant is low enough and opens to let the water gravity flow to town. This water by passes the water plant and heads straight into the 1,000,000 gallon storage tank located just north of the water plant. We also have a 12, 000 gallon storage tank that stores the water for Hidden Valley which is also pumped out of the clear well.