by Pat McCool, KRWA consultant

Osage City: years ahead in meeting DBPR requirements

While many cities and rural water districts are struggling to meet the Maximum Contaminant Levels (MCLs) for disinfection byproducts, Osage City addressed this matter several years ago. The city's water treatment plant consistently produces water that meets the MCLs for these byproducts by comfortable margins. This achievement was not by chance, but had resulted from a plan developed by the city to address the matter in a timely manner. More details on this to come after an interesting background of the Osage City's water treatment plant.

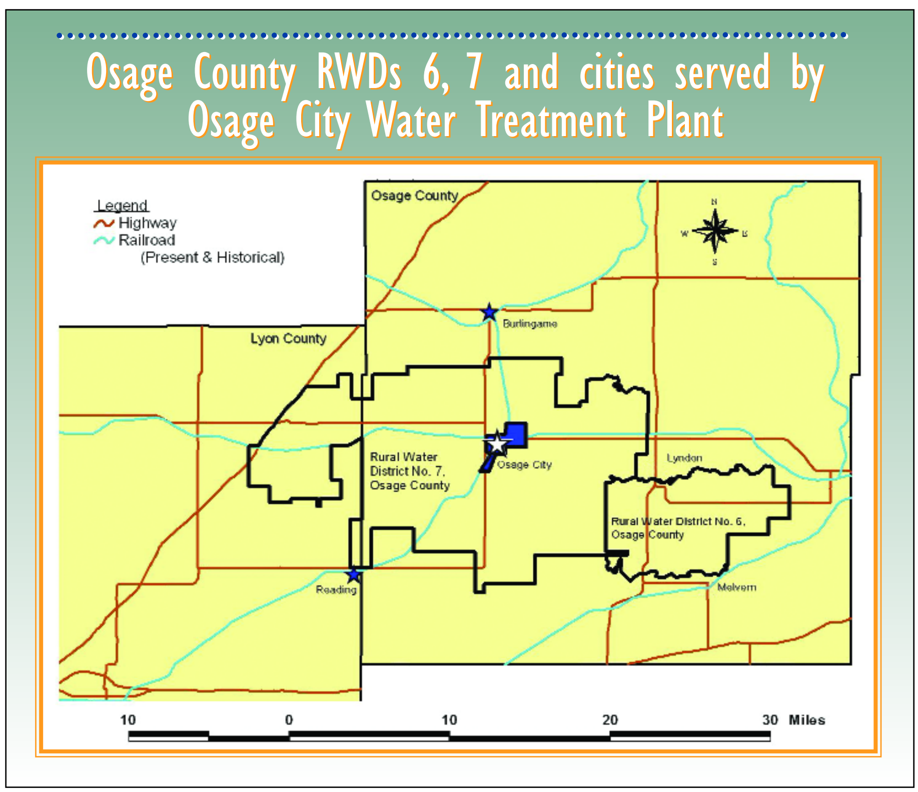
The water supply source is Melvern Reservoir and includes approximately nine miles of 12-inch raw water transmission water line. This source began operation in 1975 after many decades of using the City Lake that still can be used as an emergency water source.

The city's plant is a conventional, 1,170 GPM surface water treatment plant. The processes include dual rapid mix; three, solids contact basins in parallel; a chlorine contact basin; four rapid-sand, dual media, gravity filters; and a clearwell with high service pumps. All these processes were constructed in 1987 with two of the solids contact basins being constructed in 1975 and 2004.

Besides serving approximately 3,100 city residents, the plant produces drinking water for Osage RWD 7, the city of Reading, Osage RWD 6 and the city of Burlingame. Sales to these water suppliers are approximately 50% of the plant production. There also have been discussions on the possibility of selling water to the city of Harveyville within the next two years. The plant's annual water production has increased from an average of 120 MGY in the late 1990's to a total of 203 MGY in 2004, mainly due to the addition of Burlingame as a purchaser.

Osage City employees from the left: Ken Kaniper, superintendent, Keith Smulling, Mike Gilliland, utility director, Kurt Cox and Rick Miller

The water, gas, and sewer superintendent and staff have responsibility for the operations, maintenance, and emergencies of the water treatment plant, water lines, wastewater lagoon, sewer lines, wastewater pumping stations and natural gas distribution system. Mike Gilliland is director of utilities and



he oversees these operations as well as the electrical distribution and power generation systems. The staff includes Superintendent Ken Kaniper and four operators who are each cross-trained in all areas of work. Four of these six operators have Class IV water supply certificates and two have Class II water supply certificates. This is quite an accomplishment for which the city should be proud.

In 1999, Mike and Ken reviewed the Stage 1 Disinfectants and Disinfection Byproduct Rule (D/DBPR) (see sidebar) and evaluated data from the Osage City's plant and other similar plants. They concluded that a change in the location of where free chlorine was added would significantly reduce the free chlorine contact time and result in lower levels of disinfection byproducts in the water. They implemented the change and began sampling monthly for THMs and HAAs from February 2000 until March 2002 to assess the change. The results were very good. Since this change was made the plant has produced water that has THMs in the range of 30 - 40 ug/l and HAAs in the range of 20 - 30 ug/l.

However, the new chlorine addition location resulted in the algae growth in the solids contact basins during summer months. At first operators tried to carry a low chlorine residual in the basins. That was not successful. The algae growth resulted in many hours spent cleaning the basins. The city decided to add covers to the basins to prohibit sunlight on the water and, thus, eliminate the algae growth. Also, the city added another basin to increase settling of turbidity in the water before filtration. These improvements were completed in 2004.

The operator tests in the plant laboratory include the amperiometric titrations for chlorine residuals in addition to

Cover on the north solids contact basin. Note entrance on right and square covers to access/ventilation openings in lower portion of cover

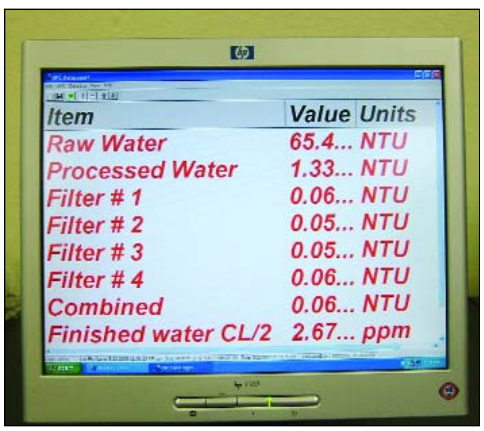
Free chlorine contact basin which provides for primary disinfection and THM/HAA control. You can also see in the upper left the metal cover to the east solids contact basin.

the automatic, continuous measurements; fluoride measurements; turbidity calibrations; settling tests on the solids mixture in the solids contact basins center columns; and jar testing of polymers.

Presently, the city staff is pursuing additional improvements to the plant operations. Their philosophy concerning plant operations is "Good is Good, but Better is Better." They have recently installed a proportional, automatic polymer feeder that increases/decreases polymer dosages in proportion to the raw water influent turbidity levels. After rains, influent turbidity can easily increase in a matter of an hour or two from 25 NTU to 400-600 NTU. This feeder will increase dosages in these situations until an operator can be called to the plant to check dosages/operations.

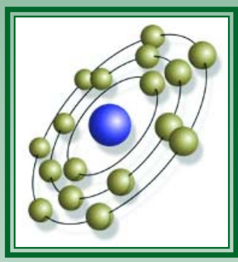
Also, the staff is in the process of installing a continuous, free chlorine analyzer and recorder of the chlorine contact basin water. This installation will also have the capability of calling the operators when the free chlorine levels are above or below operator-determined levels. This will provide added assurance that adequate disinfection occurs and that water without adequate chlorine does not reach the clearwell.

The mayor and city council have supported staff recommendations in the past. The city continues to look for cost-effective improvements. The staff continues to look for ways to improve plant operations and to meet upcoming regulations. The staff knows that both raw water turbidity and regulations will change, and emergencies will arise. But their goal is to "stay ahead of the curve" and keep the emergencies to a minimum.



Above left: *A listing of alarms that alert operators of predetermined operating conditions.*
Above right: *Daily settling test on solids contact basin mix chamber.*
Left: *Computer screen summarizing turbidity and chlorine levels. The staff plans to add readouts of free chlorine residual at the chlorine contact basin.*

EPA D/DBPR Announcement Revisited



EPA announced the Stage 1 Disinfectants and Disinfection Byproduct Rule (D/DBPR) in December 1998. This rule required all water systems that use a chemical disinfectant to meet an annual running average based on the Maximum Contaminant Levels (MCLs) of 80 ug/l total trihalomethanes (TPHMs) and 60 ug/l haloacetic acids (HAAs). Systems serving more than 10,000 persons were to meet these requirements by January 2003, and those systems serving fewer than 10,000 persons were to meet these requirements by January 2004. Many of the smaller systems have not yet met these requirements. Most surface water systems in Kansas use free chlorine as a primary, chemical disinfectant. Free chlorine reacts with natural organics in the water to form these byproducts, that is, TTHMs and HAAs. Most of the systems that meet the MCL requirements do so by limiting the free chlorine contact time by adding ammonia. Ammonia essentially stops the formation of these byproducts by reacting with the free chlorine to form combined chlorine that does not form these byproducts.