by Pat McCool

Franklin Co. RWD 6 upgrades contact basin

Franklin Co. RWD 6 constructed a new water treatment plant in 2000. The new plant had a chlorine contact basin where chlorine was added to the influent and ammonia was added to the effluent. At the plant's operational flow rate of 550 GPM, the detention time of the basin was approximately 85 minutes.

This long detention time resulted in high concentrations of disinfection byproducts (DBPs) being formed by the free chlorine reacting with natural organics in the water. Disinfection byproducts are regulated under the Stage 1 Disinfection Byproducts Rule. Franklin RWD 6's near new plant was out of compliance with the required maximum contaminant level (MCL) of 80 ug/l (parts per billion) for trihalomethanes (THMs). Also, considerable costs and time were being incurred for the required quarterly public notices of the violations.

The District's engineer, Bartlett and West Engineers, designed a divider/overflow wall where a new chlorination point was added. The District's board authorized the construction and Carrothers Construction, Inc. of Paola, Kan., installed the divider/chlorination wall in April 2006.

The chlorine contact basin is located below the pump room of the plant. A 76-inch by 11½-inch hole had to be cut in the 10¼-inch concrete floor of the pump room to install the divider/overflow wall in the chlorine contact basin.

The divider/overflow wall was constructed of ¼-inch stainless steel with reinforcing angle iron and tubing on the downstream side of the wall. This wall was more than 6-foot wide and 10-foot high. The wall has a 2-foot wide, adjustable overflow weir that provides the overflow at the west end of the wall where the chlorine is to be added from a submerged diffuser.

Two workers from Carrothers Construction, RWD 6 manager, Bill Kern, and district operator, Rick Titus, installed the wall.

During installation, it was determined that the floor and basin walls were not straight and square so changes in the sealing were needed. Difficulties in sealing, especially at the bottom, caused delays in the project completion.

A ½-inch thick by 2-inch wide rubber material along with Waterplug had to be used to successfully seal the wall to the existing basin walls and floor.

The plant was out of compliance with the required maximum contaminant level (MCL) of 80 ug/l for trihalomethanes (THMs).

The divider/overflow wall weighs approximately 1,800 pounds. It is bolted to angle iron that is bolted to basin walls on each side and basin floor. A ¼-inch thick rubber material to prevent leakage around and under the wall was to be used as a seal between the wall and angle iron and between the

The divider/overflow wall constructed of 1/4-inch stainless steel plate and stainless angle waits on a cart before installation. Because of the 1,800 pound weight, temporary wheels were welded to the downside corners of the wall construction, carrying some of the weight.

Waterplug by Thoro Consumer Products is a cement-based, quick-setting, hydraulic cement that is used to seal water leaks under pressure where normal mortar will be washed away or will not bound.

The location of the divider/overflow wall in the chlorine contact basin and the change of the chlorination point from the basin influent to the wall will result in approximately 30 minutes of free chlorine contact time before ammonia addition. This will result in significantly lower levels of DBPs and will bring the plant into compliance with required MCLs for THMs.

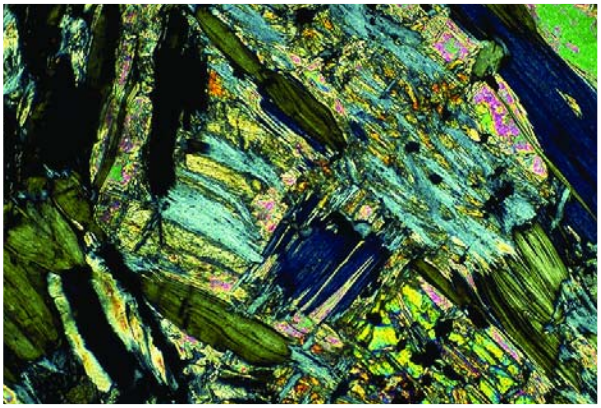
The delays resulted in the basin having to be pumped out eight times for sealing changes. The capacity of the basin is 48,500 gal. Final sealing of the overflow divider/chlorination wall was completed in late May.

The total cost of the wall and installation was around $25,000.

Left: *Wall, hole for wall, and basin access hole in background.* ***Above:*** *Wall being lowered into hole.* ***Right:*** *Chlorine solution injection line at wall overflow.*

The June sampling for THMs showed the results of significantly lowering the total trihalomethane levels as compared to what the levels would have been with the longer free chlorine contact time.

What's the concern over DBPs?



A magnified view of chlorite crystals, one of the contaminants with set limits for systems.

While protecting against microbial contamination is the top priority, water systems must also control disinfection byproducts (DBPs). DBPs are chemical compounds formed unintentionally when free chlorine and other disinfectants react in water. In the early 1970s, EPA scientists first determined that drinking water chlorination could form a group of byproducts known as trihalomethanes (THMs), including chloroform. US EPA first regulated THMs in 1979 at 100 ppb, or ug/L, for systems serving 10,000 or more persons. The Agency revised this rule when it issued the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) in December of 1998. The Stage 1 DBPR was the first phase in a rulemaking strategy required by Congress as part of the 1996 Amendments to the Safe Drinking Water Act. The Stage 1 DBPR set the maximum contaminant level for THMs at 80 ppb and for the first time set a maximum contaminant level for five haloacetic acids (HAAs) at 60 ppb. Requirements for bromate and chlorite were set for systems using ozone and chlorine dioxide, respectively, for treatment. These standards had to be met by the end of 2002 for systems serving more than 10,000 persons and by the end of 2004 for systems serving fewer than 10,000.

There were approximately 36 water treatment plants in Kansas that were out of compliance at the end of 2005 with THMs or HAAs or both. There were additional plants that had levels near but not greater than one or both the MCLs. Most of these systems are considering or are going to use some form of limiting the free chlorine contact time in addition to possibly other treatment changes or improvements.