

Topeka Air Industrial Park shows innovation in tank renovation

The Metropolitan Topeka Airport Authority (MTAA) has management offices in the Topeka Air Industrial Park adjacent to Forbes Airport. MTAA administrators there have been dealing with an overdue maintenance and renovation of the water system's elevated storage tanks. The history and business makeup of the MTAA facility has presented some unique challenges for the renovation process.

History of the MTAA

It dates to World War II when Topeka Army Air Field was built hurriedly, eight months after Pearl Harbor as a bomber training/delivery center for heavy bombers including B-29 Superfortresses and crews heading for the Pacific. After WW II the USAF Strategic

Air Command reopened the facility, renamed it Forbes Air Force Base after Major Dan Forbes, a Topeka pilot killed in a 1948 training flight. The base then saw duty as a reconnaissance base, a strategic bomber base, a fighter base, and

later as the administrative center for an Atlas intercontinental ballistic missile base. Forbes was finally closed in 1973 with ownership transferred to the city government of Topeka in April of 1976. The MTAA was created in 1974 to oversee the transition and legislation followed in 1978 that designated the MTAA to be an autonomous agency working under state statutes with taxing authority.

Business makeup of MTAA

Addressing a common misconception about the facility, MTAA President Eric Johnson explained, "In my 10 months on the job, I've had several people ask, 'How in the world do you run a municipal airport in the middle of an Air Force Base?' The strong memory of Forbes Air Force Base and having the Kansas Air Guard flying the KC-135 tankers every day gives that false impression of the facility. The reality is that the Kansas Air Guard is a very important MTAA tenant and they pay rent for the use of the two main runways at Forbes Airport.

"We have more than 100 business customers in the 450-acre Topeka Air Industrial Park and sell water through a master meter to

customers across Highway 75 to the west in the Forbes Air Industrial Park. We provide water, fire protection and police protection with a fully equipped bomb squad, including robots. The Authority's water utility system provides service to customers that run the gamut from heavy industrial to residential. We really act like a small municipality and our water system is a very important component of our customer service."

Water supply operations need attention

In the Fall of 2007, KRWA Consultant Pat McCool evaluated the MTAA water system's loss of chlorine residual due to the large volume of water storage. (see "Summer challenge of chlorine



Dan Knupp
Communications



MTAA Water System Operator Charles Cordero at left, and MTAA President Eric Johnson give a map tour of Forbes Airport and the 450-acre Topeka Air Industrial Park. Over 100 tenants lease buildings and space in the facility including the Kansas Air National Guard and the Kansas Department of Health and Environment Laboratory.

residuals" by Pat McCool, *The Kansas Lifeline*, July 2008) He noted several possible solutions in his report to MTAA: "A 'top fill/bottom draw' method with combined chlorine being added at the top would be better; a floating,



recirculation pump with the method of adding combined chlorine at the top of the water storage also has merit. In this case, the rate of circulation in gallons per minute is important. In either case, reducing the amount of water stored (say, 0.35 MG) will make each method more effective. The operations of the tank (water levels, rechlorination levels, recirculation rates) are all important to the success of maintaining chlorine residuals in such a large tank."

Many MTAA customers including the Air National Guard and Forbes Airport store high volumes of aviation fuel, other petroleum products and flammable chemicals. As a result, the International Standardization Organization (ISO) determinations for fire insurance ratings dictate that system water storage volumes are adequate to fight a large fuel or

structure fire on the MTAA premises. Keeping the .75 MG storage unit only partially filled is not an option. Normally, daily water use is only 35,000 gallons which prevents turnover of water in the large tank. Both system storage tanks were in need of maintenance and renovation – which was another contributing factor in the chlorination loss. The .75 MG tank had not seen comprehensive maintenance since it was constructed in 1987.

The MTAA board decided to tackle the loss of chlorination problem initially with a total renovation of both tanks that included interior sandblasting, new interior epoxy paint, exterior high pressure wash, and new exterior paint. It was also decided to install the Solar Bee, high volume, floating recirculation system units in the tanks. A maintenance contract was signed, guaranteeing annual tank inspections, annual maintenance if needed and future renovation when tank conditions dictate that it is needed again.

"Our water system and storage tanks are extremely important to us. When I became administrator, Water Systems Operator Charles Cordero explained the problems and possible fixes. We let bids to get both tanks renovated and that's now being done," Johnson noted. "We've used cathodic protection in the past to minimize corrosion but with this tank renovation, we're also putting in recirculation systems that reduce thermal stratification. They are solar powered and will run all the time, reducing power usage and will help keep the chlorine levels right."

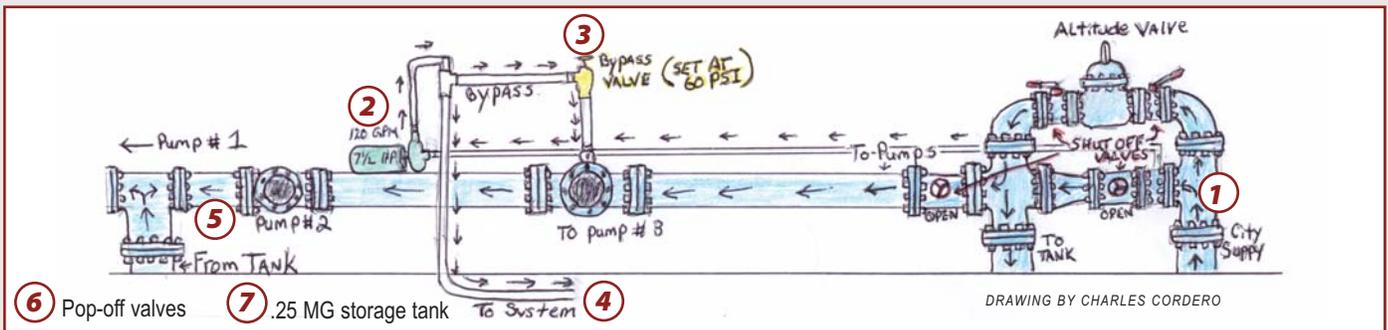
"We didn't want to do the rechlorination injection system at this time because of the regulation, additional expense, additional work with implementation and daily testing that would come with that," Water System Operator Charles Cordero explained. "We elected to go with the recirculating pumps instead. It is a simple system that constantly churns so the water does not get stale. We've been reassured by the



Above: Michael Jacobberger, owner of J & D Painting and a subcontractor for Utility Service Co., Inc., power washes 21 years of weathered scum from the storage tank's original paint. MTAA has a maintenance contract with Utility Service Company of Liberty, Mo.

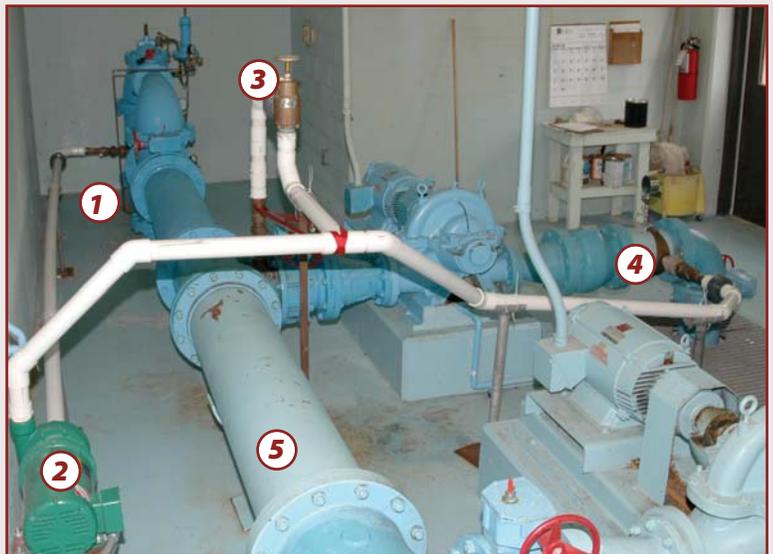
Above left: The .75 MG storage tank was added in 1987, replacing a WW II era concrete water tower. The same year the facility's original cast iron water system was replaced with C-900 PVC with ductile iron pipe placed under the roadways.

Keeping the pressure on isn't always easy – but it can be!



When describing the temporary plumbing loop utilized to keep the MTAA water system pressurized during tank renovation, Charles Cordero used his drawing above to help follow the process. It's used again here with the photos to help with the explanation.

- 1.** Topeka water from the .25 MG storage tank enters through the 10-inch line and is accessed by plumbing through an 1.5-inch hole, cut with a hole saw in the ductile iron fitting. The loop system has three access holes at points 1, 3 and 4.
- 2.** The 7-HP, 120 GPM, 3-phase pump pulls water from the storage tank on the supply side and pumps water at 60 psi to the system side through another 1.5-inch access, pressurizing the system. This is seen in the illustration and photo at point 4.
- 3.** The 60 lb. psi is determined by the mechanical setting on this by-pass valve. When the pressure in the system exceeds 60 lbs. psi, the by-pass valve opens and routs the extra water back into 10-inch piping return to the storage tank, lowering system pressure. Normal operating pressure when the large storage tank is in use is 55 lbs. This loop system allows for a little more operating pressure.
- 4.** The temporary pressure loop holds system pressure steady at 60 lbs. psi.
- 5.** In case of a fire, the system utilizes three pumps in the pump house, the smallest rated at 480 GPM. Activating one of the pumps would instantly blow out system lines. To counter this, six pop-off valves are utilized throughout the system, affixed to system fire hydrants. A pop-off valve can be seen in hydrant photo 6.
- 6.** The pop-off valves, which are pre-set at 65 psi, assure any instant increase in pressure caused by the activation of a large pump will not cause any damage to the system. Also, if a very large fire increased water volume needs, additional drawdown from fire department pumping would allow the other two system pumps to join the first, and still not damage the system.



- 7.** The .25 MG ground level storage tank is located next to the pump house. It is manually topped off daily when the pressure loop is in use. This is accomplished by opening and closing the feeder valve outside at the back of the building. The tank volume can sustain the loop system for three days with normal operating water usage. The MTAA system draws Topeka water from the tank rather than directly from the feeder line. This ensures the city feeder line will be safe from water hammer when the large pumps might be turned on.

manufacturer that the recirculation GPM will be adequate for our needs. Without the recirculation system, the tank's top water stays there, heated by the sun on the outside of the tank. The water gradually loses chlorine and the minute the fresh water hits, it zaps the chlorine right away when demand is highest and then, before you know it, you have no chlorine throughout the system. The recirculation units will be installed by the end of September after the weather has cooled, so we won't know how they perform until next summer. We'll reevaluate the system at that time and go from there."

Keeping the system under pressure during tank rehab

When a water system is faced with long term loss of pressure due to elevated storage tank maintenance, options for continued operation are few. System operators having the newer but expensive variable speed pumps

have it made. They can easily run the pump at the speed to keep demand pressure on the system side at the optimal level. A second option is to rent a mobile pressurized storage tank that actually takes the place of the elevated storage tank.

Neither option was workable

For the MTAA water system, neither of these systems would fit into a budget that was already stretched to pay for the tank maintenance and renovation.

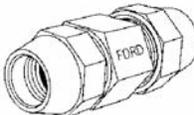
"The bids for a pressurized tank ran over \$11,000 for 30 days and \$250 per day after that. We would have needed it for 60 days at least." Cordero stated. "My assistant operator Rod Niehaus and I put our heads together and came up with another solution. We designed a looping pressurization rig that includes a 7.5 HP, 120 GPM pump, a by-pass valve and PVC plumbing and hardware for a total cost of \$2,000. We installed it the first of July and it's worked

like a charm ever since." (See the sidebar on the previous page on how the temporary pressure loop system works.)

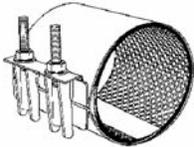
The pressure loop system can be left in place for use during yearly maintenance inspections that will cause temporary tank outages for the system.

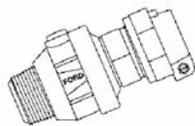
The temporary set-up also utilizes six, two-inch pop-off valves that are also described in the sidebar. They are installed on fire hydrants spaced throughout the MTAA water system. These were borrowed from Topeka City Water Department and Utility Service Company.

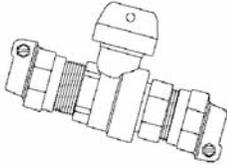
"Anyone planning on doing a tower renovation should definitely want to look into using a pump setup like this," Cordero said. "It can stay in place and be ready for the next tower outage, planned for or not!"



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