By Charlie Schwindamann, Wastewater Tech

How to Reduce Total Phosphorus in Wastewater Utilities

These pumps add the alum to reduce the total phosphorus to meet limits of 0.5 mg/L in a Kansas wastewater system.

In the past several months KRWA has been contacted by wastewater treatment operators for assistance in meeting reduced effluent phosphorus (TP) as part of their permit requirements. Depending on the receiving stream from the treatment plant, most such utilities will see a limit of 1.5 mg/L for TP in their permit. Some will be lower; I have seen one at 0.5 mg/L. Most wastewater stabilization ponds (lagoons) will see monitoring for TP and total nitrogen (TN). Depending on the receiving stream and flow from the lagoons, some lagoons may notice actual limits.

Some systems with lower influent TP may see a reduction by shortening the aeration cycle to allow stripping of oxygen from the nutrients in order to meet TP and other nutrient limits. Others using the same method, may reduce the TP enough that the amount of chemical needed to meet the TP limits is less and thereby, cost effective.

I visited two systems in the past few weeks that use chemical precipitation to meet permit limits. One originally used the chemical to reduce hydrogen sulfide in the lift station. The system had originally used ferric chloride but switched due its corrosiveness. The system now uses ferric sulfate; operators have noticed a reduction in effluent TP. At this time the system does not have TP limits, but the community is required to monitor for it. The system has at times met the proposed limit of 1.5 mg/L with the use of ferric sulfate as well as when using ferric chloride.

The above system is an Aero-Mod type treatment plant with average flow of 350,000 gpd and a design flow of 1.3 MGD. They use from 18 to 22 gallons of ferric sulfate per day, using a chemical feed pump to add the chemical. The cost is approximately $1 per gallon and is purchased in bulk (2,000 to 4,000 gallons at a time). The annual cost is between $5,500 and $8,000. That cost does not reflect the initial cost of the chemical storage tanks, piping installation and feed pumps. This system adds the chemical into the manhole just upstream of the lift station to achieve good mixing of the ferric sulfate and the wastewater. This system has influent TP between 6 and 9 mg/L and effluent TP of 1.4 to 1.9 mg/L.

The other system operates two wastewater treatment plants; both utilize alum as the coagulant for removal of phosphorous. One is a new 0.5 MGD Schreiber Plant, with an average flow of 0.150 MGD; the plant went online in 2014. They add alum prior to the clarifier and also a small amount to the digester decant. This plant uses approximately 15 gallons per day at a cost $3.50 per gallon for an average annual cost of $20,000. In August 2014, that system also began adding alum to the aeration basin. Data generated since this change indicates the plant should be able to meet the 0.5 mg/L TP limit set by their permit. This limit is

The 2015 KRWA conference, March 24 – 26 in Wichita offers nine pre-conference sessions on Tuesday, 3/24 and 48 concurrent sessions on Wednesday and Thursday, 3/24 and 3/25. Check the program for the following sessions that provide credit for wastewater operators and that should be of interest to owners as well. Also, find scores of exhibits in EXPO targeted towards wastewater utility operations and maintenance.

Tuesday, 3/24, Pre-conference wastewater credit session:

- Chlorination: Operation, Maintenance and Safety
- Waste Stabilization Ponds, Operational Theory and Troubleshooting

Wednesday, 3/25 wastewater credit sessions:

- Water and Wastewater Emergency Preparedness
- Implementation of the Globally Harmonized System
- Nutrient Removal and Monitoring
- How Mobile Can Improve Your Processes
- Operation and Maintenance of Lift Stations
- Operation and Maintenance of Variable Frequency Drives
- Addressing Regulatory, Pumping and H2S Odors
- Chlorine Safety: Important Information You Need to Know
- CIPP 101 for Gravity and Pressure Pipe Applications
- Safety in the Workplace – From Audits to Operations
- The Adverse Effects of I & I on Wastewater Systems
- New Features of ITIC/IMAP and Other Smart Phone Features

Thursday, 3/26 Sessions:

- Wastewater Operator Refresher Course
- Chemical Feed Pumps – Staying with the Flow
- Using GIS and Digital Mapping Technologies
- The Revolution in Utility Office Technologies
- Hydro-Excavation: Safety Matters

significantly lower than most other plants. Presumable this is because the effluent flows into a lake used as a source for drinking water and for recreation.

That system's other treatment plant is an older style with a Lakeside oxidation ditch and final clarifier. They also use alum at this plant for reducing phosphorous. The average flow is 0.1 MGD. The permit for this facility limits total phosphorous in the plant effluent to 4.17 pounds/day, based on a 12-month rolling average. The permit notes that this limit of 4.17 pounds/day is actually the sum of phosphorous discharges from this facility plus the new 0.5 MGD Schreiber plant. This plant uses only 1.7 gallons of alum per day; it is added to the clarifier influent.

Systems that want to chemically remove phosphorous may want to experiment with adding a coagulant at different

These chemical feed pumps are used to inject ferric sulfate to reduce total phosphorus.

locations to determine which location gives the best results, and by using the least amount of chemical. Usual application points include the aeration basin influent (or headworks), the clarifier influent and/or the digester decant. Operators may actually find a combination of application points provides the best phosphorous removal. Periodic testing should confirm which approach provides the best results.

I also wanted to remind operators of systems serving communities that have metal fabricating businesses that some of those may use phosphoric acid to clean metal prior to painting. Phosphoric acid can add a significant amount of phosphorus to the plant influent, making overall phosphorous removal very difficult. If a community wastewater system receives such discharges, I recommend that a utility representative contact the businesses to determine if phosphoric acid is being used and if any alternative metal cleaning processes can be used instead.

Wastewater utility operators should review their system's sewer use ordinance and make needed corrections to disallow discharges of wastewater containing high levels of phosphorus, nitrogen and ammonia. The sewer use ordinance may need to be revised to place appropriate limits on such pollutants so they are within an acceptable range for treatment.

Charlie Schwindamann has been Wastewater Tech at KRWA since September 1999. Charlie holds Class II Water and Class I Wastewater Operator certification. He is a member of the Marysville, KS City Council.

In Memoriam

Carl Carroll, Former Manager/Operator and KRWA Director Passes Away

Carl James Carroll, age 88, of Independence, Kansas passed away unexpectedly on Saturday, December 27, 2014 at his daughter's home in Missouri City, Texas. Carl served on the KRWA board of directors from 1988 to 2006.

Carl was born March 9, 1926 in Independence where he attended Independence schools. In 1944 at age 17, he enlisted in the U.S. Navy during his senior year in high school, receiving his diploma while serving his country. He was an aviation machinist mate who repaired and maintained aircraft during WWII. Upon returning from WWII, he operated a body and fender shop, worked at Independence Coca Cola Bottling, Universal Atlas Cement Plant, and painted houses in his grandfather's painting business. He was also co-owner of D & W Welding & Machine Shop for 29 years. He worked as a welder, machinist, metal fabricator and staff supervisor. He sold his half of the business and retired in 1991.

The Kansas Rural Water Association awarded its 2005 Conger Award to Carl Carroll. Carl retired from the KRWA board of directors at the conclusion of the 2006 conference, ending 18 years of board service, serving from 1988 to 2006.

Carl became a director of the Montgomery Rural Water District 2 board in 1974, later serving as board chair. In the early 80s he was appointed as RWD 2 representative to the planning committee to help create Public Wholesale Water Supply District (PWWSD) No. 4, the first of its kind in the state, which started production in 1985. Carroll served as director on the PWWSD board and later served as chairman, completing 22 years with the district. Carl also served as manager/operator of Montgomery RWD 2 for ten years.

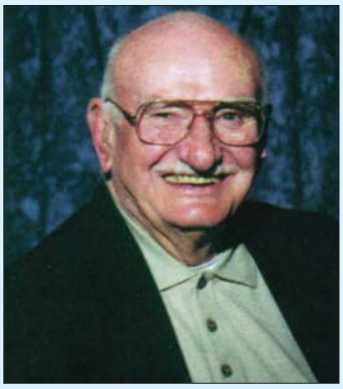
Carl was also active in the First Baptist Church of Independence as a Sunday school teacher, ordained deacon and chairman of deacons, and many other involvements in the church. Carl is survived by Lila, his wife of 65 years, daughter Susan Carroll Barnett of Missouri City, Texas, and a son, Jim Carroll of Independence, four grandchildren and three great-grandchildren.

Funeral services were on Monday, January 5, at the First Baptist Church of Independence with burial in Mt. Hope Cemetery at Independence.

Carl Carroll
1926 – 2014

Carl nearly always ended any visit with anyone with his short saying, "Glad you got to see me." He summed up his years with KRWA in 2006 with this comment: "It has been a very rewarding experience to serve as a small part of such a giving organization with such great goals of helping people. KRWA's efforts in providing education and assistance for utilities to better serve customers as well as to serve as a resource for legislators, state and federal agencies is indeed a worthy cause."

Alvin B. Hermsen, Famed Trainer in Cross Connection Control and Backflow Prevention, Passes



Alvin B. Hermsen
1928 – 2014

Alvin B. "Al" Hermsen, 86, of Topeka, passed away Wednesday, November 12, 2014. Al Hermsen was known across Kansas and the U.S. for his years of dedicated service in providing assistance and training to hundreds of public water supply systems and industries concerning backflow prevention and cross connection control.

Al was born January 31, 1928, in David City, Nebraska. He attended David City High School until he enlisted in the U.S. Navy, serving in the South Pacific during WW II. He would later graduate from high school. He began employment with the U.S. Postal Service in Fort Collins, CO, retiring in 1976. After retirement, he graduated from Crowder College, a trade school in Neosho, Missouri, where he received certification in Backflow Prevention and Cross-Connection Control. He would go on become very well recognized throughout the United States for his expertise in that field. He worked as mechanical sanitary inspector for the city of Topeka, retiring after ten years of service. He was later self-employed in the field of Adult Education, retiring in 2000. He worked extensively with the Kansas Rural Water Association. From April 1990 to November 1998, Al provided 397 days of training on cross connection control; that training was attended by 7,002 people.

Al was a member of the Disabled American Veterans and American Legion. He contracted polio while serving in the U. S. Navy but in spite of his physical handicap, Al Hermsen continued with a robust schedule of work.

Al married Betty L. "Lisa" Hoagland on November 25, 1958 in Miami, OK. She survives. Other survivors include five daughters, Cheryl "Chae" (Joe) Williams, Sheridan, WY, Vicki (Sonny) Smith, Ridgecrest, CA, Jan Hermsen, Waldorf, MD, Jo Thornton, Kooskia, ID, and Rebecca Hermsen, Topeka; and a sister, Evelyn Ducoff, Madera, CA.

A funeral service with military honors was held on Monday, November 17, 2014 at the Mt. Hope Chapel, 4700 SW 17th St., Topeka. Entombment followed at the Mt. Hope Mausoleum, Topeka.

Al Hermsen was often introduced at KRWA training sessions as being an "evangelist" on the topic. Few people could match his presentation style that made each training session an event that attendees appreciated. His knowledge and first hand experience relating to the plumbing and waterworks industries made his presentations legitimate. As Al often said, "In cross connection control, when everything works, nothing happens." KRWA recognized his work in 1998 with its "Friend of Rural Water" Award, and in 1999 with its highest award, "The Conger Award."