

City of Atchison addressing combined sewer overflows

Recently, KRWA assisted the city staff in Atchison, population 10,232, with smoke testing a portion of the city's sewer system. Our goal was to determine the extent of downspouts and storm sewer catch basins flowing into the city's sewer system which is a combined sewer system. I found this to be very interesting. I have not dealt with such a massive project before and I thought readers might appreciate learning of it.

Although not as common in Kansas, combined sewer systems were the norm in many older cities. In a combined sewer system, the sewage discharge from homes or business is collected by the same sewage system that also collects storm-

water runoff from streets and rooftops. Partially separated channels carry the sanitary sewage and the storm-water runoff. The arrangement allows the sanitary sewer system to provide backup capacity for the runoff sewer. The

design is vulnerable to sanitary sewer overflow during periods of high rainfall. During periods of excessive rainfall, relief structures designed into the system allow water to exit the system and flow into a nearby body of water through a relief sewer. Such discharges go untreated. During normal weather, all sewage flows to the treatment facility to be properly treated. During rain

events the combined flow can be in excess of what the treatment facility can treat. So, either storage spaces to hold all the flow

due to either a blockage or other event. The city does not however need to notify the public during a rain event. Signs are posted near

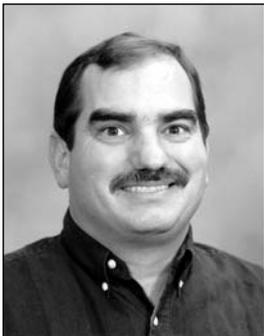
Signs are posted near the outfall structures to provide notice that the area could be contaminated and that access is restricted.

or outfalls were built into the design.

The topic of this article is how the Atchison city government is anticipating modifications to the city's sewage system to eliminate eight combined sewer overflows (CSOs) that were constructed into the system. The photos accompanying this article show one of the discharge structures.

the outfall structures to provide notice that the area could be contaminated and that access is restricted.

Atchison's wastewater treatment facility is designed for 2.8 million gallons per day (MGD) dry weather and 8.4 MGD peak wet weather from the combined sewer system. The original collection system was



*Charlie Schwindamann
Wastewater Tech*



PHOTOS COURTESY OF ATCHISON UTILITIES DIRECTOR MIKE MATHEWS

This 14th Street sign is typical for all eight CSO locations. The signs are necessary because of the dangers of combined sewer overflows during wet weather puts people at risk of exposure to a number of human bacteria or viruses that can cause illness and disease.

Atchison, as part of its present permit, is required to notify the public by newspaper and radio when a dry weather bypass occurs. A dry weather bypass could be

built in the late 1800s to early 1900s and is typical of systems designed for cities on rivers and large bodies of water. Atchison has approximately 100 miles of

sewer lines, 80 % of which are combined. In the last five years, the city had an average of 379 combined sewer overflows per year with the least number being 272 in 2003; the highest was 451 in 2005.

Atchison is under an administrative order from the Kansas Department of Health & Environment as of January 2004 to come up with a remedy to correct the CSOs. The city hired the engineering firm of Burns & McDonnell to evaluate the situation to correct the CSO problem. The engineer's recommendation is to separate the sanitary and storm sewers. The cost is estimated to be \$54 million, based on 2004 construction prices. The cost is estimated to increase by \$1.3 million annually with an inflation rate of 2.5 percent. The city is working on a 20-year plan to reduce the outfall areas. The first area planned to be separated is the 11th and 14th street CSOs due in

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part because the two discharge into White Clay Creek. The creek is classified as "recreational waters." Separating this area is estimated to cost \$10.6 million. The next area on the list is the Sawmill & 2nd Street CSOs. It has a cost estimate of \$6.1 million.

The city is classified as a financially high-burdened community with the average sewer bill of \$17.67 per month. If the city were to finance the project without outside funding, the monthly estimated cost would be \$113 per tap. As of July 2007, Atchison is included on the Water Resources Development Act authorization list for \$20 million but the funding has to be appropriated by Congress. The city should know if the

appropriation will be provided as late as May 2008.

Smoke testing Atchison

As I mentioned earlier, KRWA worked with city staff to complete a smoke testing of the area between 4th Street and 17th Street north of Highway 59. The purpose was to determine where the city's combined sewer system had downspouts and storm sewer catch basins flowing into the system. The smoke testing identified 277 problems with the sanitary sewer with almost 200 of these being storm sewer catch basins and down spouts. We also found a watershed dam with continuous flow entering the sewer system.

Atchison has one of the most extensive permits I have seen; it's

The screenshot shows the website for the Kansas Rural Water Association (KRWA). The header includes the KRWA logo and navigation links for news, lifeline, systems, entire site, and the web. A search bar is present with the text "search KRWA.net:". The main navigation menu includes ABOUT, ONLINE RESOURCES, TECHNICAL ASSISTANCE, TRAINING (highlighted), and MEMBERSHIP. Under TRAINING, there are sub-links for Training Sessions, Conference, Online Activities, and Survey. The main content area is titled "Calendar & Registration" and contains text about training sessions. To the right of the text is a photograph of a man presenting to a group of people in a classroom setting. At the bottom of the page, there is a "continue" button.

Your water or wastewater system's commitment to good management, operation and maintenance relies on training for operators, staff and members of your governing body. KRWA will offer nearly 100 training sessions during 2008. Whether it's compliance with regulatory issues, water quality, facility operations or the popular KanCap board/council training, KRWA's mission is to help meet the training needs and interests of cities and RWDs in Kansas. To view KRWA's schedule and details of each session and to register online, always check www.krwa.net and then the sublink 'training' as shown above.



For a .pdf brochure containing further information about the session, click on "Details" next to the session. If you do not have Acrobat Reader, you can download it free from this link. To register, select the "register" to complete all your registrations, select "checkout."

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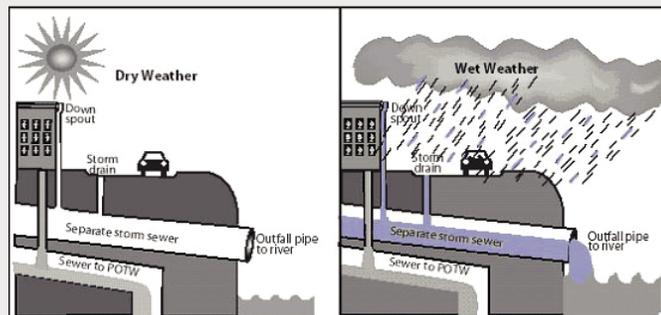
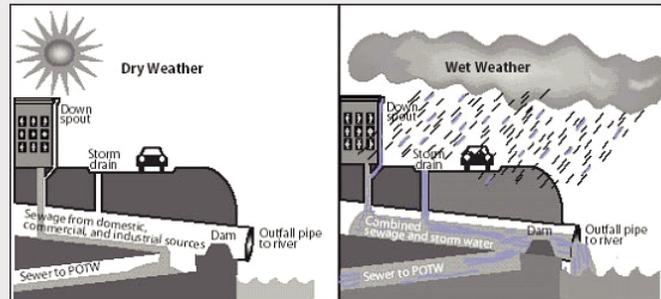
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What are the risks associated with the discharge of raw sewage?



STATE OF KENTUCKY WATER OFFICE

Raw sewage can carry a variety of human bacteria and viruses. Depending on the amount and concentration of the sewage and on how people are exposed to it, these bacteria and viruses can cause illness. Combined sewer overflows CSOs also contain a variety of chemicals, oils and other wastes picked up by stormwater as it flows across parking lots, roads, lawns and other surfaces. Most combined sewer overflows occur during rain and are therefore diluted by rain and river water, but the potential for health and environmental hazards is still present. People most likely to be affected are water skiers, swimmers and others involved in water sports.

There are water quality standards in Kansas that limit the amount of certain bacteria in water. When these standards are exceeded, the Kansas Department of Health and Environment issues advisories to alert citizens to potential health hazards.

Some factors to take into account when determining the level of risk or characteristics of the discharge are time of day that the combined sewer system begins to discharge, ability of the publicly owned treatment works to capture the first flush, size of receiving surface waters and duration of the precipitation event.

Combined sewer overflows that occur in the absence of wet weather are called dry weather overflows. Dry weather overflows are usually a result of line blockages, power failures at pump stations, bottlenecks in the system or some other operation and maintenance issue. Adjusting the regulator settings of combined sewer systems for peak water usage during dry conditions will help ensure that dry weather discharges do not occur. Dry weather CSO discharges are prohibited under the National Pollutant Discharge Elimination System program. Dry weather overflows consist of concentrated wastewater, and the risks associated with exposure are therefore greater than wet weather combined sewer overflows.



Above: The concrete horseshoe CSO discharge location can be seen from the Amelia Earhart bridge. This is a view from the east looking into Atchison. This is actually the outlet for the White Clay Creek but it carries the overflows from 4th, 6th, 7th, 11th and 14th Streets in addition to natural creek water.

Above right: The 11th Street native stone built CSO discharges into White Clay Creek.



A one-inch rain over one city block (350 x 350 ft.) can add more than 76,358 gallons of water to a system considering all runoff drains into the storm sewer. Over a 10-sq. block area, the volume would be more than 760,000 gallons!

I would like to thank Utilities Director Mike Mathews for providing the photos and local

information about Atchison's combined sewer system. This represents a huge project for the city and one that will require financial assistance if it is to be accomplished.

I also encourage readers to attend the 2008 Conference, it has numerous training sessions for wastewater operators and owners.

nine full pages! This does not include the four pages of standard conditions and five pages of administrative orders. The city is on weekly monitoring of Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). They also are required to perform water quality monitoring on the Missouri River above and below three of the outlets for BOD, TSS and fecal coliform bacteria. Atchison is also required to test once yearly for heavy metals and Acute Whole Effluent Toxicity.

Combined sewer systems have been in service for decades in many cities. Some systems unknowingly have storm sewer catch basins connected to the sanitary sewer system. The added water during a rain event from these types of connections can adversely affect the wastewater treatment, whether the treatment is with lagoons or mechanical.



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