



In previous articles in *The Kansas Lifeline*, I have made statements about how many articles I have written about wastewater collection systems and their inflow and infiltration (I and I). In the July 2022 issue, I wrote an article entitled “Sump Pumps-Lagoon System Killers”. It was about I and I. I will openly admit that the title sounds more dramatic than necessary to discuss inflow and infiltration. Due to the repetitive nature of my writing about the subject, I needed to have a dramatic title to get the readers to read yet another article about inflow and infiltration. And now, less than a year later, here I am again writing an article about inflow and infiltration. To add insult to injury, not only am I going to write this article about I and I, I have already planned a follow-up article about – you guessed it, I and I. To be clear, I don’t have an infatuation with I and I or at least my therapist hasn’t noted it as a significant issue yet.

Joking aside, my purpose in the continued writing about this issue is derived from observing the multi-millions of dollars being spent to identify and eliminate I and I by seemingly every other town in southeast Kansas where I grew up and now live. The issue isn’t isolated to southeast Kansas. Inflow and infiltrations are more prevalent in the eastern portion of the state due to the increased precipitation received compared to the western part. Historically the east side of the state receives 40 plus inches of rainfall per year while areas in the west receive less than ten inches annually.

Until the last few weeks of precipitation events, many on the eastern side of the state may have disagreed on the precipitation amounts being more significant on the eastern versus the western side Kansas due to the dry conditions. Dry is relative to geographic location. One good thing about drought conditions is that it was an excellent time to show what “normal” wastewater flows are within the wastewater collection system. Even as “dry” as it has been on the eastern side, it does not take long for the ever-present I and I issue to show back up. As with the case study of Humboldt,

located in southeast Kansas, precipitation events sometimes of even less than half of an inch can increase flows to the wastewater treatment facility past the design flow.

Over the past five years working at Kansas Rural Water Association, I have had the opportunity to closely monitor the I and I of several towns and communities that have spent millions of dollars chasing only one I in the I and I combination. That is the infiltration portion of I and I. This is the case study of Humboldt that has essentially sealed up the collections system of infiltration at the cost of roughly \$10 million over multiple projects since the late 90’s. Now that the infiltration has been reduced to non-significant levels all flow issues are pointing at the other I – the Inflow.

In my opinion, the city of Humboldt did what they were asked to do by KDHE under the Schedule of Compliance in the NPDES permit. City manager Cole Herder also diligently spread out the projects and costs while loans and some grants became available. The city took on the project with guidance from their engineering consultant and spent approximately \$10 million to

essentially eliminate infiltration. Even though the project to rehab the sewer collection system only addressed Infiltration, it was unavoidable and had to be completed because a large percentage of the system had failed and was allowing leaching of sewage and bypasses that needed to be repaired. Unfortunately, the project did little to specifically address inflow.

The issue, as you can see, is now from the KDHE’s recent letter of warning. Normal average flows through the treatment plant are fairly constant at less than 150,000 gallons per day. In reviewing flow data, monitoring precipitation totals, and lift station runtimes, it is apparent that the only culprit is inflow. This is also known as illegal connections to the city’s wastewater collection system.

For example, in February 2023, with no precipitation events for 15 days prior to 0.80-inch of rain, the five-day



**Humboldt, Kan. City Manager Cole Herder has been active in the pursuit of identifying inflow and infiltration in Humboldt's wastewater collection system.**

### Case study: Humboldt, Kansas – Population 1853 (2020 Census)

Wastewater Utility: Mechanical wastewater treatment facility design flow of 0.25 million gallons per day (MGD) average and a 1.0 MGD peak flow.

The city's wastewater collection system consists of 330 manholes, eight (8) lift stations, and approximately 97,400 feet of sewer main of which approximately 15,350 feet of cast-in-place pipe (CIPP) rehabilitation was installed in 2007-2008.

The city has been under a Schedule of Compliance within its NPDES permit since 2013 to reduce the peak flow to the wastewater facility and improve the handling capacity of the 1.8-million-gallon peak weather holding basin. The city planned to do the upgrades and improvements in two phases.

The city completed Phase 1 in 2013 and Phase II in 2020. It involved the entire town collection system improvements and rehabilitation projects. The total cost for Phase 1 and 2 and CIPP in 2007-2008 was roughly \$10 million.

On March 28, 2023 the city received a Letter of Warning (LOW) from the Kansas Department of Health and Environment (KDHE) stating that the city is operating near or above the 0.25 MGD average design flow of the wastewater treatment facility. It was also noted in the KDHE LOW that during the summer months, flows have increased.

average flow of the wastewater treatment facility after the event with no additional precipitation was 446,000 gallons per day average daily flow. On average the flow for the five days before the precipitation event was 130,000 gallons per day.

Working with the city and spot checking with smoke testing and even attempting to recreate a runoff event using a hydrant and dyeing the water in the ditch to try to identify locations of such significant increases in flows from a small amount of precipitation has revealed no significant location of infiltration.

Since beginning work with the city several years ago, I have all but force-fed my I and I articles to Utility Director Jeremy Bulk and City Manager Cole Herder preaching that illegal connections are the issue. They have never doubted that sump pumps, floor drains, roof gutters, or any other inflow could be the issue with the increased flows during precipitation events.

The city has proven that the increased flow issues at the wastewater treatment facility are due to inflow.

In this industry for more than 15 years, I have not heard or witnessed a city council that has enforced its ordinances against inflow connections before addressing infiltration. While handling inflow connections should be a simple task, it is much more complicated than it seems. This leads me to my promise of yet another I and I article.

I am going to outline what makes the enforcement of this ordinance so challenging. I am also requesting input from



**This photo was taken during the attempt to recreate a runoff situation within an area the city staff suspected infiltration into the city's wastewater system.**

any readers who have an example, procedure, or technique of how their entity successfully addressed the inflow issues and lived to talk about it. Please email those comments to [jason@krwa.net](mailto:jason@krwa.net).

I prefer something other than telling me how an inspection was done on every house sold to ensure no inflow connections were present. In many small towns I work with, it would be 2099 or beyond before each home was inspected or sold.

As in the case of Humboldt, they already have a letter of warning from KDHE which says to me, eliminate the inflow problem now, upgrade the current treatment plant, or build a facility that can handle the flow of inflow.

In no way is Humboldt alone in this inflow issue. I have seen many millions of dollars spent on new wastewater treatment facilities to handle the flow of inflow. My hometown of Chanute, just nine miles downstream from Humboldt, will face the same issues as Humboldt shortly.

Eliminating Inflow and Infiltration has to be a multiple-step process while understanding that “the two I’s” always referred to jointly are entirely different issues, and both must be addressed before significant decreases in flows will occur. In my opinion, infiltration is easier to eliminate because you do not have to deal with citizens who do not understand the complexity of a wastewater collection system or the negative impacts to the treatment facility by sending their basement sump pump rainwater to the wastewater treatment facility.

And other than us dirty water people, who want to be educated about keeping poo-eating bacteria healthy in the treatment plant? Very few, but when the citizens are asked to pay a \$10 million tab, a few more might become interested.

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