

Benefits of smoke testing collection systems realized

I began working as Wastewater Tech for KRWA in September 1999. My first on-the-job technical assistance was, as you may have guessed, smoke testing a sanitary sewer collection system. Since then I have smoke tested 120 systems. During those tests and working with the cities and counties, we located more than 5,500 problems. Including some that were severe, such as the combined storm sewer locations in Atchison (see the March 2008 issue of *The Kansas Lifeline*). Most problems although were less severe – a problem of a cleanout extending 12 inches above the ground without a cap. A problem of this nature is just an attractive nuisance waiting for a toy – a can or rocks to be dropped into.

Why smoke test?

The purpose of smoke testing is to locate and identify the source of an inflow or infiltration problem. It is important to find and identify these sources because they may seriously affect the efficiency of the wastewater treatment facility and increase operating expenses. Some of the impact of having excessive inflow and infiltration (I & I) include:

- Increased operating expenses because of treating ground water or storm water that should not require treatment
- Pump stations handling large volumes of unnecessary water

- Possible sewer backups into homes and businesses
- Overloads on the overall system
- Sunken streets due to broken pipes

catch basins and broken service and sanitary sewer mains.

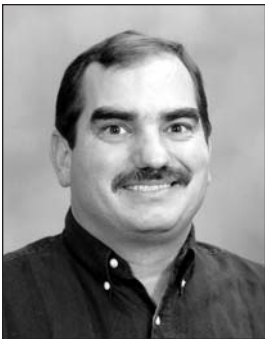
Why all these problems?

Wastewater utilities in Kansas vary greatly in age and type of materials used to construct them.

The purpose of smoke testing is to locate and identify the source of an inflow or infiltration problem.

- Increased collection system maintenance and cleaning
- Smoke testing is a great tool and a smoke testing project is relatively inexpensive. Smoke testing can locate manholes, broken or open clean outs and abandoned service lines. It is also possible to locate storm sewer

Many systems are more than 50 years old. Pipelines sag or break and tree roots penetrate the pipe causing blockages. The connection of basement and yard drains, guttering and downspouts all contribute to excessive inflow. The process of smoke testing involves placing a blower on a



Charlie Schwindamann
Wastewater Tech



This photo shows one of several "smokers" that KRWA uses to smoke test sanitary sewer systems. The smoker consists of a gasoline engine and high speed fan that blows smoke into the system.

manhole and adding a product, such as a smoke bomb or material that drips onto the exhaust manifold, to create smoke. Smoke should exit the vent stacks of the surrounding properties within the testing area. When smoke or the odor of the smoke are detected inside a home or building, that's an indication that gases from the sewer system may also be entering. Public notices and announcements are essential to prevent a panic by local citizens in case smoke enters a structure. Citizens should understand that if smoke enters their home or business during the testing project, then dangerous sewer gases could be entering as well. Of course the smoke is not dangerous and it leaves no residuals. The visible smoke and odor only lasts for a few minutes with adequate ventilation.

What's the response?

In order to gauge the benefits of smoke testing, I recently dropped in on several systems where KRWA had conducted tests. I visited with City Superintendent Mick Swearingen in Waterville, located in southern Marshall County. Waterville was also the first system I smoke tested. I was pleased to learn that the most severe problems were corrected soon after the testing in 1999 and that subsequently; all the problems identified had been corrected. I was glad that I stopped in to see Mick because he indicated that the city might want to conduct another test to make sure no problems were missed or to identify any new contributors to I & I.

Retesting a system is not unusual. In some cases, KRWA has been asked to return for a second project because the previous operator or city council wasn't proactive in fixing the problems identified in the first test; and the new people are now



Smoke can be seen rising from the grass in this house yard. There is a break in the service line from the home to main. Breaks in service lines have been the most common problem found during smoke testing by KRWA.

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Benefits of smoke . . .

ready to take care of the I&I problems.

In Frankfort, located in northeast Kansas, I found that the city had made a few repairs and was actually working on another

sewer problem. This is an example of the old operator moving with a new operator now in charge. The original smoke testing was conducted in Frankfort just a few days following the Waterville

project in 1999. The operator at the time repaired several problems, one of which included hiring an excavator because of the depth of the sewer line. The problem under repair at the time of my most recent visit was where a storm sewer connection to the sanitary sewer had caused a small sink hole to develop.

I contacted Neodesha in southeast Kansas, where previous smoke testing had identified 471 problems. Neodesha's city council and staff were very progressive and had just recently completed a repair project at a total cost of just over \$581,000 – including engineering and administrative fees. This project replaced more than 800 feet of 8-inch pipe, 197 feet of 10-inch pipe and nine manholes. The city also completed 8,509 feet of 8-inch 'cured in place' repair and 1,073 feet of 10-



Smoke escapes from a service line where the electric utility placed their anchor.

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inch cured-in-place pipe rehabilitation. Neodesha also rehabilitated 254 vertical feet of manholes. They also had to replace some water lines and storm sewer as part of the project. Neodesha is to be congratulated for rehabbing more than 10,500 feet of pipe. This is more footage than many small communities have in their entire collection systems. To this I say, "Well Done Neodesha!"

Unfortunately, not all communities are as proactive as Waterville or Neodesha. A few systems I have smoke tested received the report and did absolutely nothing with it. This was because either the council wouldn't move forward or the operator didn't present it to the council as an area of concern. Most cities are now getting ready to budget for the coming year and I believe that the infrastructure should be a top priority for all systems. Unfortunately, many city council members may see a new city park as the priority. I understand what the operators are going through trying to improve the collection system or water mains, only to be told that "We don't have money for that" and in the next breath the council wants a new swimming pool or over lay the streets with new asphalt. They forget that under the streets are old pipes that may and in some cases have collapsed causing the new street to only be excavated. Why not repair or replace the lines first?

Each community's water and sewer fund should be separate from the general fund as a good business practice. I know myself that if it was not for working here at KRWA and being on the Marysville city council for more than six years, I would not understand the budgeting process. I recommend that cities prioritize the problems and budget to correct as many problems as possible each year.

Prioritize the work

It's important to prioritize the problems identified in a smoke testing. Perhaps there are some storm sewers connected; perhaps the cost to make the repairs is only

lower insurance premiums because they had advised underwriters of programs in place to repair problems annually and also of their maintenance policies for line cleaning. I recommend that cities

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a few thousand dollars. Because of the huge volumes of inflow that can be introduced through storm sewers, correcting the problems will have a long-range effect on the entire system. The costs of just the electricity to pump just one inch of rainwater is huge over a period of time. There are other costs including the cost of insurance for having sewers back up into homes. Would repairing the problem for a few thousand dollars reduce the insurance premium? I know of several communities benefiting from

meet with insurance providers and discuss this topic. I think many will be surprised of the positive impact on insurance premiums.

Smoke testing is just the first basic step to finding problems. Smoke testing will find some, but not all of the problems. The next step will be to have the lines televised to show the exact location of the problems. Some are not as evident as in case of a joint that has pulled slightly and smoke escapes but no signs show on the video of what has happened.

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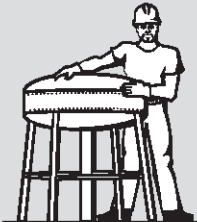
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