

## Using RATs to Improve Collection System Resource Deployment - Acoustic Inspection Technology at Little Rock Water Reclamation Authority (LRWRA), Arkansas

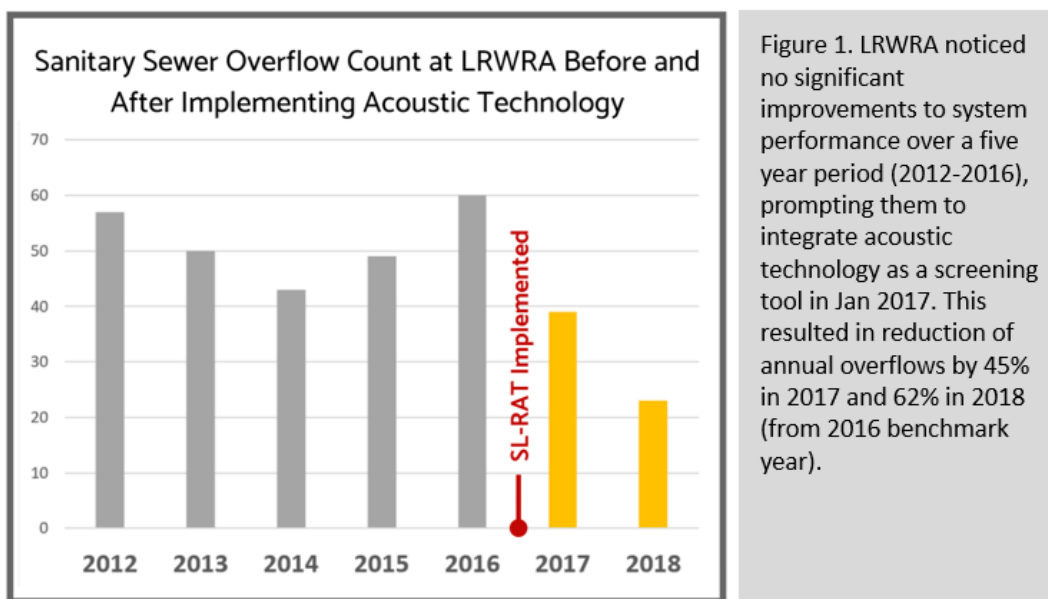
Every day, the billions of gallons of water we flush and pour down drains must travel through an extensive network of sewer pipes to reach one of thousands of sewage treatment plants. Regularly cleaning and inspecting these lines is a vital part of ensuring a reliable collection system. But determining when and where resources should be deployed can be a complex challenge. If cleaning and inspection resources are deployed to pipes that are functioning properly, then time and money are wasted. But if pipes that are not functioning properly are overlooked, serious consequences, such as sanitary sewer overflows, can occur.

Current maintenance strategies are often time-based, meaning that cleaning schedules are based on set time-intervals. However, collection systems are large and dynamic making it difficult to determine good cleaning intervals to prevent overflows. This results in resources being used to clean already clean pipes, since most pipes in in a utility’s collection are clean and functioning properly.

### Limitations of Little Rock Water Reclamation Authority’s Time-Based Sewer Maintenance Program

Little Rock Water Reclamation Authority, formerly Little Rock Wastewater, provides wastewater services to 200,000 residents and oversees 1,400 miles (2253km) of collection system. The collection system maintenance department is staffed with 90 employees, who work together to provide a reliable system to protect the environment and serve its customers.

Like most utilities, prior to implementing acoustic technology, LRWRA utilized a time-based preventative maintenance strategy. They considered factors such as age, type and depth of pipe, as well as historical stoppage and overflow data to determine where resources should be deployed. With this strategy, LRWRA was able to perform annual maintenance on 40% of its small diameter pipes. This time-based strategy, proved to have limited impact on improving the system performance, as shown by the lack of improvements to annual overflow and stoppage occurrence over a five-year period from 2012-2016 (Figure 1).



## Transitioning to a Condition-Based Maintenance Program Using Acoustic Technology

LRWRA was initially introduced to acoustic inspection technology in 2013 and launched a 2-year pilot study from 2015 to 2016. The SL-RAT® or Sewer Line Rapid Assessment Tool uses acoustic technology to inform an operator of the blockage conditions of a pipe segment on a scale of 0 to 10 (0: sound signal completely blocked, 10: pipe with plenty of flow capacity). Acoustic technology provides a very low-cost, very fast, but low-resolution view of blockage conditions, allowing operators to focus more expensive cleaning resources on areas with identified need.

The results of LRWRA's pilot study proved that valuable resources, such as staff and fleet, were not being deployed optimally. In fact, 50% of pipes that would have been previously cleaned on a time-based cleaning schedule had plenty of flow capacity and were being cleaned too frequently. These results were reflective of industry reports that indicate 70-80% of pipes in average collection systems do not require immediate cleaning.

In 2017, LRWRA launched a full acoustic inspection program. They were able to do this without hiring additional personnel by allocating six employees from their cleaning operations to form three acoustic inspection crews. LRWRA established a standard for what acoustic inspection scores should initiate cleaning work orders and set daily production goals for each crew.

### Sound Implementation – 3 Ways Acoustic Technology Enhanced LRWRA's Maintenance Process

- 1. By adapting acoustic technology, LRWRA increased annual maintenance of small-diameter (12in (30cm) or less) gravity systems from 40% to 100% annually.** Because the SL-RAT gives results very quickly and affordably, it became possible for LRWRA to screen all pipes before deploying much more expensive cleaning resources.
- 2. By focusing resources on pipes that needed cleaning, LRWRA saw vast and measurable improvements in their preventative maintenance program. Although they decreased cleaning by 32%, and utilized 21% fewer manhours, they increased total debris removed by 54% between 2016 and 2017. Spending significantly less time and fewer resources to clean more debris shows that acoustic technology has enhanced the effectiveness of LRWRA's maintenance efforts (Figure 2).**
- 3. LRWRA is efficiently employing acoustic inspection technology as a screening tool to save time, save water and enhance money utilization, while improving overall collection system performance based on their cleaning operations. Their innovative approach has significantly improved overflow count, which has been reduced by 45% in 2017, and by 62% in 2018 from the 2016 benchmark year (Figure 1).**

Today, LRWRA has established a condition-based program where cleaning operators know that pipes, they are cleaning have been acoustically identified as a potential problem area. This has helped to improve the significance of cleaning operations and improved the maintenance process. Overall, use of SL-RAT acoustic inspection technology as a screening tool can result in more directed maintenance activity that substantially improves collection system performance.

## 2016 vs 2017: Acoustic Inspection Impact



Figure 2. In the first year of implementation (2017), LRWRA was able to drastically reduce time and resources spent cleaning, while significantly improving the amount of debris removed from the system, showing that utilizing acoustic technology as a preliminary tool helped to save time, water and money later in the workflow.

### As Featured in:

#### **Presentations:**

- WEFTEC 2018: “RATs in the House – How Little Rock Water Reclamation Authority Moved from a Time-Based to a Condition-Based Sewer Cleaning Strategy” by Timothy Harrison, Asset Management Program Manager at LRWRA & Alex Churchill, CEO at InfoSense (October 2018)
- Arkansas Water Works & Water Environment Association Conference 2018: “RATs in the House” by Timothy Harrison, Asset Management Program Manager at LRWRA & Shane Sangalli, MoS Environmental (April 2018)