



National Risk Management
Research Laboratory

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Aging Water Infrastructure Research Program

Addressing the Challenge Through Innovation

Condition Assessment of Collection Systems

“Our nation’s extensive water infrastructure has the capacity to treat, store, and transport trillions of gallons of water and wastewater per day through millions of miles of pipelines. However, as our infrastructure deteriorates, there are increasing concerns about the ability of this infrastructure to keep up with our future needs.”

George Gray, Ph.D.
Assistant Administrator for
Research and Development
United States Environmental
Protection Agency

EPA has begun a new research program intended to generate the science and engineering that will address our aging water infrastructure. The program, entitled “Innovation and Research for Water Infrastructure for the 21st Century,” calls for research relating to system rehabilitation, advanced concepts, and condition assessment.

To assess the condition of a collection system, data and information are gathered through observation, direct inspection, investigation, and indirect monitoring and reporting. An analysis of the data and information helps determine the structural, operational, and performance status of capital infrastructure assets. Condition assessment also includes failure analysis to determine the causes of infrastructure

failures and to develop ways to prevent future breakdowns. Condition assessment enhances the ability of utilities to make technically sound judgments regarding asset management.

Current Issues

There are several concerns related to condition assessment of collection systems. Since the Clean Water Act was passed in 1972, sewer system condition assessment has focused on the reduction of:

- Infiltration – ground water that enters a sewer system through pipe leaks
- Inflow – water that flows into a sewer system through improper connections, such as downspouts, sump pumps, and manhole covers

Excessive infiltration and inflow must be conveyed and treated; too much of this infiltration and inflow in a sewer system can cause backups and system overflows, and peak-flow treatment at wastewater treatment plants becomes challenging.

Deterioration of a wastewater collection system can result in infiltration of ground water and the export of recharge water from watersheds. This situation, when combined with the impervious surfaces found in urban and suburban areas, reduces flows in streams, which can adversely affect aquatic ecosystems and reduce water availability.

A universal challenge for wastewater utilities is corrosion of the collection

infrastructure. Specifically, sulfuric acid corrosion negatively affects concrete surfaces, mortar, and metal reinforcement material. To address this issue, it’s important to identify the extent of the pipe corrosion, where corrosion could happen, and the best resolution (i.e., rehabilitation, repair, retrofitting, or replacement).

State of the Technology

Comprehensive asset management is broadening the focus of sewer system condition assessment to include the likelihood and consequences of capital infrastructure deterioration and failure. The current state of the technology in the area of inspection and condition assessment is the ability to visually examine the internal condition of a gravity sewer using internal cameras, usually closed circuit television (CCTV). Most utilities employ a rating system that uses the results from CCTV investigations to make an overall assessment of each section of sewer. The rating can be combined with other data and information to determine maintenance and system rehabilitation priorities.

Inspection technologies using sonar, laser, ultrasonic, and infrared (technologies not traditionally applied to sewer system investigation) are emerging with concurrent advances in digital, modular, and robotics technologies.

New Research

Beginning in fiscal year 2007, EPA's new research program will initiate projects that address inspection and condition assessment in the following areas:

- Assess State of the Technology
 - Convene technology forum
 - Develop state-of-the-technology capsule reports
 - Internal camera inspection
 - Advanced integrity monitoring
- Conduct Technology demonstration studies
 - Develop protocols and metrics for field demonstrations
 - Determine site selection criteria for field demonstrations
 - Initiate field demonstrations

The Door Is Open for Collaboration

EPA, whose primary role is that of advocate for a sustainable water infrastructure, is only one partner in this effort. The Aging Water Infrastructure research program presents opportunities for utilities, vendors, researchers, academics, water associations (trade and professional), and other agencies



and organizations to collaborate. In fact, the success of the program depends on stakeholder involvement, sharing information and tools, and working together toward the long-term stewardship of our water infrastructure.

CONTACT

Daniel J. Murray, Jr., P.E.,
Senior Environmental Engineer
Office of Research and Development
U.S. Environmental Protection Agency
National Risk Management Research Laboratory
(513) 569-7522
murray.dan@epa.gov

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