

CONTROLLED-CONDITION RESEARCH ON WASTEWATER COLLECTION AND DRINKING WATER DISTRIBUTION SYSTEMS



IMPACT STATEMENT

The upgraded controlled-condition testing apparatus resulting from this project will be used to generate performance and cost data for innovative pipe inspection and rehabilitation technologies. This information will enable faster and more informed decisions about the development, selection, and use of innovative technologies for the inspection and rehabilitation of buried water and wastewater conveyance systems.

BACKGROUND:

While there are numerous types of pipe inspection technologies already available, further improvement is required. The wide range of pipe failure scenarios poses some limitations on existing technologies but can be used to drive improvements to proven methods, as well as to develop new and emerging methods. Such improvements should be based on the performance and economic requirements of the user community. Controlled-condition testing can be a useful stepping stone between laboratory and field testing because it provides technology performance and cost data under conditions that are more realistic than laboratory testing, yet better controlled and less expensive, time consuming, and risky than field testing. Controlled-condition testing data can help technology developers, users, and financial supporters to determine whether a device or procedure is ready for field testing or needs further improvement. The ability to control and repeat test conditions will also enable comparisons between different devices or procedures.

The U.S. Environmental Protection Agency (EPA) can expand and accelerate the evaluation, improvement, and use of effective and innovative technologies for the inspection and rehabilitation of buried water and wastewater infrastructure by constructing simulated systems for controlled-condition testing. The Urban Watershed Research Facility in Edison, NJ, which is managed by Water Supply Water Resources Division's Urban Watershed Management Branch, has the land area and some facilities for such testing. The existing Edison Pipeline Test Apparatus was built and predominantly used for the evaluation of acoustic leak detection and location technology as part of the leaking underground storage tank program. While modifications will be required, the existing facility will be used to the maximum extent possible. During the development of the design basis for the proposed upgrades, input was obtained from key members of the potential user community, including academic researchers, technology vendors, industry organizations, and utilities.

DESCRIPTION:

EPA's Office of Research and Development's (ORD) National Risk Management Research Laboratory has funded this research project in support of its Aging Water Infrastructure (AWI) Research Program. This project will upgrade an existing controlled-condition testing apparatus at ORD's facility in Edison, NJ. These upgrades will enable EPA and other researchers to test innovative technologies for the inspection, assessment, and rehabilitation of buried water and

wastewater infrastructure in a more controlled, repeatable, safe, and economical manner than field testing, while maintaining more realistic conditions than laboratory testing. The upgraded controlled-condition testing apparatus will be used to generate performance and cost data for innovative pipe inspection and rehabilitation technologies. This information will enable faster and more informed decisions about the development, selection, and use of innovative technologies for the inspection and rehabilitation of buried water and wastewater conveyance systems.

Key controlled-condition research and data needs for the inspection or rehabilitation of water and/or wastewater conveyance systems were identified based on an evaluation of the current state of the nation's water and wastewater buried infrastructure, as well as an investigation of the capabilities and potential limitations of existing and emerging technologies. The data gaps that were identified were ranked based on key parameters so that the most critical needs would serve as the basis for facility upgrades to be designed under Phase I of this project. From the list of nineteen needs that were identified, the two most critical were associated with large diameter (>18-in.) ferrous pressure mains (water & sewer). The top ten needs were associated with the inspection and/or detection of leaks in pressure piping (water & sewer), as well as assessment of the pipe-soil envelope for the presence of voids or evidence of pipe leakage. A survey of the existing test facility in Edison, NJ, was conducted, and preliminary designs for upgrades to meet selected data needs are being prepared. A final design will be developed following EPA review and approval. The ultimate goal for the test apparatus is to have the capability to evaluate multiple technologies for three categories of pipe: water pressure pipe, gravity sewers, and sewage force mains. This flexibility will enhance technology evaluation under conditions likely to be encountered in the nation's collection and distribution systems.

EPA GOAL: Goal #2 - *Clean & Safe Water*; Objective 2.1.1- *Water Safe to Drink*

ORD MULTI YEAR PLAN: Drinking Water (DW), Long Term Goal (LTG) - DW-1 *Characterize risks associated with DW sources, distribution, treatment, and use*; Water Quality (WQ) LTG - WQ-3 *Source Control*

RESEARCH PARTNERS: STREAMS Task Order 64; RTI/CDM

EXPECTED OUTCOMES AND IMPACTS

The desired outcomes from the upgraded facility are to expand and accelerate the development and use of more effective water infrastructure technologies by enabling: increased awareness of the existence, capabilities, and limitations of emerging technologies, including those developed overseas; controlled-condition evaluation of innovative technologies before implementation in active systems; evaluation of manufacturers' claims; increased confidence in effective, economical and innovative technologies; comparisons of different technologies over time under uniform conditions; generation of baseline performance data on selected existing technologies; evaluation and validation of procedures for testing innovative technologies; and evaluation of the capability of innovative technologies to meet user community's desired performance and/or cost targets.

OUTPUTS:

Current and expected project outputs include a project report, conceptual and final design, and a journal article.

RESOURCES:

Aging Water Infrastructure Research Program: <http://www.epa.gov/awi/>

Urban Watershed Management Research: <http://www.epa.gov/ednrmrl/>

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Drinking Water



Water Quality



Aging Water Infrastructure