

CONDITION ASSESSMENT FOR DRINKING WATER SYSTEMS



IMPACT STATEMENT

This project will enable a systematic approach to characterizing the value of condition assessment of drinking water mains that will provide the basis for better communication among, and decisions by, stakeholders regarding goals and priorities for research, development, and technology transfer for condition assessment of water mains.

BACKGROUND:

Condition assessment of water mains is ideally intended to provide value-added for water utilities. If the present and future condition of a pipeline can be determined with reasonable accuracy, then these determinations enable more optimized decisions regarding when, where, and how to inspect, repair, rehabilitate, and replace drinking water mains as well as associated financial planning. Good decisions about these matters help reduce catastrophic failures, leakage, water quality problems, accelerated deterioration, boil water orders, property damage, economic losses, public safety incidents, etc. However, condition assessment can also result in negative value-added if the costs exceed the benefits so care must be taken when deciding where and how to conduct water main condition assessment.

Condition assessments of water mains are often complex, difficult and expensive undertakings. Technology advances are arising that potentially enable better, faster, and/or less expensive collection, reporting, and analysis of structural data from water mains. The U.S. Environmental Protection Agency's (EPA) Office of Research and Development (ORD), through its Aging Water Infrastructure (AWI), Small Business Innovation (SBI), and Environmental Technology Verification (ETV) Research Programs, and in cooperation with other national and international research organizations, seeks to accelerate and expand development and acceptance of effective and innovative water main condition assessment technologies. The ultimate objective of this project is to enable more systematic and effective determination of the value of condition assessment technologies. Accomplishing this ultimate objective will help ensure that high-value condition assessment technologies are more quickly recognized, developed and adopted.

DESCRIPTION:

ORD's National Risk Management Research Laboratory has funded this research project in support of its AWI Research Program. The goal of this project is to develop and evaluate an approach or model for estimating the value of structural condition assessment technologies for buried drinking water mains. Accomplishing this goal will enable systematic estimates of the potential value of innovative or existing condition assessment technologies. A systematic approach to characterizing the value of condition assessment will provide the basis for better communication among, and decisions by, stakeholders (e.g., utilities, technology vendors, researchers, inspection service providers, consultants, private and public research funders and EPA Program Offices) regarding goals and priorities for research, development, and

technology transfer for condition assessment of water mains. The specific objectives of this project were to: develop and test a model for determining the value (i.e., benefit-cost) of condition assessment technologies for high-risk water mains; develop and test a pilot database for condition assessment value data (i.e., pipe failures and consequences; technology characteristics, performance and cost, etc.); and populate the database with high quality data for high-risk mains.

An existing equation for the value of condition inspection was the basis for the condition assessment value model. The model consists of an inspection benefits equation and an inspection cost equation, with the value being calculated as the difference between them. In the model, the benefits of condition inspection arise from avoidance and through inspection and timely maintenance of main failures and their associated adverse effects. Although progress was made toward developing a systematic approach for estimating the value of condition assessment technologies for water mains, the results of the modeling effort were not conclusive. A database sufficiently diverse to meet the universal project goals was not available, and the project retreated to site-specific modeling applications. As more site-specific applications are included, the type of database needed will be generated.

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 - DW-1 *Characterize risks associated with DW sources, distribution, treatment, and use*

RESEARCH PARTNERS:

Contractors: STREAMS Task Order 25; Eastern Research Group; Shaw Environmental; Department of Public Works, Water Distribution, Laramie, Wyoming

EXPECTED OUTCOMES AND IMPACTS:

Outcomes may be environmental, behavioral, health-related, or programmatic in nature, but must be quantitative. Projects to be funded under this announcement are expected to contribute to the attainment of the desired primary outcome of this program, which is to assist the user community, such as water utilities, to more effectively meet their Clean Water Act and Safe Drinking Water Act requirements and conserve energy in the production of drinking water, wastewater, improve water efficiency, reduce the carbon footprint of the water industry, and improve water infrastructure sustainability. This desired outcome will be achieved by providing the user community with technical data, guidance, and decision support tools that will improve their capability to identify, select, and implement appropriate innovative approaches for optimizing energy and water resources.

OUTPUTS:

The expected outcomes of this project are reduced infrastructure failures and their adverse public health, safety, environmental and economic effects as well as reduced premature replacement of sound buried water infrastructure.

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



Aging Water Infrastructure