



BILLING CODE 3510-13

U.S. DEPARTMENT OF COMMERCE

National Institute of Standards and Technology

[Docket Number: 180904815-8815-01]

Request for Information Regarding Measurement Science Needs for Water Use Efficiency and Water Quality in Premise Plumbing Systems

AGENCY: National Institute of Standards and Technology, Department of Commerce.

ACTION: Request for Information (RFI).

SUMMARY: Premise plumbing systems are key to the built environment, given that our ability to live and thrive in buildings is highly dependent on efficient and sustainable access to potable water. The design of premise plumbing systems in the U.S. is based in part on decades-old data embodied in building codes, much of which was developed at the National Institute of Standards and Technology (NIST). However, many important factors affecting these systems have changed considerably in recent years. Per capita water demand has declined, new materials have been introduced into plumbing systems, and there are growing concerns regarding human exposure to opportunistic pathogens in plumbing systems and other water quality issues. New information is needed to ensure that premise plumbing systems are designed, installed, and operated such that the goals of water efficiency, water quality, and energy efficiency are considered in an integrated manner. NIST requests information from the public regarding measurement science needs that must be addressed to inform future code revisions, green building standards, and guidance documents in ways that enable safe, reliable and efficient plumbing systems in buildings. Responses to this RFI will assist NIST in its execution of a project to

investigate approaches that can reduce water and energy consumption and reduce or prevent water quality problems by informing improvements in plumbing system design, codes and standards.

DATES: Comments must be received by 5:00 PM Eastern time on [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Written comments in response to the RFI should be submitted according to the instructions in the ADDRESSES and SUPPLEMENTARY INFORMATION sections below. Submissions received after that date may not be considered.

ADDRESSES: Responses to this RFI can be submitted by either of the following methods:

- Agency Website: [<https://www.nist.gov/el/energy-and-environment-division-73200/rfi-response>]. Follow the instructions for sending comments on the agency website.
- E-mail: safeandsustainableplumbing@nist.gov. Include “RFI Response: Regarding Measurement Science Needs for Water Use Efficiency and Water Quality in Premise Plumbing Systems” in the subject line of the message.

FOR FURTHER INFORMATION CONTACT: Dr. David Yashar, Deputy Chief, Energy and Environment Division, Engineering Laboratory, National Institute of Standards and Technology, 100 Bureau Drive MS 2201, Gaithersburg, MD 20899, 301-975-5868, or by email to dyashar@nist.gov.

SUPPLEMENTARY INFORMATION:

I. Background

Premise plumbing systems are key to the built environment, given that our ability to live and thrive in buildings is highly dependent on efficient and sustainable access to potable water. The design of premise plumbing systems in the U.S. is based in part on decades-old data embodied in building codes, much of which was developed at NIST. However, as described below, many important factors affecting these systems have changed considerably in recent years. Per capita water demand has declined and concerns exist regarding human exposure to opportunistic pathogens in plumbing systems and other water quality issues. New technical information is needed to ensure that premise plumbing systems are designed, installed, and operated such that the goals of water efficiency, water quality, and energy efficiency are considered in an integrated manner, based in part on the following considerations:

- Population growth and concerns over the scarcity of water and the ability to deliver potable water through an aging treatment and distribution infrastructure have led Americans to implement measures that reduced indoor household water use by 22 % since the late 1990's.¹ As a result, new premise plumbing systems are being designed and installed with water flow rates that are significantly lower than those corresponding to the design data in building codes and other guidance.
- Many existing plumbing systems are being operated at lower flow rates than those for which they were designed to operate. These low flow rates create situations where water remains in distribution and building plumbing systems for longer periods of time, potentially rendering water treatment practices less effective and leading to conditions that can promote the growth of opportunistic waterborne pathogens.

¹ Water Research Foundation, Residential End Uses of Water, 2016.
<http://www.waterrf.org/PublicReportLibrary/4309A.pdf>

- Materials used in piping networks and fixtures have changed, and there is insufficient information about their performance and impacts over time.
- Water stressed areas are considering on-site reuse for non-potable uses. However, there is some uncertainty regarding design criteria to implement these systems in a healthy and sustainable manner.
- The distribution and consumption of water inside a building has significant influence on the amount of energy that a building consumes. Efforts to advance energy efficiency may affect how water moves in a building as well as its resulting water quality.
- The need to use water more efficiently to supply a growing population and economy will not diminish as water shortages, most notably in the western U.S., become more frequent and/or severe. The U.S. Government Accountability Office predicts that water shortages in non-drought conditions will be experienced in 40 of the 50 states by 2024.²

Based on these factors and trends, it is clear that research is needed to advance the state of knowledge that supports the design of new premise plumbing systems and the operation and retrofit of existing systems to conserve water resources, protect public health, and support community resilience.

The input received through this RFI may be incorporated into a long-term research agenda to develop the codes, standards, and guidance to advance building water use efficiency and water quality which will be accessible to multiple public and private sector organizations. This research agenda will target the following core issues:

² U.S. Government Accountability Office, Freshwater: Supply Concerns Continue, and Uncertainties Complicate Planning, May 22, 2014. <http://www.gao.gov/products/GAO-14-430>

- Updated data and models to support the codes, standards, and guidance necessary for the design of new premise plumbing systems based on the lower water flow rates, the use of new materials, and the increased awareness of opportunistic pathogens and other water quality issues.
- Information to inform codes, standards, and guidance for the operation and potential retrofit of existing plumbing systems that are subject to lower water flow rates than those for which they were designed and which may be affected by degradation in system materials over time.
- Codes, standards, and guidance for future plumbing systems based on increasing demands for water efficiency and water quality, employing technologies such as onsite reuse, and different scales of delivery and treatment.
- Codes, standards, and guidance for human factors related to water use as well as system operation and maintenance.

For the purposes of this RFI, premise plumbing is defined as all potable and non-potable, piping and appurtenances (e.g., water heaters, chillers) within a property line, and includes reuse, collection system, and onsite storage within a residential or commercial facility. NIST is interested in issues related to the following aspects and features of premise plumbing systems:

- All premise plumbing systems in residential, commercial and industrial buildings, per the above definition, including but not limited to irrigation systems, fire suppression systems, cooling towers, water features and data centers

- Materials used in plumbing systems, their resistance to corrosion, their ability to maintain structural integrity, and their interaction with contaminants and treatment chemicals
- System operation and maintenance, and occupant water use
- Water quality conditions at point of entry into the building
- Data needed for design and operation, including water demand assumptions
- Models for designing new systems and evaluating existing systems

II. Request for Information

NIST requests information from the public regarding measurement science needs that must be addressed to inform future code revisions, green building standards, and guidance documents in ways that enable safe, reliable and efficient plumbing systems in buildings. Responses to this RFI will assist NIST in its execution of a project to investigate approaches that can reduce water and energy consumption and reduce or prevent water quality problems by informing improvements in plumbing system design, codes and standards.

Respondents are encouraged – but are not required – to respond to each question and to present their answers after each question. The following questions cover the major areas about which NIST seeks comment. Respondents may organize their submissions in response to this RFI in any manner, and all responses that comply with the requirements listed in the DATES and ADDRESSES sections of this RFI will be considered..

Attachments will be accepted in plain text, Microsoft Word, or Adobe PDF formats.

Comments sent by any method other than those specified in this notice, to any address or individual other than those specified in this notice, or received after the end of the

comment period, may not be considered. Comments containing references, studies, research, and other empirical data that are not widely published should include copies or electronic links of the referenced materials.

All submissions, including attachments and other supporting materials, will become part of the public record and subject to public disclosure. NIST reserves the right to publish comments publicly, unedited and in their entirety. Sensitive personal information, such as account numbers or Social Security numbers, or names of other individuals, should not be included. Submissions will not be edited to remove any identifying or contact information. Do not submit confidential business information, or otherwise sensitive or protected information. Comments that contain profanity, vulgarity, threats, or other inappropriate language or content will not be considered.

NIST is interested in receiving information from the stakeholder community to answer the following questions:

- 1) What are the most important issues to design and operate safe, healthy, reliable, and efficient plumbing systems?;
- 2) In the context of the core issues listed above or any other issues identified in this notice, what are the research needs that should be considered in developing this research agenda?;
- 3) Is there any other information respondents want to provide regarding this effort?

Authority: 15 U.S.C. 272(b)(10)

Kevin A. Kimball,
Chief of Staff.

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