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Framework for Direct Potable Reuse

What do regulators and decision-makers need to know about direct potable reuse?

BACKGROUND

Prolonged and severe droughts, along with other factors, have made water supplies increasingly scarce in the Southwest and other regions of the United States, as well as elsewhere around the globe. Because of water supply contraints, there is a clear need to more effectively utilize our existing water resources to provide reliable and high-quality potable supplies to our communities. In this context, considerable interest exists in water reuse in general and potable water reuse in particular. A framework document was developed by a panel of experts to provide information about the value of direct potable reuse (DPR) as a water supply option and what is needed to implement a DPR program. Individual communities can realize numerous advantages – including increased water reliability, decreased carbon footprints, greater value from limited natural water supplies, and controlled increases to the cost of water – by considering DPR as part of their community water supply portfolios.

FRAMEWORK DEVELOPMENT AND APPROACH

This framework document was developed through a collaborative effort between WateReuse, the American Water Works Association, and the Water Environment Federation through an independent advisory panel administered by the National Water Research Institute. The panel convened over a period of almost two years to identify the subject areas and topics that future DPR guidelines will need to address, and prepare the final document.

This framework represents a consensus among the panel, while taking into consideration input from a Project Advisory Committee comprised of technical experts in water and wastewater treatment, as well as state and federal regulators.

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American Water Works Association http://www.awwa.org

Water Environment Federation the water quality people® http://www.wef.org

NWRI National Water Research Institute http://www.nwri-usa.org

OVERVIEW OF POTABLE WATER REUSE

Potable water reuse involves the use of a community's wastewater as a source of drinking water. Planned and unplanned potable reuse both occur in the United States today.

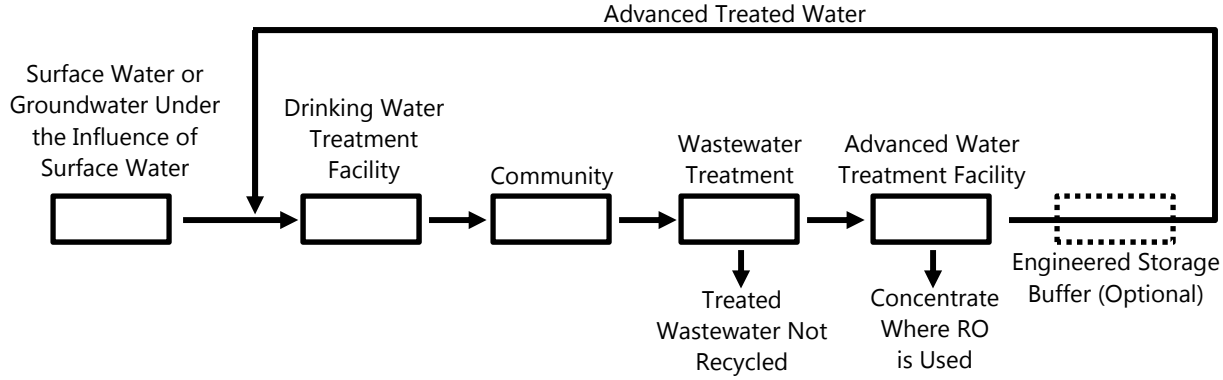
Often identified as *de facto* potable reuse, unplanned potable reuse occurs when downstream surface waters subject to upstream wastewater discharges are used as a source of drinking water. For planned potable reuse, two forms exist:

1. **Direct potable reuse** (DPR), in which highly treated wastewater is introduced immediately after treatment into a community's water supply system
2. **Indirect potable reuse**, in which treated wastewater is introduced into an environmental buffer (e.g., a groundwater aquifer or surface water reservoir, lake, or river) for a period of time before the blended water is introduced into a water supply system

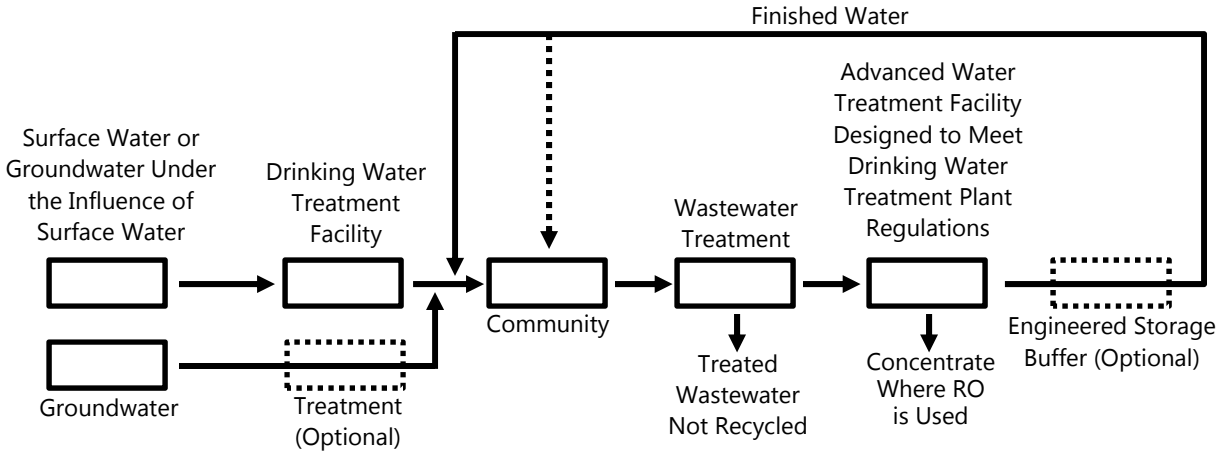
HOW CAN DIRECT POTABLE REUSE BE IMPLEMENTED?

There are two forms of DPR in use today: one involves advanced treated water (ATW) and the other involves finished water. Both forms are illustrated as follows:

1. ATW is introduced with or without the use of an engineered storage buffer (ESB) into the raw water supply immediately upstream of a drinking water treatment facility (DWTF). To date, permitted operational DPR projects in the United States involve this form of DPR.



2. Finished water is directly introduced – with or without the use of an ESB – into a drinking water supply distribution system, either downstream of a DWTF or within the distribution system. Although a finished water DPR project has been in operation at Windhoek, Namibia since 1967, the production of finished water is not the focus of this document.



FRAMEWORK OUTLINE

Chapter 1 – Introduction

- Outlines the purpose and need for enhanced guidance regarding DPR

Chapter 2 – What Is Direct Potable Reuse?

- Identifies the differences between DPR, *de facto* (unplanned) potable reuse, and indirect potable reuse
- Examples of DPR projects are provided as well as information regarding costs, energy requirements, and comparative issues with other water sources and measures for DPR

Chapter 3 – Key Components of a Successful/Sustainable Direct Potable Reuse Program

- Includes a summary of the key regulatory, technical, and public outreach components that subsequent chapters of the Framework will address in greater detail

Chapter 4 – Public Health and Regulatory Aspects for Direct Potable Reuse

- Summarizes the current knowledge regarding the health effects associated with potable reuse along with applicable public health concepts
- Discusses the Safe Drinking Water Act, Clean Water Act, and existing state regulations regarding potable water reuse
- Identifies criteria developed to control for microbial and chemical constituents

Chapter 5 – Source Control Program

- Identifies the importance and principle elements of an effective source control program

Chapter 6 – Wastewater Treatment

- Outlines the downstream effects that secondary treatment processes can have on DPR as well as potential impacts from climate change and water conservation

Chapter 7 – Advanced Water Treatment

- Provides examples of treatment trains and the individual unit processes used for advanced water treatment in DPR applications
- Identifies critical control points and outlines the reliability of various treatment trains based on the redundancy, robustness, and resiliency of the treatment technologies

Chapter 8 – Management of Advanced Treated Water

- Discusses issues regarding blending and the integration of advanced treated water into a drinking water treatment facility and distribution system

Chapter 9 – Process Monitoring

- Outlines strategies for process monitoring and control for DPR applications as well as how pathogen removal credits are allocated

Chapter 10 – Residuals Management

- Identifies the types of residuals produced from an advanced water treatment facility as well as management options for reverse osmosis concentrate

Chapter 11 – Facility Operation

- Highlights the importance of facility operations in DPR including startup and commissioning, operator requirements, and maintenance programs

Chapter 12 – Public Outreach

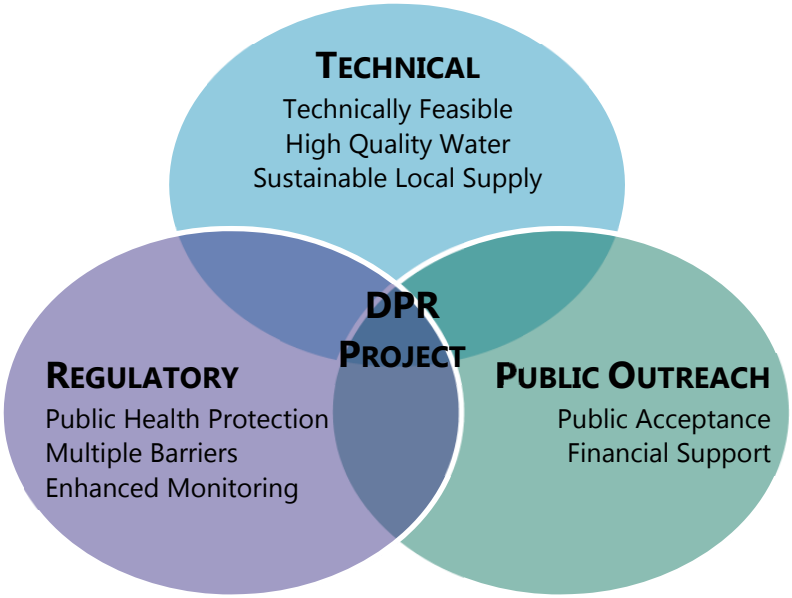
- Includes examples of public outreach strategies for DPR and establishes the necessity of an appropriate outreach program for any successful DPR project

Chapter 13 – Future Developments

- Identifies future regulatory, technology, and public outreach needs

RELEVENACE TO INDUSTRY

As interest in potable reuse grows, so does the need for providing guidelines for DPR. However, national guidance or regulations are not expected in the near term. In lieu of such guidance, this framework document provides an overview of DPR and its essential principles, as well as identifies issues that need to be addressed in the development of DPR guidelines and regulations. Specifically, this framework document can be used to: (1) provide guidance on the key components that make up a DPR program; and (2) assist decision-makers in understanding the role DPR projects can play in a community's overall water portfolio. This framework document can serve as a valuable resource to municipalities, utilities, and agencies seeking to implement DPR programs.



Inter-relationship of the Key Components of a DPR Program

ABOUT WATEREUSE

WateReuse is internationally-recognized as a thought-leader on alternative water supply development. It is the go-to organization for applied research, policy guidance, and educational tools on water reuse as well as the principal influencer of public opinion, lawmakers and policymakers on policy and projects related to water reuse.

ABOUT WEF

The Water Environment Federation is a not-for-profit technical and educational organization of 36,000 individual members and 75 affiliated Member Associations representing water quality professionals around the world. As a global water sector leader, our mission is to connect water professionals; enrich the expertise of water professionals; increase the awareness of the impact and value of water; and provide a platform for water sector innovation.

ABOUT AWWA

Established in 1881, the American Water Works Association is the largest nonprofit, scientific and educational association dedicated to managing and treating water, the world's most important resource. With approximately 50,000 members, AWWA provides solutions to improve public health, protect the environment, strengthen the economy and enhance our quality of life.

ABOUT NWRI

Since 1991, the National Water Research Institute has sponsored projects and programs to improve water quality, protect public health and the environment, and create safe, new sources of water. NWRI specializes in working with researchers across the country with the best available facilities, such as laboratories at universities and water agencies, and is guided by a Board of Directors made up of representatives of water and wastewater agencies in California.