

# Executive Summary



## Bringing clarity to the SWRO desalination permitting process

Database of Permitting Practices for Seawater Desalination Concentrate (Desal-13-07)

### The Central Issue

Permitting disposal of concentrate and other waste streams is often one of the most challenging tasks associated with the development and implementation of desalination projects. Seawater reverse osmosis (SWRO) desalination is of growing importance in the U.S. due to water needs associated with growing coastal populations and the benefits provided by a droughtproof source of water. Yet SWRO desalination is relatively new to the U.S. and regulatory and permitting experience is limited.

### Context and Background

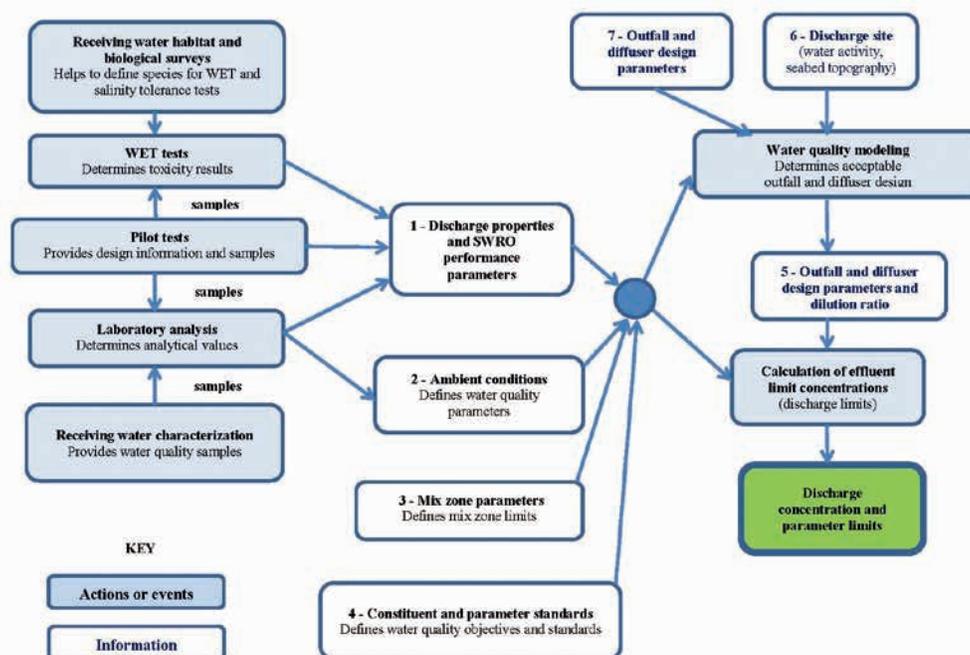
Identifying the discharge information that permitting agencies need and the decision-making process they go through to permit discharge methods may help desalination project proponents focus and expedite their permitting efforts. The study was based on permitting experience with recent SWRO projects with a focus on the regulatory issues and considerations with the most commonly used concentrate management method – discharge to surface waterbodies. Issues specific to the permitting of thermal desalination plants were not addressed, because although popular in the Middle East, thermal desalination has not found significant application in seawater desalination in the U.S.

Information was gathered from the three key U.S. states (California, Florida, and Texas) where interest in SWRO desalination has been

highest. Due to the more extensive international experience with SWRO desalination, information was also obtained from the countries of Australia, Israel, and Spain – all having significant recent large-scale SWRO desalination projects.

### Findings and Conclusions

The report documents SWRO discharge regulatory issues and provides a critical overview of facility discharge-related information required for permitting desalination projects. The report discusses the relatively new interest and recent challenges associated with the permitting complexity of medium and large SWRO desalination plants in the U.S. It describes how to determine the quantity and quality of concentrate and addresses the characterization of all other nonconcentrate waste streams generated at a typical SWRO desalination plant. The researchers discuss the most commonly used methods of seawater discharge and provide a brief overview of other concentrate and residual management methods. An overview of the U.S. federal regulatory framework and other issues associated with regulatory guidance and the process of providing information required to determine discharge permit limitations that address potential environmental impacts are discussed. The researchers summarize regulations specific to the three key U.S. states with the most desalination projects, present permitting case studies, and provide an overview of permitting processes abroad.



Information and events typically involved in the determination of concentrate discharge numerical limitations defined and discussed in this report.

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The researchers present conclusions and recommendations in the following areas:

- Regulatory systems
- Regulatory process
- Regulatory guidelines
- Elapsed time for environmental review and issuance of discharge permits
- Discharge salinity standards
- WET test species and conditions
- Salinity tolerance of marine organisms used in WET tests

### Management and Policy Implications

This research identifies the discharge information that permitting agencies need and the decision-making process they use to permit discharge methods. The research findings bring clarity to the regulatory process by defining discharge permit decision-making steps and by analyzing associated regulatory and permitting issues. The results can

benefit the understanding and implementation of SWRO desalination as a droughtproof water supply source and provide a strong framework for the development of federal and state desalination project permitting guidelines.

The project results also help to define areas of needed research to more firmly establish a scientific basis for setting permit limits for concentrate discharge. This is an important step in the path to strengthening (from a regulatory perspective), simplifying, and expediting (from a utility perspective) SWRO concentrate management and permitting.

#### Agencies Participating in this Research

Brownsville Public Utilities Board  
Massachusetts Division of Fisheries  
SA Water Corporation  
Tampa Bay Water  
Texas Commission on Environmental Quality  
West Basin Water Management District

### Related WE&RF Research

#### Project Title

#### Research Focus

**Salinity Management Guide: The Links Between Soil, Salt, and Recycled Water (WRRF-03-12)**

Promotes the use of recycled municipal waters instead of potable waters for irrigation of landscapes through education on various salinity management techniques.

**Development of a Knowledge Base on Desalination Concentrate and Salt Management (WRRF-07-02)**

Gathers, analyzes, and synthesizes information regarding municipal desalination facility decision-making needs and provides information on understanding concentrate management.

**Selection of Salt, Metal, Radionuclide, and Other Valuable Material Recovery Approaches (WRRF-10-09)**

Examines efforts aimed at recovering materials from aqueous solutions with the goal of recovering valuable compounds from desalination brine/concentrate streams. The report reviews and summarizes current literature on the extraction of metals, salts, and other valuable constituents; organizes information into searchable EndNote databases; determines the feasibility of valuable material extraction from desalination brine/concentrate; and summarizes relevant case studies where extraction was evaluated or performed.

**Desalination Concentrate Management Policy Analysis for the Arid West (WRRF-11-09)**

Reviews and analyzes regulatory and policy barriers to concentrate management (CM) involving several sources of technical, legal, economic, and policy expertise. Report includes white papers that examine policies and regulations for several western states, as well as Florida. Case studies of desal facilities and CM practices in the U.S. identify policies and regulations that inhibit and/or facilitate the development and use of brackish water desal in practice. Includes information from various U.S. utilities with regard to permitting processes to compare environmental issues, consistency, relative/approximate costs, sustainability, and timelines for development.

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