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Assessment of the Potential Presence of Chemical Contaminants in Water Produced by Desalination Systems

Principal Investigators: David L. Sedlak, *University of California at Berkeley*

Cash Contributors (in addition to the Bureau of Reclamation): State Water Resources Control Board (CA); Trojan Technologies

Objectives:

The primary objective of the project is to assess of the occurrence of contaminants posing risks to human health or aquatic organisms in water produced by desalination system when chlorine is used for seawater pre-treatment or for the disinfection of blends of desalinated water and water from other sources.

Summary of Findings:

Chlorine disinfection byproducts, including bromoform, brominated haloacetic acids, dihaloacetonitriles and bromophenols are produced during chlorine pretreatment in seawater desalination. The concentrations of disinfection byproducts exhibit spatial and temporal variability and cannot be predicted easily with aggregate water quality parameters such as total organic carbon. The concentrations of disinfection byproducts in reverse osmosis concentrate are comparable to those present in power plant cooling water and pose little ecological risk under normal circumstances. Some of the low molecular weight disinfection byproducts (e.g., the dihaloacetonitriles) are not completely removed during reverse osmosis. However, the concentrations present in desalinated water are usually below thresholds for human health concern. The elevated concentrations of bromide in desalinated water can alter the types and concentrations of disinfection byproducts produced when desalinated water is blended with organic-matter containing water from other sources.

Recommendations:

To make informed decisions about the use of chlorine, the designers and operators of desalination plants need to understand the potential risks that chlorine disinfection byproducts pose to water consumers and aquatic organisms. Research presented in the previous chapters has provided insight into some of the risks associated with the use of chlorine in seawater desalination plants.