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7-18-2006

# Advanced Concepts in Desalination

Thomas M. Mayer et al.  
*Sandia National Laboratories*

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Abstracts of presentations given on Tuesday, 18 July 2006, in session 1 of the UCOWR Conference.

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## Recommended Citation

Mayer et al., Thomas M., "Advanced Concepts in Desalination" (2006). 2006. Paper 105.  
[http://opensiuc.lib.siu.edu/ucowrconfs\\_2006/105](http://opensiuc.lib.siu.edu/ucowrconfs_2006/105)

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## **ADVANCED CONCEPTS IN DESALINATION**

**T. M. Mayer**, Sandia National Labs  
**R.W. Kottenstette**, Sandia National Labs  
**P.V. Brady**, Sandia National

The Advanced Concepts Desalination program at Sandia National Laboratories aims to increase the availability of fresh water through cost-effective developments in desalination technology, particularly for treatment of brackish ground water. The major obstacles to widespread implementation of desalination are the high energy consumption of current reverse osmosis (RO) technology, low recovery due to concentration of low solubility salts, and the limited options for concentrate disposal. In this talk we review a number of efforts initiated by Sandia to address these problems. Near-term projects focus on increasing fresh water recovery and concentrate management. An innovative hybrid RO-electrodialysis system isolates and removes sparingly soluble calcium salts from an RO concentrate stream, allowing recycling of the concentrate and additional water recovery. A similar concept uses an inter-stage precipitator to remove slightly soluble salts prior to additional RO treatment. Where deep well injection is the preferred method of concentrate disposal, geochemical modeling is being used to evaluate the compatibility and chemical stability of the concentrate with the disposal reservoir. Long-range R&D programs include development of high-efficiency nanostructured membranes for RO and electrodialysis that may substantially decrease the energy requirements for production of fresh water. New concepts in membrane module construction are being examined to make the best use of high efficiency membranes. New treatments for preventing and controlling membrane biofouling will increase the efficiency and lower the cost of operation of membrane processes.

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the US Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000.

Contact: Thomas M. Mayer, Sandia National Laboratories, [tmmayer@sandia.gov](mailto:tmmayer@sandia.gov),  
Geochemistry Department, PO Box 5800, MS 0754, Albuquerque, NM 87185-0754,  
505-844-0770, 505-844-0240