

Desalination Concentrate Management Policy Analysis for the Arid West



*Year 2013 Annual Underground
Injection Control Conference
January 22-24, 2013*



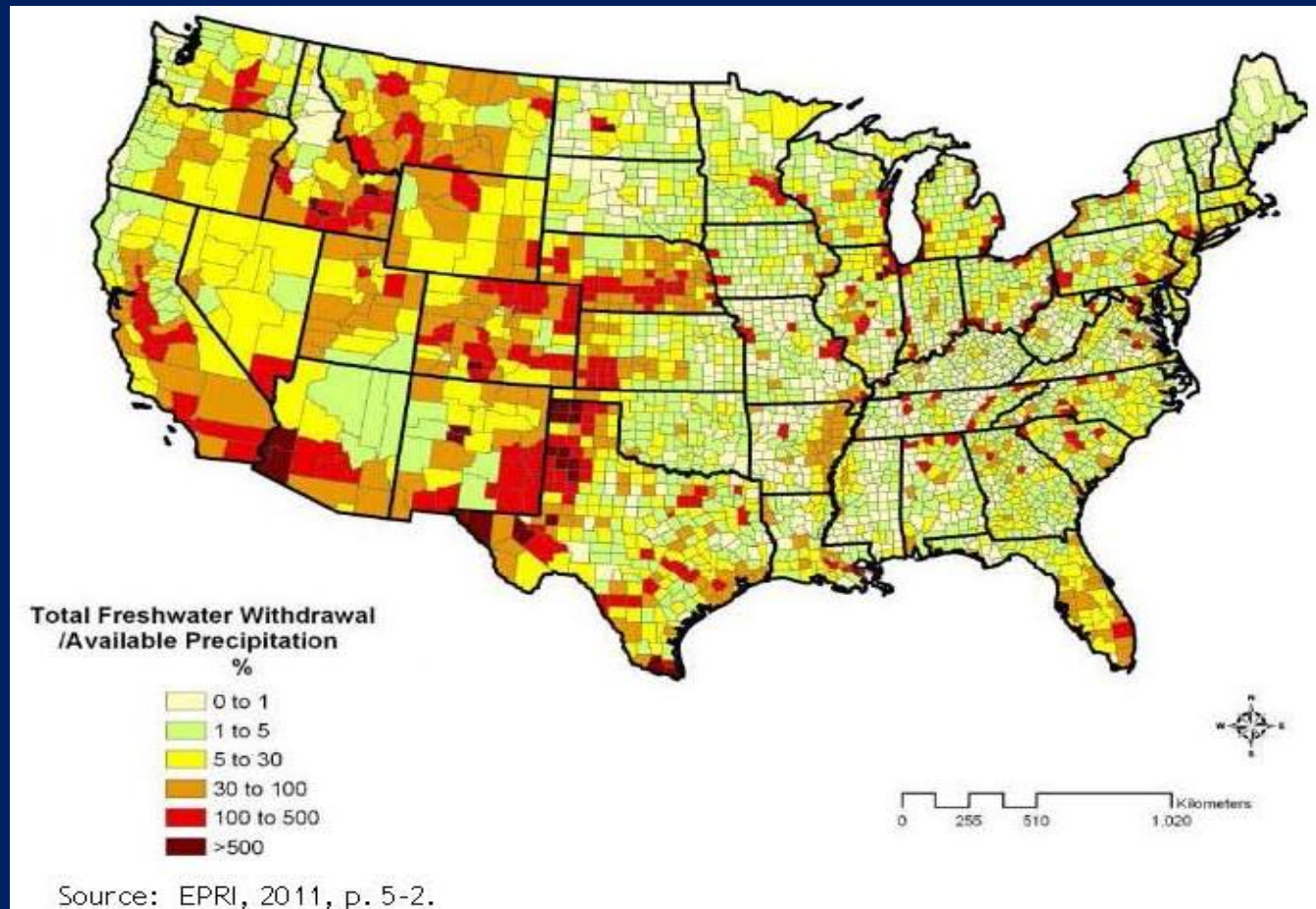
WateReuse Research Foundation
Project No. 11-09

Project Background/Orientation:

- Critical need for potable water in “Arid West”
- Massive, available resource in form of brackish water
- Reduction in costs for membrane treatment
- Series of Geographic Examples Follow:

Freshwater Withdrawals as a Percent of Available Precipitation (2005)

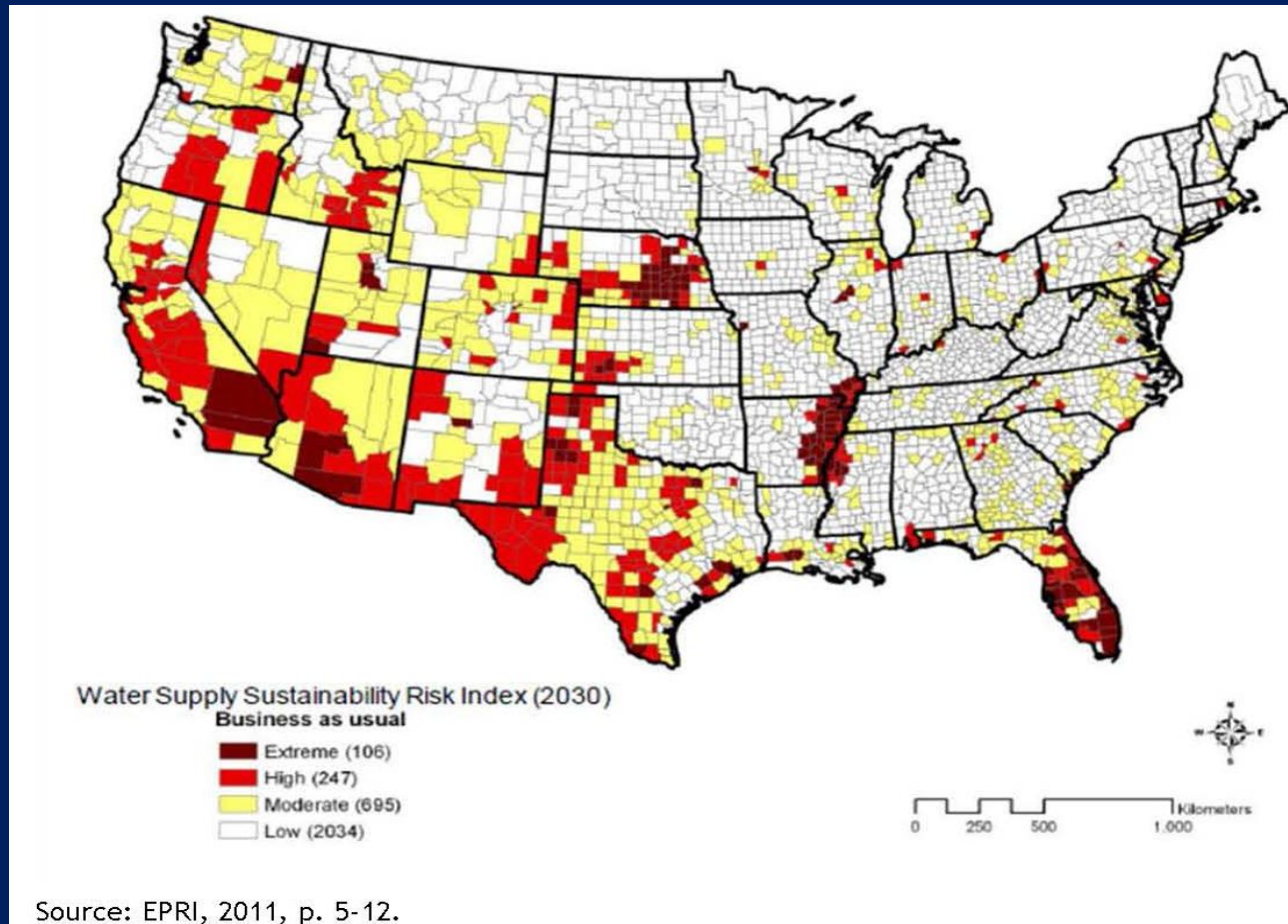
Map Source: Electric Power Research Institute



Water Supply Sustainability Risk Index, 2030 Projections

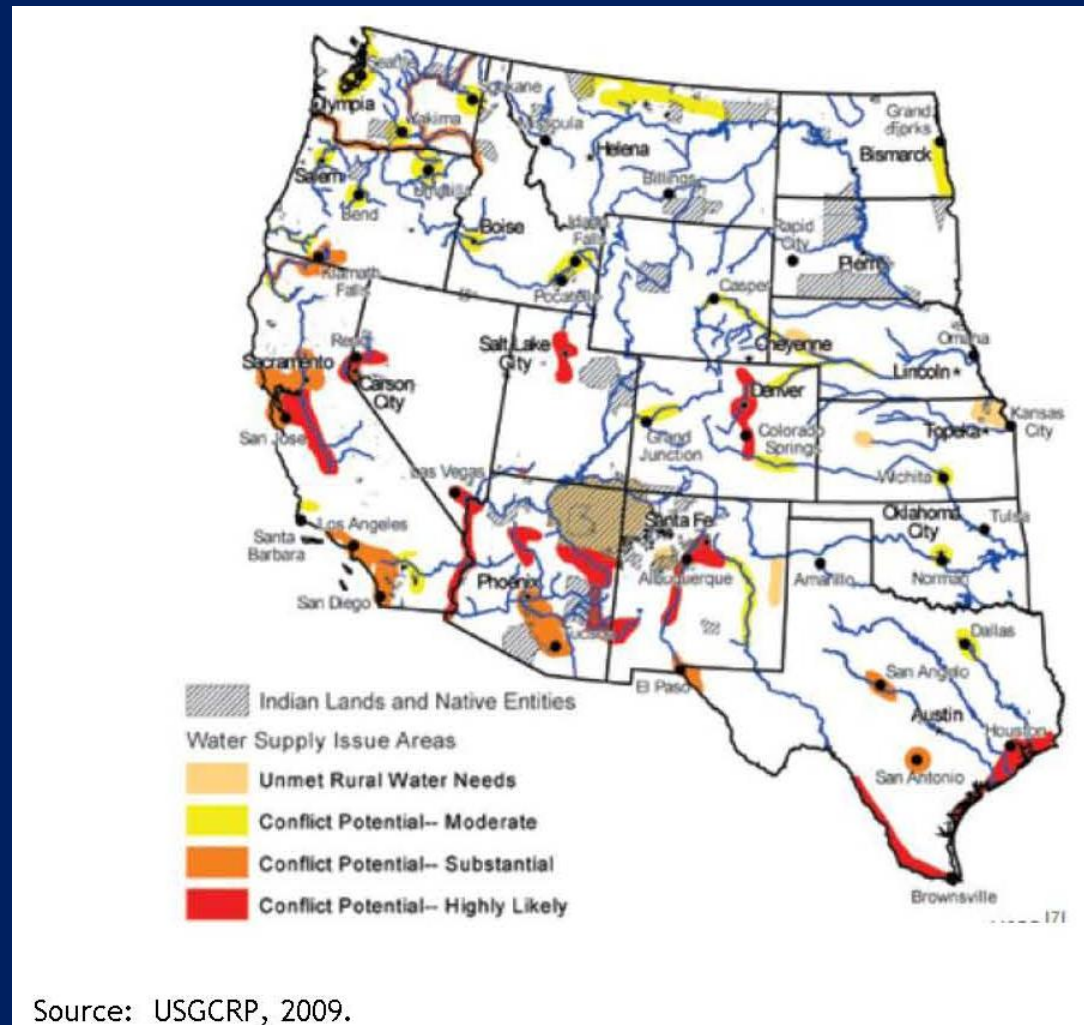
(Index accounts for renewable supplies, drought susceptibility, future demand)

Map Source: Electric Power Research Institute



Source: EPRI, 2011, p. 5-12.

Projection of the Potential for Water Supply Conflicts in 2025

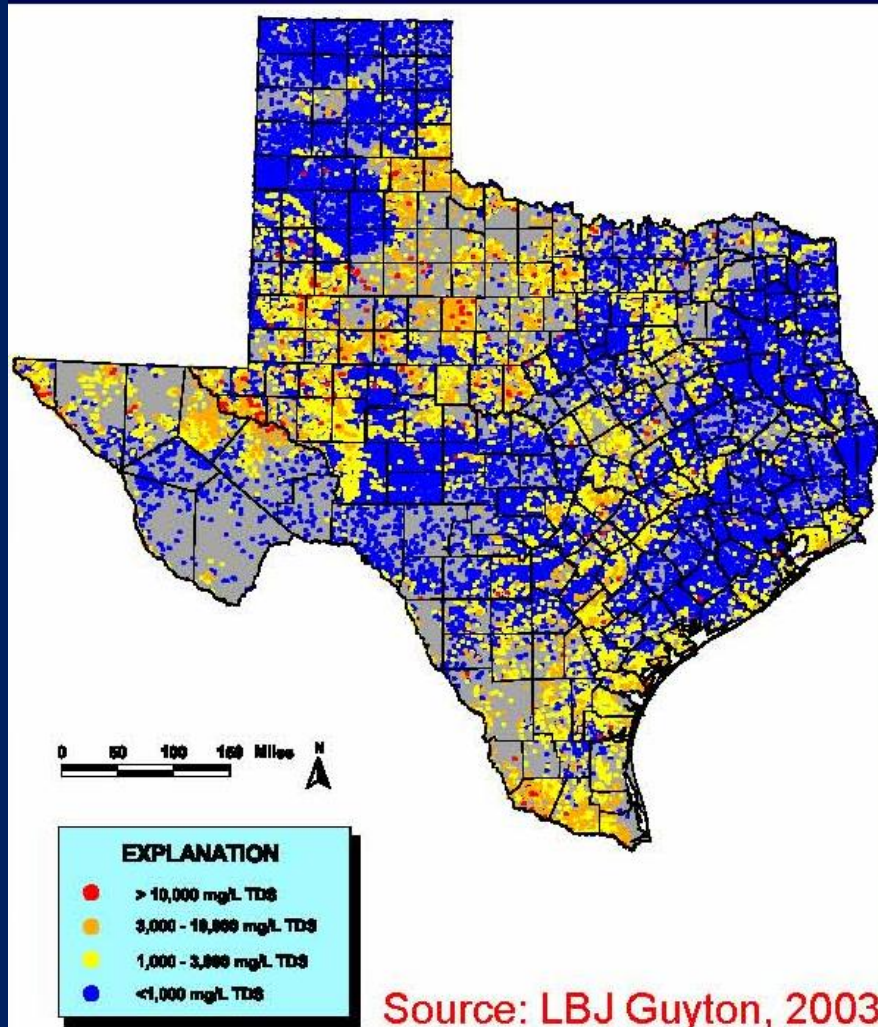


Source: USGCRP, 2009.

Considerable Brackish Water Available in TX

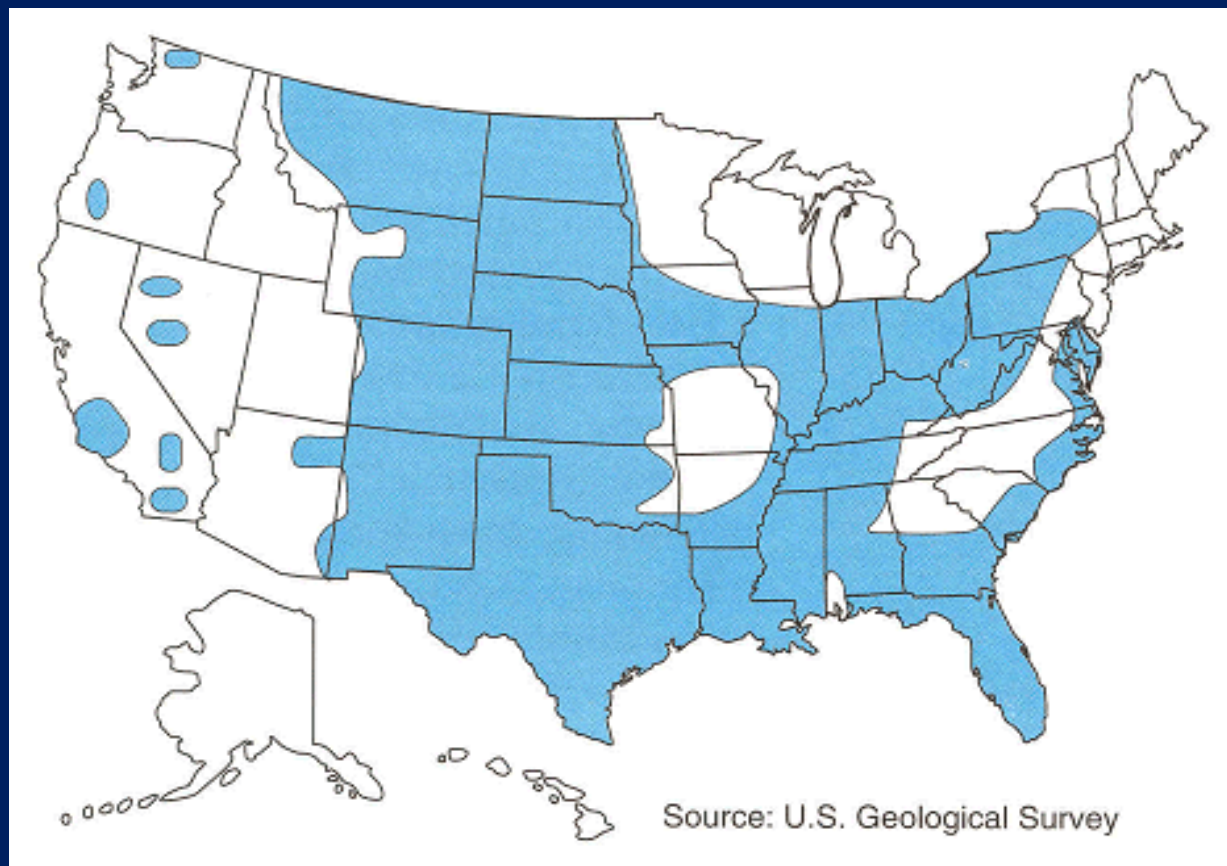
(Yellow & Orange indicates Brackish Groundwater)

Bureau of Economic Geology



- Abundant resource throughout the state often at shallow depths with reasonable well yield

Availability of Brackish Groundwater Resources in the United States (TDS < 3,000 mg/L)



List of Policy Barriers and Project Objectives

- Policy Barriers to concentrate management (CM) for inland desalination:
 - Regulatory and permitting practices vary from state to state, and are sometimes vague and uncompromising
 - Legal and institutional policies are often biased against some disposal options
 - Testing and permitting requirements may not be economical nor pertinent w.r.to proving site suitability
 - Not all states are amenable to some disposal options
- Project Purpose/Objective: Identify and evaluate potential solutions

Options for Inland Concentrate Management (CM)

- Surface water discharge
- Wastewater treatment plant/sewer
- Land disposal (land application)
- Evaporation ponds
- Deep well injection (DWI)
- High recovery (e.g., zero liquid discharge) and beneficial use

Options not generally viable for inland desalination in Arid West:

(unless *very small scale*)

- Surface water and sewer discharge
 - Inadequate dilution for NPDES permits
- Land application
 - Brine concentrations too high
- Evaporation ponds
 - Land area requirements and costs
 - Ultimate removal and disposal of solids
- Same constraints faced, to lesser degrees, in Florida and elsewhere (not just arid West)

Background Information on Deep Well Injection (DWI)

- Regulated under Underground Injection Control (UIC) program, per SDWA:
 - State primacy (the case for most States),
or
 - Regional EPA

Deep Well Injection: Class I

(Background Information-cont.)

- Municipal and Industrial wastes-generally fall into this Class, (as hazardous or non-hazardous categories)
 - *including desalination concentrate* and other Drinking Water Treatment Residuals
- Stringent requirements, including public hearings and participation
- There are less than 600 nationwide

Other Classes-Deep well Injection (Background Information-cont.)

- Class II: Oil and Gas
- Class V: Miscellaneous, non-hazardous
(EPWU's choice, reduced public participation requirement)
- Class VII-?? (possibly a new class for membrane concentrate-?)

Key UIC Barriers to DWI

(Background Information-cont.)

- Underground Source of Drinking Water (USDW)
 - Defined by TDS < 10,000 mg/L
- Lengthy and expensive permit process
 - Procedural and technical requirements
- Aquifer Exemption (AE) process
- Cost to EPWU for Entire Class V Permit and AE Process = Approx. \$1.5 million

High Recovery and Volume Reduction

(Most Methods are still experimental)

- Advantages:
 - Increases water yield
 - Reduces volume of concentrate
- Challenges and barriers:
 - High energy demand
 - High cost
 - Increases final brine concentration
 - Solids (and near solids) require disposal
 - Precipitation potential in DWI wells
 - Possible hazardous or radioactive waste

Overview of Tasks

Task 1: Identify national, state policies (completed)

Task 2: Develop case studies, issue papers
defining CM practices (completed)

Task 3: Define, evaluate existing regulatory
policy barriers to sound management
(in progress)

Task 4: Plan/Conduct project workshop (completed)

Task 5: Define potential solutions for Report
(in progress)

Task 6: Final report due -June 2013



Primary Project Team Members

- Stratus Consulting, Inc.-Lead Project Consultant
- Mike Mickley & Associates-CM Technical Specialist
- Bickerstaff, Heath Law Firm-Primary Legal Consultant
- UTEP-Consultant for New Mexico CM practices
- CHIWAHA Members- Project Research Investigators:
(EPWU, UTEP, NMSU, TX-AgriLife Research of TAMU, City of Alamogordo, NM)



Task 1: Evaluate Existing Policies

- Existing statutory authorities (e.g., SDWA, CWA, RCRA): U.S., states with primacy
(RCRA=Resource Conservation and Recovery Act)
 - Associated hurdles (inconsistencies, unintended consequences, etc.)
- Evaluated impact on: cost, feasibility, technology, uncertainty and timeline

Task 2: Develop Utility Case Studies and Issue Papers

Primary, Secondary Case Study Facilities:

- Primary: El Paso Water Utilities, East Cherry Creek Valley, CO, Alamogordo, NM and Vero Beach, FL
- Secondary: San Antonio and Brownsville, TX; Sterling, CO; and Norwood-Oeffler, FL
- All utilizing DWI except Alamogordo (evaporation ponds), and Brownsville (discharge to canal)



Task 2: Develop Utility Case Studies and Issue Papers (Continued)

Issue Papers:

- Inland desalting technically viable
- There is need, opportunity, and value
- Barriers to inland desalting:
 - Costs: declining, especially relative
 - Energy demands: growing efficiency
 - Concentrate (brine) management

Task 3: Describe Regulatory and Policy Constraints

- Technical assessment of impacts of specific regulations, policies, other institutional factors
 - Costs of concentrate management, and of providing brackish desalination overall
 - Technology selection and operational implications and impacts
 - Degree of environmental and public health protection (contrasted to alternatives)
- Legal and policy evaluation
 - Consistency with intent, precedent, other sectors, etc.

Task 4: Plan and Conduct Workshop

- October 25 - 26, 2012; EPWU TechH₂O Facility
 - Day 1: Review case studies, barriers and rank potential solutions
 - Day 2: Discuss policy implications and paths forward for promising solutions

Task 4: Plan and Conduct Workshop (Continued)

Participants:

- Research Grant Foundations - WRUF, WRF, WERF, TWDB (Including WRUF PAC members)
- Universities-UTEP, NMSU, TAMU
- Federal, State Regulatory & Water Agencies- EPA, TCEQ, NMED, AZ-DEQ, USBR
- Water Utilities-EPWU, SAWS, Brownsville, Sunland Park, Tucson, SNWA, E. Cherry Creek, WBMWD
- Project Team and Volunteer Consultants, Lawyers



Task 4: Plan and Conduct Workshop

(Continued)

Breakout Group Discussion Topics, First Session:

- Deepwell Injection (DWI) Issues under Class I of the UIC Program (2-groups)
- Alternative Options under the UIC Program (Alternatives to Class I, II, etc...)
- Concentrate Volume Reduction and Beneficial Reuse Methods
- Alternative Regulatory Policies, or Cross-Cutting Concepts

Task 4: Plan and Conduct Workshop (Continued)

Second Session

Breakout Group-Possible Solutions:

- **Priority No. 1:** Define a New Subcategory for DWI under Class V; improve definitions of USDW's, and aquifer "endangerment"
- **Priority No. 2:** Develop Uniform Guidance Tools to Issue Class I Permits addressing suitable geologic, injection, containment, chemical composition, public information and other concerns



Task 4: Plan and Conduct Workshop (Continued)

Second Session

Breakout Group-Possible Solutions (cont.):

- Priority No. 3: Develop a “General Permit” under Class I of UIC using Texas’ Model for States with Primacy; streamlined process—shorter public participation, limited State signature requirements
- Priority No. 4: Provide Primacy to States for Aquifer Exemption Program; avoids a second level EPA review



Task 4: Plan and Conduct Workshop (Continued)

Second Session

Breakout Group-Possible Solutions (cont.):

- Priority No. 5: Encourage advances in Concentrate Disposal, Beneficial Reuse using Incentive Processes; Competitions for Concept Designs and Pilot Demonstrations

Task 4: Plan and Conduct Workshop

(Continued)

Breakout Group - Third Session

Develop Practical Paths Forward:

- Address Current Limitations in Staffing at State and Federal Regulatory Agencies
- Improve Databases to Characterize Potential Disposal Sites and Respective Groundwater and Concentrate Qualities
- Identify and Organize a Broad Coalition of Interested Stakeholders with a Common Interest in Desalination and CM Policies to Work Together on Proposed Solutions

Task 5: Define Potential Solutions for Final Report

- Describe and evaluate solution options
 - Promoting consistency across locations, practices, and sectors
 - Providing adequate environmental protections
 - Aligning with legal framework (statutory intent and precedent)
 - Indicating potential cost savings, technical advantages, reduced timeline and uncertainty
- Team-wide (major input from legal and technical consultants, and CHIWAWA)

Task 6: Develop Reports

- Draft report: February/March 2013
- Final report: July 1, 2013





Questions?