Desalination in Texas

Jorge A. Arroyo
Texas Water Development Board
San Angelo, February 2004
Why desalination?

Different (complementing) views:

- Water development policy
- Regional water planning
- Hydrogeology
- Engineering

TWDB Desalination Program
The World’s Very First Desalination Facility
A more complex [practical] option
# Drinking Water Standards

<table>
<thead>
<tr>
<th>TDS Standard [Secondary]</th>
<th>Milligrams/liter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas Commission on Environmental Quality</td>
<td>1,000</td>
</tr>
<tr>
<td>United States Environmental Protection Agency</td>
<td>500</td>
</tr>
<tr>
<td>World Health Organization</td>
<td>500</td>
</tr>
</tbody>
</table>
Desalination
An alternative/complement to traditional (stressed) sources

R. Grande 2001

CCID#2-Intake-2004
Desalination Brings New Water
As a means to increase reliability of water supplies

Increasing vulnerability to droughts

Texas Statewide PHDI*
January 1900 - April 2003

*Palmer Hydrological Drought Index

National Climatic Data Center / NESDIS / NOAA
It is not a fad… we just haven’t needed it that bad.

Regional Percentages of Global Desalination Capacity(*)

- Middle East: 48%
- Asia: 12%
- Europe: 13%
- N. America: 17%
- Africa: 6%
- Others: 4%

6.8 BGD

(*) International Desalination Association, May 2000
## Desalination Costs

The costs of desalination keep decreasing

<table>
<thead>
<tr>
<th>Plant</th>
<th>Production cost [$/1,000 gal]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tampa Bay (USA)-25 MGD</td>
<td>$2.49</td>
</tr>
<tr>
<td>Point Lisas (Trinidad)-26 MGD</td>
<td>$2.67</td>
</tr>
<tr>
<td>Askelon (Israel) – 2X37 MGD</td>
<td>$1.99</td>
</tr>
<tr>
<td>Singspring (Singapore)–36 MGD</td>
<td>$1.60</td>
</tr>
</tbody>
</table>
Desalination in Texas

~367 miles of Gulf Coast
Desalination in Texas
~2.7 Billion ac-ft of brackish groundwater
## Desalination in Texas

<table>
<thead>
<tr>
<th>Plant</th>
<th>Capacity MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing TCEQ permitted capacity (100)</td>
<td>173 [40]</td>
</tr>
<tr>
<td>Corpus Christi-North Padre Island</td>
<td>1-5</td>
</tr>
<tr>
<td>Southmost RWA [BGW-RO]</td>
<td>7.5</td>
</tr>
<tr>
<td>Wichita Falls [BSW-RO]</td>
<td>15</td>
</tr>
<tr>
<td>Brownsville PUB/ Corpus Christi/ Freeport</td>
<td>25+ ea</td>
</tr>
</tbody>
</table>
Southmost Regional Water Authority
Brackish Desalination Plant
The Reverse Osmosis Process

Figure 2-3  Process flow diagram for the Dare County, North Carolina, North RO plant
Southmost Regional Water Authority
Brackish Desalination Plant
Southmost Regional Water Authority
Brackish Desalination Plant
Southmost Regional Water Authority
Brackish Desalination Plant
A Hardware Technology
Regional Water Facility Plans

<table>
<thead>
<tr>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q1</td>
</tr>
<tr>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
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</tr>
<tr>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q1</td>
</tr>
</tbody>
</table>

**PROJECT DEVELOPMENT:**

- **Facility Planning**
- **Federal/State Funded**
  - Env. Rvw/Permits
  - Engineering
  - Construction
- **Privately Funded**
  - Contract
  - T. Plant: Permits/design/construction
  - Transmission: Permits/design/construction

79th Session
80th Session

Regional Water Facility Plans
TWDB Research Activities

2003
Q1 Q2 Q3 Q4

2004
Q1 Q2 Q3 Q4

2005
Q1 Q2 Q3 Q4

RESEARCH:

Permit Roadmap

TWDB Funded

Product Water Desal.

CDT Verification

US BoR/TWDB Funded

Concentrate Disposal
[Oil/Gas well fields]

Charter RSC

Research Steering Committee

79th Session

TWDB-JAA 20