Please, Pass the Salt: Can the Oil Industry Benefit from Desalination Wastes?

TIPRO Mid-Winter Policy Meeting
Fort Worth, Texas
January 13, 2004

Jean-Philippe Nicot, P.E.
Bureau of Economic Geology
The University of Texas at Austin

Work done in collaboration with the Texas Water Development Board and funded by the U.S. Bureau of Reclamations
The Problem

- Texas population will likely grow from 21M in 2000 to 40M in 2050
- Despite conservation measures, demand for water will grow from 17M AFY in 2000 to 20M AFY in 2050
- Municipal water needs will increase from 4.2M AFY in 2000 to 7.1M AFY in 2050

Source: Water for Texas, TWDB, 2002
Water Use by Category

Source: Water for Texas, TWDB, 2002
Per Capita Water Use (year 2000)

Source: Water for Texas, TWDB, 2002
Uneven Predicted Water Shortage

- A water shortage can occur because of either limited amount or insufficient quality.
- The problem is or will be more acute in some counties/cities especially during droughts (municipal needs in El Paso County).
- Unconventional water sources are already considered and/or used (reuse of waste water, brackish water, sea water, produced waters) in addition to conservation and additional development of conventional sources (surface and ground water).
Counties with Unmet Needs in 2050

Source: Water for Texas, TWDB, 2002
A Solution: Desalination

• Desalination of brackish water / sea water is a drought-proof, mature technology

• Several cities have chosen desalination as a viable mean to fill their municipal needs (e.g., Fort Stockton, Sherman)

• Several plants are under consideration: El Paso, Wichita Falls, Freeport, Corpus Christi, Brownsville

• Current desalination municipal capacity is ~0.045 M AFY (~1% of demand), this produces a waste stream of ~5-10 M gal/day (to be compared to the more than 600 M gal/day of produced waters in Texas – 2/3 in the Permian Basin)
Current Desalination Plants in Texas

Desalination Plant Production
(Millions of gallons per day)

- 0 - 1
- 1 - 4
- 4 - 7
- 7 - 10
- 10 – 12.7

Ground Water
Surface Water
Cities

Note: map is incomplete and production numbers may include blending of the desalted stream with other water

Source: TCEQ, 2003
A Solution: Desalination

- Fate of concentrate is the biggest issue facing desalination (options include return to sea, evaporative basins, injection wells, disposal into surface waters or waste water stream)
- Class I Injection well applications are expensive and technically complex, but this is currently the only class allowed to accept desalination wastes
- Injection along with produced waters into Class II wells for pressure maintenance or for EOR could greatly simplify the process to the benefit of both parties
Opportunities for the Oil Industry

• Limit drawbacks of reinjecting produced waters (presence of suspended solids, oil droplets…)
• Reduce need for fresh water as make-up water and potential conflicts with other fresh water consumers
• Bring an extra source of revenue
Favorable Conditions

• We are entering an era where water is treated as a commodity

• Texas water laws give power to local governments (Groundwater Conservation Districts, municipalities) to manage water issues facilitating agreements with local oil operators
Potential Challenges

- Potential increased scale deposition, clay swelling and other compatibility issues but this is no worse than mixing waters from two different sources
- Consistent quality and quantity of the concentrate effluent
- Possible additional water handling material investment
- However, there is a history of using brackish waters and waste waters in waterfloods
Conclusions

• Current desalination waste stream accounts for less than 1 percent of state-wide produced water volume. It may grow in the future to a few percents
• There is no technical difficulty in injecting desalination waste along with produced waters
• Additional revenue is created
• A case by case evaluation of benefits and suitability is needed
Contacts - Information

- Sigrid Clift, BEG, Austin, TX: 512 471- 0320
- JP Nicot, BEG, Austin, TX: 512 471- 6246
- Ali Chowdhury, TWDB, Austin, TX: 512 936 - 0834

- Web sites, regularly updated, to visit:
  - [http://www.twdb.state.tx.us/desalination/Desal/Index.asp](http://www.twdb.state.tx.us/desalination/Desal/Index.asp)
  - [http://www.beg.utexas.edu/environglty/grndwater/index.htm](http://www.beg.utexas.edu/environglty/grndwater/index.htm)
Questions, Comments?

“…..And we must not only improve water conservation, but desalinate the saltwater that splashes upon our coast each day.”

Governor Rick Perry
State of the State Address
February 11, 2003