I. Advanced Membrane Desalination of Brine Produced during Oil and Gas Production.

II. New Cleanup Agents for Membranes used in Produced Brine Desalination

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DOE/PERF Project Review Annapolis MD, November 2005

A&M Desalination Programs

Goal of the GPRI Program

to develop cost effective methods to desalinate oil field brine.

Goal of the Texas Water Resources Institute

to develop fresh water resources from unconventional sources.

Funding for Desalination Programs

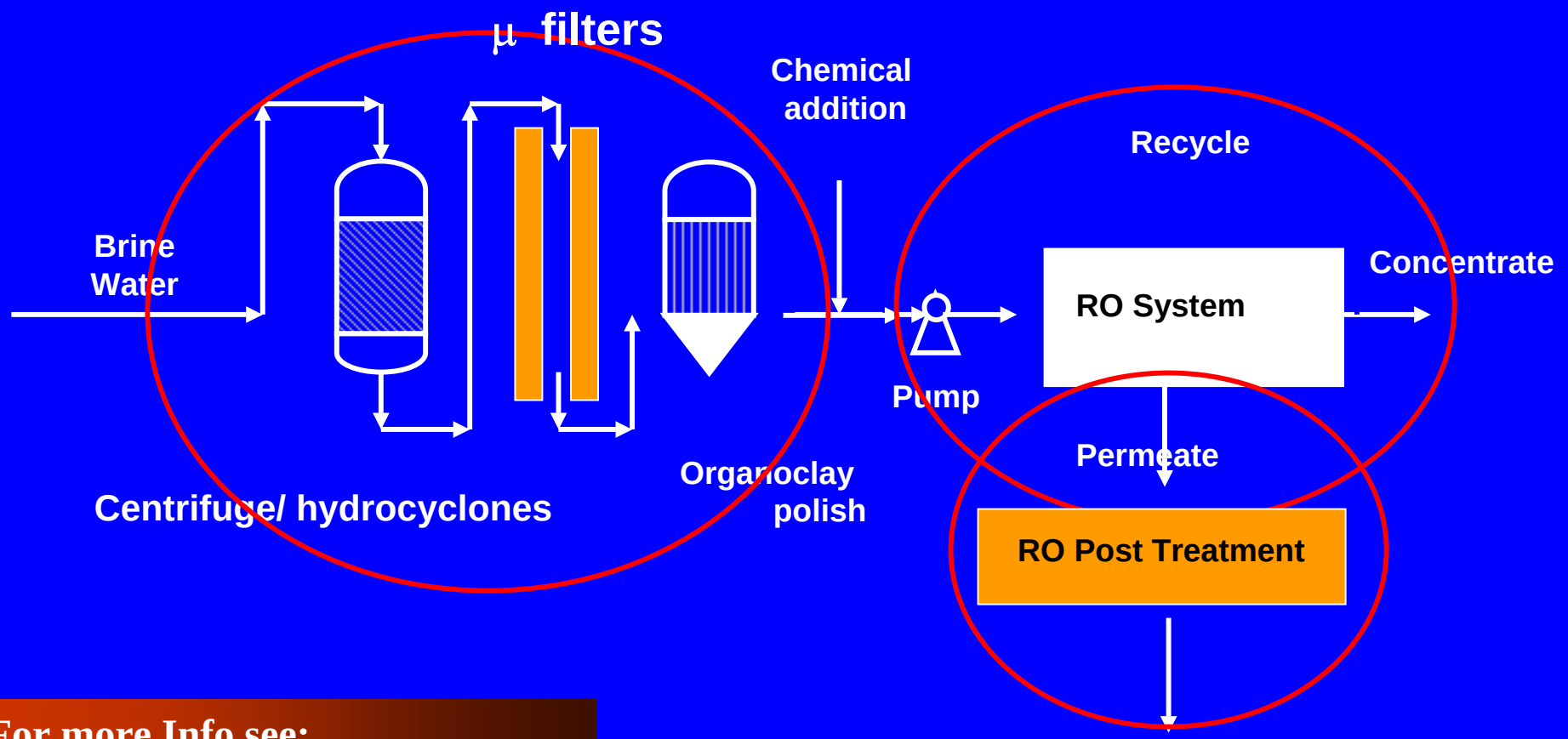
Department of Energy ~$500,000	2004- 2006	70% completed
Industry ~$500,000	2003 – 2006	70% completed
State of Texas ~$100,000		
NGO ~$40,000		

For more Info see: http://www.twri.tamu.edu/

Membrane Treatment of Oil Field Brine

- *New Types of Pre-Treatment and Reverse Osmosis Desalination provide cost effective fresh water resources.*
- *Membrane treatment can be used to recondition fracturing brine so that it can be re-used in other well stimulations.*
- *New Types of Cleanup Agents can Sustain Membrane Filtration Efficiency*

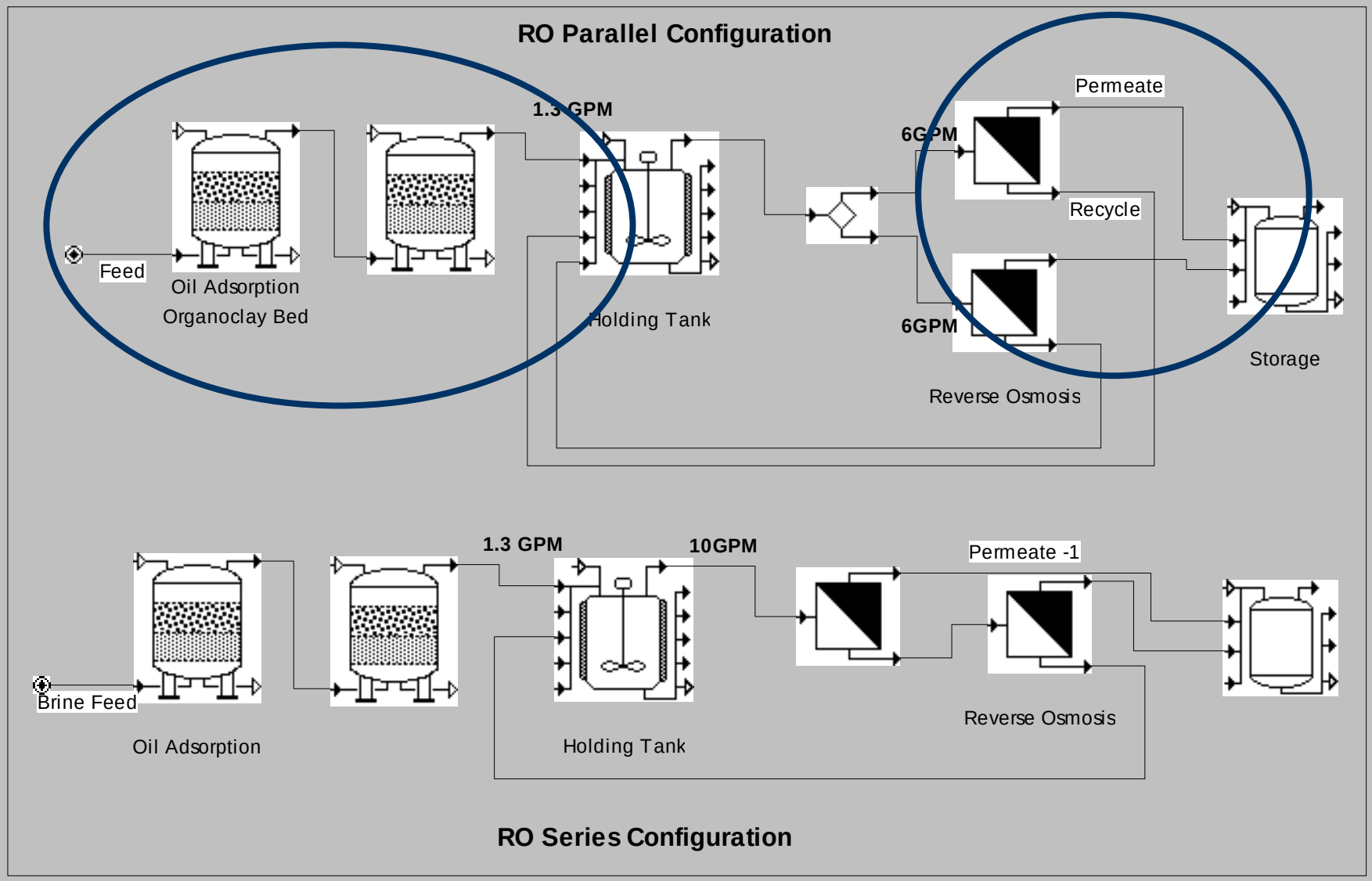
Desalination Process



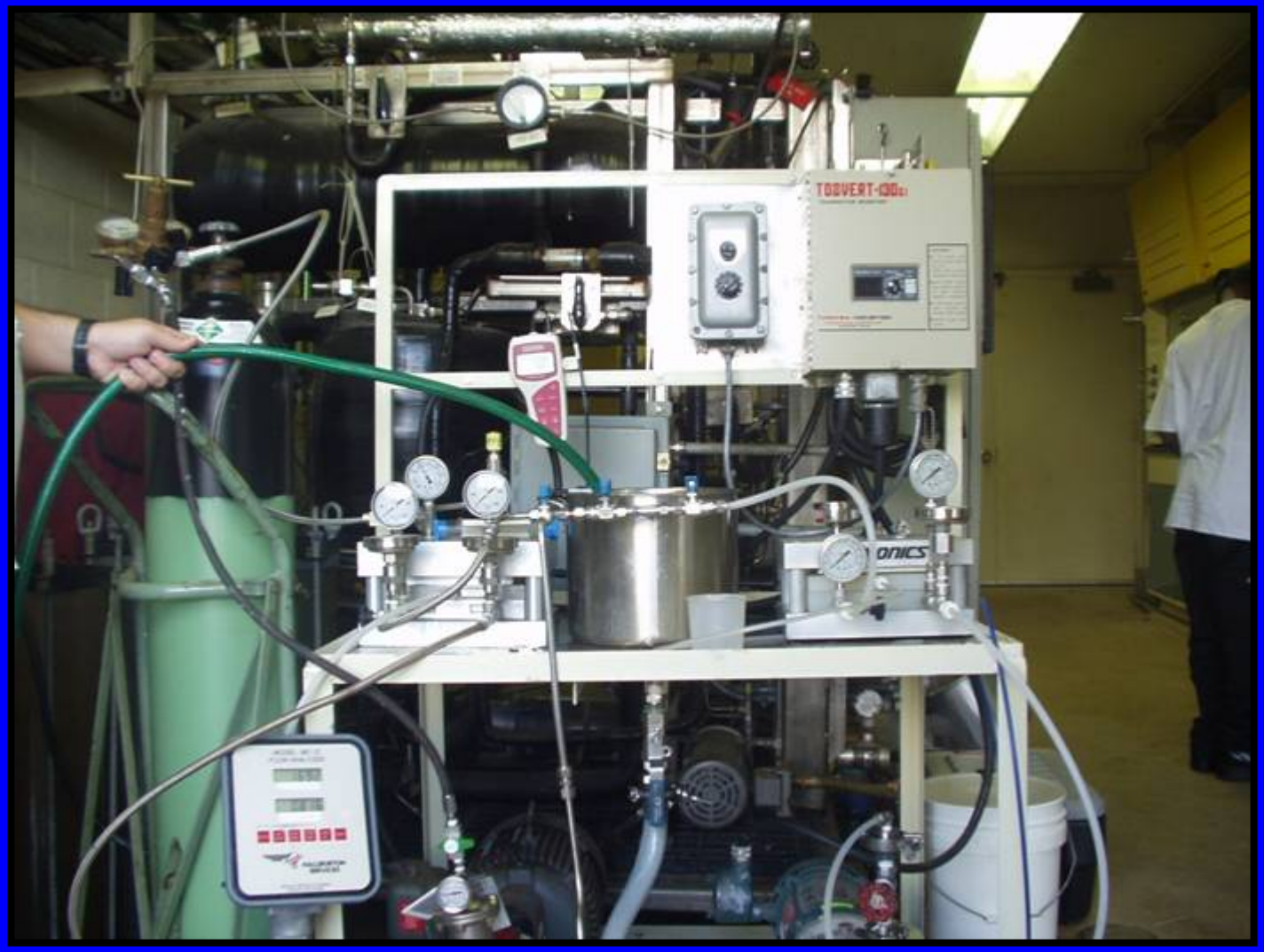
For more Info see:

http://www.gpri.org

Remote Operated, Coupled Unit Operations



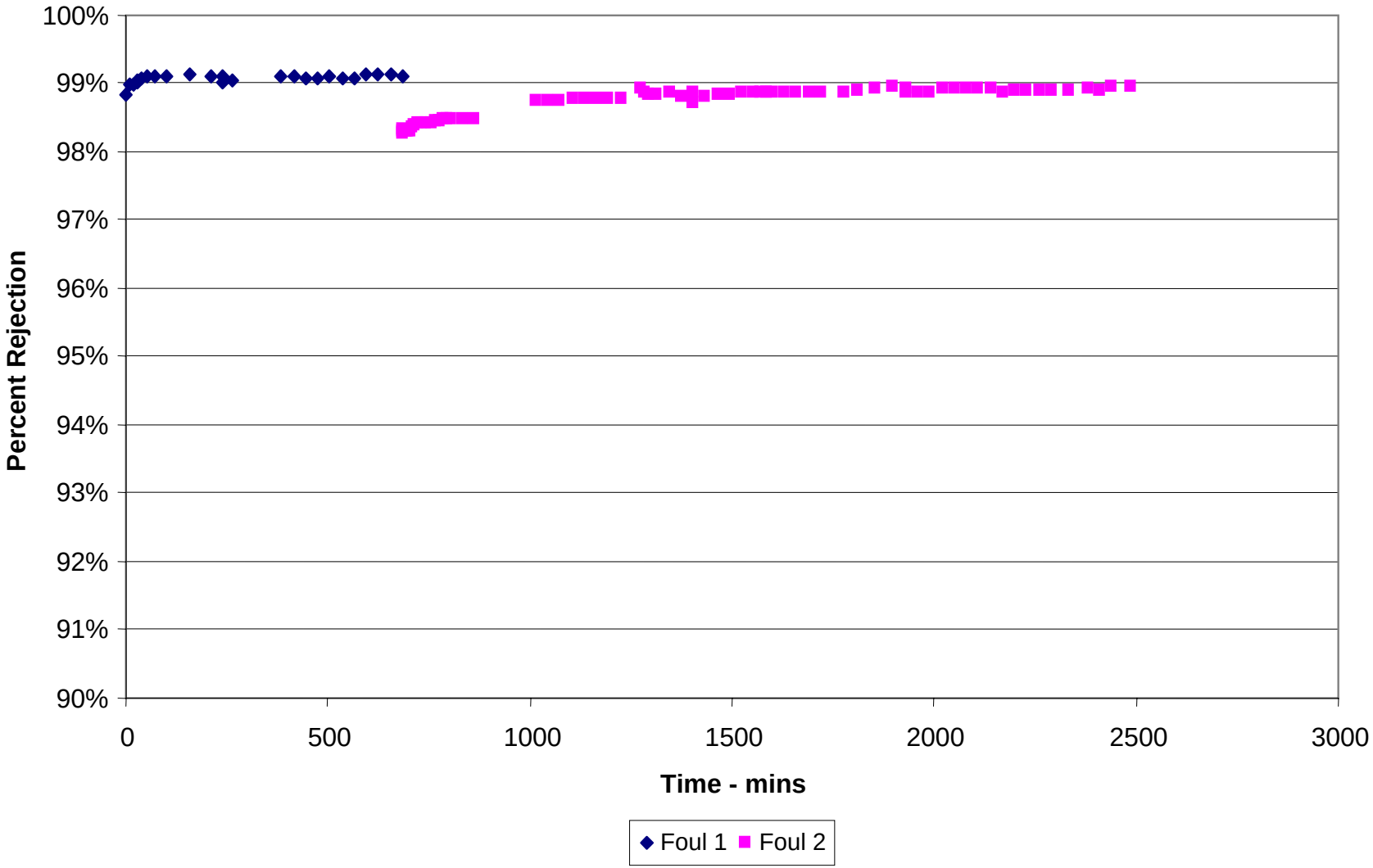
Small Cell Testing to Evaluate Membrane Cleanup Agent Performance



Results

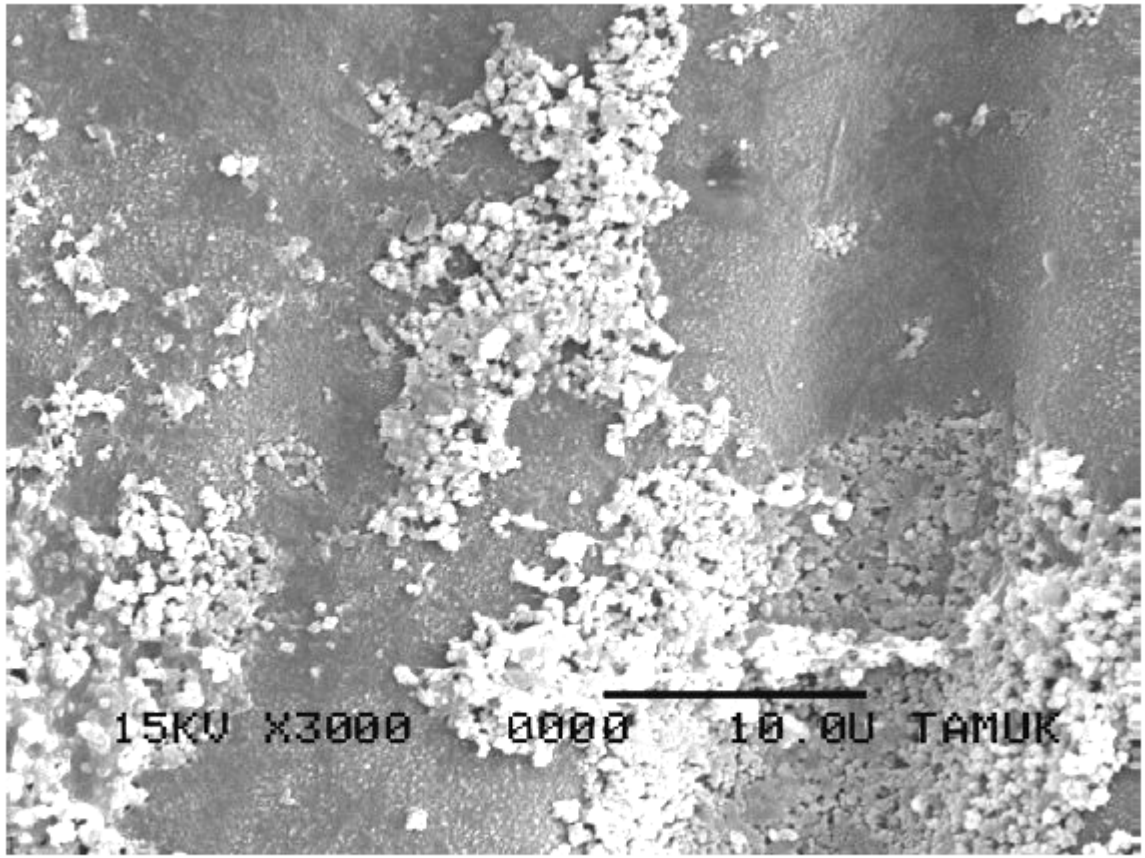
Percent Salt (TDS) Rejection vs. Time for Fouling Test for the Selected Membrane J

(Selected Operating Pressure = 550 psi and Operating Flow Rate = 10 gpm, 12500 ppm TDS Produced Water)



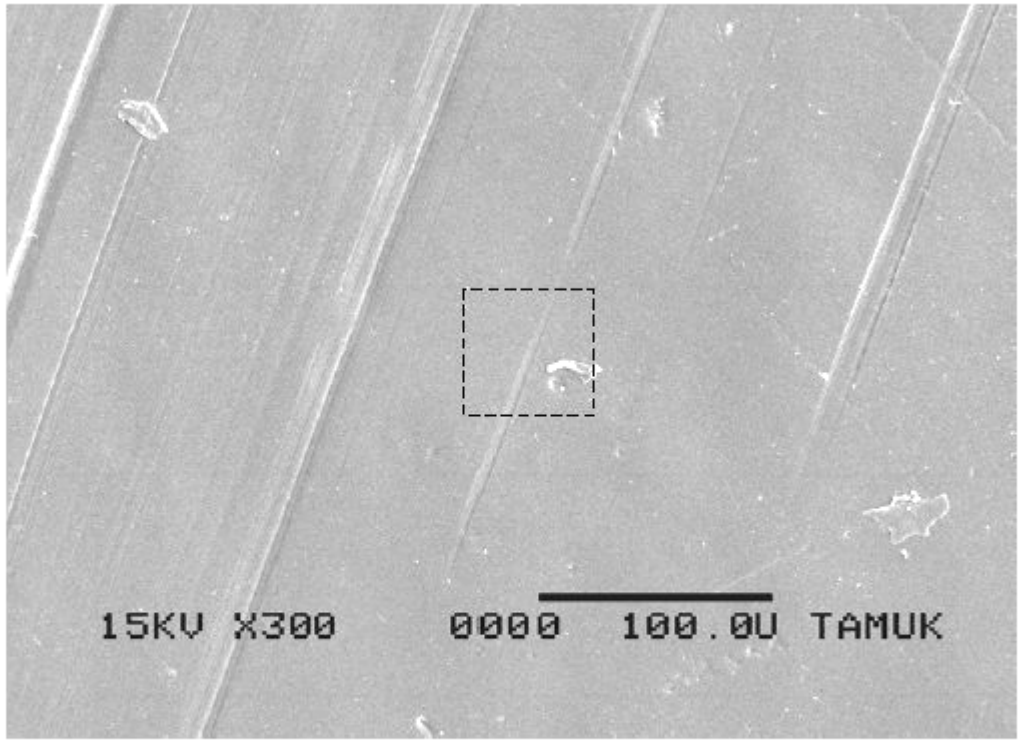
Results

size.



The micrograph below is for your "AKE" fouled membrane at 3000X magnification. This membrane did not appear to have significant fouling.

Results



The micrograph below is of the same "BL" membrane at 3000X magnification centered at approximately shown by the dashed box above.

Modified Koch Membrane Unit

Desalination Rig at Denton Creek Test Site

Test Field Operations in North Texas

Burlington Resources performs water fracs in the Barnett Shale using water from the Trinity River.

Demonstration units being used to treat the frac water for re-use.

For more info see:

www.mcog.org/ barnettlinks.html

Water Hauling Costs are Greater than Desalination Costs

Benefit & Need

Water Disposal costs are ~ $35 per 1,000 gal in Wise County Texas.
Permian Basin Disposal Costs from $25 to $40 /1,000 gal.

Trucks Unloading at Denton Creek

A&M Brackish Ground Water Desalination with Concentrate Disposal into Oil and Gas Fields

- *Reverse Osmosis desalination of brackish ground waters offers "drought proof" water resources for West Texas municipalities.*

Texas A&M Desalination: Who We Are

- *Texas A&M University System*
  - Texas A&M Engineering (TEES)
  - Texas Water Resource Institute (TWRI)
  - Intl Agriculture Program
  - Global Petroleum Research Institute (GPRI)
  - Food Protein Science Separation Pilot Plant

- *State and Federal Partners*
  - Texas Railroad Commission (TRRC)
  - Texas Water Development Board
  - Texas Department of Agriculture
  - U.S. Department of Energy
  - U.S. Environmental Protection Council
  - U. S. Department of the Interior (BLM)

Funding

Thank You to

Texas A&M University Desalination Project

Acknowledgements

GPRI Sponsoring Companies ($500,000)

- BP
- Burlington Recourses
- Key Energy
- Tarlton Mfg.
- Total

Contractors

- Polymer Ventures
- Costner Industries Texas

Agencies ($600,000)

- Texas Water Resources Institute
- Ground Water Protection Council
- Texas Railroad Commission
- Stripper Well Consortium
- NYSERDA
- U. S. Department of Energy