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The Petroleum Recovery Research Center is a division of
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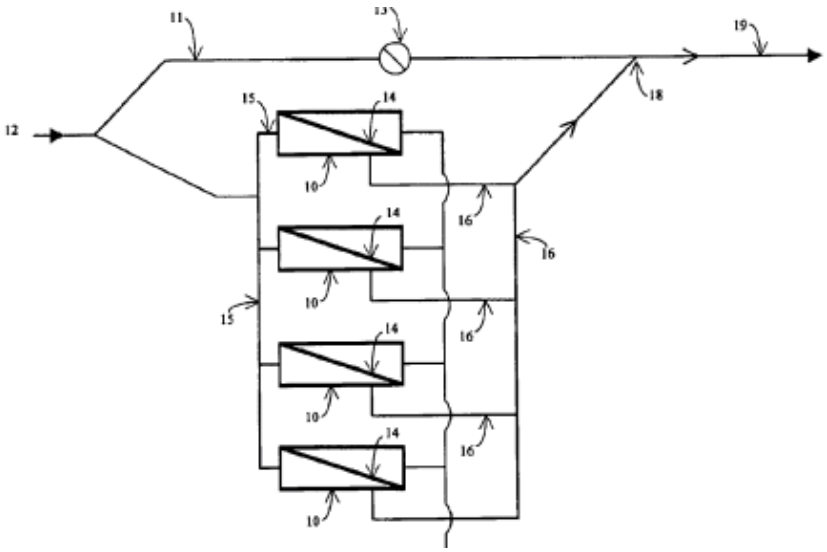
New Patent for PRRC Emeritus



This embodiment (Fig. 2) of US 6,905,504 is meant for immediate use with ready-made RO units adapted as described in the patent.

The appearance of US 6,905,504 on June 14, 2005, "Method of Converting Feed Water to Fresh Water," marked a special occasion at the PRRC, representing the culmination of several years of research and study by Dr. Joseph J. Taber, PRRC Director Emeritus. The process claimed by this patent uses existing water pressures and high flow rates of waterfloods to produce fresh water by reverse osmosis, for minimal operating costs and with no disposal problems. With this process, operators could adapt off-the-shelf RO units for immediate application in their waterfloods, as shown in the embodiment represented by Fig. 2 (above).

The device pictured in the patent's Fig. 1 hasn't been built yet, but Dr. Taber and the New Mexico Tech Foundation, who owns rights to the patent, hope that a manufacturer can be found to correctly fabricate the flanges needed. There are several different embodiments but the envisioned best application would be to install the RO unit in the line, right in the water injection pipe going to the injection well. Dr. Taber and PRRC hope that this process will be useful in New Mexico oilfields.

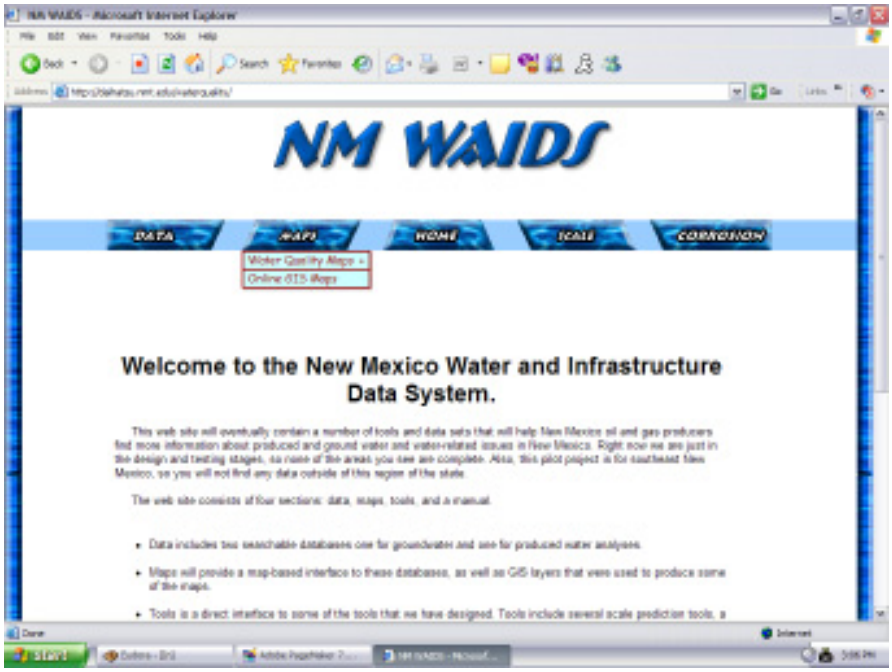
Instead of simply publishing his findings, the patent was sought, says Dr. Taber, because "a patent seems to lend a certain credibility that publishing a paper in a journal doesn't." He has been interested in RO for many years—while lecturing on CO_2 flooding (he is an expert in this field) he thought of water under pressure in oilfield waterfloods: why not use the existing pressures in the brackish/salty waters for RO processes? "Once I started looking at this," he says, "I realized there were two other significant benefits. First, you could employ the high flow rates often found in waterfloods to sweep the membranes clear of the salts that normally accumulate there. Second, this new method would get rid of all the usual waste disposal problems that are almost always a part of RO systems." All reject water is injected to recover oil.

From concept to patent took about 10 years, although Dr. Taber was not engaged in patent research during all that time. This is his ninth patent—and the first to bear his name alone as the inventor. Dr. Taber calls it, "the most difficult of my patents." (The rest were filed while he was working for Gulf Oil). "The first ones were easier, not just that I was much younger, but because many people at Gulf provided advice and assistance—especially Gulf's patent lawyers, who did all the application work. Perhaps," he adds, "patent examiners have made life more difficult in the last 40 years, because in this case, we had to answer many more objections raised by the patent examiner."

Although this patent could have ramifications for waste disposal, Dr. Taber's future plans do not include any new patents that are in the works right now. He wants to get back to writing his book, whose working title, he says, is *Injecting the Right Stuff for Maximum Oil Recovery*.

The patent may be obtained by anyone from the U.S. Patent Office website at http://www.uspto.gov/. Dr. Taber welcomes questions or comments on this useful research that he has pursued into the sixth decade of his scientific career. He may be contacted through the PRRC's Publications Office, 505-835-5406, or lizb@prrc.nmt.edu.

NM WAIDS Now Online at PRRC



Entry page for the NM WAIDS website, which offers tools and data to help operators with regulatory and management decisions.

The New Mexico Water and Infrastructure Data System (NM WAIDS) is now online at http://octane.nmt.edu/waterquality/. This DOE-funded project, completed May 2005, aims to alleviate a number of produced water-related issues in southeast New Mexico. The concept for the project was generated by discussions with New Mexico oil and gas producers that revealed a number of water-related problems and issues that they had to deal with daily.

The Industrial Services and Outreach Group (ISOG) of the PRRC, led by PI Martha Cather, designed and implemented a Geographical Information System (GIS) and integral tools to provide operators and regulators with necessary data and useful information to help them make management and regulatory decisions.

NM WAIDS has already become a research tool for first-look assessments of where various methods might be most appropriately applied. Partly as a result of the availability of this data, a number of companies have become quite active pursuing more beneficial and environmentally-sound methods of using produced water.

The NM WAIDS site offers:

- A water quality database containing over 7000 entries of produced water chemistry and 30,000 entries of groundwater data, including formations, depths, and chloride/total dissolved solids (TDS) for New Mexico for produced water analyses from a variety of sources.
- A web site allowing users access to this data via both text- and map-based queries, using a GIS database and map server to integrate and display data from several sources. The web interface also allows users to move between this web site and other GO-TECH web sites devoted to production data and state land information.
- An easy-to-use, web-based scale prediction tool that can run from user input data. The user can also select samples from the water analysis database and input the data into the tool.

Efforts continue to collect produced water quality information from operators in southeast New Mexico. Other ongoing project activities include corrosion education in the region through operator visits, compilation of both hard copy and online corrosion toolkit material, improvement of the integrated web and GIS interface for all the information collected (including data from northwest New Mexico), and the continued development of a fuzzy logic spill risk assessment tool (FRAT) that was initially developed prior to this project.

A CD for NM WAIDS, containing the databases, a GIS viewer, and instructions for use, is also available for $40.00 from the PRRC Publications Office (835-5406, or email lizb@ prrc.nmt.edu).

PTTC
Technology Connections
Southwest Regional Lead Organization

Production Data: Collecting It and Using It!—Midland, March 1 and Farmington, March 17

This joint workshop with Texas PTTC featured survey results of the methods being currently used by more than 30 operators to capture field production data. Other presentations included an overview of production accounting software; digital technology to capture production data; and new technologies to optimize well and field production data.

Horizontal Drilling: Updates on the Permian Basin—Midland, May 12

Another joint workshop with Texas PTTC Region drew more than 100 attendees. The workshop featured case studies and updates of several Permian Basin fields, horizontal drilling in the Texas Permian Basin, horizontal well stimulation, and a horizontal waterflood pilot in Oklahoma.

Hydraulic Fracturing: Measurement, Characterization and Analysis—Farmington, June 21

Dr. Jennifer Miskimins of the Colorado School of Mines presented this workshop, which covered recent advances in hydraulic fracturing techniques and how to use them to characterize the producing reservoir. The basics of hydraulic fracturing and the complexities of treatment design and analysis were covered in this one-day workshop. Special issues such as non-Darcy flow, G-function analysis, and "mapping" techniques were also reviewed, and case studies were presented.

NOTE: Proceedings CDs for the Horizontal Drilling workshop and Frac workshop workbooks are still available: call 505-835-5406 or email lizb@prrc.nmt.edu

Publications, Presentations

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Balch, R.: "Risk Reduction with a Fuzzy Expert Exploration Tool", Final Project Review Presentation, Tulsa, DOE/NETL Office, April 20, 2005.

Balch, R., Ruan, T. and Schrader, S.: "Fuzzy Expert Systems in Oil Exploration," presented at the SIAM Conference on Computational Science and Engineering, Orlando, FL, Feb. 12-15, 2005

Cather, M.: "NM WAIDS: A Produced Water Quality and Infrastructure GIS Database for NM Oil Producers," Contract No. DE-FC26-02NT15134, U.S. DOE, Final report (May 2005).

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Creek, J.L., Gonzalez, D., Wang, J.X., Muhammad, M., Chapman, W., Hirasaki, G.J., and Buckley, J.S.: "Effect of Synthetic Oil-Based Drilling Fluid Contamination on Asphaltene Stability," presented at the 6th International Conference on Petroleum Phase Behaviour and Fouling, Amsterdam, June 19–23, 2005.

Engler, T.W.: "Capturing Missed Reserves in Existing Wells," *GasTips*, Vol 11, No. 3, (Summer 2005), pg 24-27.

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Grigg, R.B.: "CO_2 Sequestration Storage Using Petroleum Industry Experience in CO_2 Flooding," presented at the AUG Chapman Conference on the Science and Technology of Carbon Sequestration: Verification and Assessment of Natural and Deliberate Carbon Sinks, San Diego, Jan. 16–20, 2005.

Gu, X., Zhang, J., Dong, J., and Nenoff, T: "A Platinum-Cobalt-Loaded NaY Zeolite Membrane for Nonoxidative Conversion of Methane to Higher Hydrocarbons and Hydrogen," *Catalysis Letters*, 102, 1-2 (2005), 9–13.

Gu, X., Dong, J., and Nenoff, T: "Synthesis of Defect-Free FAU-Type Zeolite Membranes and Separation for Dry and Moist CO_2/N2 Mixtures," *Ind. Eng. Chem. Res.,* 44 (2005), 937–944.

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Ruan, T., Balch, R., and Schrader, S. : "A Fuzzy Expert System for Oil Prospecting in the Lower Brushy Canyon of Southeast New Mexico," presented at the 2005 IEEE International Conference on Information Reuse and Integration, Las Vegas, Nevada, August 15–17, 2005

Ruan, T., Balch, R., Schrader, S. and Hart, D.: "A Web-Based Fuzzy Ranking System and Application," presented at the 9th World Multiconference on Systemics, Cybernetics and Informatics, Orlando, FL, July 10–13, 2005

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Schrader, S., Balch, R., and Ruan, T.: "Using Neural Networks to Estimate Monthly Production: A Case Study for the Devonian Carbonates, Southeast New Mexico," paper SPE 94089 presented at the 2005 SPE Production and Operations Symposium, Tulsa, April 17–19.

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Zhang, J.: "Investigation of the Effect of Parameters on Production Performance with Multilayered Low-Permeability Conceptual Model," M.S. Thesis, New Mexico Institute of Mining and Technology, Socorro, NM (May 2005).

Zhang, Y., et al.: "Cleaning Cores after Contamination with Synthetic Oil-Based Mud Components," (Apr. 2005) Petroleum Recovery Research Center Internal Report, PRRC 05-04.

Don't Miss This September Workshop

Coming up: "Introduction to Mining the Internet: Using Free GIS Data and Low Cost Software for the Oil & Gas Professional," Sep 13, Midland and Sep. 15, Farmington. See the GO-TECH website at www.octane.edu for details and a link to online registration, or call Sigrid Klift at 512-471-0320.

CO_2 Phase II Project Awarded, Starts in October

In June, the US DOE announced the award of "SW Regional Partnership for Carbon Sequestration, Phase II," to New Mexico Tech. Dr. Brian McPherson, head of the PRRC CO_2 Sequestration Group, is PI for this $17.8 million, four-year project, of which $2.3 will go to NMT as the lead organization. Partners represent a variety of energy-related entities in six states. Industry partners include KinderMorgan, Burlington, and Resolute Natural Resources. Phase II will perform validation tests of the most promising sequestration technologies for the Southwest Region, including three geologic pilot tests and two terrestrial pilot test programs.

PRRC

Petroleum Recovery Research Center
A Division of New Mexico Tech

The PRRC is a state-supported center that conducts research designed to improve methods of recovering crude oil and natural gas and that transfers petroleum technology to domestic oil producers. Funding for the PRRC comes from three sources: the State of New Mexico, the federal government (Department of Energy), and private industry.

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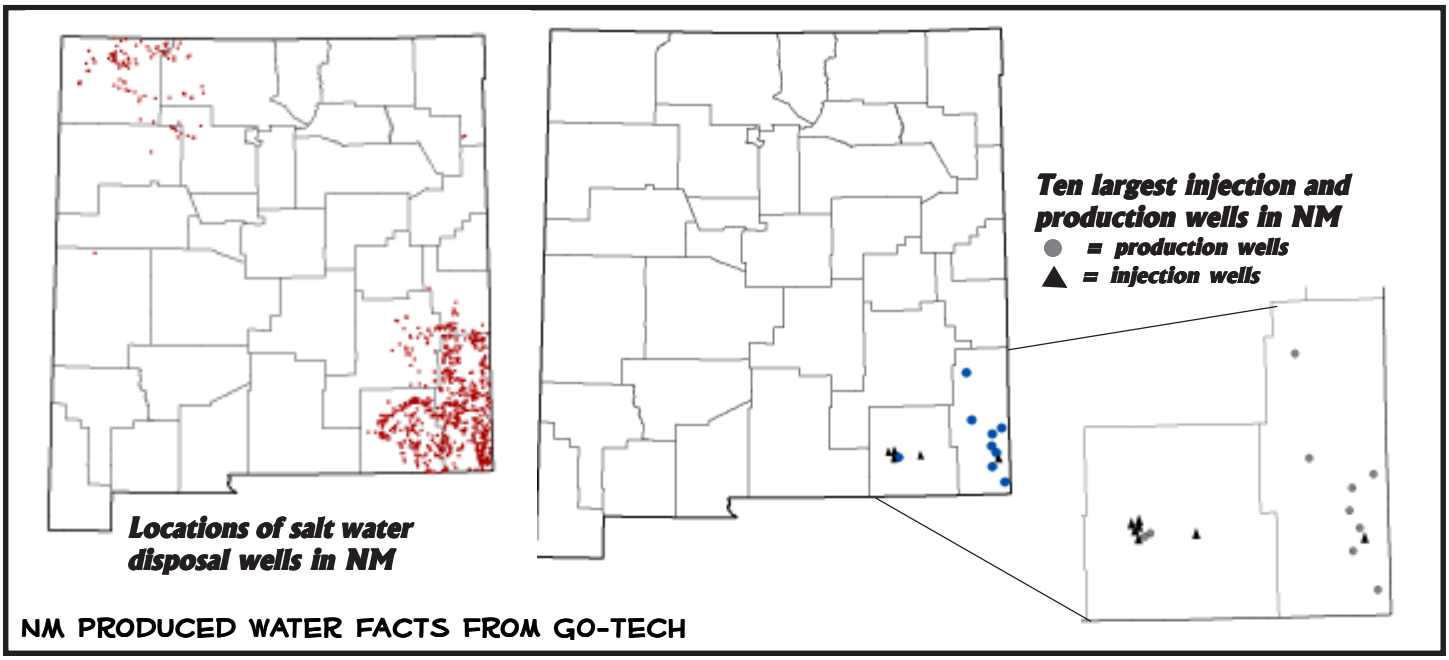

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