Co-inventors Helmuth Heneman, NRG President, and Patrick Brady (right), Sandia Senior Scientist, discuss well core analysis.

Recipes Extract More Oil from Wells While Using Less Water

"Sandia's timing of this remarkable contribution to the cost competitiveness of America's oil industry could not be more fortuitous."

— Helmuth Heneman

President
NRG Systems, Inc.

CHALLENGE

Although over 3 million barrels of oil per day is being produced from hydraulically fractured "tight" formations (low permeability rocks), this represents only about 6% of the oil in the formations. With the high cost of drilling, the high consumption of water used in the process, and the recent drop in oil prices, new ways of extracting more oil from each well are needed to make these wells economically viable.

PARTNERSHIP

Sandia National Laboratories' work in enhanced oil recovery attracted NRG Systems (www.NRGsysinc.com), a small veteran-owned company established in 1989 that provides technology development solutions for the global energy industry.

Working together, Sandia can focus on the science while NRG contributes ideas about how to improve the methods being tested to meet the needs of the market. Refinement and validation of these new ideas continues in the lab while plans are made for field testing and commercial introduction.

A Commercialization Agreement between NRG and Sandia was negotiated up front, securing NRG's commercial rights to joint intellectual property (IP) developed under a CRADA. In addition to the Commercialization Agreement, NRG has licensed two pieces of Sandia's IP. And two additional patent applications resulting from collaboration under the CRADA have been filed so far.

SOLUTION

By working out the forces that bind hydrocarbons to tight formations using Sandia-developed surface chemical models, Sandia Senior Scientist, Patrick Brady, developed recipes for modifying the hydraulic fracturing fluid to increase oil production.

The recipes vary from formation to formation and depend on the mineral content of the specific formation, oil chemistry, and groundwater composition. Some recipes permit recycling of existing oilfield waste water, decreasing the amount of valuable fresh water used in the process, and making the approach more environmentally responsible.

IMPACT

Domestic oil drilling enhances U.S. energy independence. Even a 10% increase in productivity resulting from the use of the new extraction methods would have a significant economic impact, increase efficiency of natural resource use, and reduce total extraction costs.

In 2015, oil company partnerships will be developed to field test these advances and move the technology to commercial use.

PARTNERSHIP TYPE: Commercialization Agreement, Cooperative Research and Development Agreement (CRADA), and License
GOAL: Increasing oil production using new, cost-effective, water-efficient recovery methods