

Development of a Resource for Produced Water Data and Analysis

Argonne's Environmental Science Division (EVS) has evaluated many aspects of produced water from oil and gas production, including its characteristics, options for its management, state and federal requirements for regulation, and the costs for disposing or otherwise managing produced water. EVS's analysis of produced water has contributed to the national regulatory debate over management options for produced water, and has been used as a source of information by many stakeholder groups.

PROBLEM/OPPORTUNITY

Produced water is water trapped in underground formations that is brought to the surface along with oil or gas. It is by far the largest volume by product or waste stream associated with oil and gas production. In the United States, about 15 to 20 billion barrels of produced water are generated each year (1 barrel = 42 gallons), and the worldwide estimate is about 70 billion barrels per year. The primary constituents in produced water that limit its disposal or reuse are salt content, the presence of organic materials measured as oil and grease, various toxic chemicals, and naturally occurring radioactive materials. Management of produced water presents challenges and costs to oil and gas production. Inappropriate produced water management can lead to environmental problems.



Tank battery used to separate and store oil and produced water.

APPROACH

In the early 1990s, the U.S. Environmental Protection Agency (EPA) was developing national

regulations for produced water discharge at offshore and coastal oil and gas platforms. EVS worked with the U.S. Department of Energy (DOE) to analyze data concerning produced water data, management technologies, and EPA's regulatory proposals.

RESULTS

EVS's work in reviewing national discharge standards for offshore produced water discharges contributed to the development of requirements that were based on good data, assumptions, or analyses. The final discharge standards and the permits that were later written based on those standards provide a balance of environmental protection with fair and reasonable compliance requirements.

EVS has evaluated a series of oil field environmental technologies. One technology that is particularly relevant to produced water management is downhole oil/water separation (DOWS). EVS published a series of reports that characterize the performance of DOWS technology, and has developed several databases of DOWS installations around the world. These and other produced water reports can be viewed and downloaded at <http://www.EVS.anl.gov>.

In 2004, at the request of DOE, EVS prepared a produced water white paper that provides basic information on many aspects of produced water, including its constituents, how much of it is generated, how it is managed and regulated in different settings, and the cost of its management. The report has been widely distributed to interested scientists and policymakers. In 2004-2005, EVS planned and conducted a study of the oxygen-demanding constituents of produced water

discharged to nearshore areas in the Gulf of Mexico. The study involved samples taken at 50 offshore platforms. See the EVS fact sheet titled “Impact of Produced Water Discharges on the Hypoxic Zone.”

COMMUNICATION OF RESULTS

EVS makes the results of its work readily available through publications, reports, and presentations. The EVS website contains over 20 reports dealing with oil and gas water and waste issues. Many of these focus on produced water topics.

EVS scientists are frequently invited to speak on produced water topics at U.S. technical meetings and several times each year at international meetings. EVS participates actively in organizations such as the Society of Petroleum Engineers, the Ground Water Protection Council, the Produced Water Society, the Petroleum Environmental Research Forum, and the International Petroleum Environmental Conference. EVS interacts with several universities on produced water projects and workshops (e.g., Texas A&M, Colorado School of Mines, University of Arkansas, and Louisiana State University).