

Produced Water Treatment and Management for Oil and Gas Production in the Western United States

Researching water quality and providing guidance for treating water from oil and gas extraction

Bottom Line

If treated to appropriate standards or managed properly, produced water could serve as a “new” water supply.

Better, Faster, Cheaper

Treating produced water could reduce the cost and environmental impact of energy production on existing water supplies.

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Collaborators

- U.S. Geological Survey (USGS)
- Department of Energy (DOE)
- Environmental Protection Agency (EPA)
- State Oil and Gas Commissions
- Oil and Gas Industry Energy Producers

Problem

The oil and gas industry is both a consumer and a producer of water. Oil and gas recovery techniques require large amounts of water to be used for hydraulic fracturing, while water that naturally exists in subsurface formations with oil and gas resources is brought to the surface during extraction.

Produced water coexists naturally with oil and gas deposits underground and is the largest waste stream associated with oil and gas production. Produced water is extracted at an average rate of 2.4 billion gallons per day in the United States (U.S.). Over 80 percent of production occurs in the Western U.S. Produced water is commonly re-injected for disposal due to its salinity, but in water stressed areas this water can be treated and managed for use as:

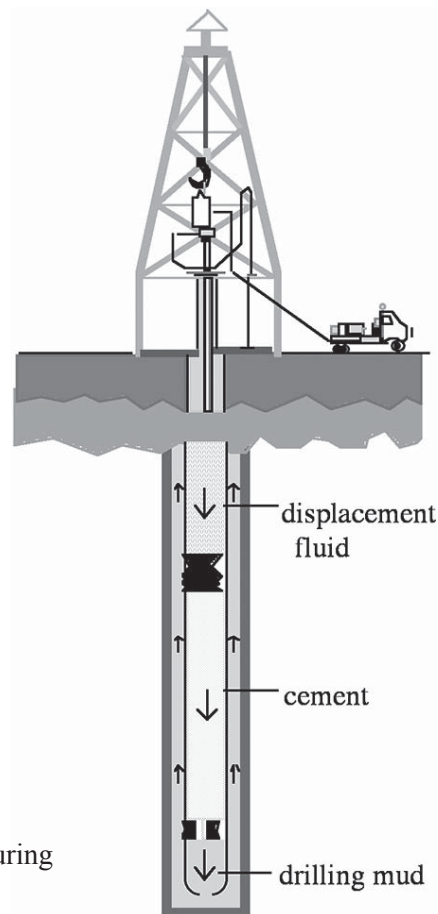
- Livestock water
- Irrigation water
- Surface water augmentation
- Drinking water applications
- Onsite reuse for well drilling or hydraulic fracturing
- Emergency drought supply

Most produced water requires treatment to make it suitable for beneficial use.

Many different types of technologies can be used to treat produced water; however, produced water varies widely in quantity and quality depending on the method of extraction, type of oil and gas reservoir, geographical location, and the geochemistry of the producing formation. Thus, choosing the best technology for a particular site must consider the types of constituents removed by each technology and the degree of removal.

Solutions

To increase the likelihood of using produced water to help meet the growing demand for water in the Western U.S. in an environmentally friendly, cost-effective manner, we need to evaluate commercially available treatment systems and explain the benefits, limitations, and most appropriate applications for these technologies to water managers. Reclamation is working on several products to evaluate and guide water managers and others in using produced water.



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Oil and Gas Produced Water Management and Beneficial Use in the Western United States

This report was created in 2011 as a comprehensive background document on the treatment and management of produced water from beneficial use in the Western U.S. The report includes information on produced water quality, water treatment technologies, and suitability for beneficial use opportunities.

Produced Water Treatment Primer for Oil and Gas Operations

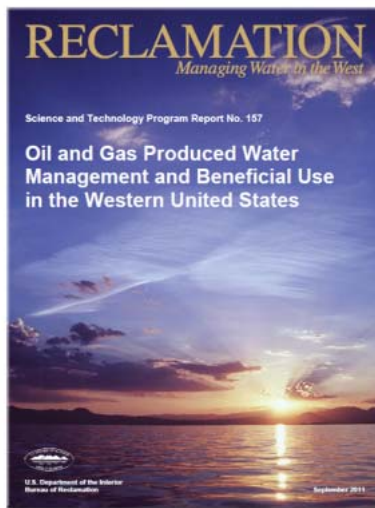
This primer document will be available in September 2013. This document catalogs available technologies, categorizes water treatment capabilities and performance, lists applicable contaminants removed, describes technologies based on classification of mechanisms, references technology applications in produced water treatment, and provides operational experience and performance data where available.

Guidance for the Evaluation of Produced Water as an Alternative Water Supply

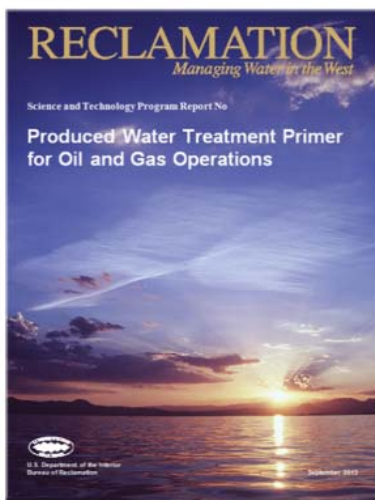
This guidance document is a companion document to the *Produced Water Treatment Primer for Oil and Gas Operations* and will also be available in September 2013. This document highlights locations of opportunity for the beneficial use of produced water using geographic information system (GIS) mapping and water supply estimations. It also advises water managers on the potential supply and demand balance associated with energy production. Alternative water resources for fracturing and industry reuse projects are also highlighted, with information on existing produced water treatment facilities.

Future Plans

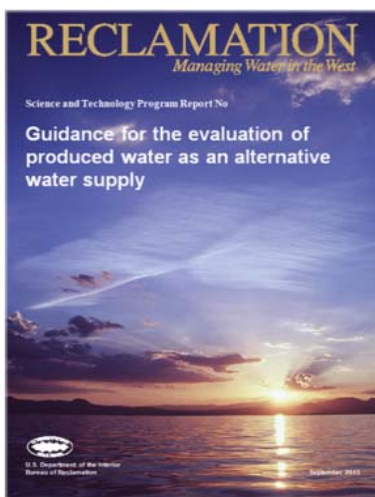
Using the solutions highlighted in this update, researchers are applying these concepts to the evaluation of water supplies on a watershed scale. Results of these studies will be used in cooperation with Reclamation's Basin Study Program to evaluate the potential supply and demand planning related to oil and gas operations within study basins.



Reclamation background report on the beneficial use of produced water in the West.



Reclamation report catalogs available treatment, technologies, capabilities, and performance.



Reclamation report highlights locations of opportunity for produced water beneficial use.

“In arid and rural areas, water for hydraulic fracturing and oil and gas development poses challenges to regional water supply allocations. It is important to consider water requirements for energy production and the potential supply available if produced water is treated for use in the region. The goal of this research is to assess the value of produced water in the Western U.S. to manage water resources effectively for all water users.”

Katharine Dahm
Civil Engineer,
Reclamation's Technical Service Center

More information

Science and Technology Program research projects:

www.usbr.gov/research/AWT/reportpdfs/report157.pdf

www.usbr.gov/research/projects/detail.cfm?id=1617

www.usbr.gov/research/projects/detail.cfm?id=3259