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ENERGY DEVELOPMENT AND WATER USE

Impacts of Potential Oil Shale Development on Water Resources

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Highlights

Highlights of GAO-11-929T, a testimony before the Subcommittee on Energy and Mineral Resources, Committee on Natural Resources, House of Representatives

Why GAO Did This Study

Oil shale deposits in Colorado, Utah, and Wyoming are estimated to contain up to 3 trillion barrels of oil—or an amount equal to the world's proven oil reserves. About 72 percent of this oil shale is located beneath federal lands managed by the Department of the Interior's Bureau of Land Management, making the federal government a key player in its potential development. Extracting this oil is expected to require substantial amounts of water and could impact groundwater and surface water.

GAO's testimony is based on its October 2010 report on the impacts of oil shale development (GAO-11-35). This testimony summarizes (1) what is known about the potential impacts of oil shale development on surface water and groundwater, (2) what is known about the amount of water that may be needed for commercial oil shale development, (3) the extent to which water will likely be available for such development and its source, and (4) federal research efforts to address impacts to water resources from commercial oil shale development. For its October 2010 report, GAO reviewed studies and interviewed water experts, officials from federal and state agencies, and oil shale industry representatives.

View GAO-11-929T. For more information, contact Anu K. Mittal at (202) 512-3841 or mittala@gao.gov.

What GAO Found

Oil shale development could have significant impacts on the quality and quantity of water resources, but the magnitude is unknown because technologies are not yet commercially proven, the size of a future industry is uncertain, and knowledge of current water conditions is limited. In the absence of effective mitigation measures, water resources could be impacted by disturbing the ground surface during the construction of roads and production facilities, withdrawing water from streams and aquifers for oil shale operations, underground mining and extraction, and discharging waste waters produced from or used in such operations.

Commercial oil shale development requires water for numerous activities throughout its life cycle, but estimates vary widely for the amount of water needed to commercially produce oil shale primarily because of the unproven nature of some technologies and because the various ways of generating power for operations use differing quantities of water. GAO's review of available studies indicated that the expected total water needs for the entire life cycle of oil shale production range from about 1 barrel (or 42 gallons) to 12 barrels of water per barrel of oil produced from in-situ (underground heating) operations, with an average of about 5 barrels, and from about 2 to 4 barrels of water per barrel of oil produced from mining operations with surface heating, with an average of about 3 barrels.

GAO reported that water is likely to be available for the initial development of an oil shale industry but that the size of an industry in Colorado or Utah may eventually be limited by water availability. Water limitations may arise from increases in water demand from municipal and industrial users, the potential of reduced water supplies from a warming climate, the need to fulfill obligations under interstate water compacts, and decreases on withdrawals from the Colorado River system to meet the requirements to protect threatened and endangered fish species.

The federal government sponsors research on the impacts of oil shale on water resources through the Departments of Energy (DOE) and Interior. Even with this research, nearly all of the officials and experts that GAO contacted said that there are insufficient data to understand baseline conditions of water resources in the oil shale regions of Colorado and Utah and that additional research is needed to understand the movement of groundwater and its interaction with surface water. Federal agency officials also told GAO that they seldom coordinate water-related oil shale research among themselves or with state agencies that regulate water.

In its October report, GAO made three recommendations to the Secretary of the Interior to prepare for the possible impacts of oil shale development, including the establishment of comprehensive baseline conditions for water resources in the oil shale regions of Colorado and Utah, modeling regional groundwater movement, and coordinating on water-related research with DOE and state agencies involved in water regulation. The Department of the Interior generally concurred with the recommendations. GAO is making no new recommendations at this time.