

GAO Highlights

Highlights of [GAO-13-716](#), a report to the Ranking Member, Subcommittee on Oversight, Committee on Science, Space, and Technology, House of Representatives

Why GAO Did This Study

About 13 percent of our nation's electricity is produced by pressurized water reactors that rely on lithium-7, an isotope of lithium produced and exported solely by China and Russia, for their safe operation. Lithium-7 is added to the water that cools the reactor core to prevent the cooling water from becoming acidic. Without the lithium-7, the cooling water's acidity would increase the rate of corrosion of pipes and other infrastructure—possibly causing them to fail. Utilities that operate the pressurized water reactors have experienced little difficulty obtaining lithium-7, but they may not be aware of all the risks of relying on two producers.

GAO was asked to review the supply and domestic demand for lithium-7 and how risks are being managed. This report examines (1) what is known about the supply and demand of lithium-7, (2) what federal agencies are responsible for managing supply risks, and (3) alternative options to mitigate a potential shortage. GAO reviewed documents and interviewed officials from DOE, NNSA, and NRC, in addition to industry representatives. This report is an unclassified version of a classified report also issued in September 2013.

What GAO Recommends

GAO recommends that the Secretary of Energy ensure a stable future supply of lithium-7 by directing the Isotope Program to take on a stewardship role for lithium-7 by taking steps, including fully assessing risks and accurately determining domestic demand. DOE concurred with the recommendation.

View [GAO-13-716](#). For more information, contact David C. Trimble, (202) 512-3841 or trimbled@gao.gov or Dr. Timothy M. Persons, (202) 512-6412 or personst@gao.gov.

September 2013

MANAGING CRITICAL ISOTOPES

Stewardship of Lithium-7 Is Needed to Ensure a Stable Supply

What GAO Found

Little is known about lithium-7 production in China and Russia and whether their supplies can meet future domestic demand. According to industry representatives, China and Russia produce enough lithium-7 to meet demand from U.S. pressurized water reactors, a type of commercial nuclear power reactor that requires lithium-7 for safe operation. However, China's continued supply may be reduced by its own growing demand, according to an expert that is familiar with China's plans. Specifically, China is building several pressurized water reactors and developing a new type of reactor that will require 1,000s of kilograms of lithium-7 to operate, rather than the 300 kilograms needed annually for all 65 U.S. pressurized water reactors. Relying on two producers of lithium-7 leaves U.S. pressurized water reactors vulnerable to lithium-7 supply disruptions.

No federal entity has taken stewardship responsibility for assessing and managing risks to the lithium-7 supply, but DOE is taking some steps. Risk assessment is the identification and analysis of relevant risks, communication of risks to stakeholders, and then taking steps to manage the risks, according to federal standards for internal control. Officials at DOE, the National Nuclear Security Administration (NNSA), and the Nuclear Regulatory Commission (NRC) told GAO they view lithium-7 as a commercial commodity for which industry is responsible. Industry representatives told GAO that they had no concerns about the lithium-7 supply, as they have experienced no problems in obtaining it. But GAO learned that industry representatives may not be familiar with all the supply risks. Notwithstanding, DOE plans to set aside 200 kilograms of lithium-7 and is funding research on lithium-7 production methods. DOE also studied lithium-7 supply and demand and concluded that no further action is needed. However, GAO found several shortcomings in its study, including that DOE underestimated the amount of lithium-7 used domestically. Industry estimates show that about 300 kilograms of lithium-7 are used annually in the United States, whereas DOE estimated that 200 kilograms are used annually. This and other shortcomings make it unclear if DOE's conclusion is correct that no additional action is needed.

Based on information from agency officials and industry representatives, GAO identified three options to mitigate a potential lithium-7 shortage: (1) building a domestic reserve is a low-cost option that could help in the short-term; (2) building a domestic production capability is a longer-term solution that could eliminate lithium-7 imports, but take about 5 years and cost \$10-12 million, according to NNSA; and (3) reducing pressurized water reactors' reliance on lithium-7 is another longer-term solution, but may require years of research and changes in how reactors are operated.