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What's up with helium?

It's hard to believe, but this is my last report as a Congressional Science Fellow. I'm passing the Hill credential off to Todd Bianco and will be looking forward to reading his reports in the future. For my last report, I'm taking a deep dive into a subject that landed on my desk this past April: the Helium Stewardship Act of 2012.

So, what's up with helium? In 2010, the National Research Council published a report titled "Selling the Nation's Helium Reserve" that caught the attention of Senate Energy and Natural Resources Committee Chairman Jeff Bingaman and his staff. That set into motion the process of introducing legislation to prevent a catastrophic global helium shortage.

First things first. Helium is the second lightest element on the periodic table, and it is also the second most abundant element in the universe. It is inert, has high thermal conductivity, low viscosity, and high ionization potential, which makes it highly valued for many applications, including high-tech manufacturing (e.g., semiconductors, optical fibers, and LED lights); cryogenics (e.g., magnetic resonance imaging and fundamental science); pressurization and purging (e.g., space and defense rocket launches); lifting (e.g., weather and party balloons); and welding, leak detection, and commercial diving, among others. It is the product of radioactive decay of heavy elements in Earth's crust, and it is effectively trapped in the same geologic reservoirs that trap natural gas. Separation of helium from natural gas becomes economically feasible at concentrations of greater than 0.3% helium.

In 1925, the United States created the Federal Helium Reserve (FHR) near Amarillo, Texas, USA, to ensure a stable supply of helium for airships and dirigibles that were critical for national security. Helium played an important role in the United States' security interests for the remainder of the century, and Cold War policies ensured that the element continued to be stockpiled at the FHR while simultaneously accruing a US$1.3 billion debt to the Federal Treasury. In the mid-nineties, the federal government decided to get out of the helium business and passed the Helium Privatization Act of 1996, which directed the Bureau of Land Management (BLM) to sell the helium in the reserve to repay the federal government for the debt associated with the helium program. Rather than sell the helium at market prices, the 1996 legislation used a formula to determine the price at which the helium would be sold that was based on the amount of debt to be paid, the volume of helium stored in the reserve, and the number of years that the reserve was authorized (through 2015). At the time the legislation was passed, the price of helium sold from the reserve was nearly twice the price of private crude helium. The BLM price for helium is the only published price and so, over the next decade, the price of private crude helium steadily rose until it equaled the price of federally owned helium.

Several unintended consequences resulted from the 1996 helium legislation. First, the global helium market became coupled to the published BLM price of helium, which artificially depressed the global market price. Consequently, the low federal price of helium meant that the FHR became the source of choice for 50% of domestic and 30% of global helium demand. Furthermore, because the federal government sells helium so cheaply, private industry has not been incentivized to develop new helium sources (aside from the United States, Qatar, Algeria, and Russia are also major suppliers of helium). Finally, any disruption in the supply from the FHR could have a debilitating impact on American industries and businesses because of the lack of a diverse supply chain.

While the 1996 legislation authorized the helium sell-off through 2015, it didn't anticipate that the US$1.3 billion debt to the treasury would be paid off two years early. Once the debt is paid in full, which is anticipated to happen sometime in 2013, the funding mechanism for the FHR ceases to exist. Without funding, the reserve is unable to continue operating. This brings us to the precipice—a cliff requiring a legislative solution before American manufacturing, patient health care, and discovery-driven research suffer the consequences of a potential global helium shortage.

In April 2012, Senators Bingaman, Barrasso, Wyden, and Enzi introduced bipartisan legislation (S.2374) that would authorize the FHR to continue selling helium, but at market prices. S.2374 aims to promote the responsible management of federally held crude helium assets and to stimulate development of private sources of helium. This will secure helium supplies for federal agencies, such as NASA, DOD, DOE, and NIH, as well as for medical, scientific, and commercial users over the long term. Selling the helium at market price will ensure that sales of this scarce, critical, and non-renewable resource recover fair value for U.S. taxpayers. Finally, the Act would authorize the Secretary of Energy to support research and development of technologies that aid the natural gas industry and helium users in capturing, gathering, producing, recycling, and conserving helium.

In April 2012, I was given responsibility for this issue on the committee. There was a hearing in May shortly after S.2374 was introduced and then a steep learning curve for me as I spoke with the stakeholder community and learned more about their concerns should the FHR go offline in 2013. Because helium touches so many facets of American well-being, we were successful in getting 23 bipartisan cosponsors for the bill (12 Democrats, 10 Republicans, and 1 Independent). Normally, at this stage in the process, the bill would be marked-up and reported out of the committee. However, the Senate Committee on Energy and Natural Resources has not

had a mark-up since March 2012, so, given the time-sensitive nature of the legislation, an alternative option was identified to discharge the bill from the committee. Ultimately, S.2374 was packaged with other issues under the committee's jurisdiction and offered as a substitute amendment to a critical minerals bill that the House passed (H.R. 4402) earlier in the year and that was subsequently referred to the Senate Energy Committee.

On 13 September, the package was "hotlined," a process that seeks to expedite passage of a measure by having all Senators unanimously agree to approve the bill. If there are any objections, a Senator can hold up the entire package. A "hold" can be placed for any reason and can also be lifted at any time. In the case of this hotline, several holds were placed on the measure so, at the time of writing, it has not yet cleared the Senate.

The end of this story is yet to be written, but it certainly will be satisfying to have played a role in passing a public law during my fellowship. It will be even more satisfying knowing that this particular legislation has a direct impact on the research enterprise in the United States, among many other important end-user applications of helium in this country. Thanks to GSA and USGS for selecting me as their fellow this past year, and thanks to the Committee and the helium stakeholders for entrusting me with this issue.

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