

Gradual path proposed to empty helium reserve

Lawmakers and consumers urge an overhaul of the 1996 program to end the federal government's involvement in the helium business.

Bipartisan sponsors of a House bill hope it will prevent an already severe helium supply crunch from worsening this fall if the federal government halts sales from the Federal Helium Reserve. Users of helium told lawmakers recently that the shortage is already the worst in decades.

"Unless Congress takes swift action, America will float off a helium cliff," warned Representative Doc Hastings (R-WA), chairman of the House Committee on Natural Resources and one of the bill's sponsors, at a 14 February hearing on the bill. "There are many who believe that the federal government shouldn't be in the helium business, and I would agree. But we are and have been since the mid 1990s." New legislation is required, he said, "because helium is too essential to suddenly shut off the valve at the reserve."

The helium reserve has been declining since 1996, when Congress ordered its selloff. The reserve currently supplies 35% of world consumption and 42% of US demand. Proceeds are being used to repay \$1.4 billion that was owed

the Treasury for helium purchases made decades ago. The debt should be paid off by October, and absent new legislation, the Department of the Interior's Bureau of Land Management (BLM), which operates the reserve, will lose its authority to continue selling.

A 2010 National Research Council committee concluded that the selloff was harming helium users (see *PHYSICS TODAY*, March 2010, page 28). The House bill, HR 527, would address that concern by setting a "glide path" for drawing down the reserve, which held an estimated 11.5 billion cubic feet (319 million cubic meters) of helium measured at atmospheric pressure as of 30 September 2012. In the first year following the bill's enactment, the BLM would be required to sell at least as much helium as it did in 2012. After that, the BLM would be given discretion to determine the rate of sales until the reserve is reduced to 3 billion ft³—a volume that's expected to meet federal agencies' demand for 15 years.

A similar bipartisan Senate bill to extend helium reserve operations died in

committee last year, and one of its principal sponsors, Jeff Bingaman (D-NM), has since retired. At press time a measure hadn't been reintroduced in the Senate.

Federal helium users, which include NASA and the Department of Energy, already receive preferential treatment and pricing over the private sector. Federal purchases from the reserve accounted for 10% of reserve sales in fiscal year 2012, according to Timothy Spisak, deputy assistant director of minerals and realty management at the BLM.

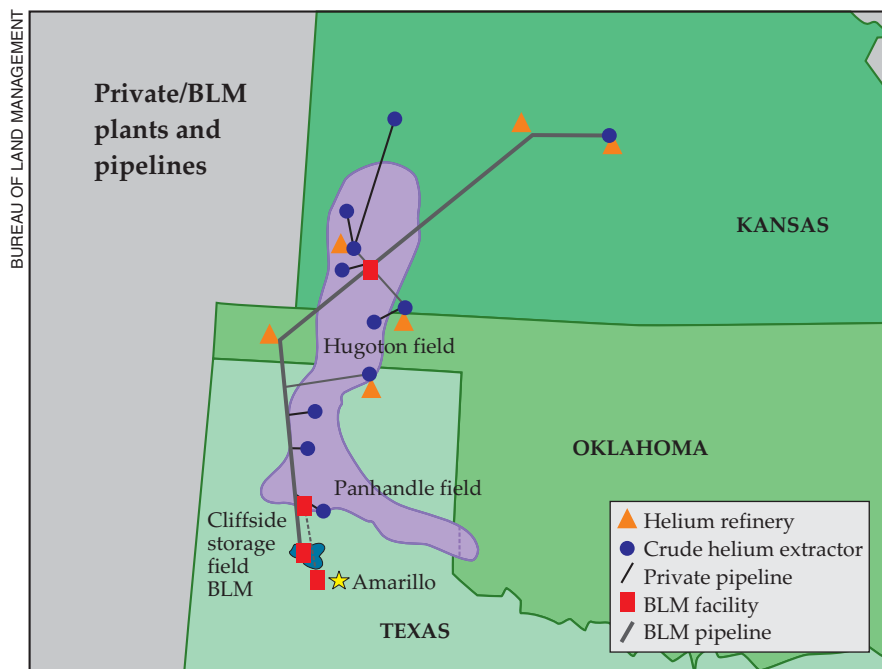
Price spike

The House measure would require that the price of helium be set at biannual auctions, to better reflect prevailing market conditions. Refined helium prices have more than tripled since 2000, to an estimated \$6.13 per m³ in 2012, according to the US Geological Survey. But the government sells crude helium at a fixed price that is based on the 1996 law's requirement that the BLM recover its operating costs as it sells off the reserve. Crude helium is 65–80% pure, and refined helium is 99.99–99.9999% pure. On 1 March the BLM announced a hike in its crude helium price to \$84 per thousand ft³ from \$75.75 per thousand ft³. The price for federal users increased from \$65.50 to \$67.75 per thousand ft³.

"The cheap price of federal helium creates disincentives for helium users to invest in conservation and recycling, it gives unfair market advantage to the handful of companies that are allowed to purchase helium, and it can depress exploration for new sources of helium," Hastings said.

Several factors have contributed to the helium shortage. They include maintenance issues at helium plants in Qatar, Algeria, and Australia; the delay of a new plant in Wyoming; and plunging natural gas prices. A byproduct of natural gas production, helium occurs only in certain gas fields at sufficient concentrations—0.3% or more—to make it economically recoverable. Helium concentrations in the Hugoton and Panhandle fields adjacent to the reserve near Amarillo, Texas, are especially high. Shale gas, on the other hand, contains insignificant amounts of helium.

The BLM owns and operates an underground helium storage reservoir and a 724-km crude helium pipeline system that extends across the Hugoton



In addition to the helium storage reservoir known as Bush Dome, located within the Cliffside storage field near Amarillo, Texas, the Federal Helium Reserve operated by the Bureau of Land Management includes a 724-kilometer crude helium pipeline and a helium enrichment plant. Six privately owned helium refineries tap into the pipeline and purify the gas for sale to end users.

and Panhandle fields from northern Texas into Kansas. Additionally, it operates a crude helium enrichment plant that then moves the product to six privately owned refineries along the pipeline (see the figure on page 28). In 2012 demand exceeded the enrichment plant's 164 000 m³ per day capacity, and the BLM began allocating helium to the refineries.

Rationing under way

The helium shortage has affected government and industry users alike. At the 14 February hearing, Sam Aronson, former director of Brookhaven National Laboratory, said that Argonne and Oak Ridge national labs have been receiving just 70% and 60%, respectively, of their helium allocations. Rodney Morgan, vice president of procurement for the semiconductor manufacturer Micron Technology, said his company has gotten 80% of the helium it contracted for over the past year. Helium is irreplaceable in semiconductor manufacturing as a carrier gas for deposition processes, as a dilutant in plasma etch processes, and in some specialized wafer cooling applications, he said. Brad Boersen, director of strategic planning and analysis for optical fibers at Corning, said the current supply shortage has been ongoing since the spring of 2012, far longer than a previous 2007 shortage,

and is expected to continue indefinitely.

Aronson, vice president of the American Physical Society, pointed to a National Research Council recommendation that federal scientific research grantees be eligible to get reserve helium at the lower government price. Currently, he said, those small users face "severe supply constraints and price shocks which their research grants cannot accommodate. They are being forced to either shut down experiments, invest in expensive recycle equipment using their own resources, or, according to one nanotechnology researcher, switch to room-temperature experiments to continue their work in less-than-optimal conditions."

The BLM has allotted 94% of the reserve sales in recent years to the four companies that own the refineries: Air Products and Chemicals, Linde, Praxair, and DCP Midstream. Other suppliers, who have been allocated the remaining 6% of available helium, must pay the refiners—who are also their competitors—to purify the helium before selling it to end users. While suppliers complain that refiners have been declining requests for their services, refiners counter that they have their hands full with their own sales and point out that they invested their own capital to build the refineries.

David Kramer ■

Recently on physics today online...

► Points of View

Curt Wyman, a veteran semiconductor engineer, recounts how he enrolled in the UTeach program at the University of

Texas at Austin and became a physics teacher.



► Science and the Media

Media analyst Steven Corneliussen reviews coverage of the Obama administration's recent directive regarding the public's access to the results of federally funded research.



◀ The Dayside

In his blog, PHYSICS TODAY's online editor Charles Day writes about steampunk physics, the relative merits of video and board games, and a life spent studying insects.

www.physicstoday.org

NEW from Amptek Digital Multichannel Analyzer



The MCA8000D is a full-featured digital multichannel analyzer intended to be used with a wide variety of detector systems.

The easy to use 'Pocket MCA' can fit in a shirt pocket.

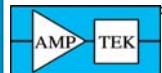
FEATURES OF THE MCA8000D

- Compatible with traditional analog pulse shaping
- MCA and MCS modes
- High speed ADC (100 MHz, 16 bit) with digital pulse height measurement
- 8k data channels
- Minimum pulse peaking time 500 ns
- Conversion time 10 ns
- Sliding-scale linearization
- Differential nonlinearity $< \pm 0.6\%$
- Integral nonlinearity $< \pm 0.02\%$
- Two peak detection modes for nuclear spectroscopy or particle counter calibration in clean rooms.
- Two TTL compatible gates for coincidence and anticoincidence
- USB, RS-232, and Ethernet communication interfaces
- USB powered
- Dimensions: 125 x 71 x 20 mm
- Weight: <165 g

Free Software

Free Software Development Kit (SDK). Complete protocol and example code for custom software applications.

Free Display and Acquisition software.



AMPTEK Inc.

www.amptek.com