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Testimony on "The Past, Present and Future of the Federal Helium Program" and Legislative Hearing on H.R. 527

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Chairman Hastings, Ranking Member Markey, distinguished members of the Committee:
My name is Samuel Aronson, and I am the former director of the Brookhaven National Laboratory, part of the Department of Energy National Laboratory complex. Today, I am representing the American Physical Society as its recently-elected Vice President. The APS is a non-profit membership organization working to advance and diffuse the knowledge of physics through its outstanding research journals, scientific meetings, and education, outreach, advocacy and international activities. APS represents over 50,000 members, including physicists in academia, national laboratories and industry in the United States and throughout the world. Thank you for providing me the opportunity to speak to you today about one of our nation's most critical resources, helium.

In 2010, the National Research Council and National Material National Materials Advisory Board released a report which examined the impact of the 1996 Helium Privatization Act. Principal among those has been the impact of the act on federal users and researchers who rely on federal grant programs. It is about these users that I wish to focus my comments.

But first, I would like to briefly discuss the properties of helium. Helium is extremely unique, even among other elements. It occurs at a fraction of a percent in natural gas, and it is only economic to recover helium from deposits where its concentration is 0.25% or greater. It is very rare in the atmosphere, making recovery from air extremely expensive. It is unlikely that other economically viable sources of helium will ever be discovered. Natural gas is extracted from reservoirs at a rapidly increasing rate and, as a result, much of the Earth's endowment of helium is being rapidly depleted. Conservation and efficiency in obtaining helium is therefore critical.

In 1995, the Council of the American Physical Society issued a statement about helium, concluding that "In view of the importance of this unique and irreplaceable natural resource to modern science and technology, The American Physical Society urges that measures be adopted

that will both conserve and enhance the nation's helium reserves. Failure to do so would not only be wasteful, but would be economically and technologically short-sighted."

I commend the Committee for working to address this important issue.

Turning to scientific applications, helium is used in a broad range of research, in small and large scale facilities and experiments. Its unique properties make it irreplaceable for superconducting magnets and radio frequency power systems, vacuum systems, measurements of nuclear magnetic resonance, research in nanotechnologies and many other cryogenic applications.

At Brookhaven and other large scale labs, helium is used to cool superconducting equipment for accelerators, particle detectors, and research magnets. It is also used for research magnets and to operate measurement and diagnostic measurement. Devices used in astronomy and astrophysics studies also depend critically on liquid helium. The acquisition of extremely weak signals in several disciplines relies on helium-cooled detectors to reduce thermal and electrical noise. These detectors are also used for national defense needs, such as for detecting submarines by the military.

There is no other substance other than helium that can be used as a refrigerant to achieve temperatures from 4.2 K above absolute zero down to millikelvins (thousands of a kelvin). If researchers cannot obtain helium due to supply or pricing constraints, they must shut down their experiments. Light sources and accelerators which depend upon liquid helium must shut down if supplies are inadequate or too costly.

During my tenure as Brookhaven director, we confronted such a shortfall. During the 2011 operations of our large particle accelerator, the Relativistic Heavy Ion Collider, an electrical failure caused the shutdown of our liquid helium (LHe) refrigerator and the loss of several thousand gallons of helium. The restart of the accelerator had to be postponed due to delivery problems. The loss of research productivity was minimized by an extremely cooperative vendor and our own scrounging for small amounts of helium from other researchers on site, but weeks of valuable data were not produced. Recent discussions with both large and small research projects at Brookhaven show that reliability of supply is more often the problem than the volatility of the price of helium.

The 1996 Helium Privatization Act established the federal In-Kind program designed to give preferential access to federal users. The initial focus was on those Federal users with a 'major' requirement of helium. The Bureau of Land Management then lowered the bar on what constituted a major requirement of helium. BLM signed contracts with 'authorized federal helium suppliers' requiring them to make Federal users a priority. While the smaller Federal users were not required to use the In Kind program, according to the BLM, nothing precluded them from doing so.

It is unclear that small researchers are sufficiently aware of their ability to use the in-kind program. Given the extreme price fluctuations and supply shocks over the last ten or more years that have buffeted small researchers reliant upon federal grants, the 2010 National Research Council report recommended that such users be able to participate in the federal in-kind program. The report also recommended that the "in-kind program and its associated customer priorities should be extended by the BLM, in cooperation with the main federal agencies not currently participating in the in-kind program—for example, the National Science Foundation, the National Institutes of Health, and the extramural grant programs of the Department of Energy—to research being funded in whole or in part by government grants."

Despite the National Research Council recommendation, small researchers reliant on federal research grants continue to be subject to 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.

I also note that some large federal users are having their allocations cut back. Argonne National Laboratory is currently receiving only 70% of its allocation from its supplier. Oak Ridge National laboratory currently receives only 60% of its allocation. Sandia National Lab often receives delayed or short orders. As a result, the laboratories have had to reprioritize some of their projects. Federal users who are supposed to receive priority access are not receiving that access.

H.R. 527 includes a provision that authorizes the In-Kind program and ties the price being offered under that program to the minimum auction price. I encourage the committee to more closely examine the operation of the In Kind program and, specifically, to ensure that small Federal grantees are explicitly eligible for such priority access and pricing.

Finally, I wish to say a word about medium and long term helium availability. While your focus has been on addressing the near term issue of supply from the Federal reserve, medium and long-term supply issues should also be addressed sooner rather than later given that uses for helium are likely to increase, not decrease. Specifically, we believe it would make sense for the Department of Energy to examine the R&D opportunities to increase the efficiency of helium capture at the well-head or during liquefaction. Doing so would ensure that less helium escapes into the atmosphere during drilling.

I'd like to thank the committee for the opportunity to testify on this critical issue and look forward to addressing any questions you might have.